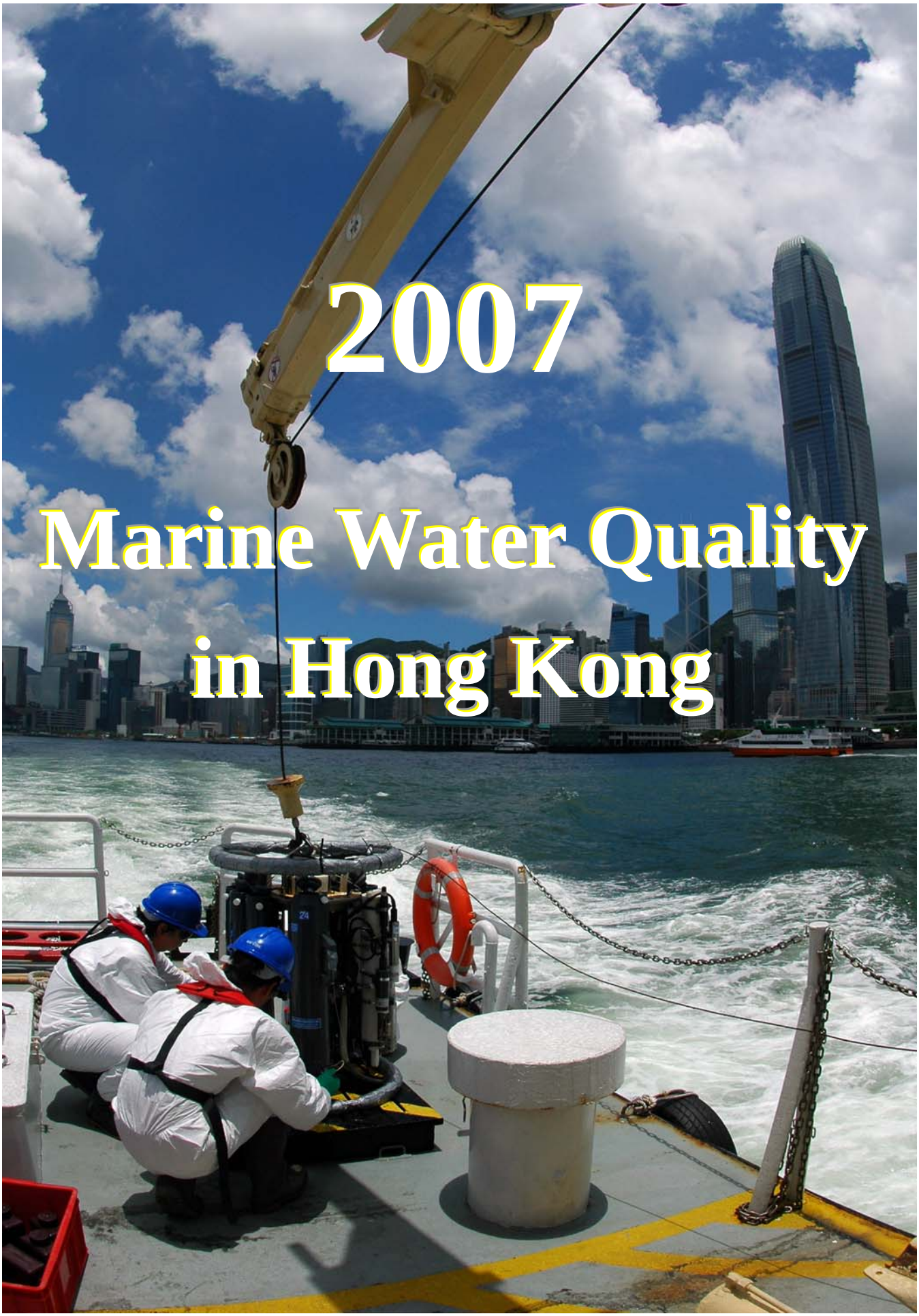

2007

Marine Water Quality in Hong Kong

Environmental Protection Department

The Government of the Hong Kong Special Administrative Region

Mission

To conduct a comprehensive and scientific monitoring programme that helps safeguard the health of Hong Kong's marine environment and achieve the Water Quality Objectives.

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Introduction

Hong Kong has one of the busiest harbours in the world and over 1,600 km^2 area of coastal waters which supports a diversity of marine life. To protect the ecology and beneficial uses of Hong Kong marine waters, the Environmental Protection Department (EPD) has implemented a comprehensive marine water quality monitoring programme since 1986.

The aims and objectives of the marine monitoring programme are to:

- indicate the state of coastal waters;
- assess compliance with the statutory Water Quality Objectives (WQOs);
- reveal long-term changes in water quality;
- provide a basis for planning water pollution control strategies;
- measure the benefit of water quality improvement measures.

The EPD conducts marine water quality monitoring at 76 sampling stations once a month and sediment quality monitoring at 45 stations twice a year. In addition, it monitors water and sediment quality of 17 typhoon shelters, marinas and dockyard across Hong Kong. The EPD also carries out monthly sampling of phytoplankton in the water at 25 monitoring stations.

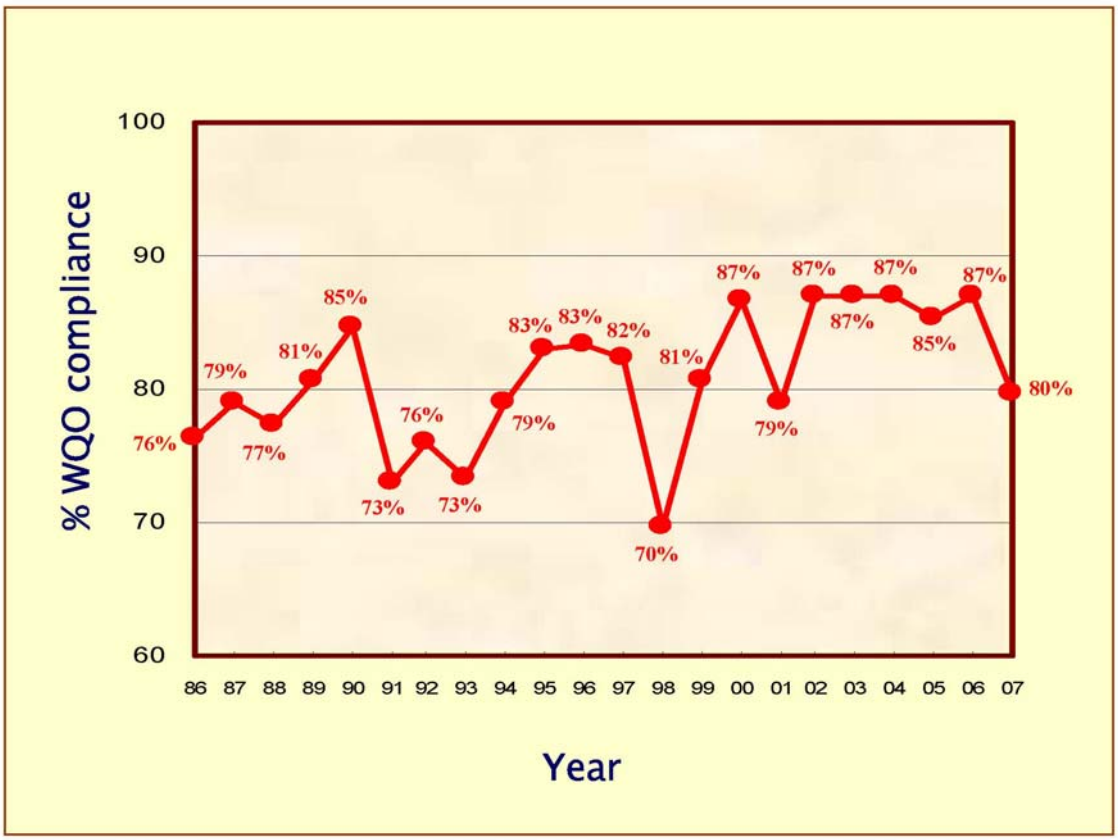
The EPD has a dedicated marine monitoring vessel "*Dr. Catherine Lam*". It is equipped with an advanced conductivity-temperature-depth (CTD) profiler linked to a computer-controlled rosette water sampler which takes field measurements and collects water samples at the same time. Marine sediments were collected using bottom sediment grabs. The water and sediment samples are analysed by the EPD's laboratories and the Government Laboratory for over 80 physical, chemical and biological parameters

EPD's marine monitoring vessel *"Dr. Catherine Lam"*

The State of Hong Kong Marine Waters in 2007

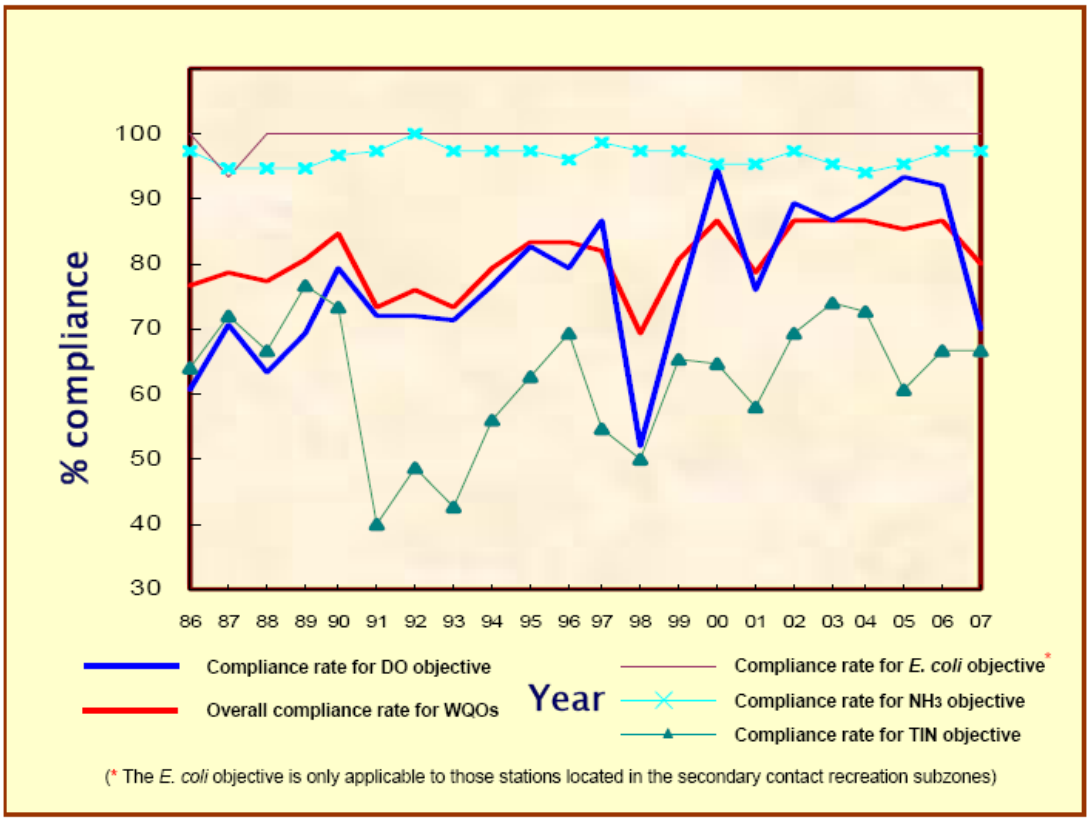
The overall WQO compliance rate of the whole territory is based on the combined individual compliance rates of all stations in the territory for the four important marine WQOs, namely Dissolved Oxygen (DO), Total Inorganic Nitrogen (TIN), Unionised Ammonia (NH_3) and *E. coli* bacteria.

In 2007, the marine water quality in Hong Kong achieved 80% overall compliance with the WQOs, lower than that in 2006 (87%).



Overall compliance with the marine Water Quality Objectives
in Hong Kong, 1986-2007

The figure below shows that the decrease of the WQO compliance in 2007 was mainly due to a decrease of compliance with the WQO for DO compared with 2006 while the compliance with the TIN, NH_3 and *E. coli* bacteria objectives remained the same between the two years.



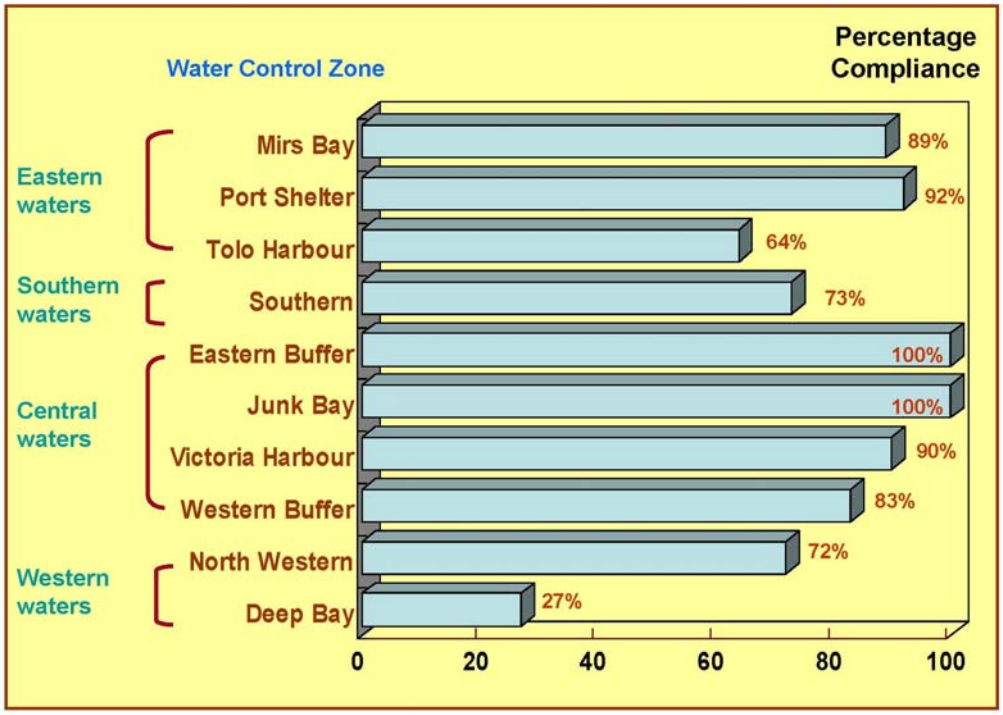
The overall compliance rate with the WQOs and the compliance rates for the four objectives in Hong Kong, 1986-2007

The decrease of the compliance rate for DO objective in 2007 was due to a general and territory-wide decrease of DO in Hong Kong marine waters, most notable in the summer months of 2007. The decrease was most likely due to the fact that 2007 was an unusually warm year and the solubility of oxygen in sea water greatly decreased under the warm temperature. According to the Hong Kong Observatory, the year 2007 was the second warmest year on record in the northern hemisphere. In Hong Kong, 2007 was the fifth warmest year since records began in 1884. The annual mean temperature of 23.7 degrees was 0.7 degree higher than normal.

The Port Shelter and Mirs Bay Water Control Zones (WCZs) had very good water quality. However there was a decrease of compliance with the WQOs, from 100% compliance in 2006 to 89-90% in 2007 due to a reduction of DO in the water. In the Tolo Harbour WCZ, while nutrient and *E. coli* bacteria, two pollution related parameters, were low in 2007, its overall WQO compliance rate dropped to 64%, also due to low DO levels in the water.

In the Victoria Harbour WCZ, the WQO compliance rate in 2007 was maintained at 90%, indicating that the water quality improvements, particularly on the eastern side, due to the implementation of the Harbour Area Treatment Scheme (HATS) Stage 1 were sustained. The Eastern Buffer and Junk Bay WCZs fully complied with the WQOs in 2007, the same as in the previous year. On the other hand, the *E. coli* bacterial levels in the central and western harbour were still high. The problem will be alleviated by the implementation of the advanced disinfection facilities, under which effluents from the Stonecutters Island Sewage Treatment Works will undergo disinfection treatment starting at the end of 2009.

The Deep Bay WCZ had the lowest water quality in the territory. Its WQO compliance rate dropped further from 40% in 2006 to 27% in 2007 largely due to a decrease of DO in the outer bay. In addition, there was an increase of ammonia (by 66%) and *E. coli* bacteria (by 110%) in the inner part of the bay, which was likely to be related to pollution from Shenzhen and Hong Kong. The water quality in the Southern, Western Buffer and North Western WCZs was influenced by the Pearl River flow, and was largely stable with the WQO compliance rates ranging between 72% and 83% in 2007.



Level of compliance with the Water Quality Objectives in the ten Water Control Zones in 2007

Eastern Waters

The eastern waters of Hong Kong cover an area of 900 km^2 and comprise three Water Control Zones (WCZs): Mirs Bay, Port Shelter and Tolo Harbour & Channel. They have beautiful coastlines and good water quality which supports a diverse marine life. There are six gazetted bathing beaches, three marine parks (Yan Chau Tong, Hoi Ha Wan and Tung Ping Chau), 21 fish culture zones and several secondary contact recreation subzones within the eastern waters.

Mirs Bay Water Control Zone

The Mirs Bay WCZ experienced a significant reduction of the WQO compliance from 100% (maintained since 1999) to 89% in 2007. This was attributed to the reduction of the compliance with the WQO for Dissolved Oxygen (DO) from 100% to 64%. EPD's monitoring data showed that low DO occurred near the sea bed during the summer months, which may be related to the warm and wet weather in the period. Within the inner Mirs Bay, waters around Crooked Harbour, Long Harbour and Double Haven had very low *E. coli* bacterial counts (<10 cfu / 100mL), fully complying with the WQO for secondary contact recreation. Starling Inlet, which borders Shenzhen and Sha Tau Kok, had a slightly higher *E. coli* count (30 cfu / 100mL), indicating a certain degree of sewage pollution in the area. The chlorophyll-*a* level in Mirs Bay remained stable in the past few years, indicating that there was little sign of increased eutrophication in the bay.

Hoi Ha Wan Marine Park in Mirs Bay

Port Shelter Water Control Zone

The water quality in the Port Shelter WCZ was amongst the best in the territory with high DO and low levels of nutrients and *E. coli* bacteria. In 2007, the overall compliance with the WQOs was 92% (100% from 1999 to 2006) due to the low compliance with the DO objective (67%). A similar low rate was observed in 1998 when the DO compliance dropped to 60%. 1998 was an El Niño year, which also witnessed the most devastating red tide and fish-kill in Hong Kong's history[Note]. Port Shelter maintained its excellent bacteriological quality (*E. coli* <5 cfu/100mL) in 2007, making it an ideal place for swimming, yachting and water sport activities.

Yachting is a popular sport in Port Shelter

Note : Yin, K., Harrison, P.J., Chen, J., Huang, W., Qian, P., 1999 "Red tides during 1998 in Hong Kong: is El Niño responsible?", Marine Ecology Progress Series Vol. 187, 289-294

Tolo Harbour and Channel Water Control Zone

Similar to Mirs Bay and Port Shelter, the Tolo Harbour WCZ also experienced a decrease of the overall WQO compliance from 86% in 2006 to 64% in 2007 with a very low compliance for DO (29%); whereas the levels of pollutants, e.g. 5-day Biochemical Oxygen Demand (BOD_5), *E. coli*, nitrogen remained stable. Tolo Harbour was heavily polluted and plagued with red tides in the mid-80s. The implementation of the Tolo Harbour Action Plan (including control of domestic and livestock wastes, improvement of sewage treatment facilities, export of treated effluent outside harbour, extension of village sewerage) has led to a steady recovery of the water environment in Tolo Harbour. In 2007, the WCZ achieved a 90% compliance with the chlorophyll-*a* objective, as in the past five years, indicating a stable phytoplankton population. The *E. coli* levels in the WCZ were low (<15 cfu/100mL), fully (100%) complying with the WQO for secondary contact recreational use, which is designated for the entire WCZ.

Wind-surfing in Tolo Harbour

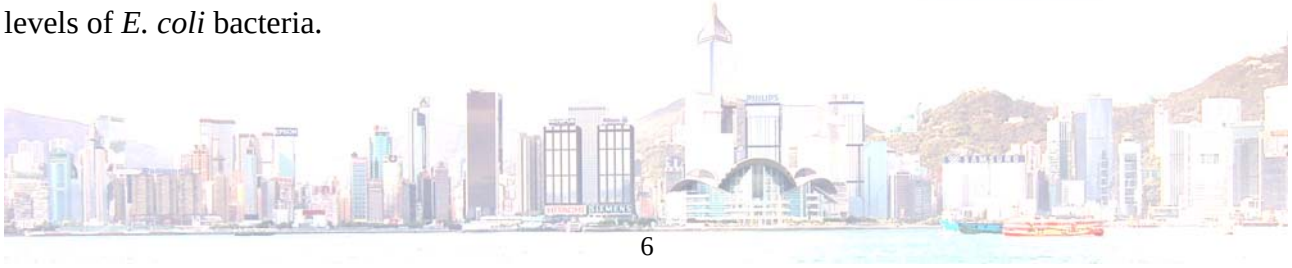
Central Waters

The central waters of Hong Kong, including the Victoria Harbour, Eastern Buffer, Western Buffer and Junk Bay WCZs, are important navigational channels and port areas. After the commissioning of the Stonecutters Island Sewage Treatment Works under HATS Stage 1 in 2002, about 75% of the sewage around the Victoria Harbour now undergoes chemically enhanced primary treatment, resulting in a substantial improvement of water quality.

Victoria Harbour at dusk

Victoria Harbour Water Control Zone

In 2007, the Victoria Harbour WCZ achieved 90% compliance with the WQOs, the same as that in 2006. The water quality improvements (i.e. increase in DO, decreases in nutrients and *E. coli*) in eastern Victoria Harbour since HATS Stage 1 had largely been maintained. The western harbour area around the Stonecutters Island Sewage Treatment Works outfall continued to have elevated levels of *E. coli* bacteria.



Eastern Buffer and Junk Bay Water Control Zones

In 2007, full compliance (100%) with the WQOs was achieved in the Eastern Buffer and Junk Bay WCZs, the same as that in 2006. The water quality improvements achieved by the implementation of HATS Stage 1 were sustained in these WCZs.

Western Buffer Water Control Zone

The Western Buffer WCZ achieved 83% compliance with the WQOs in 2007. The *E. coli* level in the zone was high due to the effect of the effluent from HATS Stage 1. This problem will be alleviated once the effluent from the Stonecutters Island Sewage Treatment Works is disinfected starting at the end of 2009.

Container ocean liners passing under the Tsing Ma Bridge

Western Waters

The Deep Bay and North Western WCZs are located in the western waters. Deep Bay is a shallow, sediment laden water body impacted by pollution from both Hong Kong and Shenzhen. It has the ecologically sensitive Mai Po and Inner Deep Bay Ramsar site, and areas of oyster culture. The North Western WCZ is affected by the Pearl River as well as local discharges, and is the home of the Chinese white dolphins.

Deep Bay Water Control Zone

Deep Bay has the poorest water quality in the territory with high concentrations of organic and inorganic pollutants and low levels of DO. In 2007, the WQO compliance in the Deep Bay WCZ was 27%, lower than that in 2006 (40%) but similar to those in 2003 to 2005 (20-33%). Pollution problems were more acute in the inner bay which received discharges from Shenzhen River. While three of the monitoring stations in the outer bay met the WQO for NH_3, only the outer most station met the objective for DO, and none of the stations in the Deep Bay WCZ was able to meet the TIN objective.

Oyster culture rafts in Deep Bay

North Western Water Control Zone

The water quality in the North Western WCZ in 2007 was largely similar to that in 2006, attaining an overall WQO compliance rate of 72%. However a drop in the compliance with the DO objective was noted (from 100% to 50% in 2007). This was related to the general occurrence of low DO starting June 2007. Except for the two western stations, (closer to Deep Bay and Pearl River, which did not meet the WQO for TIN) all other stations achieved full compliance with the TIN and NH_3 objectives. The level of orthophosphate phosphorus (PO_4-P) and total phosphorus (TP) in the WCZ were largely stable in recent years.

Southern Waters

The Southern WCZ stretches from Hong Kong Island south to Lantau Island and faces the South China Sea. The western part of the WCZ is impacted seasonally by the Pearl River flow and the effect diminishes towards the eastern end.

Southern Water Control Zone

In 2007, the Southern WCZ attained an overall 73% compliance with the WQOs, the same as that in 2006. Full compliance (100%) with the WQOs for DO, unionised ammonia (NH_3) and *E. coli* was achieved. Due to the influence of the nitrogen-rich discharge from the Pearl River, the compliance with the WQO for total inorganic nitrogen (TIN) was low (13%). Within the secondary contact recreation subzones, full compliance (100%) with the *E. coli* objective was attained, indicating that these areas were suitable for water sports activities.

Lamma Island in the Southern waters

Sediment Quality in Hong Kong

Sea bottom sediments are the ultimate sink of pollutants in the marine environment, and are also home to a wide diversity of benthic organisms. The quality of marine sediments can therefore serve as one of the indicators of the health of the sea.

Collecting sediment samples

Higher levels of heavy metals, in particular copper and silver were detected in the sediments of Victoria Harbour, Junk Bay and Tsuen Wan Bay in 2003-2007. This was related to previous pollution from printed circuit board, electroplating industries and photo-developing business in the 60s to 80s before pollution control legislation was introduced. The levels of mercury and organic pollutants, such as polychlorinated biphenyls (PCBs) and high molecular weight polyaromatic hydrocarbons (HMW-PAHs) were generally low except for one station in the western harbour. This could be related to the discharges from dental clinics and industries in the past as well as contamination from the waste incineration facility in Kennedy Town, which was decommissioned in the 1990s.

Typhoon Shelters in Hong Kong

Typhoon shelters are vulnerable to pollution from both land and sea. The EPD monitored the water quality of 17 typhoon shelters (TSs), marinas and dockyard around Hong Kong in 2007. Three typhoon shelters, i.e.Yim Tin Tsai TS and Hebe Haven TS in the Port Shelter WCZ and Hei Ling Chau TS in the outlying islands had the best water quality with high DO (6.0-7.2 mg/L) and low *E. coli* counts (1-7 cfu/100mL). The Yim Tin Tsai TS also had the best sediment quality amongst the typhoon shelters. The typhoon shelters in Victoria Harbour generally had poorer water quality, and their sediments were often contaminated by heavy metals due to historical discharges from industries. During 2003-2007, the Kwun Tong TS's sediment recorded the highest levels of heavy metals, (e.g. cadmium, chromium, copper) and also total PCBs which were related to the use of PCB transformers and capacitors in the past. For polyaromatic hydrocarbons (PAHs), the level in the To Kwa Wan TS was higher than those in other typhoon shelters. PAHs are derived from sources

Hebe Haven Marina

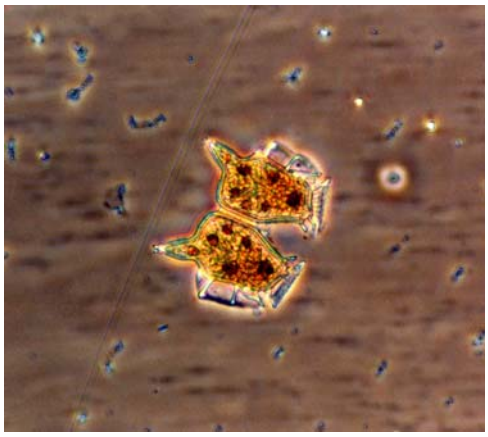
such as vehicle exhaust, surface run-off contaminated by gasoline, diesel and lubricating oil. The high PAHs level in the sediments of the To Kwa Wan TS may be attributed to contamination from the old industrial areas in San Po Kong and the Kai Tak Airport which ceased its operation in 1997.

There was a substantial improvement in the water quality of the typhoon shelters around Victoria Harbour in the last decade. The DO in the Kwun Tong TS increased from the hypoxic levels (1.6 mg/L) in 1998 to 3.4 mg/L in 2007, and *E. coli* decreased from 100,000 to 13,000 cfu/100mL during the same period. Yau Ma Tei TS and Causeway Bay TS also showed marked reductions in pollutants, e.g. ammonia (NH_4-N) and BOD_5 particularly after the commissioning of HATS Stage 1.

Phytoplankton and Red Tides in Hong Kong

Eutrophication is a condition in a water body where high concentrations of nutrients (e.g. nitrogen and phosphorus) stimulate excessive algal (i.e. phytoplankton) growth. The enhanced algal growth (often called algal blooms) can reduce dissolved oxygen in the water when dead algae decompose and suffocate other marine organisms and caged fish. Phytoplankton monitoring can track the biological consequences of nutrient enrichment over time and forms an essential part of the coastal eutrophication management.

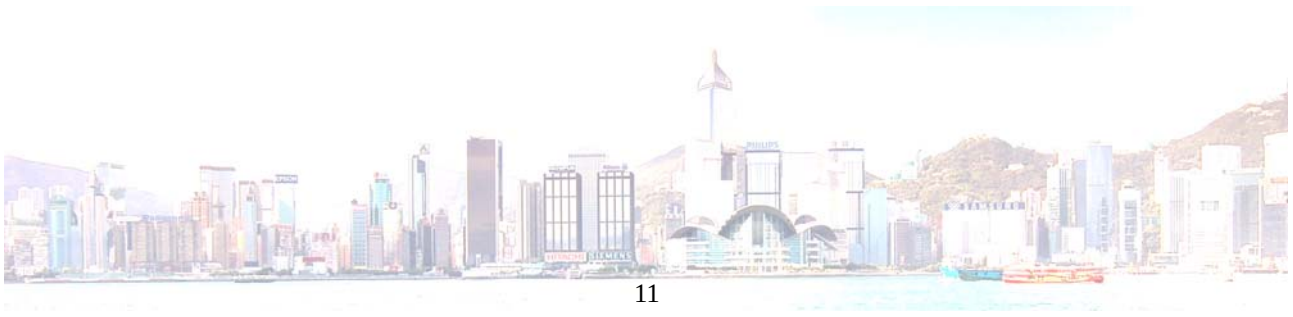
EPD conducted monthly monitoring of phytoplankton at 25 stations covering nine WCZs in 2007. Diatoms constituted the largest component of phytoplankton in term of both species number and cell density. The dominant diatom species was *Skeletonema costatum* which made up 26-89% of the diatom population in the Eastern Buffer, Victoria Harbour, Southern, North Western, Western Buffer and Deep Bay WCZs. The most abundant dinoflagellate species were *Gymnodinium vestifici* and *Gymnodinium* spp. comprising 36-58% of the dinoflagellate population in all the WCZs. In 2007, phytoplankton densities were generally higher in the Tolo Harbour & Channel, Victoria Harbour, Southern and Deep Bay WCZs than those in other WCZs.



The phytoplankton *Dinophysis caudata (Dinoflagellate)* under the electron microscope

Algal blooms including red tides are phenomena which occur seasonally in both polluted and unpolluted waters. In Hong Kong, red tides occurred more frequently in the Eastern (>70%) and Southern (~16%) waters. The most common red tide species was the dinoflagellate *Noctiluca scintillans*, which accounted for ~29% of the reported red tides since the 1980s. In 2007, 13 red

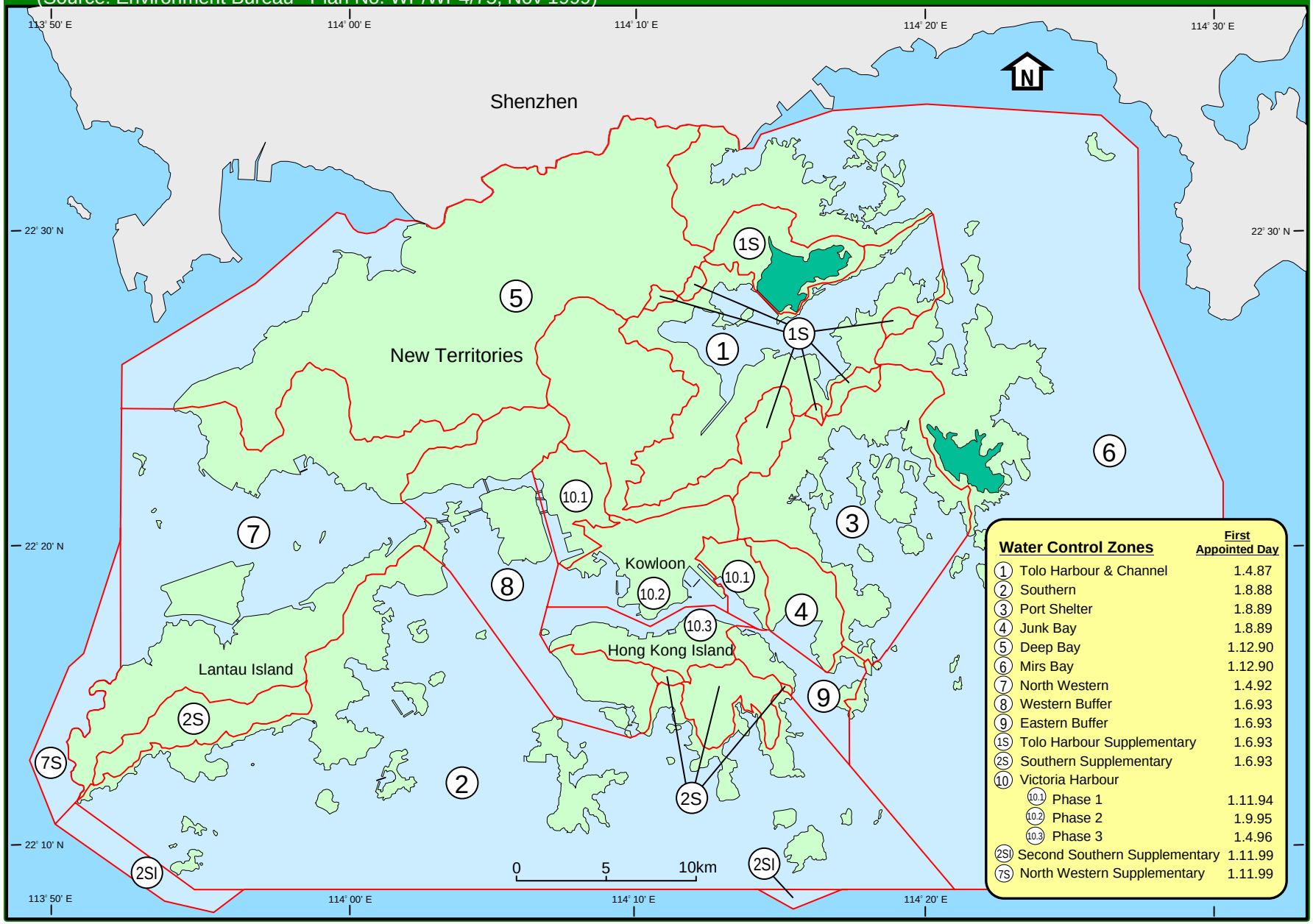
tides were recorded in Hong Kong waters, which involved 8 species of microplankton (i.e. *Noctiluca scintillans, Mesodinium rubrum, Trichodesmium erythraeum, Cochlodinium* sp., *Akashiwo sanguinea, Heterosigma akashiwo, Skeletonema costatum* and *Scrippsiella trochoidea*).



Appendices

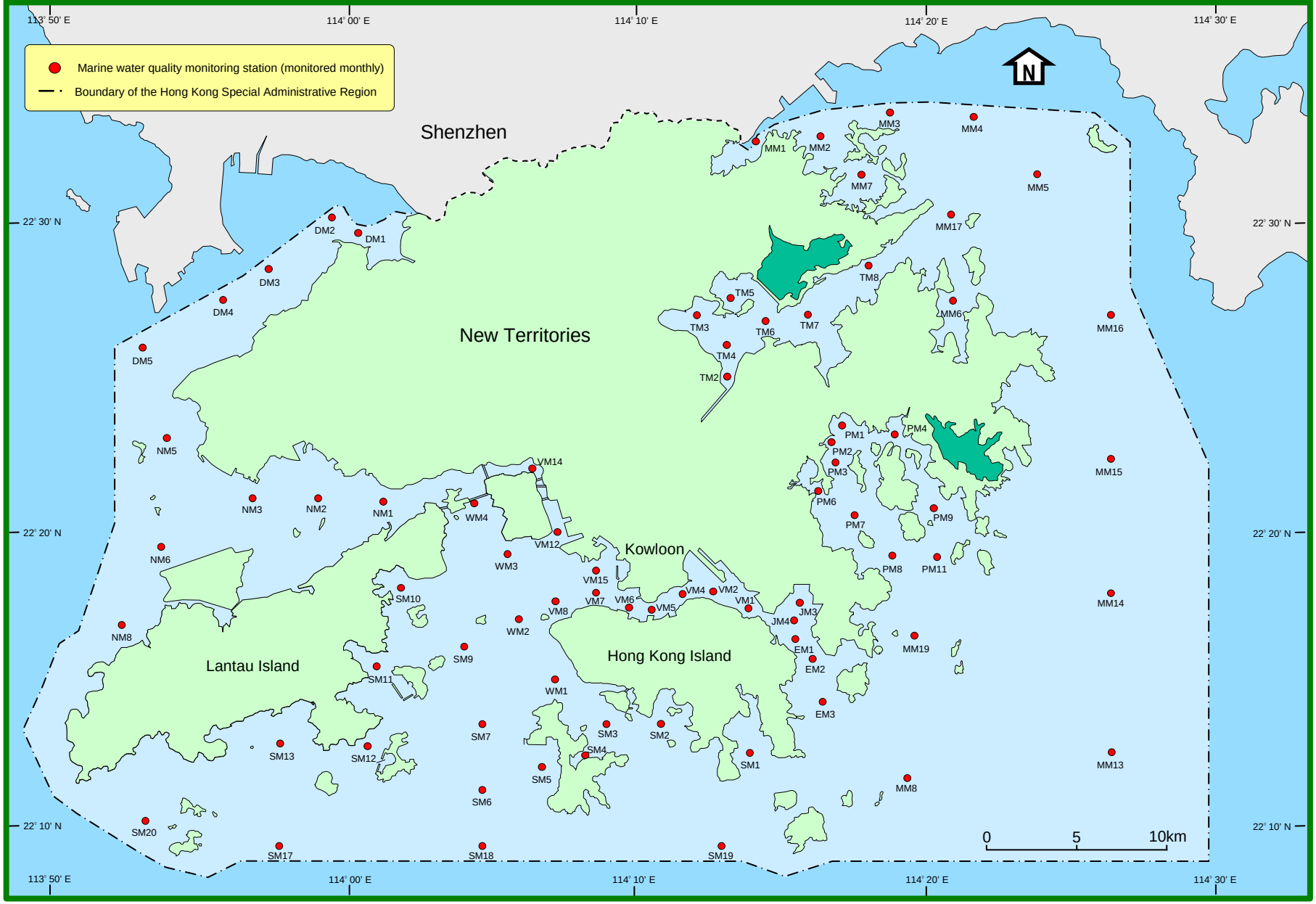
The Water Control Zones in Hong Kong

(Source: Environment Bureau– Plan No. WP/WP4/75, Nov 1999)

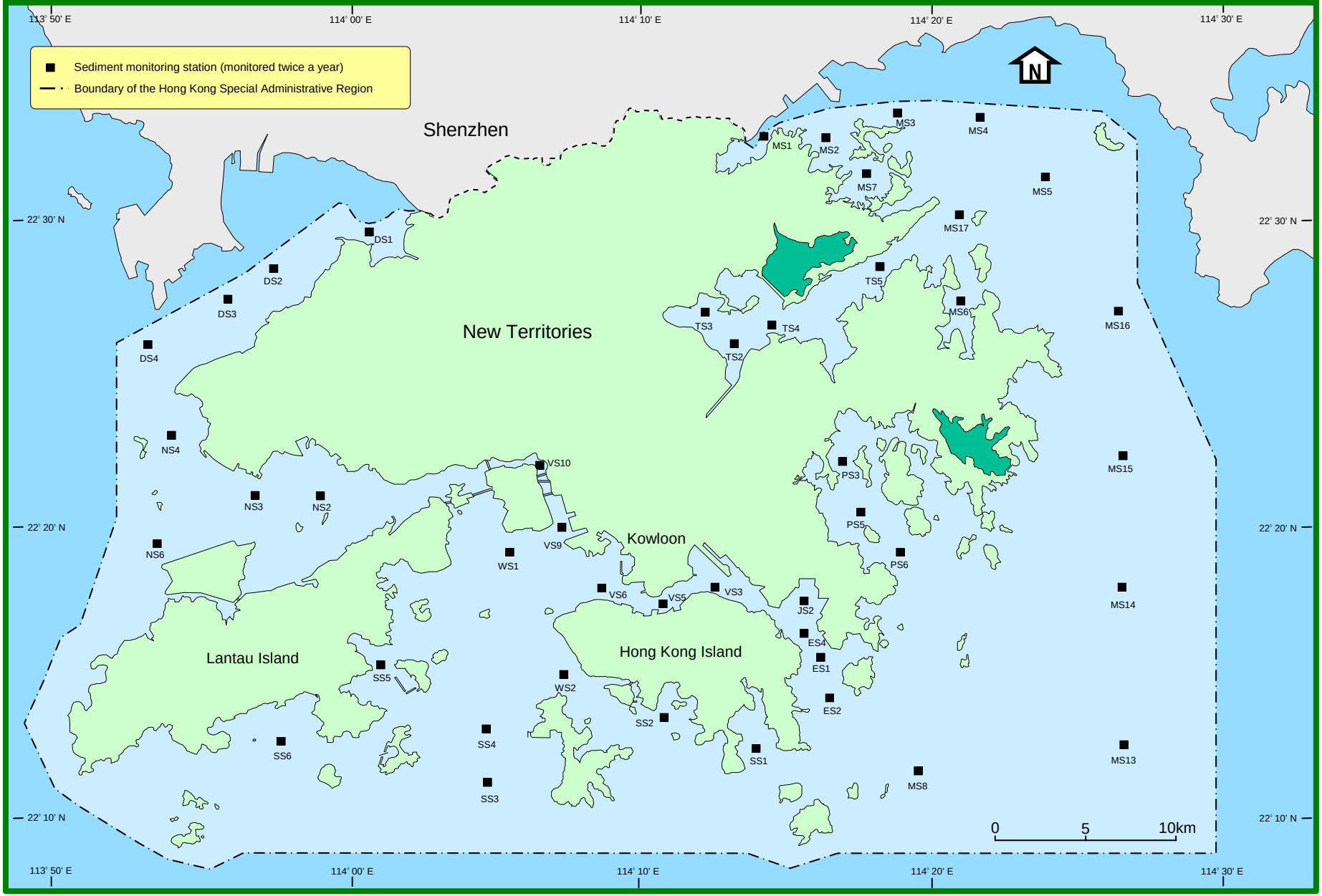


Water Control Zones	First Appointed Day
(1) Tolo Harbour & Channel	1.4.87
(2) Southern	1.8.88
(3) Port Shelter	1.8.89
(4) Junk Bay	1.8.89
(5) Deep Bay	1.12.90
(6) Mirs Bay	1.12.90
(7) North Western	1.4.92
(8) Western Buffer	1.6.93
(9) Eastern Buffer	1.6.93
(1S) Tolo Harbour Supplementary	1.6.93
(2S) Southern Supplementary	1.6.93
(10) Victoria Harbour	
(10.1) Phase 1	1.11.94
(10.2) Phase 2	1.9.95
(10.3) Phase 3	1.4.96
(2SI) Second Southern Supplementary	1.11.99
(7S) North Western Supplementary	1.11.99

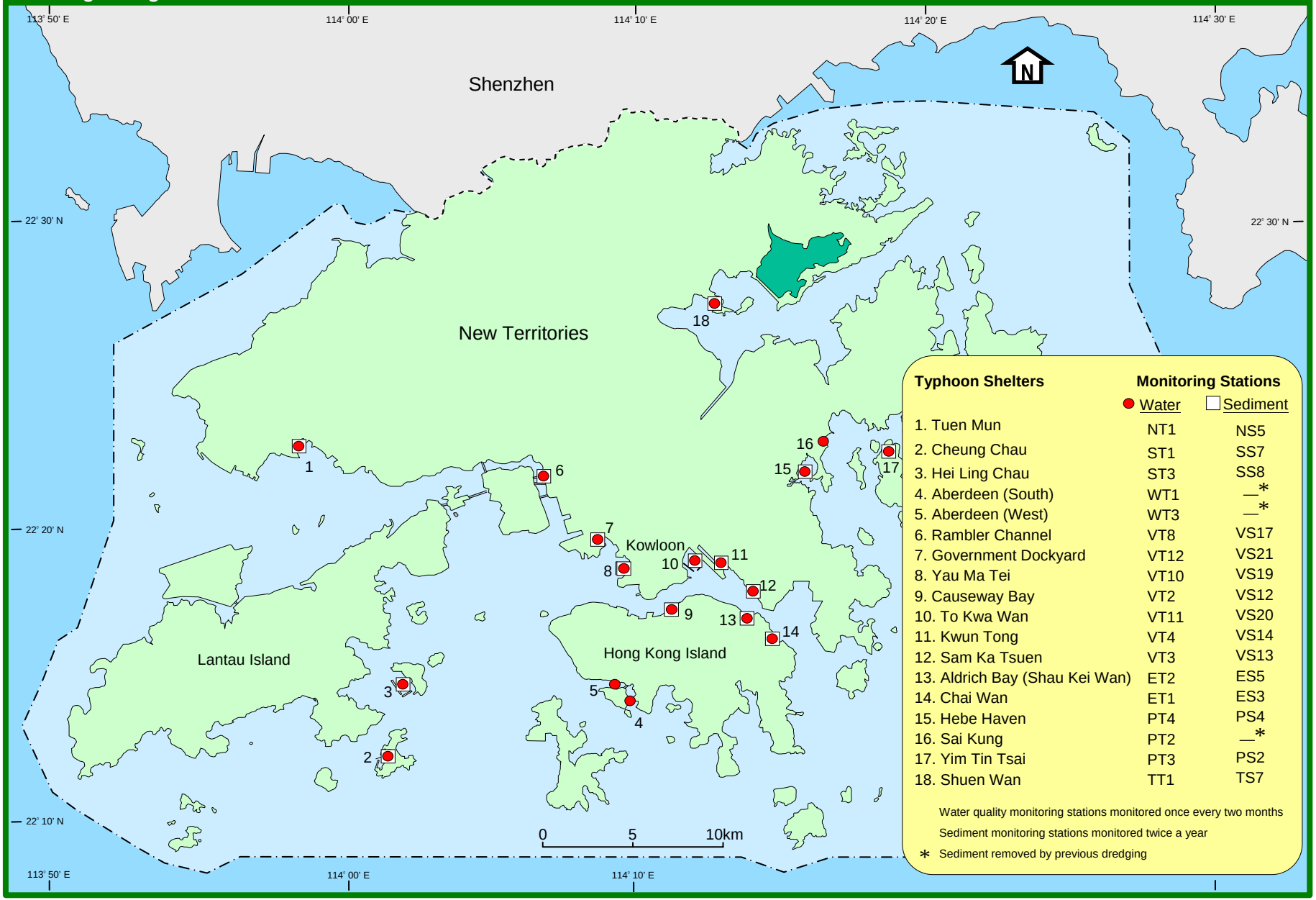
The 76 water quality monitoring stations in the open waters of Hong Kong in 2007



The 45 sediment monitoring stations in the open waters of Hong Kong in 2007



The 18 water quality monitoring stations and 15 sediment monitoring stations in the typhoon shelters of Hong Kong in 2007



Typhoon Shelters	Monitoring Stations: Water	Monitoring Stations: Sediment
1. Tuen Mun	NT1	NS5
2. Cheung Chau	ST1	SS7
3. Hei Ling Chau	ST3	SS8
4. Aberdeen (South)	WT1	—*
5. Aberdeen (West)	WT3	—*
6. Rambler Channel	VT8	VS17
7. Government Dockyard	VT12	VS21
8. Yau Ma Tei	VT10	VS19
9. Causeway Bay	VT2	VS12
10. To Kwa Wan	VT11	VS20
11. Kwun Tong	VT4	VS14
12. Sam Ka Tsuen	VT3	VS13
13. Aldrich Bay (Shau Kei Wan)	ET2	ES5
14. Chai Wan	ET1	ES3
15. Hebe Haven	PT4	PS4
16. Sai Kung	PT2	—*
17. Yim Tin Tsai	PT3	PS2
18. Shuen Wan	TT1	TS7

Water quality monitoring stations monitored once every two months

Sediment monitoring stations monitored twice a year

* Sediment removed by previous dredging

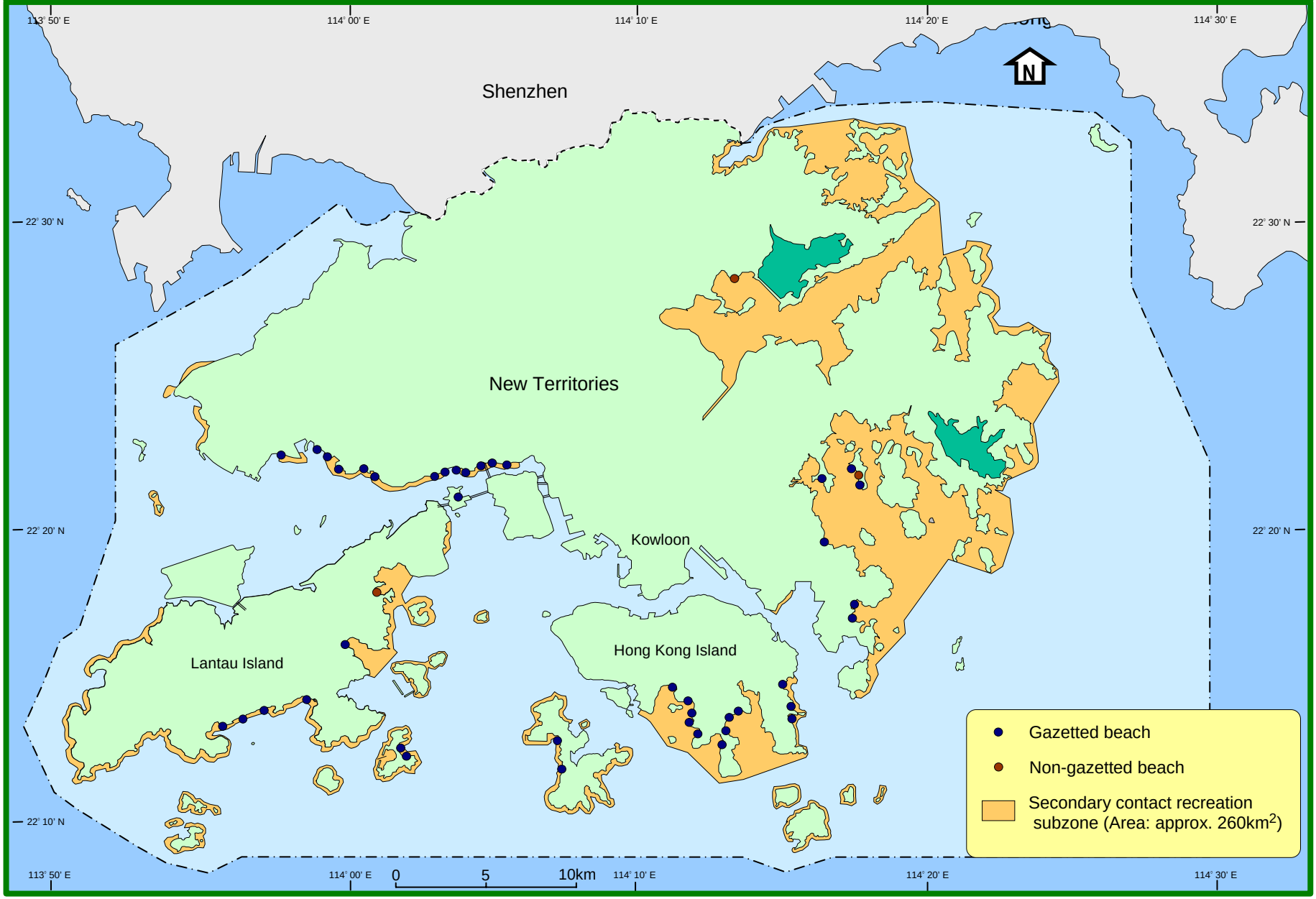
Location of marine water and sediment monitoring stations

Water Control Zone	Station		Location		Depth (m)
	Water	Sediment	Latitude	Longitude	approx.
Tolo Harbour and Channel	TM2		22° 24.744' N	114° 13.085' E	4
	TM3	TS3	22° 26.857' N	114° 12.181' E	7
	TM4	TS2	22° 25.964' N	114° 13.176' E	8
	TM5		22° 27.426' N	114° 13.456' E	4
	TM6	TS4	22° 26.631' N	114° 14.506' E	12
	TM7		22° 26.907' N	114° 16.057' E	11
	TM8	TS5	22° 28.392' N	114° 18.003' E	22
	*TT1	*TS7	22° 27.270' N	114° 12.717' E	6
Southern Water	SM1	SS1	22° 12.738' N	114° 13.885' E	14
	SM2	SS2	22° 13.447' N	114° 10.691' E	14
	SM3		22° 13.527' N	114° 8.980' E	33
	SM4		22° 12.758' N	114° 8.315' E	11
	SM5		22° 12.141' N	114° 6.728' E	8
	SM6	SS3	22° 11.500' N	114° 4.743' E	14
	SM7	SS4	22° 13.740' N	114° 4.473' E	8
	SM9		22° 16.420' N	114° 4.024' E	8
	SM10		22° 18.125' N	114° 1.919' E	5
	SM11	SS5	22° 15.443' N	114° 1.078' E	8
	SM12		22° 12.861' N	114° 0.869' E	7
	SM13	SS6	22° 12.957' N	113° 57.724' E	6
	SM17		22° 9.211' N	113° 57.727' E	12
	SM18		22° 9.211' N	114° 4.746' E	21
	SM19		22° 9.211' N	114° 13.077' E	24
	SM20		22° 10.448' N	113° 52.932' E	7
	*ST1	*SS7	22° 12.517' N	114° 1.493' E	5
	*ST3	*SS8	22° 14.734' N	114° 1.928' E	6
Port Shelter	PM1		22° 23.242' N	114° 17.145' E	6
	PM2		22° 22.643' N	114° 16.687' E	8
	PM3	PS3	22° 22.156' N	114° 16.910' E	13
	PM4		22° 22.940' N	114° 18.819' E	6
	PM6		22° 21.102' N	114° 16.213' E	11
	PM7	PS5	22° 20.453' N	114° 17.703' E	17
	PM8	PS6	22° 19.168' N	114° 18.745' E	20
	PM9		22° 20.529' N	114° 20.196' E	15
	PM11		22° 19.240' N	114° 20.163' E	21
	*PT2		22° 22.798' N	114° 16.540' E	3
	*PT3	*PS2	22° 22.790' N	114° 18.400' E	6
	*PT4	*PS4	22° 21.728' N	114° 15.879' E	5
Junk Bay	JM3	JS2	22° 17.490' N	114° 15.657' E	10
	JM4		22° 16.873' N	114° 15.378' E	16
Deep Bay	DM1	DS1	22° 29.769' N	114° 0.644' E	2
	DM2		22° 30.454' N	113° 59.549' E	2
	DM3	DS2	22° 28.600' N	113° 57.551' E	3
	DM4	DS3	22° 27.335' N	113° 55.937' E	4
	DM5	DS4	22° 25.561' N	113° 53.388' E	8
North Western	NM1		22° 20.877' N	114° 1.286' E	34
	NM2	NS2	22° 21.130' N	113° 58.815' E	11
	NM3	NS3	22° 21.324' N	113° 56.783' E	14
	NM5	NS4	22° 23.051' N	113° 53.972' E	20
	NM6	NS6	22° 19.281' N	113° 53.908' E	5
	NM8		22° 16.695' N	113° 51.886' E	8
	*NT1	*NS5	22° 22.475' N	113° 58.353' E	4
Mirs Bay	MM1	MS1	22° 32.984' N	114° 14.271' E	6
	MM2	MS2	22° 32.626' N	114° 16.648' E	11
	MM3	MS3	22° 33.714' N	114° 18.615' E	16
	MM4	MS4	22° 33.817' N	114° 21.483' E	18
	MM5	MS5	22° 31.233' N	114° 23.633' E	20
	MM6	MS6	22° 27.334' N	114° 20.997' E	12
	MM7	MS7	22° 31.409' N	114° 17.824' E	13
	MM8	MS8	22° 12.021' N	114° 19.345' E	31
	MM13	MS13	22° 13.000' N	114° 26.920' E	28
	MM14	MS14	22° 17.560' N	114° 26.920' E	25
	MM15	MS15	22° 22.120' N	114° 26.920' E	24
	MM16	MS16	22° 26.670' N	114° 26.920' E	22
	MM17	MS17	22° 30.192' N	114° 20.960' E	17
	MM19		22° 15.921' N	114° 19.411' E	28
Western Buffer	WM1	WS2	22° 15.044' N	114° 7.363' E	35
	WM2		22° 17.074' N	114° 5.730' E	13
	WM3	WS1	22° 19.203' N	114° 5.826' E	20
	WM4		22° 20.940' N	114° 4.256' E	26
	*WT1		22° 14.494' N	114° 9.737' E	7
	*WT3		22° 14.811' N	114° 8.918' E	10
Eastern Buffer	EM1	ES4	22° 16.506' N	114° 15.335' E	16
	EM2	ES1	22° 15.732' N	114° 15.971' E	21
	EM3	ES2	22° 14.237' N	114° 16.144' E	21
	*ET1	*ES3	22° 16.203' N	114° 14.624' E	6
	*ET2	*ES5	22° 17.078' N	114° 13.783' E	12
Victoria Harbour	VM1		22° 17.280' N	114° 13.839' E	38
	VM2		22° 17.862' N	114° 12.619' E	12
		VS3	22° 17.631' N	114° 12.526' E	8
	VM4		22° 17.860' N	114° 11.654' E	12
	VM5		22° 17.266' N	114° 10.510' E	11
		VS5	22° 17.077' N	114° 10.600' E	8
	VM6		22° 17.371' N	114° 9.665' E	14
	VM7	VS6	22° 17.771' N	114° 8.416' E	10
	VM8		22° 17.564' N	114° 7.175' E	11
	VM12	VS9	22° 19.757' N	114° 7.278' E	14
	VM14	VS10	22° 21.935' N	114° 6.527' E	11
	VM15		22° 18.579' N	114° 8.539' E	13
	*VT2	*VS12	22° 17.194' N	114° 11.304' E	5
	*VT3	*VS13	22° 17.448' N	114° 14.250' E	5
	*VT4	*VS14	22° 18.734' N	114° 12.814' E	6
	*VT8	*VS17	22° 21.360' N	114° 6.867' E	5
	*VT10	*VS19	22° 18.590' N	114° 9.430' E	5
	*VT11	*VS20	22° 18.981' N	114° 11.814' E	6
	*VT12	*VS21	22° 19.429' N	114° 8.587' E	5

Note : 1. All locations are based on WGS84 datum

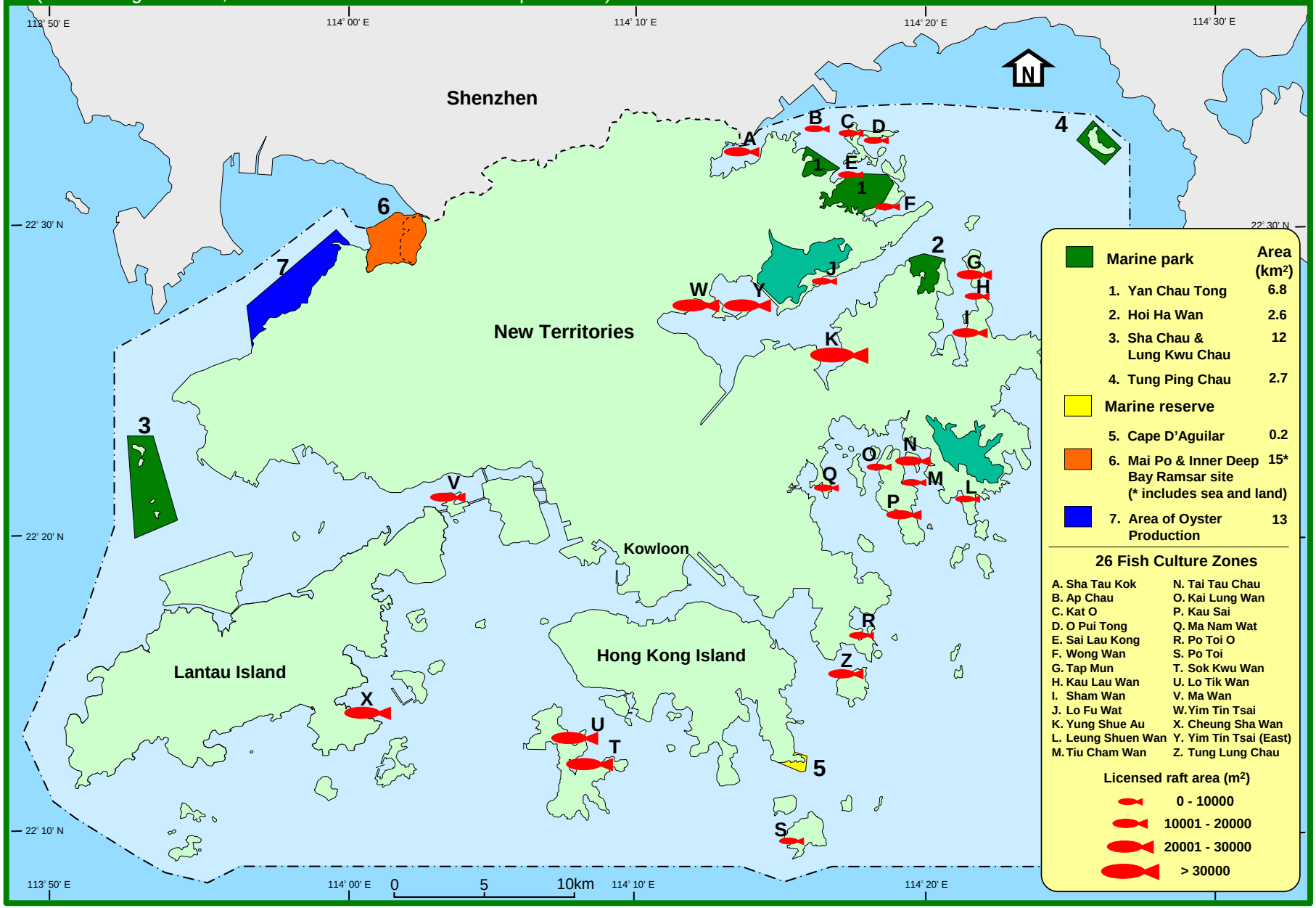
2. Water quality and sediment monitoring stations in typhoon shelters are marked with an asterisk *

Bathing beaches and secondary contact recreation subzones in Hong Kong in 2007



Fish and shellfish culture zones and marine conservation sites in Hong Kong in 2007

(source: Agriculture, Fisheries and Conservation Department)



Marine disposal areas and major reclamation sites in Hong Kong in 2007

(sources: Civil Engineering and Development Department and Environmental Protection Department)

Marine Disposal Areas		Uncontaminated mud & excavated material (m^3)	Contaminated mud (m^3)
1	East of Ninepins	150,000	-----
2	South of Cheung Chau	410,000	-----
3	East of Sha Chau (confined disposal facilities)	290,000	1,000,000

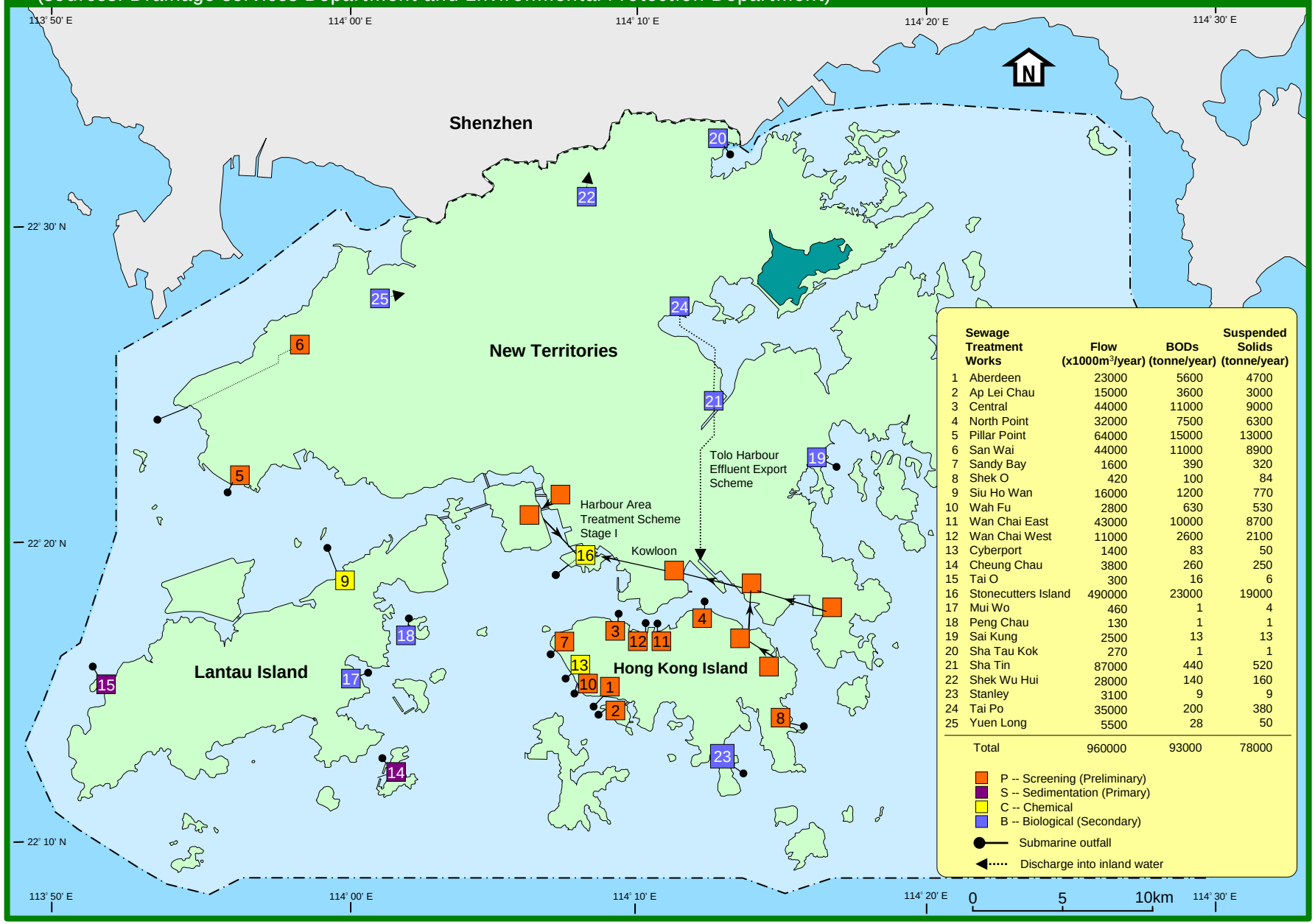
Major Reclamation Sites

4 Penny's Bay

5 Central Reclamation III

Major public sewage treatment works, outfalls, and pollution load in Hong Kong in 2007

(sources: Drainage Services Department and Environmental Protection Department)



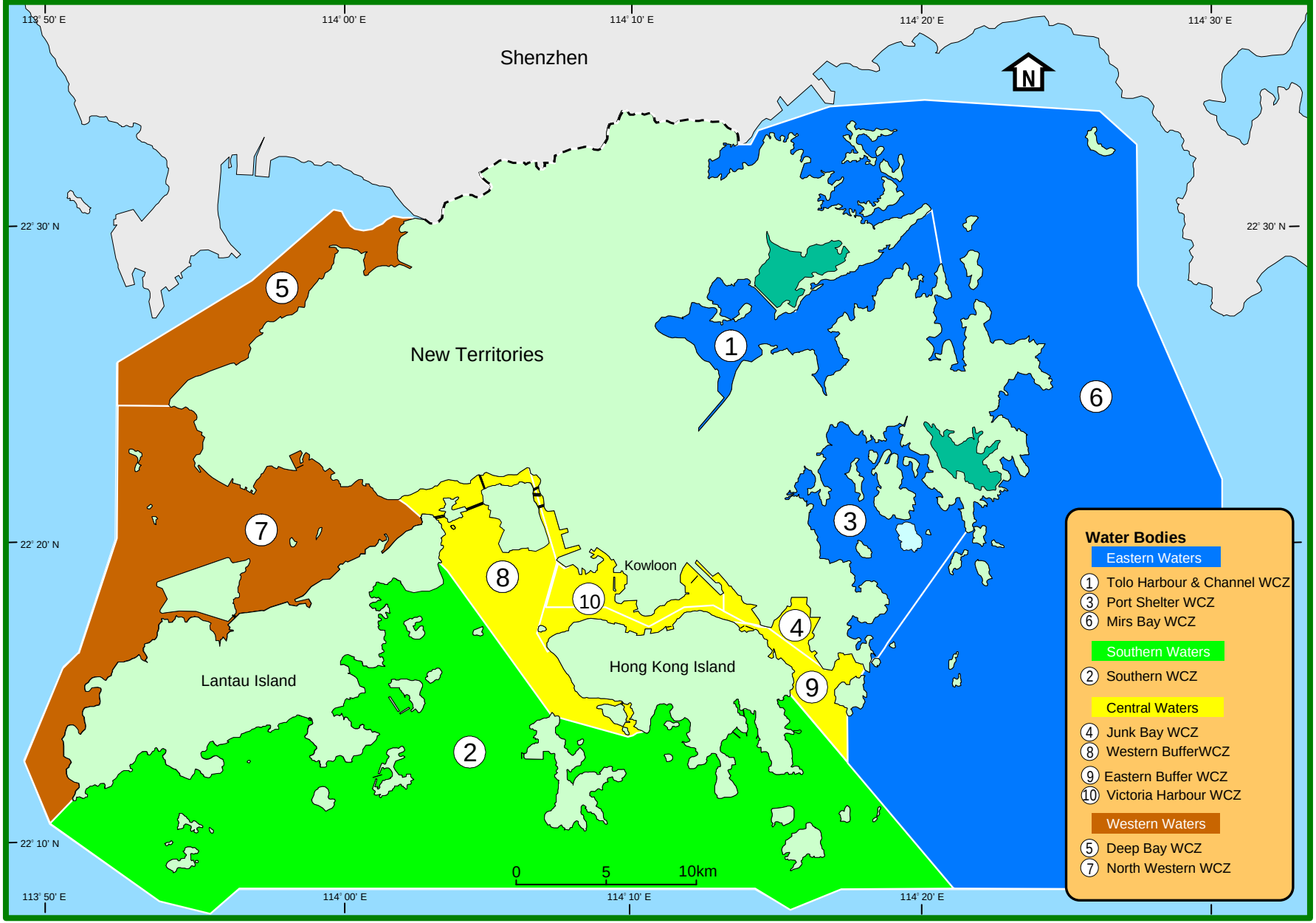
	Sewage Treatment Works	Flow (x1000m³/year)	BODs (tonne/year)	Suspended Solids (tonne/year)
1	Aberdeen	23000	5600	4700
2	Ap Lei Chau	15000	3600	3000
3	Central	44000	11000	9000
4	North Point	32000	7500	6300
5	Pillar Point	64000	15000	13000
6	San Wai	44000	11000	8900
7	Sandy Bay	1600	390	320
8	Shek O	420	100	84
9	Siu Ho Wan	16000	1200	770
10	Wah Fu	2800	630	530
11	Wan Chai East	43000	10000	8700
12	Wan Chai West	11000	2600	2100
13	Cyberport	1400	83	50
14	Cheung Chau	3800	260	250
15	Tai O	300	16	6
16	Stonecutters Island	490000	23000	19000
17	Mui Wo	460	1	4
18	Peng Chau	130	1	1
19	Sai Kung	2500	13	13
20	Sha Tau Kok	270	1	1
21	Sha Tin	87000	440	520
22	Shek Wu Hui	28000	140	160
23	Stanley	3100	9	9
24	Tai Po	35000	200	380
25	Yuen Long	5500	28	50
	Total	960000	93000	78000

P -- Screening (Preliminary)
S -- Sedimentation (Primary)
C -- Chemical
B -- Biological (Secondary)

Submarine outfall

Discharge into inland water

The four marine water bodies in Hong Kong – Eastern, Southern, Central and Western



Summary of Water Quality Objectives (WQOs) for marine waters of Hong Kong		
Parameter	**Water Quality Objective**	**Water Control Zone (WCZ) / Part(s) of zone / Subzone to which the WQO applies**
Aesthetic Appearance	There should be no objectionable odours or discolouration of the water Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substances should be absent Mineral oil should not be visible on the surface. Surfactants should not give rise to a lasting foam. There should be no recognisable sewage-derived debris. Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent. The waters should not contain substances which settle to form objectionable deposits.	All WCZs (whole zone)
Dissolved Oxygen (bottom)	Not less than 2 mg/L for 90% of samples ;	Marine waters of all WCZs except Tolo Harbour & Channel WCZ
Dissolved Oxygen (Depth-averaged)	Not less than 4 mg/L for 90% of samples ;	Marine waters of all WCZs except Tolo Harbour & Channel WCZ
Dissolved Oxygen (bottom)	Not less than 2mg/L	Harbour Subzone in Tolo Harbour & Channel WCZ
	Not less than 3mg/L	Buffer Subzone in Tolo Harbour & Channel WCZ
	Not less than 4mg/L	Channel Subzone in Tolo Harbour & Channel WCZ
Dissolved Oxygen (surface to 2m above bottom)	Not less than 4mg/L	Harbour Subzone and Buffer Subzone in Tolo Harbour & Channel WCZ
Dissolved Oxygen (all depths)	Not less than 4mg/L	Channel Subzone in Tolo Harbour & Channel WCZ
Nutrients	Annual mean depth-averaged total inorganic nitrogen not to exceed 0.1 mg/L	Marine waters of Southern WCZ and Port Shelter WCZ
	Annual mean depth-averaged total inorganic nitrogen not to exceed 0.3 mg/L	Marine waters of Mirs Bay WCZ, Junk Bay WCZ, North Western WCZ (Castle Peak Subzone)
	Annual mean depth-averaged total inorganic nitrogen not to exceed 0.4 mg/L	Marine waters of Eastern Buffer WCZ, Western Buffer WCZ, Victoria Harbour WCZ.
	Annual mean depth-averaged total inorganic nitrogen not to exceed 0.5 mg/L	Marine waters of Deep Bay WCZ (Outer Subzone) and North Western WCZ (Whole zone except Castle Peak Subzone).
	Annual mean depth-averaged total inorganic nitrogen not to exceed 0.7 mg/L	Marine waters of Deep Bay WCZ (Inner Subzone)
Unionised ammonia	Annual mean not to exceed 0.021 mg/L	All WCZs (whole zone) except Tolo Harbour & Channel WCZ
E. coli	Annual geometric mean not to exceed 610 cfu/100mL	Secondary contact recreation subzones in Tolo Habour & Channel WCZ, Southern WCZ, Port Shelter WCZ, Mirs Bay WCZ, Deep Bay WCZ, North Western WCZ, Western Buffer WCZ.
	Annual geometric mean not to exceed 610 cfu/100mL	Fish culture subzones in Tolo Habour & Channel WCZ, Southern WCZ, Port Shelter WCZ, Junk Bay, Mirs Bay WCZ, Deep Bay WCZ, Eastern Buffer WCZ, Western Buffer WCZ.
pH	To be in the range 6.5 - 8.5, change due to waste discharge not to exceed 0.2	Marine waters of all WCZs except Tolo Harbour & Channel WCZ
	Change due to waste discharge not to be greater than ±0.5	Harbour Subzone in Tolo Harbour & Channel WCZ
	Change due to waste discharge not to be greater than ±0.3	Buffer Subzone in Tolo Harbour & Channel WCZ
	Change due to waste discharge not to be greater than ±0.1	Channel Subzone in Tolo Harbour & Channel WCZ
Salinity	Change due to waste discharge not to exceed 10% of natural ambient level	All WCZs (Whole zone) except Tolo Harbour & Channel WCZ
	Change due to waste discharge not to be greater than ±3%	Tolo Harbour & Channel WCZ
Temperature	Change due to waste discharge not to exceed 2℃	All WCZs (Whole zone) except Tolo Harbour & Channel WCZ
	Change due to waste discharge not to exceed 1℃	Tolo Harbour & Channel WCZ
Suspended solids	Waste discharge not to raise the natural ambient level by 30% nor cause the accumulation of suspended solids which may adversely affect aquatic communities	Marine waters of all WCZs except Tolo Harbour & Channel WCZ
Toxicants	Not to be present at levels producing significant toxic effect	All WCZs (Whole zone)
Chlorophyll-*a*	Not to exceed 20mg/m^3 (μg/L) calculated as running arithmetic mean of 5 daily measurements for any location and depth	Harbour Subzone in Tolo Harbour & Channel WCZ
	Not to exceed 10mg/m^3 (μg/L) calculated as running arithmetic mean of 5 daily measurements for any location and depth	Buffer Subzone in Tolo Harbour & Channel WCZ
	Not to exceed 6mg/m^3 (μg/L) calculated as running arithmetic mean of 5 daily measurements for any location and depth	Channel Subzone in Tolo Harbour & Channel WCZ

Sediment Quality Criteria for the Classification of Sediments[1]

Contaminants	Lower Chemical Exceedance Level (LCEL)	Upper Chemical Exceedance Level (UCEL)
Metals *(mg/kg dry weight)*		
Cadmium (Cd)	1.5	4
Chromium (Cr)	80	160
Copper (Cu)	65	110
Mercury (Hg)	0.5	1
Nickel (Ni)[2]	40	40
Lead (Pb)	75	110
Silver (Ag)	1	2
Zinc (Zn)	200	270
Metalloid *(mg/kg dry weight)*		
Arsenic (As)	12	42
Organic-PAHs *(µg/kg dry weight)*		
Low Molecular Weight PAHs[3]	550	3160
High Molecular Weight PAHs[4]	1700	9600
Organic-non-PAHs *(µg/kg dry weight)*		
Total PCBs	23	180
Organometallics *(mg TBT/L in Interstitial water)*		
Tributyltin[2]	0.15	0.15

Footnote:

1 The table is extracted from Appendix A of WBTC (W) No. 34/2002 Management of Dredged / Excavated Sediment (http://www.devb-wb.gov.hk).

2 When the LCEL and UCEL for a contaminant are the same, the contaminant level is considered to have exceeded UCEL if it is greater than the value shown.

3 Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene.

4 High molecular weight PAHs include benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluoranthene, pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene.

5 Total PCBs include 18 congeners: PCB 8, 18, 28, 44, 52, 66, 77, 101, 105, 118, 126, 128, 138, 153, 169, 170, 180, 187.

Summary of marine water quality parameters

Parameter		Unit	Reporting Limit	Sampling Depth	Standard Method / Techniques used [20]	Analysed by
Physical and Aggregate Properties	Temperature[1]	°C	0.1	Depth Profiling[10]	Instrumental (thermistor), SEACAT19+ CTD and Water Quality Profiler	MMT/EPD[15]
	Salinity [1,8]	-	0.1	Depth Profiling	Instrumental (electrical conductivity), SEACAT19+ CTD and Water Quality Profiler	MMT/EPD
	Dissolved Oxygen[1]	mg/L % saturation [9]	0.1 1	Depth Profiling	Instrumental (membrane elelectrode), SBE23Y dissolved oxygen sensor linked to SEACAT19+ CTD and Water Quality Profiler	MMT/EPD
	Turbidity[2]	NTU	0.1	Depth Profiling	Instrumental (nephelometric / infrared back scattering), OBS-3 turbidity sensor linked to SEACAT 19+ CTD and Water Quality Profiler	MMT/EPD
	pH[1]	-	0.1	Depth Profiling	Instrumental (electrodemetric) SBE18 pH sensor linked to SEACAT19 + CTD and Water Quality Profiler	MMT/EPD
	Secchi Disc Depth[2]	m	0.1	---	Manual	MMT/EPD
	Suspended Solids[2]	mg/L	0.5	S,M,B[11]	In house method GL-PH-23, based on APHA 20ed. 2540D (weighing)	GL[18]
	Volatile Suspended Solids[3]	mg/L	0.5	S,M,B	In house method GL-PH-23, based on APHA 20ed. 2540E (weighing)	GL
Aggregate Organic Constituents	5-day Biochemical Oxygen Demand (BOD_5)[4]	mg/L	0.1	S,M,B	In house method based on APHA 18ed. 5210B	EML/EPD[16]
Nutrients and Inorganic Constituents	Ammonia Nitrogen[5]	mg/L	0.005	S,M,B	In house method GL-IN-15, based on ASTM D3590-89 B (FIA)	GL
	Unionised Ammonia[5]	mg/L	0.001	S,M,B	By calculation[12]	MMT/EPD
	Nitrite Nitrogen[5]	mg/L	0.002	S,M,B	In house method GL-IN-18, based on APHA 20ed. 4500-NO2- B (FIA)	GL
	Nitrate Nitrogen[5]	mg/L	0.002	S,M,B	In house method GL-IN-18, based on APHA 20ed. 4500-NO3- F & I (FIA)	GL
	Total Inorganic Nitrogen[5]	mg/L	0.01	S,M,B	By calculation[13]	MMT/EPD
	Total Kjeldahl Nitrogen[5] (soluble; soluble & particulate)	mg/L	0.05	S,M,B	In house method GL-IN-14 & GL-IN-15, based on ASTM D3590-89 B (FIA) & APHA 20ed 4500-N A&D (FIA)	GL
	Total Nitrogen[5]	mg/L	0.05	S,M,B	By calculation[13]	MMT/EPD
	Orthophosphate Phosphorus[5]	mg/L	0.002	S,M,B	In house method GL-IN-16, based on ASTM D515-88 A (FIA)	GL
	Total Phosphorus[5] (soluble; soluble & particulate)	mg/L	0.02	S,M,B	In house method GL-IN-14 & GL-IN-16, based on ASTM D515-88 B (FIA) & APHA 20ed 4500-P G (FIA)	GL
	Silica (as SiO_2) (soluble) [5]	mg/L	0.05	S,M,B	In house method GL-IN-17, based on APHA 20ed. 4500-SiO2 C&E (FIA)	GL
Biological and Microbiological Examination	Chlorophyll-*a* [6]	µg/L	0.2	S,M,B	In house method GL-OR-34, based on APHA 20ed. 10200H 2 (spectrophotometric)	GL
	Escherichia coli (*E. coli*)[7]	cfu/100mL	1	S,M,B	In house method, membrane filtration with CHROMagar Liquid *E. coli* -coliform culture[14]	EML/EPD
	Faecal Coliforms[7]	cfu/100mL	1	S,M,B	In house method, membrane filtration with CHROMagar Liquid *E. coli* -coliform culture[14]	EML/EPD
	Phytoplankton	cell/mL	1	S	In house method, 10 ml settled sub-sample using plankton chamber and inverted microscope[19]	WSL/EPD[17]

Note:
1 Indicate general oceanographic conditions of marine water
2 Low transparency and light penetration would affect aesthetic value and photosynthesis in marine water
3 Indicate the amount of particulate organic matters in marine water
4 Indicate the amount of organic pollutants in marine water
5 Major nutrients (nitrogen, phosphorus, silica) promoting algal growth in marine water
6 Indicate the amount of algal biomass in marine water
7 Sewage bacteria indicate the extent of faecal pollution in marine water
8 Measuring and reporting of Salinity (S) is based on the Practical Salinity Scale and International Equation of State of Seawater (UNESCO Technical Papers in Marine Science No. 30 (1981) ; No. 36 (1981) and No. 45 (1985))
9 Percent saturation of dissolved oxygen is calculated from dissolved oxygen in mg/L based on Weiss R.F. (1970); The solubility of nitrogen, oxygen and argon in water and seawater. Deep Sea Res. Vol. 17, pp.721-735
10 Depth profiling - continuous measurements at downcast are processed and presented at 1m intervals from 1m below the surface to 1m above the
11 If water depth is 6m or above, sampling is taken at three depths during upcast: S - 1m below water surface; M - mid-depth of water column; B - 1m above seabed. If water depth is 4 to 5 m, "M" is skipped; If water depth is 3m or less, "M" and "B" are skipped.
12 i) Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-
13 Total Inorganic Nitrogen = Ammonia Nitrogen + Nitrite Nitrogen + Nitrate Nitrogen ; Total Nitrogen = Total Kjeldahl Nitrogen (soluble & particulate) + Nitrite Nitrogen + Nitrate Nitrogen
14 i) DoE, DHSS & PHLS (1983); The Bacteriological Examination of Drinking Water Supplies 1982, Sec.7.8 & 7.9;
15 MMT/EPD - Marine Monitoring Team, Water Policy and Science Group, Environmental Protection Department.
16 EML/EPD - Environmental Microbiology Laboratory, Water Policy and Science Group, Environmental Protection Department.
17 WSL/EPD - Water Sciences Laboratory, Water Policy and Science Group, Environmental Protection Department
18 GL - Environmental Chemistry B Section, Environmental Chemistry & Other Scientific Services Group, Government Laboratory.
19 i) Lund, J.H., Kipling, C. and Le Cren, E.D. 1958. The inverted microscope method of estimating algal numbers, and the statistical basis of estimations by counting. Hydrobiologia Vol. 11, pp. 143-170.
20 Mention of brand names and commercial products does not constitute or imply endorsement or recommendation by the Environmental Protection Department.

Summary of marine sediment[1] parameters

	Parameter	Unit [2]	Reporting Limit	Standard Method / Techniques used [8]	Analysed by
Physical and Aggregate Properties	Particle Size Fractionation	% w/w	1	In house method, sieving and weighing ; 8 fractions : >4000 µm, <4000µm, <2000µm, <1000µm, <500µm, <250µm, <125µm and <63µm	MMT/EPD [6]
	Electrochemical Potential [4]	mV	1	Instrumental, Orion Model 250A pH/Redox Meter (electrodemetric)	MMT/EPD
	Total Solids (TS) [3]	% w/w	0.1	In house method GL-PH-22, based on APHA 20ed 2540G (weighing)	GL [7]
	Total Volatile Solids (TVS) [3]	% TS	0.1	In house method GL-PH-22, based on APHA 20ed 2540G (weighing)	GL
	Dry Wet Ratio	-	0.01	In house method GL-PH-22, based on APHA 20ed 2540G (weighing)	GL
Aggregate Organic Constituents [3]	Chemical Oxygen Demand (COD)	mg/kg	2	In house method GL-OR-38, based on ASTM D1252-00 A (open reflux)	GL
	Total Carbon (TC)	% w/w	0.1	In house method GL-OR-33, based on APHA 20ed 5310 B (FIA)	GL
Nutrients and Inorganic Constituents [3]	Ammonia Nitrogen (NH_4-N)	mg/kg	0.05	In house method GL-IN-15, based on ASTM D3590-89 B (FIA)	GL
	Total Kjeldahl Nitrogen (TKN)	mg/kg	0.5	In house method GL-IN-14 & GL-IN-15, based on ASTM D3590-89 B (FIA) & APHA 20ed 4500-N A&D (FIA)	GL
	Total Phosphorus	mg/kg	0.2	In house method GL-IN-14 & GL-IN-16, based on ASTM D515-88 B (FIA) & APHA 20ed 4500-P G (FIA)	GL
	Total Sulphide	mg/kg	0.2	In house method GL-IN-45, based on APHA 20ed 4500-S^{2-} D (FIA)	GL
	Total Cyanide	mg/kg	0.1	In house method GL-IN-44, based on APHA, 20ed., 4500 CN -A&E (distillation and colorimetric)	GL
Metals & Metalloids [5]	Aluminium (Al)	mg/kg	1	In house method GL-TE-60, based on USEPA method 6010B (ICP-AES)	GL
	Arsenic (As)	mg/kg	0.1	In house method GL-TE-64 & GL-TE-66, based on USEPA method 6020 (ICP-MS)	GL
	Barium (Ba)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Boron (B)	mg/kg	5	In house method GL-TE-60, based on USEPA method 6010B (ICP-AES)	GL
	Cadmium (Cd)	mg/kg	0.1	In house method GL-TE-64, based on USEPA method 6020 (ICP-MS)	GL
	Chromium (Cr)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Copper (Cu)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Iron (Fe)	mg/kg	5	In house method GL-TE-60, based on USEPA method 6010B (ICP-AES)	GL
	Lead (Pb)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Manganese (Mn)	mg/kg	1	In house method GL-TE-60, based on USEPA method 6010B (ICP-AES)	GL
	Mercury (Hg)	mg/kg	0.05	In house method GL-TE-64 & GL-TE-66, based on USEPA method 6020 (ICP-MS)	GL
	Nickel (Ni)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Silver (Ag)	mg/kg	0.2	In house method GL-TE-64, based on USEPA method 6020 (ICP-MS)	GL
	Vanadium (V)	mg/kg	0.1	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
	Zinc (Zn)	mg/kg	0.2	In house method GL-TE-60 & GL-TE-64, based on USEPA method 6010B (ICP-AES) and USEPA method 6020 (ICP-MS)	GL
Trace Organic Compounds	Polychlorinated Biphenyls (PCBs)				
	18 PCB congeners : PCB 8, 18, 28, 44, 52, 66, 77, 101, 105, 118, 126, 128, 138, 153, 169, 170, 180, 187	µg/kg	2	In house method GL-OR-25, based on Reference Method for the Analysis of Polychlorinated Biphenyls, Environmental Protection Series: Report EPS 1/RM/31, March 1997, Environment Canada (GC-MS)	GL
	Polyaromatic Hydrocarbons (PAHs)				
	- Acenaphthene	µg/kg	50	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Acenaphthylene	µg/kg	50	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Naphthalene	µg/kg	60	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Fluorene	µg/kg	10	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Phenanthrene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Anthracene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Fluoranthene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Pyrene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Benzo(*a*)anthracene	µg/kg	3	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Chrysene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Benzo(*b*)fluoranthene	µg/kg	1	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Benzo(*k*)fluoranthene	µg/kg	1	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Benzo(*a*)pyrene	µg/kg	1	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Dibenzo(*a,h*)anthracene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Benzo(*ghi*)perylene	µg/kg	1	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL
	- Indeno(*1,2,3-cd*)pyrene	µg/kg	5	In house method, GL-OR-15, based on USEPA method 610, 1984 (UV-FLUO)	GL

Note:
1. Birge-Ekman (0.023m2) grab / Van Veen (0.1m2) grab / Smith-McIntyre (0.1m2) grab is employed to collect sediment samples from the top 10cm of seabed.
2. All parameters are reported on a dry weight basis unless otherwise stated.
3. Determinants are reported on a wet weight basis.
4. Electrochemical potential (Eh) is measured "on-site" at 3cm below the surface of freshly collected sediment samples (Reference : Handbook of Techniques for Aquatic Sediment Sampling. By A. Mudrock & S.D. MacKnight, 1994, CRC Press).
5. Digestion procedure for metals and metalloids in sediment follows In house method, WC-ME-2 (3.5 hours digestion in conc. HCl/conc. HNO3 ; 3:1 v/v)
6. MMT/EPD - Marine Monitoring Team, Water Policy and Science Group, Environmental Protection Department.
7. GL - Environmental Chemistry B Section, Environmental Chemistry & Other Scientific Services Group, Government Laboratory.
8. Mention of brand names and commercial products does not constitute or imply endorsement or recommendation by the Environmental Protection Department.

Summary of water quality statistics for the Mirs Bay WCZ in 2007

Parameter		Starling Inlet MM1	Crooked Island MM2	Crooked Island MM7	Port Island MM17	Mirs Bay North MM3	Mirs Bay North MM4	Mirs Bay North MM5
Number of samples		12	12	12	12	12	12	12
Temperature (°C)		23.8 (17.7 - 29.5)	23.4 (17.7 - 28.0)	23.4 (17.5 - 27.4)	22.7 (17.1 - 26.1)	22.9 (17.5 - 26.2)	22.8 (17.4 - 26.3)	22.7 (17.1 - 26.2)
Salinity		32.2 (28.8 - 33.3)	32.7 (30.4 - 33.6)	32.7 (31.0 - 33.5)	33.1 (31.9 - 33.6)	33.1 (31.8 - 33.7)	33.1 (31.7 - 33.8)	33.2 (31.8 - 34.0)
Dissolved Oxygen (mg/L)		6.8 (4.3 - 9.8)	6.2 (3.7 - 8.3)	6.1 (4.1 - 8.2)	5.9 (2.8 - 8.3)	6.1 (2.9 - 8.8)	6.3 (3.9 - 9.5)	6.2 (3.9 - 8.7)
	Bottom	6.1 (1.5 - 9.9)	5.4 (1.5 - 8.5)	5.2 (0.5 - 8.6)	5.5 (2.0 - 8.5)	5.5 (1.5 - 8.8)	5.6 (0.8 - 9.1)	5.6 (2.6 - 8.2)
Dissolved Oxygen (% Saturation)		96 (65 - 146)	88 (56 - 112)	86 (62 - 111)	82 (42 - 106)	85 (42 - 117)	88 (57 - 127)	87 (57 - 116)
	Bottom	85 (22 - 146)	74 (22 - 114)	71 (8 - 116)	75 (28 - 107)	75 (21 - 114)	77 (12 - 121)	78 (37 - 103)
pH		8.2 (7.6 - 8.5)	8.2 (7.6 - 8.4)	8.2 (7.7 - 8.4)	8.1 (7.4 - 8.3)	8.2 (7.6 - 8.4)	8.2 (7.5 - 8.4)	8.2 (7.4 - 8.3)
Secchi Disc Depth (m)		1.7 (1.3 - 2.1)	2.1 (1.4 - 3.1)	2.6 (1.7 - 3.5)	3.6 (2.5 - 6.0)	2.7 (1.5 - 4.5)	3.5 (1.7 - 8.0)	3.9 (1.8 - 7.5)
Turbidity (NTU)		11.2 (4.3 - 20.2)	10.7 (4.4 - 19.3)	9.81 (4.2 - 17.2)	11.8 (4.4 - 23.6)	13.1 (4.3 - 37.9)	10.4 (4.3 - 21.9)	10.8 (4.4 - 24.6)
Suspended Solids (mg/L)		3.9 (1.7 - 6.1)	2.5 (1.0 - 3.6)	1.5 (0.6 - 3.7)	1.7 (0.6 - 4.2)	6.2 (1.8 - 14.5)	2.5 (1.2 - 5.5)	2.7 (0.8 - 9.3)
5-day Biochemical Oxygen Demand (mg/L)		1.2 (0.2 - 2.5)	0.7 (0.1 - 1.3)	0.9 (0.5 - 1.5)	0.6 (0.3 - 1.2)	0.6 (0.3 - 1.5)	0.7 (0.2 - 1.7)	0.6 (0.3 - 1.6)
Ammonia Nitrogen (mg/L)		0.07 (0.02 - 0.14)	0.04 (0.02 - 0.10)	0.04 (0.01 - 0.09)	0.03 (0.01 - 0.04)	0.03 (0.01 - 0.04)	0.03 (0.01 - 0.05)	0.02 (0.01 - 0.04)
Unionised Ammonia (mg/L)		0.005 (0.001 - 0.016)	0.003 (<0.001 - 0.006)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.003)	0.002 (<0.001 - 0.003)	0.002 (<0.001 - 0.003)	0.001 (<0.001 - 0.003)
Nitrite Nitrogen (mg/L)		0.007 (0.002 - 0.030)	0.007 (0.002 - 0.037)	0.006 (0.002 - 0.032)	0.006 (0.002 - 0.021)	0.007 (0.002 - 0.036)	0.006 (0.002 - 0.017)	0.007 (0.002 - 0.023)
Nitrate Nitrogen (mg/L)		0.038 (0.004 - 0.100)	0.022 (0.002 - 0.059)	0.017 (0.002 - 0.054)	0.026 (0.002 - 0.091)	0.025 (0.002 - 0.097)	0.023 (0.002 - 0.062)	0.021 (0.002 - 0.069)
Total Inorganic Nitrogen (mg/L)		0.12 (0.03 - 0.24)	0.07 (0.02 - 0.17)	0.06 (0.01 - 0.14)	0.06 (0.01 - 0.12)	0.06 (0.02 - 0.13)	0.06 (0.01 - 0.11)	0.05 (0.01 - 0.11)
Total Kjeldahl Nitrogen (mg/L)		0.28 (0.19 - 0.39)	0.18 (0.12 - 0.30)	0.18 (0.11 - 0.23)	0.15 (0.11 - 0.20)	0.16 (0.12 - 0.27)	0.15 (0.12 - 0.19)	0.14 (0.10 - 0.19)
Total Nitrogen (mg/L)		0.32 (0.19 - 0.49)	0.21 (0.13 - 0.31)	0.20 (0.12 - 0.29)	0.18 (0.11 - 0.28)	0.19 (0.13 - 0.37)	0.18 (0.15 - 0.24)	0.17 (0.12 - 0.24)
Orthophosphate Phosphorus (mg/L)		0.010 (0.004 - 0.024)	0.009 (0.005 - 0.023)	0.010 (0.006 - 0.023)	0.009 (0.005 - 0.015)	0.008 (0.004 - 0.015)	0.008 (0.005 - 0.015)	0.008 (0.005 - 0.014)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.04)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		0.6 (0.1 - 1.6)	0.6 (0.1 - 1.6)	0.6 (0.1 - 1.5)	0.5 (0.1 - 1.3)	0.6 (0.1 - 1.5)	0.6 (0.1 - 1.4)	0.6 (0.1 - 1.1)
Chlorophyll-*a* (µg/L)		10.0 (0.7 - 30.0)	4.2 (0.8 - 9.9)	3.8 (1.1 - 8.7)	3.1 (0.9 - 7.6)	3.4 (0.9 - 8.9)	3.4 (0.8 - 7.3)	3.1 (0.8 - 7.5)
E.coli (count/100mL)		29 (1 - 330)	3 (1 - 59)	1 (1 - 4)	1 (1 - 6)	2 (1 - 14)	1 (1 - 5)	1 (1 - 5)
Faecal Coliforms (count/100mL)		74 (2 - 830)	5 (1 - 220)	2 (1 - 8)	2 (1 - 12)	3 (1 - 77)	2 (1 - 8)	1 (1 - 8)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Mirs Bay WCZ in 2007 (continued)

Parameter		Ninepin Group MM19	Waglan Isalnd MM8	Mirs Bay (South) MM13	Mirs Bay (Central) MM14	Mirs Bay (Central) MM15	Mirs Bay (Central) MM16	Long Harbour MM6
Number of samples		12	12	12	12	12	12	12
Temperature (°C)		22.4 (17.6 - 25.6)	22.5 (17.5 - 25.3)	22.7 (17.6 - 25.3)	22.5 (17.9 - 25.2)	22.4 (17.5 - 25.4)	22.5 (17.6 - 26.0)	23.1 (17.1 - 27.8)
Salinity		33.4 (31.5 - 34.1)	33.3 (31.6 - 34.4)	33.3 (32.0 - 34.5)	33.5 (31.7 - 34.4)	33.3 (31.5 - 34.2)	33.3 (31.6 - 34.1)	32.8 (31.1 - 33.6)
Dissolved Oxygen (mg/L)		6.2 (4.3 - 8.0)	6.1 (4.3 - 7.3)	6.4 (5.0 - 7.1)	6.3 (4.4 - 7.5)	6.2 (4.3 - 7.8)	6.4 (4.6 - 8.3)	6.2 (4.3 - 8.1)
	Bottom	6.0 (3.7 - 7.6)	5.9 (3.9 - 7.2)	6.2 (4.8 - 7.3)	6.1 (4.4 - 7.5)	6.0 (4.1 - 7.5)	6.0 (3.3 - 7.9)	5.3 (1.1 - 8.1)
Dissolved Oxygen (% Saturation)		86 (62 - 107)	86 (61 - 99)	90 (72 - 101)	88 (64 - 97)	86 (63 - 103)	90 (67 - 109)	87 (64 - 106)
	Bottom	83 (52 - 102)	82 (54 - 94)	86 (67 - 98)	85 (62 - 98)	83 (57 - 99)	83 (47 - 104)	73 (16 - 106)
pH		8.2 (7.6 - 8.4)	8.2 (7.6 - 8.4)	8.2 (7.6 - 8.5)	8.1 (7.5 - 8.5)	8.1 (7.5 - 8.5)	8.1 (7.3 - 8.5)	8.1 (7.5 - 8.4)
Secchi Disc Depth (m)		3.2 (1.5 - 6.5)	3.2 (1.9 - 8.0)	4.4 (1.8 - 12.0)	3.7 (1.5 - 9.0)	3.9 (1.5 - 7.0)	4.7 (2.5 - 9.0)	3.5 (2.3 - 5.5)
Turbidity (NTU)		9.9 (7.5 - 15.3)	10.7 (8.3 - 15.2)	10.0 (4.4 - 16.2)	10.3 (6.4 - 14.7)	10.2 (4.2 - 13.4)	10.1 (7.1 - 15.0)	10.9 (4.5 - 32.1)
Suspended Solids (mg/L)		2.7 (1.6 - 4.0)	3.4 (0.9 - 5.9)	3.7 (1.4 - 10.2)	3.3 (1.6 - 7.9)	2.5 (1.2 - 5.4)	2.2 (1.1 - 4.2)	2.0 (0.6 - 4.0)
5-day Biochemical Oxygen Demand (mg/L)		0.7 (0.2 - 1.1)	0.5 (0.2 - 1.1)	0.6 (0.2 - 1.1)	0.6 (0.2 - 1.2)	0.5 (0.1 - 1.3)	0.5 (0.2 - 1.1)	0.8 (0.1 - 1.2)
Ammonia Nitrogen (mg/L)		0.03 (0.02 - 0.04)	0.03 (0.01 - 0.04)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.03)	0.02 (0.01 - 0.04)	0.03 (0.01 - 0.04)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.009)	0.001 (<0.001 - 0.005)	0.001 (<0.001 - 0.004)	0.001 (<0.001 - 0.005)	0.001 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.009 (0.002 - 0.025)	0.0113 (0.002 - 0.035)	0.010 (0.002 - 0.028)	0.008 (0.002 - 0.021)	0.007 (0.002 - 0.014)	0.006 (0.002 - 0.013)	0.005 (0.002 - 0.012)
Nitrate Nitrogen (mg/L)		0.050 (0.005 - 0.143)	0.065 (0.003 - 0.160)	0.053 (0.002 - 0.127)	0.049 (0.002 - 0.160)	0.048 (0.004 - 0.147)	0.036 (0.003 - 0.093)	0.018 (0.002 - 0.066)
Total Inorganic Nitrogen (mg/L)		0.09 (0.02 - 0.18)	0.10 (0.01 - 0.19)	0.08 (0.01 - 0.16)	0.08 (0.01 - 0.19)	0.08 (0.02 - 0.18)	0.07 (0.02 - 0.13)	0.05 (0.01 - 0.11)
Total Kjeldahl Nitrogen (mg/L)		0.13 (0.09 - 0.15)	0.13 (0.09 - 0.17)	0.12 (0.07 - 0.18)	0.13 (0.09 - 0.20)	0.12 (0.09 - 0.16)	0.13 (0.11 - 0.20)	0.16 (0.11 - 0.21)
Total Nitrogen (mg/L)		0.19 (0.10 - 0.30)	0.21 (0.10 - 0.30)	0.19 (0.08 - 0.30)	0.18 (0.09 - 0.28)	0.18 (0.09 - 0.30)	0.17 (0.11 - 0.29)	0.18 (0.12 - 0.24)
Orthophosphate Phosphorus (mg/L)		0.011 (0.006 - 0.018)	0.011 (0.006 - 0.020)	0.009 (0.007 - 0.012)	0.010 (0.006 - 0.020)	0.010 (0.006 - 0.019)	0.009 (0.004 - 0.013)	0.008 (0.005 - 0.016)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.03)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.7 (0.1 - 1.3)	0.7 (0.1 - 1.4)	0.5 (0.1 - 1.0)	0.6 (0.1 - 1.3)	0.7 (0.1 - 1.3)	0.6 (0.1 - 0.9)	0.5 (0.1 - 1.2)
Chlorophyll-*a* (µg/L)		2.6 (1.5 - 4.6)	2.3 (1.1 - 6.7)	2.5 (1.0 - 7.0)	2.3 (0.8 - 7.1)	2.0 (0.8 - 4.8)	2.9 (0.7 - 9.7)	3.0 (1.1 - 6.2)
E.coli (count/100mL)		1 (1 - 1)	1.1 (1 - 2)	1 (1 - 1)	1 (1 - 1)	1 (1 - 1)	1 (1 - 1)	1 (1 - 2)
Faecal Coliforms (count/100mL)		1 (1 - 4)	2 (1 - 8)	1 (1 - 2)	1 (1 - 3)	1 (1 - 2)	1 (1 - 2)	2 (1 - 14)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Port Shelter WCZ in 2007

Parameter		Inner Port Shelter PM1	PM2	PM3	PM4	Hebe Haven PM6
Number of samples		12	12	12	12	12
Temperature (°C)		23.5 (17.4 - 27.5)	23.3 (17.4 - 27.3)	23.0 (17.5 - 27.4)	23.5 (17.2 - 27.8)	23.0 (17.4 - 27.3)
Salinity		32.9 (31.7 - 33.7)	32.9 (31.6 - 33.6)	33.1 (31.7 - 33.8)	32.9 (31.7 - 33.9)	33 (31.6 - 33.8)
Dissolved Oxygen (mg/L)		6.2 (3.4 - 8.5)	6.0 (3.6 - 8.0)	6.0 (3.3 - 7.8)	6.3 (4.5 - 8.2)	6.1 (3.6 - 9.0)
	Bottom	5.9 (2.7 - 8.6)	5.7 (1.2 - 7.9)	5.6 (2.4 - 7.8)	6.0 (3.3 - 8.3)	5.4 (1.1 - 7.8)
Dissolved Oxygen (% Saturation)		88 (51 - 114)	85 (53 - 112)	84 (49 - 105)	89 (67 - 110)	86 (53 - 121)
	Bottom	82 (39 - 115)	79 (17 - 111)	77 (34 - 104)	83 (47 - 111)	75 (16 - 103)
pH		8.2 (7.7 - 8.4)	8.2 (7.8 - 8.5)	8.2 (7.7 - 8.5)	8.2 (7.7 - 8.5)	8.1 (7.7 - 8.4)
Secchi Disc Depth (m)		2.8 (1.8 - 3.8)	2.7 (1.8 - 3.9)	2.9 (1.8 - 4.3)	2.6 (1.9 - 4.1)	3 (1.9 - 5.0)
Turbidity (NTU)		8.9 (4.2 - 14.3)	8.8 (4.1 - 13.8)	8.7 (4.3 - 13.9)	9.2 (4.2 - 14.2)	9.3 (4.3 - 14.8)
Suspended Solids (mg/L)		1.6 (0.7 - 2.9)	1.8 (0.7 - 3.4)	1.3 (0.6 - 2.7)	2.0 (0.6 - 2.8)	1.9 (0.7 - 4.6)
5-day Biochemical Oxygen Demand (mg/L)		0.9 (0.3 - 2.2)	0.8 (0.5 - 1.5)	0.7 (0.4 - 1.2)	0.8 (0.3 - 1.6)	0.8 (0.2 - 1.7)
Ammonia Nitrogen (mg/L)		0.04 (0.02 - 0.06)	0.04 (0.01 - 0.06)	0.03 (0.01 - 0.05)	0.04 (0.01 - 0.06)	0.04 (0.02 - 0.06)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.006)	0.002 (<0.001 - 0.006)	0.0025 (<0.001 - 0.008)	0.002 (<0.001 - 0.005)
Nitrite Nitrogen (mg/L)		0.003 (0.002 - 0.009)	0.003 (0.002 - 0.006)	0.004 (0.002 - 0.017)	0.002 (0.002 - 0.006)	0.004 (0.002 - 0.011)
Nitrate Nitrogen (mg/L)		0.014 (0.002 - 0.075)	0.017 (0.003 - 0.043)	0.022 (0.002 - 0.077)	0.012 (0.003 - 0.039)	0.022 (0.003 - 0.089)
Total Inorganic Nitrogen (mg/L)		0.05 (0.02 - 0.13)	0.06 (0.02 - 0.10)	0.06 (0.02 - 0.13)	0.05 (0.02 - 0.10)	0.06 (0.03 - 0.14)
Total Kjeldahl Nitrogen (mg/L)		0.17 (0.11 - 0.28)	0.17 (0.09 - 0.27)	0.16 (0.11 - 0.21)	0.16 (0.10 - 0.22)	0.16 (0.09 - 0.22)
Total Nitrogen (mg/L)		0.19 (0.11 - 0.28)	0.19 (0.10 - 0.31)	0.18 (0.12 - 0.26)	0.18 (0.10 - 0.26)	0.18 (0.10 - 0.25)
Orthophosphate Phosphorus (mg/L)		0.008 (0.005 - 0.022)	0.008 (0.005 - 0.023)	0.010 (0.005 - 0.027)	0.007 (0.005 - 0.016)	0.010 (0.004 - 0.029)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.04)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.7 (0.2 - 2.2)	0.7 (0.2 - 2.1)	0.7 (0.2 - 2.0)	0.6 (0.1 - 1.9)	0.7 (0.3 - 2.0)
Chlorophyll-*a* (µg/L)		4.1 (0.9 - 14.0)	3.9 (0.7 - 10.4)	3.2 (0.8 - 9.7)	3.7 (0.9 - 8.7)	3.4 (1.0 - 7.6)
E.coli (count/100mL)		1 (1 - 5)	4 (1 - 16)	1 (1 - 8)	2 (1 - 12)	2 (1 - 8)
Faecal Coliforms (count/100mL)		4 (1 - 40)	20 (2 - 240)	3 (1 - 30)	3 (1 - 79)	6 (1 - 18)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics of the Port Shelter WCZ in 2007 (continued)

Parameter		Outer Port Shelter PM7	Outer Port Shelter PM8	Rocky Harbour PM9	Bluff Island PM11
Number of samples		12	12	12	12
Temperature (°C)		22.9 (17.5 - 27.4)	22.7 (17.5 - 27.8)	22.7 (17.4 - 27.6)	22.6 (17.4 - 27.6)
Salinity		33.1 (31.6 - 33.9)	33.2 (31.6 - 33.9)	33.2 (31.6 - 34.0)	33.3 (31.7 - 34.0)
Dissolved Oxygen (mg/L)		6.1 (3.7 - 8.6)	6.1 (3.8 - 8.3)	6.1 (4.5 - 8.0)	6.1 (4.2 - 8.2)
	Bottom	5.6 (3.0 - 7.9)	5.8 (3.2 - 7.4)	5.7 (2.7 - 7.7)	5.77 (3.2 - 7.5)
Dissolved Oxygen (% Saturation)		86 (55 - 115)	85 (55 - 111)	85 (65 - 106)	85 (60 - 109)
	Bottom	78 (42 - 105)	80 (45 - 99)	79 (39 - 102)	80 (45 - 98)
pH		8.1 (7.5 - 8.5)	8.2 (7.6 - 8.5)	8.2 (7.7 - 8.5)	8.2 (7.7 - 8.5)
Secchi Disc Depth (m)		3.4 (2.1 - 5.4)	3.7 (2.1 - 5.5)	3.4 (2.1 - 5.0)	3.8 (2.1 - 5.3)
Turbidity (NTU)		8.8 (4.9 - 12.3)	9.28 (4.2 - 14.4)	9.2 (4.0 - 14.1)	9.66 (4.2 - 16.7)
Suspended Solids (mg/L)		1.7 (0.9 - 3.4)	1.6 (0.8 - 3.0)	1.8 (0.8 - 3.5)	2.7 (0.6 - 11.7)
5-day Biochemical Oxygen Demand (mg/L)		0.7 (0.3 - 1.6)	0.6 (0.4 - 1.4)	0.6 (0.3 - 1.1)	0.5 (0.2 - 0.8)
Ammonia Nitrogen (mg/L)		0.03 (0.01 - 0.05)	0.03 (0.02 - 0.04)	0.03 (0.01 - 0.05)	0.03 (0.02 - 0.05)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.005 (0.002 - 0.013)	0.005 (0.002 - 0.011)	0.006 (0.002 - 0.011)	0.007 (0.002 - 0.015)
Nitrate Nitrogen (mg/L)		0.029 (0.003 - 0.085)	0.035 (0.004 - 0.116)	0.033 (0.005 - 0.130)	0.039 (0.005 - 0.137)
Total Inorganic Nitrogen (mg/L)		0.07 (0.03 - 0.12)	0.07 (0.03 - 0.15)	0.07 (0.03 - 0.16)	0.08 (0.03 - 0.17)
Total Kjeldahl Nitrogen (mg/L)		0.14 (0.12 - 0.23)	0.13 (0.10 - 0.18)	0.14 (0.11 - 0.18)	0.14 (0.11 - 0.22)
Total Nitrogen (mg/L)		0.18 (0.14 - 0.26)	0.17 (0.14 - 0.24)	0.17 (0.13 - 0.25)	0.19 (0.14 - 0.27)
Orthophosphate Phosphorus (mg/L)		0.009 (0.005 - 0.018)	0.009 (0.006 - 0.016)	0.009 (0.006 - 0.017)	0.009 (0.006 - 0.017)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.04)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		0.7 (0.2 - 1.4)	0.6 (0.2 - 1.3)	0.7 (0.2 - 1.4)	0.6 (0.2 - 1.4)
Chlorophyll-*a* (µg/L)		2.6 (0.7 - 10.9)	2.2 (0.7 - 6.1)	2.2 (0.7 - 8.0)	1.8 (0.7 - 4.8)
E.coli (count/100mL)		1 (1 - 2)	1 (1 - 1)	1 (1 - 3)	1 (1 - 1)
Faecal Coliforms (count/100mL)		1 (1 - 3)	1 (1 - 3)	1 (1 - 4)	1 (1 - 2)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Tolo Harbour WCZ in 2007

Parameter		Harbour Subzone			Buffer Subzone		Channel Subzone	
		TM2	TM3	TM4	TM5	TM6	TM7	TM8
Number of samples		12	12	12	12	12	12	12
Temperature (°C)		24.0 (17.6 - 28.3)	23.9 (17.5 - 28.5)	23.6 (17.6 - 28.0)	24.2 (17.6 - 29.5)	23.4 (17.4 - 28.1)	23.1 (17.3 - 28.0)	22.8 (17.0 - 27.9)
Salinity		32.0 (30.6 - 33.3)	32.0 (29.9 - 33.4)	32.3 (30.8 - 33.5)	32.2 (31.1 - 33.3)	32.6 (31.9 - 33.6)	32.7 (31.9 - 33.9)	33.0 (32.1 - 34.1)
Dissolved Oxygen (mg/L)		6.3 (2.8 - 8.6)	6.7 (4.0 - 8.4)	6.5 (3.3 - 8.0)	6.4 (5.4 - 8.1)	6.1 (4.4 - 7.8)	6.3 (4.5 - 7.8)	6.0 (3.3 - 7.7)
	Bottom	5.7 (2.0 - 8.3)	6.3 (3.1 - 7.9)	5.6 (1.6 - 7.3)	6.3 (5.1 - 8.0)	5.2 (2.4 - 7.4)	5.7 (1.8 - 7.5)	5.3 (1.4 - 8.1)
Dissolved Oxygen (% Saturation)		89 (41 - 115)	95 (59 - 118)	92 (49 - 111)	91 (78 - 111)	86 (65 - 108)	88 (68 - 106)	84 (50 - 103)
	Bottom	81 (29 - 109)	89 (45 - 110)	78 (24 - 103)	89 (75 - 109)	72 (36 - 100)	79 (26 - 100)	72 (20 - 102)
pH		8.0 (7.6 - 8.3)	8.1 (7.5 - 8.4)	8.1 (7.6 - 8.3)	8.0 (7.4 - 8.4)	8.0 (6.8 - 8.3)	8.1 (7.6 - 8.3)	8.1 (7.7 - 8.3)
Secchi Disc Depth (m)		2.0 (1.0 - 3.0)	2.1 (1.0 - 4.1)	2.2 (1.5 - 3.4)	2.2 (1.2 - 4.0)	2.6 (1.9 - 4.8)	2.8 (2.0 - 3.8)	3.1 (2.0 - 4.5)
Turbidity (NTU)		8.8 (4.4 - 13.5)	9.3 (4.4 - 15.3)	9.7 (4.4 - 17.7)	9.4 (4.4 - 14.2)	9.2 (4.3 - 15.2)	9.2 (4.3 - 14.4)	9.3 (4.5 - 15.4)
Suspended Solids (mg/L)		2.2 (1.3 - 3.2)	2.0 (1.0 - 3.6)	1.7 (0.9 - 2.3)	3.3 (1.0 - 15.6)	1.5 (1.0 - 1.9)	1.5 (0.8 - 2.8)	1.8 (1.1 - 3.0)
5-day Biochemical Oxygen Demand (mg/L)		1.6 (0.5 - 2.8)	1.5 (0.5 - 2.4)	1.5 (0.6 - 2.0)	1.3 (0.7 - 2.5)	1.2 (0.8 - 1.8)	1.1 (0.4 - 1.6)	1.0 (0.4 - 1.9)
Ammonia Nitrogen (mg/L)		0.05 (0.01 - 0.15)	0.04 (0.02 - 0.07)	0.04 (0.01 - 0.09)	0.04 (0.01 - 0.09)	0.04 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.03 (0.01 - 0.06)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.001 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.006 (0.002 - 0.054)	0.005 (0.002 - 0.040)	0.006 (0.002 - 0.049)	0.003 (0.002 - 0.014)	0.005 (0.002 - 0.029)	0.005 (0.002 - 0.021)	0.007 (0.002 - 0.023)
Nitrate Nitrogen (mg/L)		0.008 (0.002 - 0.034)	0.009 (0.002 - 0.040)	0.008 (0.002 - 0.043)	0.006 (0.002 - 0.016)	0.006 (0.002 - 0.016)	0.006 (0.002 - 0.013)	0.015 (0.002 - 0.049)
Total Inorganic Nitrogen (mg/L)		0.06 (0.01 - 0.23)	0.06 (0.02 - 0.14)	0.06 (0.02 - 0.16)	0.05 (0.01 - 0.10)	0.05 (0.01 - 0.09)	0.04 (0.01 - 0.08)	0.05 (0.01 - 0.11)
Total Kjeldahl Nitrogen (mg/L)		0.25 (0.19 - 0.32)	0.24 (0.18 - 0.29)	0.23 (0.19 - 0.27)	0.23 (0.16 - 0.31)	0.21 (0.17 - 0.24)	0.18 (0.15 - 0.23)	0.17 (0.13 - 0.24)
Total Nitrogen (mg/L)		0.27 (0.19 - 0.40)	0.25 (0.18 - 0.32)	0.25 (0.19 - 0.34)	0.24 (0.17 - 0.32)	0.22 (0.18 - 0.26)	0.19 (0.15 - 0.23)	0.19 (0.15 - 0.24)
Orthophosphate Phosphorus (mg/L)		0.008 (0.004 - 0.031)	0.007 (0.002 - 0.019)	0.008 (0.002 - 0.024)	0.007 (0.004 - 0.023)	0.008 (0.005 - 0.021)	0.008 (0.005 - 0.020)	0.009 (0.005 - 0.020)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.05)	0.02 (0.02 - 0.04)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.04)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.5 (0.1 - 1.9)	0.4 (0.1 - 1.3)	0.5 (0.1 - 1.5)	0.5 (0.1 - 1.1)	0.5 (0.1 - 1.1)	0.4 (0.1 - 1.0)	0.5 (0.1 - 1.4)
Chlorophyll-*a* (µg/L)		7.8 (1.4 - 16.5)	7.1 (1.1 - 18.3)	5.8 (0.9 - 17.0)	5.5 (1.4 - 17.0)	4.6 (1.2 - 12.9)	4.5 (0.9 - 12.3)	3.6 (1.1 - 7.9)
E.coli (count/100mL)		12 (1 - 140)	4 (1 - 180)	3 (1 - 53)	2 (1 - 14)	1 (1 - 13)	2 (1 - 32)	1 (1 - 3)
Faecal Coliforms (count/100mL)		100 (5 - 1400)	23 (2 - 1100)	18 (1 - 610)	7 (1 - 250)	4 (1 - 88)	3 (1 - 170)	2 (1 - 17)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Southern WCZ in 2007

Parameter		Hong Kong Island (South) SM1	SM2	SM19	East Lamma Channel SM3	SM4
Number of samples		12	12	12	12	12
Temperature (°C)		23.3 (18.8 - 27.4)	23.6 (19.1 - 27.4)	23.2 (18.9 - 27.7)	23.2 (19.1 - 27.5)	23.8 (19.2 - 28.1)
Salinity		32.7 (30.8 - 34.0)	32.4 (29.9 - 33.9)	32.9 (31.3 - 34.1)	32.7 (31.1 - 33.8)	32.0 (28.8 - 33.8)
Dissolved Oxygen (mg/L)		6.3 (5.0 - 7.3)	6.2 (4.6 - 7.1)	6.2 (4.8 - 7.1)	6.1 (4.2 - 7.2)	6.2 (4.7 - 7.1)
	Bottom	5.9 (3.0 - 7.5)	5.8 (3.3 - 7.1)	5.9 (3.9 - 7.2)	5.7 (2.6 - 7.2)	5.7 (2.6 - 7.1)
Dissolved Oxygen (% Saturation)		90 (74 - 103)	88 (70 - 100)	88 (71 - 100)	86 (62 - 101)	88 (71 - 99)
	Bottom	82 (43 - 105)	81 (47 - 99)	83 (55 - 96)	79 (37 - 101)	81 (37 - 99)
pH		8.2 (7.6 - 8.5)	8.2 (7.6 - 8.6)	8.2 (7.6 - 8.5)	8.1 (7.5 - 8.4)	8.1 (7.6 - 8.6)
Secchi Disc Depth (m)		2.3 (1.3 - 4.5)	2.2 (1.0 - 3.6)	2.5 (1.5 - 3.8)	2.1 (1.0 - 3.1)	2.1 (1.0 - 3.6)
Turbidity (NTU)		10.3 (4.1 - 17.5)	10.7 (4.2 - 17.1)	11.3 (4.3 - 20.9)	11.4 (8.2 - 16.2)	10.9 (4.3 - 23.3)
Suspended Solids (mg/L)		2.9 (1.5 - 5.9)	3.8 (1.2 - 8.2)	4.2 (1.0 - 9.5)	4.0 (2.3 - 5.8)	3.4 (1.4 - 7.0)
5-day Biochemical Oxygen Demand (mg/L)		0.9 (0.1 - 2.5)	0.9 (0.2 - 3.2)	0.9 (0.2 - 1.7)	0.8 (0.2 - 2.1)	1.0 (0.2 - 3.0)
Ammonia Nitrogen (mg/L)		0.03 (0.02 - 0.06)	0.05 (0.02 - 0.07)	0.03 (0.02 - 0.06)	0.05 (0.03 - 0.08)	0.08 (0.03 - 0.12)
Unionised Ammonia (mg/L)		0.003 (<0.001 - 0.008)	0.003 (<0.001 - 0.015)	0.002 (<0.001 - 0.012)	0.003 (<0.001 - 0.008)	0.005 (0.001 - 0.017)
Nitrite Nitrogen (mg/L)		0.011 (0.002 - 0.036)	0.016 (0.002 - 0.039)	0.011 (0.002 - 0.033)	0.019 (0.003 - 0.055)	0.023 (0.004 - 0.081)
Nitrate Nitrogen (mg/L)		0.046 (0.005 - 0.153)	0.063 (0.007 - 0.160)	0.049 (0.004 - 0.163)	0.073 (0.012 - 0.190)	0.092 (0.025 - 0.247)
Total Inorganic Nitrogen (mg/L)		0.09 (0.03 - 0.19)	0.13 (0.04 - 0.24)	0.09 (0.03 - 0.20)	0.14 (0.06 - 0.25)	0.19 (0.09 - 0.35)
Total Kjeldahl Nitrogen (mg/L)		0.15 (0.10 - 0.25)	0.17 (0.11 - 0.28)	0.14 (0.08 - 0.22)	0.17 (0.11 - 0.26)	0.21 (0.12 - 0.29)
Total Nitrogen (mg/L)		0.21 (0.12 - 0.36)	0.25 (0.14 - 0.46)	0.20 (0.12 - 0.33)	0.26 (0.15 - 0.44)	0.32 (0.21 - 0.55)
Orthophosphate Phosphorus (mg/L)		0.009 (0.005 - 0.018)	0.010 (0.005 - 0.026)	0.009 (0.006 - 0.018)	0.012 (0.006 - 0.022)	0.014 (0.005 - 0.023)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.03)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.05)
Silica (as SiO_2) (mg/L)		0.6 (0.1 - 1.3)	0.6 (0.1 - 1.4)	0.6 (0.1 - 1.2)	0.8 (0.1 - 1.6)	0.7 (0.1 - 1.5)
Chlorophyll-*a* (µg/L)		2.8 (1.0 - 9.3)	2.8 (0.6 - 11.0)	2.2 (0.8 - 6.9)	2.9 (0.7 - 10.0)	4.0 (0.5 - 17.1)
E.coli (count/100mL)		2 (1 - 18)	26 (1 - 240)	1 (1 - 4)	20 (3 - 110)	26 (1 - 3300)
Faecal Coliforms (count/100mL)		3 (1 - 26)	53 (2 - 390)	2 (1 - 6)	38 (5 - 160)	64 (2 - 4300)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Southern WCZ in 2007 (continued)

Parameter		West Lamma Channel				
		SM5	SM6	SM7	SM9	SM18
Number of samples		12	12	12	12	12
Temperature (°C)		24.0 (19.1 - 28.5)	23.7 (19.1 - 27.6)	23.8 (19.3 - 27.6)	23.8 (19.5 - 28.3)	23.5 (19.0 - 27.3)
Salinity		31.9 (28.0 - 33.7)	32.1 (28.7 - 33.8)	31.4 (26.3 - 33.6)	31.1 (25.6 - 33.2)	32.5 (30.0 - 33.9)
Dissolved Oxygen (mg/L)		6.3 (5.3 - 7.5)	6.2 (5.2 - 7.2)	6.3 (4.6 - 7.1)	5.8 (4.6 - 6.9)	6.0 (4.4 - 6.9)
	Bottom	5.9 (3.3 - 7.4)	5.6 (1.6 - 7.2)	5.9 (4.2 - 7.0)	5.8 (4.1 - 7.1)	5.4 (1.6 - 7.1)
Dissolved Oxygen (% Saturation)		90 (80 - 106)	88 (78 - 102)	89 (70 - 101)	82 (66 - 99)	85 (67 - 94)
	Bottom	83 (48 - 103)	79 (22 - 101)	83 (60 - 98)	82 (60 -100)	76 (22 - 96)
pH		8.2 (7.6 - 8.6)	8.2 (7.6 - 8.6)	8.1 (7.6 - 8.5)	8.1 (7.6 - 8.5)	8.2 (7.6 - 8.6)
Secchi Disc Depth (m)		2.1 (0.8 - 3.5)	2.3 (1.2 - 4.8)	1.7 (1.0 - 2.6)	1.8 (0.9 - 2.4)	2.5 (1.2 - 5.7)
Turbidity (NTU)		10.6 (4.3 - 15.8)	10.9 (4.2 - 16.5)	11.8 (4.2 - 17.9)	12.1 (4.1 - 17.6)	11 (4.2 - 16.1)
Suspended Solids (mg/L)		4.1 (1.6 - 7.5)	5.0 (1.3 - 20.3)	6.0 (1.6 - 12.3)	6.6 (1.9 - 14.6)	4.4 (0.9 - 12.7)
5-day Biochemical Oxygen Demand (mg/L)		1.2 (0.2 - 3.5)	1.1 (0.2 - 2.9)	1.2 (0.3 - 3.0)	0.9 (0.1 - 1.7)	0.8 (0.1 - 1.9)
Ammonia Nitrogen (mg/L)		0.04 (0.02 - 0.08)	0.04 (0.02 - 0.08)	0.08 (0.02 - 0.14)	0.13 (0.05 - 0.25)	0.04 (0.02 - 0.06)
Unionised Ammonia (mg/L)		0.004 (<0.001 - 0.013)	0.003 (<0.001 - 0.011)	0.005 (0.001 - 0.009)	0.007 (0.002 - 0.015)	0.003 (<0.001 - 0.010)
Nitrite Nitrogen (mg/L)		0.0183 (0.002 - 0.041)	0.0194 (0.002 - 0.051)	0.036 (0.003 - 0.137)	0.045 (0.016 - 0.113)	0.0133 (0.002 - 0.034)
Nitrate Nitrogen (mg/L)		0.0883 (0.010 - 0.287)	0.09 (0.008 - 0.333)	0.152 (0.015 - 0.477)	0.198 (0.072 - 0.503)	0.07 (0.005 - 0.211)
Total Inorganic Nitrogen (mg/L)		0.15 (0.04 - 0.38)	0.16 (0.04 - 0.41)	0.27 (0.07 - 0.57)	0.38 (0.22 - 0.64)	0.12 (0.03 - 0.27)
Total Kjeldahl Nitrogen (mg/L)		0.17 (0.08 - 0.33)	0.18 (0.11 - 0.28)	0.24 (0.11 - 0.43)	0.30 (0.24 - 0.42)	0.15 (0.11 - 0.21)
Total Nitrogen (mg/L)		0.28 (0.14 - 0.57)	0.29 (0.13 - 0.58)	0.43 (0.17 - 0.78)	0.54 (0.38 - 0.80)	0.24 (0.13 - 0.46)
Orthophosphate Phosphorus (mg/L)		0.010 (0.005 - 0.019)	0.011 (0.005 - 0.019)	0.016 (0.004 - 0.027)	0.024 (0.007 - 0.039)	0.010 (0.006 - 0.021)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)	0.04 (0.02 - 0.07)	0.05 (0.03 - 0.09)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.7 (0.1 - 1.9)	0.8 (0.1 - 2.3)	0.9 (0.1 - 2.6)	1.2 (0.2 - 2.6)	0.7 (0.1 - 1.5)
Chlorophyll-*a* (µg/L)		3.4 (0.8 - 11.9)	3.6 (0.7 - 14.2)	7.1 (0.6 - 27.2)	4.0 (1.4 - 9.3)	2.2 (0.7 - 6.8)
E.coli (count/100mL)		2 (1 - 14)	2 (1 - 95)	21 (1 - 870)	150 (10 - 1300)	1 (1 - 2)
Faecal Coliforms (count/100mL)		2 (1 - 34)	3 (1 - 220)	41 (1 - 1800)	340 (42 - 4700)	1 (1 - 3)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Southern WCZ in 2007 (continued)

Parameter		Lantau Island (East) SM10	Lantau Island (East) SM11	Lantau Island (South) SM12	Lantau Island (South) SM13	Lantau Island (South) SM17	Soko Islands SM20
Number of samples		12	12	12	12	12	12
Temperature (°C)		24.1 (19.3 - 28.3)	24.3 (19.4 - 28.2)	24.1 (19.4 - 27.9)	24.1 (19.4 - 28.1)	23.5 (19.0 - 27.8)	23.9 (19.3 - 28.1)
Salinity		30.8 (25.7 - 33.2)	31.2 (26.9 - 33.3)	31.3 (27.1 - 33.6)	31.4 (26.9 - 33.6)	32.1 (28.3 - 33.9)	31.1 (23.6 - 34.0)
Dissolved Oxygen (mg/L)		6.8 (5.3 - 10.0)	7.0 (5.0 - 10.2)	7.1 (5.2 - 9.7)	6.7 (5.7 - 8.8)	6.4 (3.8 - 8.0)	6.1 (3.4 - 8.4)
	Bottom	7.0 (4.6 - 10.2)	6.9 (2.5 - 10.1)	6.9 (5.6 - 8.8)	6.4 (4.1 - 8.8)	5.9 (1.9 - 7.3)	6.0 (3.1 - 7.9)
Dissolved Oxygen (% Saturation)		97 (76 - 148)	101 (74 - 154)	102 (80 - 144)	96 (84 - 125)	90 (55 - 111)	87 (49 - 118)
	Bottom	99 (68 - 151)	98 (38 - 149)	98 (84 - 124)	90 (60 - 124)	84 (28 - 105)	85 (45 - 111)
pH		8.1 (7.5 - 8.9)	8.2 (7.5 - 9.0)	8.2 (7.5 - 8.9)	8.2 (7.4 - 8.8)	8.1 (7.6 - 8.6)	8.1 (7.5 - 8.4)
Secchi Disc Depth (m)		1.3 (0.5 - 2.0)	1.4 (1.0 - 2.0)	1.5 (1.0 - 2.2)	1.7 (0.9 - 2.2)	2 (1.5 - 2.5)	1.6 (0.8 - 2.1)
Turbidity (NTU)		13.6 (4.0 - 28.5)	12.1 (4.0 - 18.5)	12.9 (4.2 - 20.5)	11.7 (4.2 - 21.2)	11.4 (8.7 - 15.3)	14 (4.1 - 33.8)
Suspended Solids (mg/L)		8.1 (2.7 - 16.5)	6.5 (2.1 - 12.1)	7.7 (2.1 - 18.7)	5.9 (2.0 - 10.9)	5.4 (1.3 - 12.4)	10.4 (1.9 - 45.3)
5-day Biochemical Oxygen Demand (mg/L)		1.3 (0.1 - 2.7)	1.6 (0.2 - 3.6)	1.4 (0.1 - 3.4)	1.0 (0.3 - 1.6)	0.7 (0.2 - 1.2)	0.8 (0.4 - 2.0)
Ammonia Nitrogen (mg/L)		0.10 (0.03 - 0.23)	0.10 (0.04 - 0.22)	0.09 (0.03 - 0.16)	0.07 (0.04 - 0.12)	0.04 (0.01 - 0.08)	0.05 (0.02 - 0.10)
Unionised Ammonia (mg/L)		0.006 (0.001 - 0.019)	0.007 (0.002 - 0.029)	0.007 (0.001 - 0.028)	0.005 (<0.001 - 0.019)	0.003 (<0.001 - 0.012)	0.003 (<0.001 - 0.007)
Nitrite Nitrogen (mg/L)		0.043 (0.016 - 0.105)	0.035 (0.007 - 0.098)	0.034 (0.009 - 0.081)	0.034 (0.005 - 0.095)	0.023 (0.004 - 0.070)	0.036 (0.004 - 0.130)
Nitrate Nitrogen (mg/L)		0.179 (0.069 - 0.340)	0.137 (0.052 - 0.250)	0.131 (0.051 - 0.280)	0.130 (0.026 - 0.307)	0.095 (0.021 - 0.268)	0.172 (0.025 - 0.577)
Total Inorganic Nitrogen (mg/L)		0.32 (0.13 - 0.51)	0.27 (0.13 - 0.38)	0.25 (0.12 - 0.44)	0.23 (0.08 - 0.46)	0.16 (0.08 - 0.37)	0.26 (0.08 - 0.75)
Total Kjeldahl Nitrogen (mg/L)		0.30 (0.19 - 0.42)	0.31 (0.16 - 0.49)	0.30 (0.15 - 0.63)	0.24 (0.15 - 0.34)	0.17 (0.12 - 0.25)	0.20 (0.14 - 0.35)
Total Nitrogen (mg/L)		0.52 (0.35 - 0.79)	0.49 (0.33 - 0.75)	0.47 (0.29 - 0.98)	0.40 (0.25 - 0.73)	0.29 (0.17 - 0.52)	0.41 (0.18 - 1.05)
Orthophosphate Phosphorus (mg/L)		0.017 (0.004 - 0.038)	0.017 (0.003 - 0.035)	0.014 (0.004 - 0.027)	0.012 (0.005 - 0.019)	0.010 (0.006 - 0.019)	0.012 (0.004 - 0.021)
Total Phosphorus (mg/L)		0.05 (0.02 - 0.07)	0.04 (0.02 - 0.08)	0.04 (0.02 - 0.09)	0.04 (0.02 - 0.07)	0.03 (0.02 - 0.09)	0.04 (0.02 - 0.05)
Silica (as SiO_2) (mg/L)		1.0 (0.1 - 1.7)	0.8 (0.1 - 1.5)	0.9 (0.1 - 1.4)	1.0 (0.1 - 1.4)	0.8 (0.1 - 1.5)	1.1 (0.1 - 3.1)
Chlorophyll-*a* (µg/L)		10.9 (1.7 - 42.0)	12.1 (1.2 - 49.0)	11.8 (1.0 - 46.0)	7.5 (1.5 - 37.0)	3.7 (0.7 - 13.3)	3.7 (0.4 - 9.4)
E.coli (count/100mL)		11 (1 - 480)	3 (1 - 18)	25 (2 - 290)	4 (1 - 41)	1 (1 - 2)	1 (1 - 2)
Faecal Coliforms (count/100mL)		25 (1 - 1100)	6 (1 - 250)	54 (2 - 490)	7 (1 - 62)	2 (1 - 6)	2 (1 - 17)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics of the Victoria Harbour WCZ in 2007

Parameter		Victoria Harbour (East) VM1	Victoria Harbour (East) VM2	Victoria Harbour (Central) VM4	Victoria Harbour (Central) VM5	Victoria Harbour (Central) VM6
Number of samples		12	12	12	12	12
Temperature (°C)		22.5 (17.1 - 27.8)	22.9 (17.2 - 27.8)	23.0 (17.2 - 27.9)	23.0 (17.2 - 28.0)	23.0 (17.4 - 27.9)
Salinity		32.7 (31.7 - 33.9)	32.2 (30.1 - 33.6)	32.0 (29.3 - 33.8)	31.9 (29.3 - 33.5)	32.0 (28.8 - 33.5)
Dissolved Oxygen (mg/L)		5.7 (3.9 - 7.7)	5.6 (3.6 - 7.5)	5.4 (4.0 - 7.2)	5.1 (3.8 - 6.9)	5.0 (3.5 - 7.3)
	Bottom	5.6 (3.6 - 7.7)	5.2 (2.7 - 7.6)	5.1 (2.3 - 7.3)	4.6 (2.1 - 7.4)	4.8 3.0 - 7.4)
Dissolved Oxygen (% Saturation)		80 (55 - 99)	79 (52 - 97)	76 (57 - 95)	71 (57 - 87)	70 (53 - 94)
	Bottom	77 (51 - 99)	72 (38 - 97)	70 (33 - 94)	64 (30 - 96)	67 (42 - 95)
pH		7.9 (6.0 - 8.2)	8.0 (7.7 - 8.3)	8.0 (7.7 - 8.2)	8.0 (7.7 - 8.2)	8.0 (7.7 - 8.3)
Secchi Disc Depth (m)		2.3 (1.0 - 3.5)	2.2 (1.5 - 2.8)	2.2 (1.6 - 3.5)	1.9 (1.5 - 2.4)	2.0 (1.4 - 2.6)
Turbidity (NTU)		12.0 (4.3 - 33.1)	11.1 (4.3 - 24.4)	10.8 (4.3 - 21.1)	11.1 (4.2 - 23.4)	10.9 (4.2 - 18.3)
Suspended Solids (mg/L)		4.2 (1.6 - 7.0)	3.5 (1.8 - 6.0)	3.9 (2.4 - 6.0)	4.1 (1.5 - 11.1)	4.8 (1.7 - 16.2)
5-day Biochemical Oxygen Demand (mg/L)		0.9 (0.6 - 1.6)	1.2 (0.5 - 2.6)	1.0 (0.4 - 2.1)	1.5 (0.2 - 2.3)	1.3 (0.7 - 2.1)
Ammonia Nitrogen (mg/L)		0.09 (0.03 - 0.14)	0.12 (0.03 - 0.21)	0.14 (0.04 - 0.21)	0.18 (0.07 - 0.29)	0.20 (0.06 - 0.32)
Unionised Ammonia (mg/L)		0.003 (<0.001 - 0.007)	0.005 (<0.001 - 0.009)	0.006 (<0.001 - 0.009)	0.007 (0.001 - 0.012)	0.007 (0.001 - 0.012)
Nitrite Nitrogen (mg/L)		0.023 (0.007 - 0.057)	0.028 (0.009 - 0.089)	0.030 (0.011 - 0.111)	0.035 (0.015 - 0.108)	0.034 (0.016 - 0.082)
Nitrate Nitrogen (mg/L)		0.092 (0.036 - 0.220)	0.110 (0.043 - 0.273)	0.124 (0.047 - 0.333)	0.141 (0.060 - 0.333)	0.133 (0.060 - 0.257)
Total Inorganic Nitrogen (mg/L)		0.20 (0.08 - 0.38)	0.26 (0.09 - 0.52)	0.29 (0.10 - 0.63)	0.36 (0.14 - 0.60)	0.36 (0.14 - 0.57)
Total Kjeldahl Nitrogen (mg/L)		0.24 (0.14 - 0.28)	0.32 (0.18 - 0.47)	0.34 (0.22 - 0.46)	0.42 (0.29 - 0.56)	0.41 (0.29 - 0.55)
Total Nitrogen (mg/L)		0.35 (0.23 - 0.51)	0.46 (0.24 - 0.66)	0.49 (0.28 - 0.75)	0.59 (0.42 - 0.80)	0.58 (0.37 - 0.76)
Orthophosphate Phosphorus (mg/L)		0.02 (0.009 - 0.044)	0.03 (0.010 - 0.049)	0.03 (0.005 - 0.053)	0.04 (0.015 - 0.062)	0.04 (0.015 - 0.060)
Total Phosphorus (mg/L)		0.04 (0.03 - 0.06)	0.05 (0.03 - 0.07)	0.05 (0.04 - 0.07)	0.06 (0.05 - 0.09)	0.06 (0.05 - 0.08)
Silica (as SiO_2) (mg/L)		0.8 (0.4 - 1.8)	0.8 (0.2 - 2.0)	0.9 (0.3 - 2.3)	1.0 (0.4 - 2.2)	1.0 (0.3 - 2.0)
Chlorophyll-*a* (µg/L)		4.3 (0.8 - 17.8)	6.4 (0.7 - 36.0)	6.6 (0.5 - 41.7)	5.9 (0.7 - 30.8)	4.8 (0.6 - 22.6)
E.coli (count/100mL)		320 (90 - 1800)	1900 (210 - 47000)	1400 (430 - 13000)	6000 (640 - 29000)	4600 (1100 - 26000)
Faecal Coliforms (count/100mL)		870 (230 - 5100)	4200 (550 - 68000)	3500 (1100 - 34000)	16000 (2600 - 61000)	12000 (2600 - 54000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics of the Victoria Harbour WCZ in 2007 (continued)

Parameter		Victoria Harbour (West) VM7	Victoria Harbour (West) VM8	Stonecutters Island VM15	Rambler Channel VM12	Rambler Channel VM14
Number of samples		12	12	12	12	12
Temperature (°C)		23.3 (17.4 - 27.8)	23.3 (17.4 - 27.7)	23.2 (17.3 - 27.9)	23.3 (17.4 - 27.8)	23.7 (17.4 - 28.2)
Salinity		31.5 (26.4 - 33.4)	31.7 (26.4 - 33.5)	31.7 (28.1 - 33.5)	31.6 (28.4 - 33.4)	30 (17.7 - 33.3)
Dissolved Oxygen (mg/L)		5.0 (3.8 - 7.0)	5.5 (4.0 - 8.6)	5.3 (3.7 - 7.0)	5.2 (3.8 - 8.4)	5.6 (4.5 - 8.6)
	Bottom	4.7 (2.1 - 7.0)	5.2 (1.3 - 8.6)	4.9 (2.6 - 7.0)	5.0 (2.5 - 8.4)	5.4 (3.8 - 8.6)
Dissolved Oxygen (% Saturation)		71 (58 - 89)	77 (58 - 109)	74 (55 - 90)	73 (55 - 107)	78 (65 - 109)
	Bottom	66 (30 - 89)	73 (19 - 110)	68 (38 - 91)	70 (37 - 107)	75 (55 - 109)
pH		8.0 (7.6 - 8.5)	8.0 (7.6 - 8.5)	8.0 (7.7 - 8.4)	8.0 (7.6 - 8.5)	8.1 (7.6 - 8.5)
Secchi Disc Depth (m)		1.9 (0.9 - 2.5)	2.0 (1.2 - 3.0)	2.0 (1.7 - 2.5)	1.7 (1.0 - 2.4)	1.7 (1.3 - 2.6)
Turbidity (NTU)		10.8 (4.2 - 16.1)	13.8 (4.1 - 34.8)	11.9 (4.1 - 23.0)	13.8 (4.2 - 19.8)	12.5 (4.3 - 19.3)
Suspended Solids (mg/L)		4.7 (1.3 - 11.7)	6.6 (3.1 - 11.6)	6.7 (2.8 - 15.3)	10.3 (3.8 - 17.0)	6.7 (3.2 - 15.3)
5-day Biochemical Oxygen Demand (mg/L)		1.0 (0.4 - 2.2)	0.9 (0.3 - 1.9)	1.3 (0.6 - 2.1)	0.8 (0.3 - 1.9)	0.8 (0.3 - 1.9)
Ammonia Nitrogen (mg/L)		0.21 (0.12 - 0.28)	0.19 (0.07- 0.31)	0.20 (0.07 - 0.32)	0.19 (0.07 - 0.29)	0.15 (0.04 - 0.26)
Unionised Ammonia (mg/L)		0.009 (0.002 - 0.016)	0.008 (0.003 - 0.014)	0.008 (0.001 - 0.012)	0.008 (0.003 - 0.015)	0.007 (0.002 - 0.017)
Nitrite Nitrogen (mg/L)		0.037 (0.011 - 0.120)	0.039 (0.004 - 0.122)	0.039 (0.017 - 0.123)	0.044 (0.007 - 0.140)	0.058 (0.007 - 0.197)
Nitrate Nitrogen (mg/L)		0.154 (0.039 - 0.330)	0.138 (0.026 - 0.307)	0.146 (0.070 - 0.370)	0.164 (0.045 - 0.303)	0.236 (0.040 - 0.653)
Total Inorganic Nitrogen (mg/L)		0.41 (0.25 - 0.55)	0.37 (0.15 - 0.68)	0.38 (0.15 - 0.65)	0.40 (0.18 - 0.55)	0.45 (0.15 - 0.80)
Total Kjeldahl Nitrogen (mg/L)		0.41 (0.30 - 0.57)	0.36 (0.19 - 0.57)	0.41 (0.28 - 0.52)	0.36 (0.23 - 0.48)	0.34 (0.23 - 0.51)
Total Nitrogen (mg/L)		0.61 (0.37 - 0.80)	0.54 (0.34 - 0.95)	0.60 (0.37 - 0.77)	0.57 (0.39 - 0.70)	0.63 (0.28 - 1.28)
Orthophosphate Phosphorus (mg/L)		0.040 (0.022 - 0.060)	0.032 (0.019 - 0.059)	0.038 (0.014 - 0.059)	0.036 (0.017 - 0.055)	0.031 (0.012 - 0.051)
Total Phosphorus (mg/L)		0.07 (0.05 - 0.11)	0.05 (0.04 - 0.08)	0.06 (0.05 - 0.08)	0.06 (0.03 - 0.07)	0.05 (0.03 - 0.07)
Silica (as SiO_2) (mg/L)		1.1 (0.3 - 1.9)	1.0 (0.1 - 1.9)	1.0 (0.3 - 2.4)	1.2 (0.1 - 2.1)	1.5 (0.1 - 3.6)
Chlorophyll-*a* (µg/L)		2.8 (0.5 - 9.5)	2.9 (0.7 - 10.1)	6.2 (0.6 - 27.2)	2.6 (0.4 - 7.8)	3.0 (0.6 - 8.5)
E.coli (count/100mL)		6000 (700 - 21000)	5400 (900 - 25000)	1600 (300 - 4700)	2100 (540 - 20000)	1100 (280 - 5400)
Faecal Coliforms (count/100mL)		19000 (3100 - 81000)	14000 (3400 - 57000)	4500 (650 - 16000)	6200 (1400 - 54000)	2800 (730 - 14000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Eastern Buffer WCZ in 2007

Parameter		Chai Wan EM1	Tathong Channel EM2	Tathong Channel EM3
Number of samples		12	12	12
Temperature (°C)		22.8 (17.1 - 27.8)	22.9 (17.0 - 27.8)	22.7 (17.0 - 27.8)
Salinity		32.9 (31.7 - 34.0)	32.9 (31.8 - 34.1)	33.1 (31.7 - 34.2)
Dissolved Oxygen (mg/L)		5.7 (4.0 - 8.0)	6.0 (4.7 - 8.1)	6.0 (4.6 - 8.0)
	Bottom	5.5 (3.1 - 8.1)	5.6 (3.2 - 8.2)	5.8 (3.1 - 8.1)
Dissolved Oxygen (% Saturation)		80 (59 - 101)	84 (70 - 102)	84 (68 - 101)
	Bottom	77 (43 - 102)	78 (44 - 103)	80 (43 - 102)
pH		8.1 (7.8 - 8.3)	8.1 (7.7 - 8.3)	8.1 (7.7 - 8.3)
Secchi Disc Depth (m)		2.2 (1.8 - 3.0)	2.1 (1.5 - 2.5)	2.4 (1.5 - 3.0)
Turbidity (NTU)		15.2 (6.6 - 65.2)	18.1 (4.9 - 99.2)	12.9 (4.0 - 40.9)
Suspended Solids (mg/L)		4.0 (1.5 - 12.8)	4.2 (1.5 - 14.3)	3.3 (1.3 - 11.7)
5-day Biochemical Oxygen Demand (mg/L)		0.8 (0.2 - 1.8)	0.9 (0.2 - 1.8)	0.8 (0.2 - 1.5)
Ammonia Nitrogen (mg/L)		0.07 (0.04 - 0.10)	0.05 (0.03 - 0.08)	0.04 (0.02 - 0.05)
Unionised Ammonia (mg/L)		0.003 (0.001 - 0.005)	0.003 (0.001 - 0.005)	0.002 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.014 (0.002 - 0.022)	0.013 (0.002 - 0.021)	0.010 (0.002 - 0.022)
Nitrate Nitrogen (mg/L)		0.074 (0.009 - 0.200)	0.067 (0.009 - 0.187)	0.055 (0.007 - 0.167)
Total Inorganic Nitrogen (mg/L)		0.15 (0.05 - 0.32)	0.13 (0.05 - 0.27)	0.10 (0.05 - 0.22)
Total Kjeldahl Nitrogen (mg/L)		0.21 (0.13 - 0.31)	0.19 (0.12 - 0.26)	0.17 (0.12 - 0.29)
Total Nitrogen (mg/L)		0.29 (0.14 - 0.49)	0.27 (0.14 - 0.42)	0.24 (0.15 - 0.35)
Orthophosphate Phosphorus (mg/L)		0.016 (0.006 - 0.038)	0.014 (0.005 - 0.031)	0.011 (0.008 - 0.022)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.06)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.7 (0.2 - 1.3)	0.6 (0.2 - 1.3)	0.7 (0.2 - 1.3)
Chlorophyll-*a* (µg/L)		3.5 (1.0 - 10.8)	3.2 (0.7 - 6.7)	2.4 (0.5 - 5.5)
E.coli (count/100mL)		110 (5 - 570)	49 (4 - 190)	5 (1 - 46)
Faecal Coliforms (count/100mL)		310 (15 - 1500)	140 (24 - 650)	15 (2 - 81)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Western Buffer WCZ in 2007

Parameter		Hong Kong Island (West) WM1	WM2	Tsing Yi (South) WM3	Tsing Yi (West) WM4
Number of samples		12	12	12	12
Temperature (°C)		22.9 (17.4 - 27.7)	23.3 (17.4 - 27.7)	23.1 (17.3 - 27.7)	23.1 (17.4 - 27.8)
Salinity		32.6 (30.4 - 34.0)	31.6 (26.7 - 33.7)	32.2 (29.6 - 33.7)	31.8 (28.3 - 33.5)
Dissolved Oxygen (mg/L)		5.9 (4.1 - 9.2)	5.73 (4.4 - 8.9)	5.42 (3.8 - 8.7)	5.53 (3.6 - 9.1)
	Bottom	5.7 (2.5 - 9.0)	5.5 (2.3 - 8.8)	5.39 (2.5 - 8.6)	5.37 (2.4 - 8.8)
Dissolved Oxygen (% Saturation)		83 (59 - 117)	80 (63 - 113)	76 (55 - 111)	77 (52 - 116)
	Bottom	79 (36 - 115)	76 (34 - 112)	75 (36 - 109)	75 (35 - 112)
pH		8.1 (7.6 - 8.6)	8.0 (7.5 - 8.5)	8.0 (7.3 - 8.5)	8.1 (7.7 - 8.5)
Secchi Disc Depth (m)		2.0 (1.3 - 2.8)	1.9 (1.4 - 2.5)	1.8 (1.0 - 3.5)	1.7 (1.3 - 2.5)
Turbidity (NTU)		12.3 (4.3 - 19.1)	14.5 (4.4 - 43.6)	12.1 (4.2 - 17.4)	12.1 (4.2 - 17.4)
Suspended Solids (mg/L)		6.0 (3.6 - 9.6)	5.9 (3.3 - 9.8)	6.0 (3.3 - 12.1)	6.6 (4.2 - 12.8)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.1 - 1.4)	0.69 (0.1 - 1.7)	0.8 (0.2 - 2.2)	0.7 (0.1 - 2.0)
Ammonia Nitrogen (mg/L)		0.07 (0.03 - 0.20)	0.13 (0.06 - 0.22)	0.16 (0.06 - 0.27)	0.13 (0.04 - 0.24)
Unionised Ammonia (mg/L)		0.003 (0.001 - 0.011)	0.006 (0.002 - 0.012)	0.006 (0.002 - 0.012)	0.006 (0.002 - 0.012)
Nitrite Nitrogen (mg/L)		0.028 (0.003 - 0.078)	0.045 (0.005 - 0.163)	0.037 (0.006 - 0.103)	0.043 (0.006 - 0.130)
Nitrate Nitrogen (mg/L)		0.092 (0.011 - 0.257)	0.152 (0.030 - 0.363)	0.123 (0.035 - 0.243)	0.147 (0.031 - 0.303)
Total Inorganic Nitrogen (mg/L)		0.19 (0.08 - 0.41)	0.32 (0.14 - 0.59)	0.32 (0.19 - 0.49)	0.32 (0.13 - 0.49)
Total Kjeldahl Nitrogen (mg/L)		0.20 (0.14 - 0.37)	0.29 (0.20 - 0.41)	0.31 (0.20 - 0.49)	0.27 (0.17 - 0.43)
Total Nitrogen (mg/L)		0.32 (0.17 - 0.57)	0.48 (0.29 - 0.72)	0.47 (0.31 - 0.67)	0.46 (0.29 - 0.65)
Orthophosphate Phosphorus (mg/L)		0.017 (0.008 - 0.044)	0.025 (0.015 - 0.048)	0.028 (0.017 - 0.047)	0.026 (0.014 - 0.050)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.05)	0.04 (0.03 - 0.07)	0.05 (0.03 - 0.07)	0.04 (0.03 - 0.06)
Silica (as SiO_2) (mg/L)		0.9 (0.1 - 1.6)	1.1 (0.1 - 2.2)	1.02 (0.1 - 1.8)	1.1 (0.1 - 2.1)
Chlorophyll-*a* (µg/L)		3.5 (0.3 - 12.3)	3.0 (0.3 - 11.0)	2.3 (0.3 - 8.6)	2.9 (0.3 - 14.0)
E.coli (count/100mL)		250 (7 - 2900)	960 (12 - 5900)	3800 (490 - 30000)	1300 (110 - 4300)
Faecal Coliforms (count/100mL)		500 (22 - 5200)	2100 (38 - 19000)	11000 (840 - 110000)	3100 (270 - 15000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Junk Bay WCZ in 2007

Parameter	Junk Bay JM3	Junk Bay JM4
Number of samples	12	12
Temperature (°C)	23.1 (17.1 - 27.7)	22.9 (17.1 - 27.8)
Salinity	32.6 (30.9 - 34.0)	32.8 (31.5 - 34.0)
Dissolved Oxygen (mg/L)	6.2 (4.5 - 8.0)	5.9 (4.0 - 8.0)
Bottom	5.8 (3.9 - 8.0)	5.5 (3.2 - 8.0)
Dissolved Oxygen (% Saturation)	87 (66 - 102)	83 (59 - 101)
Bottom	81 (57 - 102)	77 (45 - 101)
pH	8.1 (7.6 - 8.3)	8.1 (7.7 - 8.3)
Secchi Disc Depth (m)	2.3 (1.5 - 3.0)	2.2 (1.5 - 3.0)
Turbidity (NTU)	13.7 (7.8 - 39.2)	12.9 (8.1 - 39.0)
Suspended Solids (mg/L)	3.4 (1.2 - 11.6)	3.3 (1.3 - 8.0)
5-day Biochemical Oxygen Demand (mg/L)	0.9 (0.2 - 2.4)	0.9 (0.3 - 1.8)
Ammonia Nitrogen (mg/L)	0.07 (0.05 - 0.09)	0.07 (0.04 - 0.11)
Unionised Ammonia (mg/L)	0.003 (0.001 - 0.007)	0.003 (0.001 - 0.006)
Nitrite Nitrogen (mg/L)	0.015 (0.002 - 0.027)	0.015 (0.002 - 0.024)
Nitrate Nitrogen (mg/L)	0.076 (0.014 - 0.173)	0.074 (0.013 - 0.197)
Total Inorganic Nitrogen (mg/L)	0.16 (0.06 - 0.25)	0.16 (0.06 - 0.30)
Total Kjeldahl Nitrogen (mg/L)	0.23 (0.13 - 0.32)	0.21 (0.13 - 0.29)
Total Nitrogen (mg/L)	0.32 (0.15 - 0.43)	0.30 (0.15 - 0.46)
Orthophosphate Phosphorus (mg/L)	0.016 (0.006 - 0.027)	0.017 (0.006 - 0.034)
Total Phosphorus (mg/L)	0.04 (0.02 - 0.05)	0.04 (0.02 - 0.05)
Silica (as SiO_2) (mg/L)	0.7 (0.2 - 1.5)	0.7 (0.2 - 1.4)
Chlorophyll-*a* (µg/L)	4.3 (0.8 - 17.7)	3.5 (0.8 - 13.3)
E.coli (count/100mL)	89 (8 - 550)	200 (56 - 510)
Faecal Coliforms (count/100mL)	280 (35 - 1700)	540 (160 - 2000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for the Deep Bay WCZ in 2007

Parameter		Inner Deep Bay DM1	Inner Deep Bay DM2	Inner Deep Bay DM3	Outer Deep Bay DM4	Outer Deep Bay DM5
Number of samples		12	12	12	12	12
Temperature (°C)		24.7 (15.1 - 32.3)	24.8 (15.1 - 32.4)	24.6 (16.2 - 31.6)	24.5 (16.7 - 30.4)	24.4 (17.0 - 29.6)
Salinity		17.1 (2.5 - 23.8)	19.1 (5.8 - 26.8)	22.9 (8.8 - 30.1)	24.1 (11.4 - 31.4)	26.1 (10.3 - 32.8)
Dissolved Oxygen (mg/L)		3.8 (0.2 - 7.1)	5.3 (1.6 - 10.2)	6.4 (2.7 - 10.4)	6.6 (3.3 - 9.9)	6.7 (3.5 - 11.1)
	Bottom	N.M.	N.M.	N.M.	6.2 (3.3 - 8.8)	6.2 (3.2 - 8.8)
Dissolved Oxygen (% Saturation)		49 (3 - 81)	70 (21 - 121)	86 (39 - 127)	90 (46 - 138)	92 (51 - 161)
	Bottom	N.M.	N.M.	N.M.	85 (47 - 122)	86 (46 - 122)
pH		7.1 (6.5 - 7.9)	7.3 (6.6 - 8.3)	7.5 (6.7 - 8.5)	7.6 (6.8 - 8.6)	7.8 (6.9 - 9.3)
Secchi Disc Depth (m)		0.3 (0.1 - 0.8)	0.4 (0.1 - 0.5)	0.5 (0.2 - 1.2)	0.8 (0.2 - 1.5)	0.8 (0.2 - 1.8)
Turbidity (NTU)		28.5 (15.1 - 37.2)	25.6 (16.7 - 41.8)	19.3 (10.6 - 35.6)	18.5 (9.3 - 32.4)	21.3 (10.5 - 65.2)
Suspended Solids (mg/L)		20.7 (7.4 - 32.0)	19.7 (10.0 - 40.0)	13.4 (4.3 - 36.0)	8.1 (2.2 - 13.5)	7.4 (4.3 - 11.5)
5-day Biochemical Oxygen Demand (mg/L)		3.8 (2.1 - 8.0)	3.6 (1.7 - 6.3)	2.3 (0.4 - 6.2)	1.3 (0.6 - 3.9)	1.5 (0.5 - 6.4)
Ammonia Nitrogen (mg/L)		5.62 (1.90 - 10.00)	3.74 (1.70 - 6.10)	0.84 (0.26 - 1.90)	0.44 (0.10 - 0.95)	0.21 (0.04 - 0.45)
Unionised Ammonia (mg/L)		0.057 (0.013 - 0.160)	0.058 (0.009 - 0.231)	0.017 (0.001 - 0.052)	0.011 (0.002 - 0.024)	0.007 (0.001 - 0.017)
Nitrite Nitrogen (mg/L)		0.256 (0.008 - 0.730)	0.305 (0.150 - 0.720)	0.210 (0.110 - 0.460)	0.163 (0.060 - 0.425)	0.120 (0.027 - 0.343)
Nitrate Nitrogen (mg/L)		0.259 (0.003 - 0.510)	0.308 (0.100 - 0.580)	0.539 (0.240 - 1.200)	0.561 (0.190 - 1.250)	0.459 (0.092 - 1.003)
Total Inorganic Nitrogen (mg/L)		6.13 (2.62 - 10.02)	4.36 (2.63 - 6.41)	1.59 (1.10 - 2.48)	1.16 (0.63 - 1.61)	0.79 (0.24 - 1.42)
Total Kjeldahl Nitrogen (mg/L)		7.10 (2.30 - 15.00)	4.89 (2.10 - 8.50)	1.28 (0.60 - 2.60)	0.71 (0.47 - 1.11)	0.46 (0.24 - 0.78)
Total Nitrogen (mg/L)		7.61 (3.02 - 15.02)	5.51 (3.03 - 8.81)	2.03 (1.36 - 3.19)	1.43 (0.91 - 1.83)	1.04 (0.44 - 1.70)
Orthophosphate Phosphorus (mg/L)		0.549 (0.300 - 0.880)	0.405 (0.260 - 0.720)	0.140 (0.037 - 0.310)	0.068 (0.006 - 0.120)	0.039 (0.006 - 0.080)
Total Phosphorus (mg/L)		0.73 (0.38 - 1.30)	0.55 (0.35 - 0.95)	0.20 (0.09 - 0.39)	0.10 (0.07 - 0.15)	0.07 (0.04 - 0.11)
Silica (as SiO_2) (mg/L)		5.8 (1.6 - 10.0)	4.5 (0.3 - 7.7)	2.7 (0.1 - 5.8)	2.6 (0.3 - 5.7)	2.2 (0.1 - 5.9)
Chlorophyll-*a* (µg/L)		18.7 (1.1 - 58.0)	22.6 (2.2 - 67.0)	14.4 (1.7 - 59.0)	8.5 (1.0 - 41.0)	8.3 (0.9 - 42.0)
E.coli (count/100mL)		5000 (80 - 220000)	1200 (150 - 35000)	38 (7 - 1300)	120 (8 - 900)	180 (10 - 2200)
Faecal Coliforms (count/100mL)		8100 (200 - 330000)	2200 (260 - 83000)	83 (15 - 2700)	240 (32 - 1200)	420 (41 - 3000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.
3. Data in brackets indicate the ranges.
4. NM - not measured.

Summary of water quality statistics for the North Western WCZ in 2007

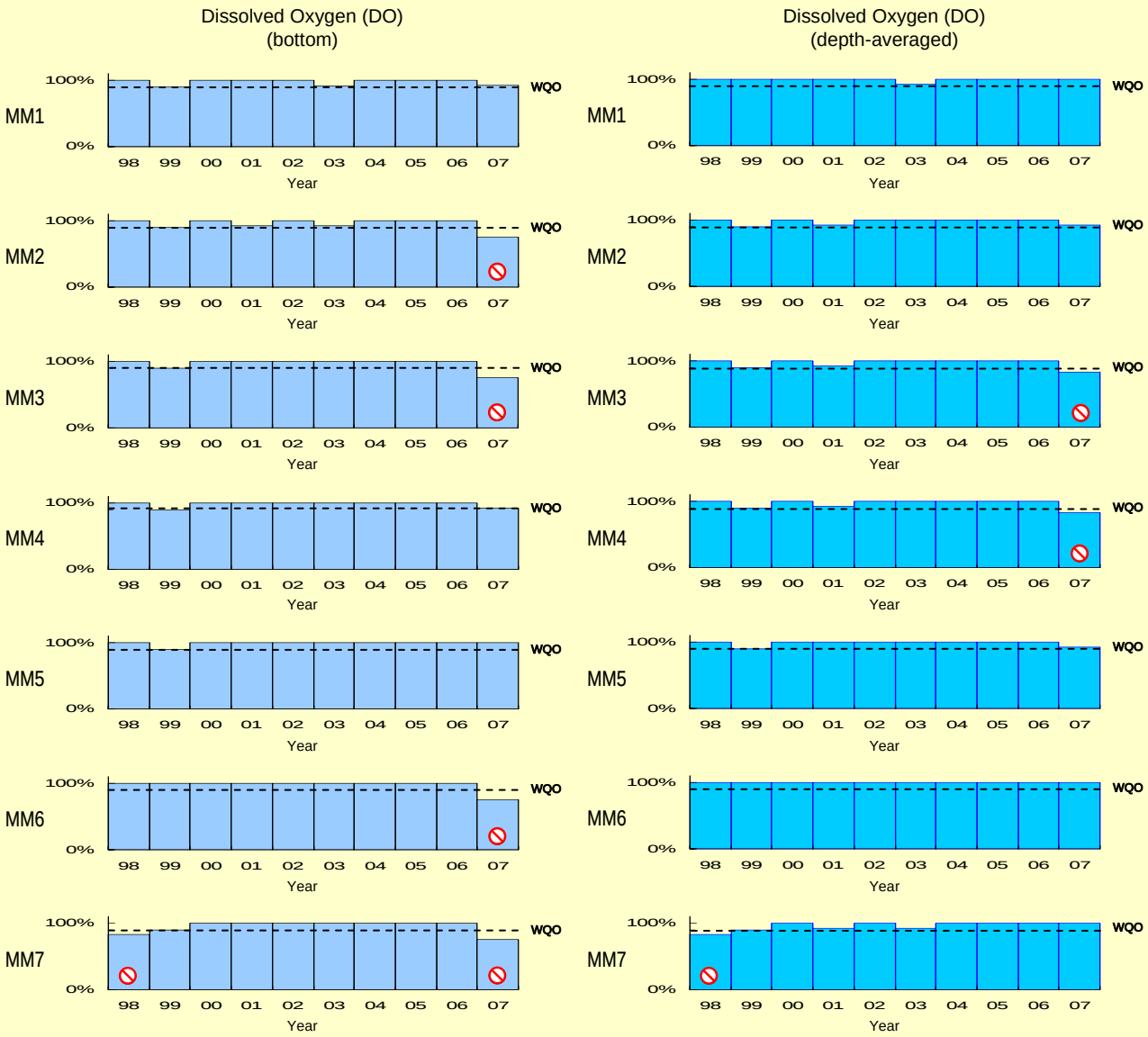
Parameter		Lantau Island (North) NM1	Pearl Island NM2	Pillar Point NM3	Urmston Road NM5	Chek Lap Kok (North) NM6	Chek Lap Kok (West) NM8
Number of samples		12	12	12	12	12	12
Temperature (°C)		23.0 (17.2 - 27.8)	23.4 (17.3 - 28.4)	23.2 (17.3 - 28.2)	23.4 (17.3 - 28.3)	23.8 (17.3 - 30.3)	23.6 (17.1 - 30.6)
Salinity		30.9 (26.1 - 33.1)	29.5 (18.8 - 33.1)	30.1 (24.9 - 33.1)	28.6 (23.0 - 33.0)	27.5 (12.0 - 33.0)	28.9 (9.7 - 33.5)
Dissolved Oxygen (mg/L)		5.7 (3.5 - 9.2)	6.0 (3.3 - 9.7)	5.8 (3.2 - 9.6)	5.7 (3.0 - 9.3)	6.4 (3.2 - 10.0)	6.8 (3.7 - 9.8)
	Bottom	5.4 (2.7 - 9.2)	5.7 (3.0 - 9.6)	5.5 (2.5 - 9.7)	5.4 (2.1 - 9.2)	6.4 (2.4 - 10)	6.5 (2.4 - 9.3)
Dissolved Oxygen (% Saturation)		79 (49 - 116)	83 (46 - 123)	80 (45 - 122)	78 (43 - 117)	89 (44 - 127)	94 (52 - 123)
	Bottom	75 (39 - 116)	79 (43 - 121)	76 (35 - 123)	74 (30 - 116)	88 (34 - 126)	90 (35 - 118)
pH		8.0 (7.4 - 8.3)	8.0 (7.5 - 8.4)	8.0 (7.5 - 8.4)	8.0 (7.5 - 8.4)	8.0 (7.5 - 8.5)	8.1 (7.5 - 8.4)
Secchi Disc Depth (m)		1.8 (0.8 - 3.5)	1.6 (1.1 - 2.6)	1.6 (1.0 - 2.3)	1.4 (0.8 - 2.0)	1.4 (1.0 - 2.0)	1.3 (0.5 - 2.0)
Turbidity (NTU)		14.9 (4.3 - 28.2)	12.5 (4.3 - 17.4)	13.5 (4.2 - 17.3)	19.2 (4.2 - 39.7)	15.4 (4.2 - 26.5)	19.9 (4.2 - 49.7)
Suspended Solids (mg/L)		8.2 (2.3 - 14.7)	5.8 (1.8 - 9.3)	7.4 (3.9 - 11.7)	11.1 (4.3 - 18.7)	10.0 (3.5 - 27.7)	11.6 (3.5 - 27.7)
5-day Biochemical Oxygen Demand (mg/L)		1.0 (0.4 - 1.9)	1.0 (0.4 - 2.5)	1.1 (0.5 - 2.5)	1.1 (0.5 - 2.7)	1.1 (0.5 - 2.7)	1.1 (0.4 - 2.1)
Ammonia Nitrogen (mg/L)		0.13 (0.05 - 0.21)	0.13 (0.05 - 0.23)	0.15 (0.07 - 0.27)	0.19 (0.09 - 0.28)	0.112 (0.05 - 0.24)	0.07 (0.02 - 0.24)
Unionised Ammonia (mg/L)		0.005 (0.001 - 0.007)	0.006 (0.001 - 0.010)	0.006 (0.001 - 0.012)	0.008 (0.001 - 0.014)	0.006 (0.001 - 0.012)	0.004 (<0.001 - 0.009)
Nitrite Nitrogen (mg/L)		0.050 (0.006 - 0.173)	0.063 (0.008 - 0.207)	0.064 (0.010 - 0.207)	0.090 (0.016 - 0.353)	0.087 (0.006 - 0.373)	0.058 (0.006 - 0.193)
Nitrate Nitrogen (mg/L)		0.207 (0.033 - 0.437)	0.281 (0.034 - 0.910)	0.26 (0.051 - 0.490)	0.36 (0.066 - 0.913)	0.379 (0.037 - 1.267)	0.312 (0.029 - 1.367)
Total Inorganic Nitrogen (mg/L)		0.39 (0.09 - 0.70)	0.48 (0.09 - 1.05)	0.47 (0.13 - 0.87)	0.64 (0.22 - 1.06)	0.58 (0.12 - 1.40)	0.44 (0.07 - 1.48)
Total Kjeldahl Nitrogen (mg/L)		0.30 (0.23 - 0.38)	0.31 (0.22 - 0.41)	0.35 (0.24 - 0.52)	0.40 (0.25 - 0.61)	0.33 (0.17 - 0.47)	0.28 (0.16 - 0.40)
Total Nitrogen (mg/L)		0.56 (0.38 - 0.87)	0.657 (0.31 - 1.29)	0.669 (0.35 - 1.07)	0.852 (0.42 - 1.26)	0.792 (0.28 - 1.69)	0.65 (0.23 - 1.78)
Orthophosphate Phosphorus (mg/L)		0.025 (0.009 - 0.039)	0.024 (0.006 - 0.040)	0.026 (0.007 - 0.044)	0.031 (0.013 - 0.053)	0.021 (0.002 - 0.059)	0.016 (0.003 - 0.036)
Total Phosphorus (mg/L)		0.05 (0.03 - 0.08)	0.05 (0.03 - 0.07)	0.05 (0.04 - 0.08)	0.06 (0.04 - 0.08)	0.05 (0.04 - 0.09)	0.04 (0.03 - 0.07)
Silica (as SiO_2) (mg/L)		1.3 (0.1 - 2.9)	1.5 (0.1 - 4.1)	1.4 (0.1 - 3.5)	1.9 (0.3 - 4.3)	1.9 (0.1 - 5.4)	1.6 (0.1 - 5.8)
Chlorophyll-*a* (μg/L)		5.4 (0.7 - 17.7)	6 (0.7 - 20.7)	5.9 (1.0 - 22.0)	5.5 (1.3 - 23.0)	7.4 (1.2 - 26.3)	8.3 (0.8 - 20.7)
E.coli (count/100mL)		670 (56 - 3100)	360 (49 - 1900)	430 (45 - 2400)	590 (64 - 2200)	18 (1 - 1300)	5 (1 - 170)
Faecal Coliforms (count/100mL)		1500 (160 - 7400)	820 (150 - 5000)	1100 (89 - 19000)	1300 (160 - 3600)	46 (2 - 2400)	12 (1 - 240)

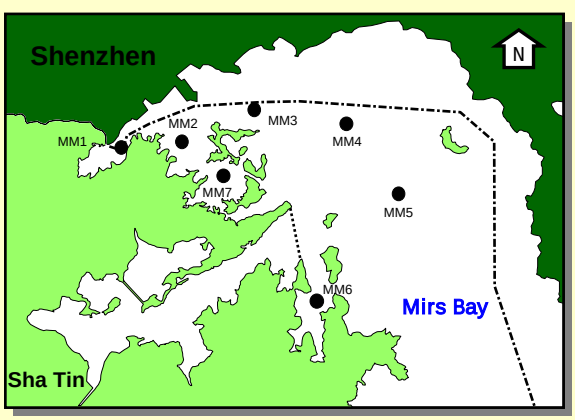
Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ





Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

% sample with bottom DO ≥ 2 mg/L

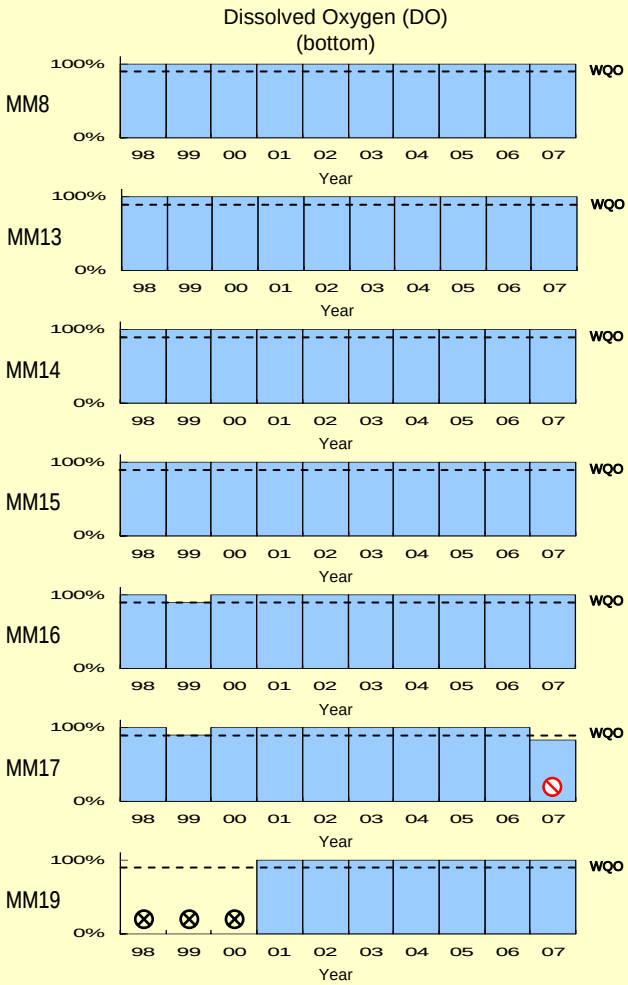
2. Depth-averaged

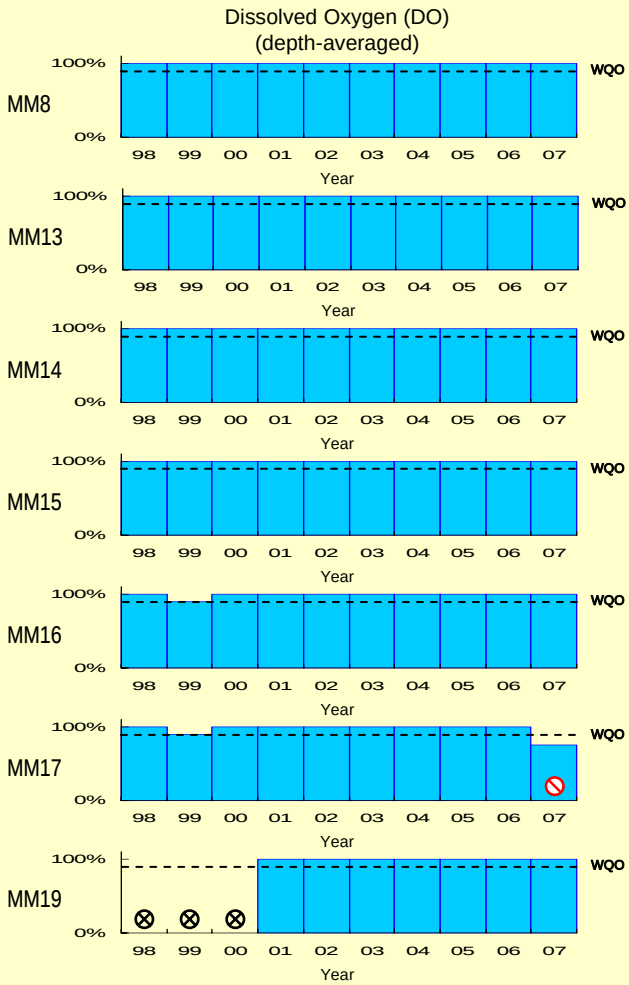
WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

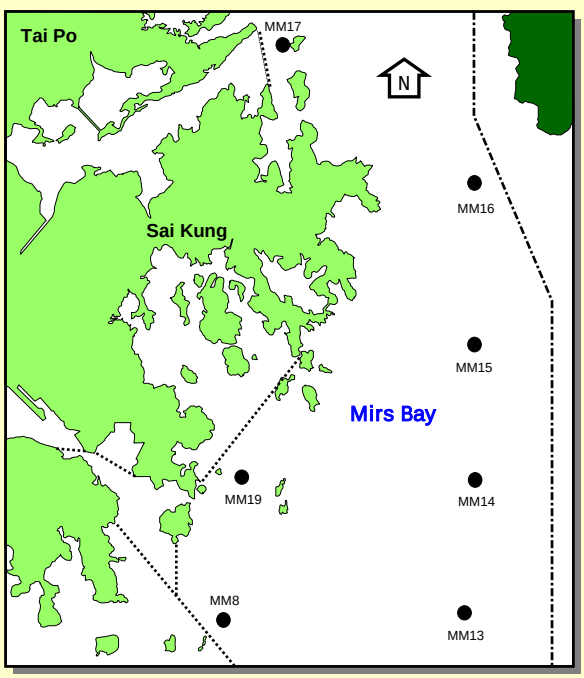
% sample with depth-averaged DO ≥ 4 mg/L

Non-compliance

Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ (continued)







Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

% sample with bottom DO ≥ 2 mg/L

2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

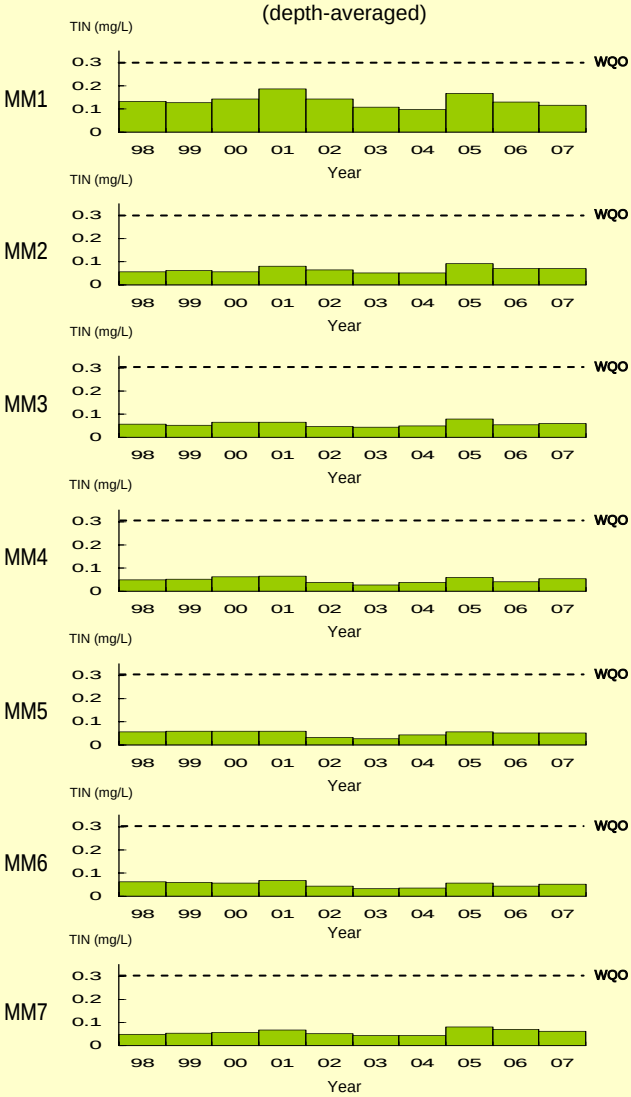
% sample with depth-averaged DO ≥ 4 mg/L

Non-compliance

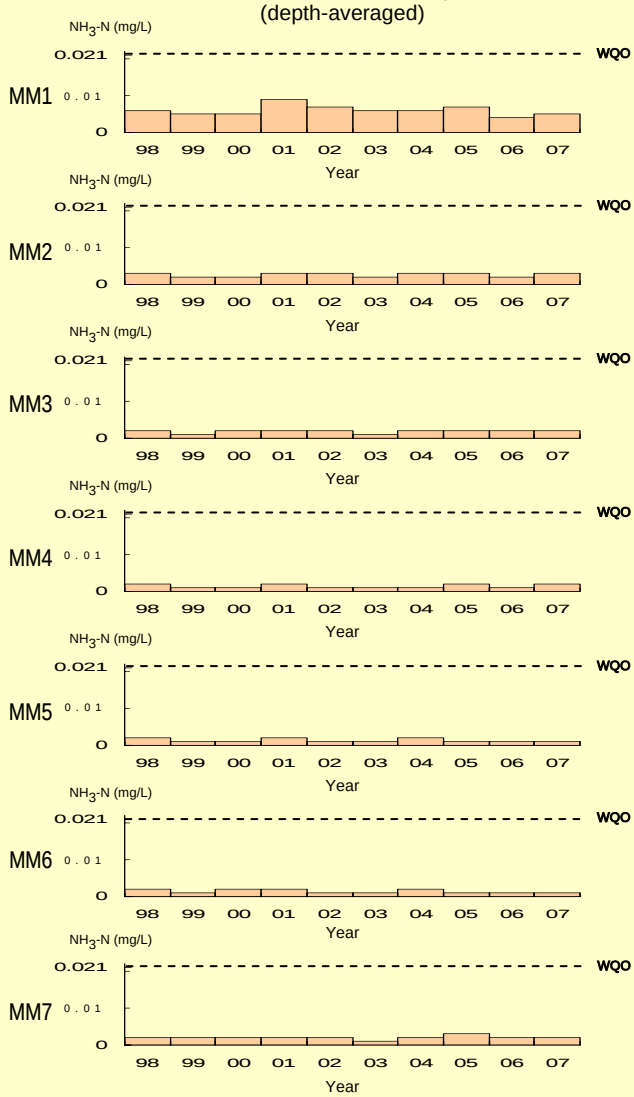
No data ; monitoring has not started

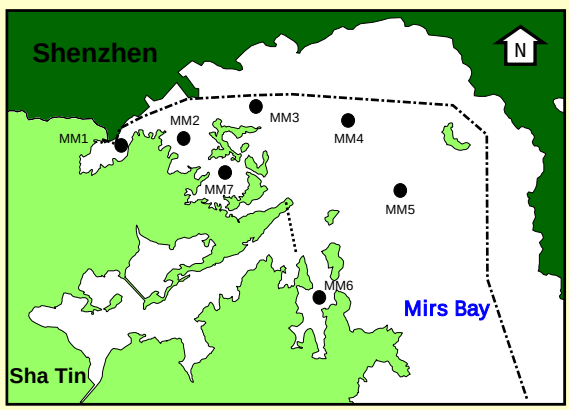
Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



Unionised Ammonia (NH_3-N) (depth-averaged)





Total Inorganic Nitrogen (TIN)

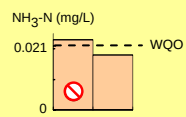
WQO : annual mean for depth-averaged TIN ≤ 0.3 mg/L

annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

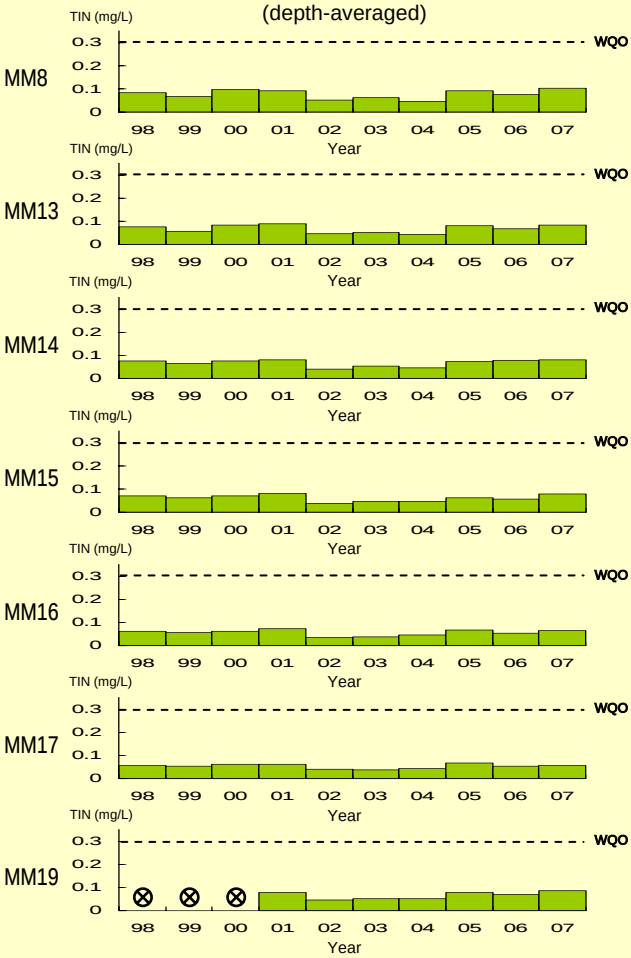
annual mean for depth-averaged NH_3-N



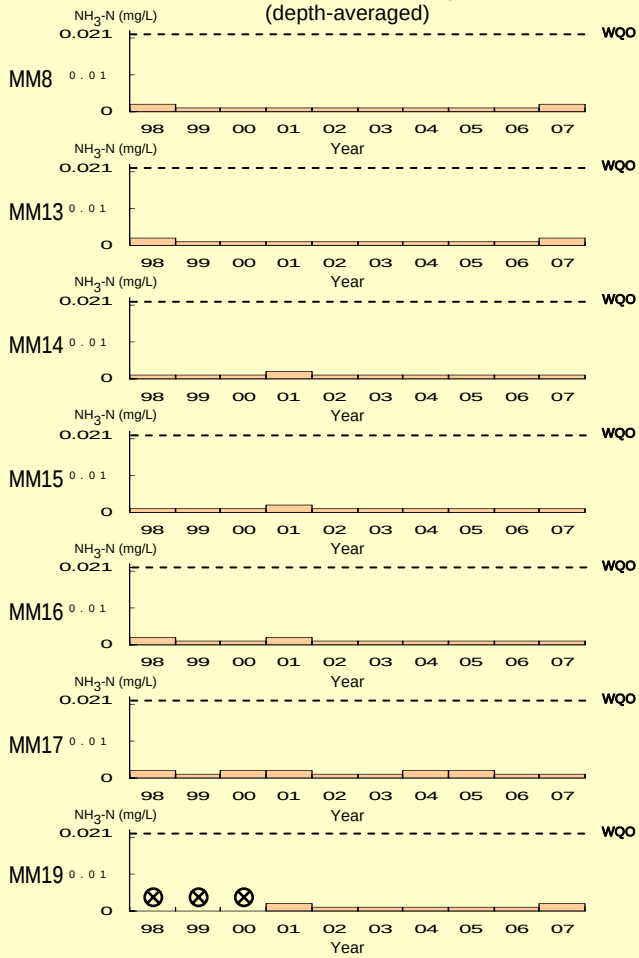
Non-compliance

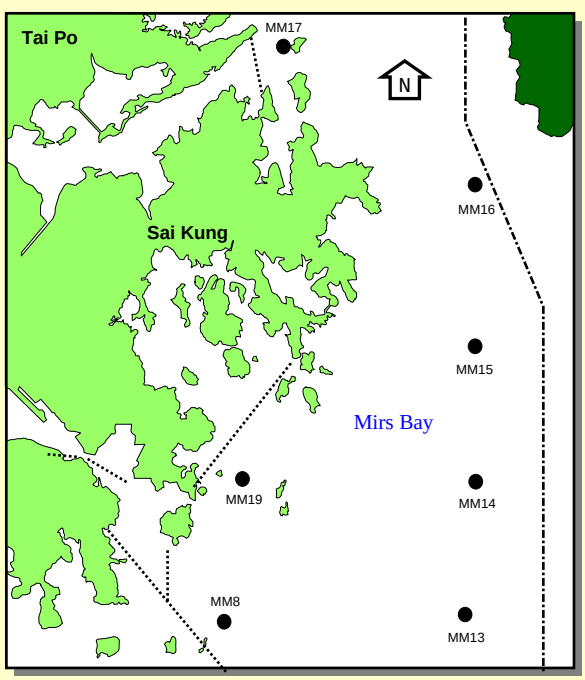
Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



Unionised Ammonia (NH_3-N) (depth-averaged)

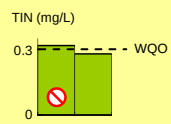




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.3 mg/L

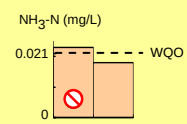
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

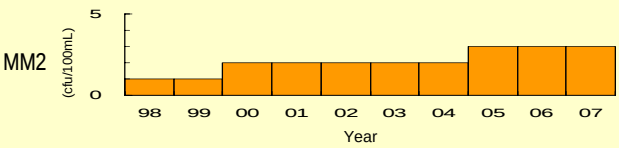


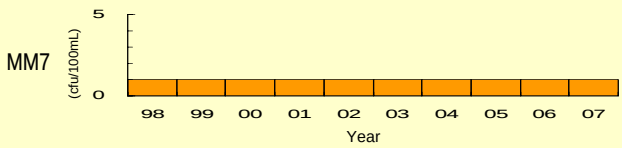
Non-compliance

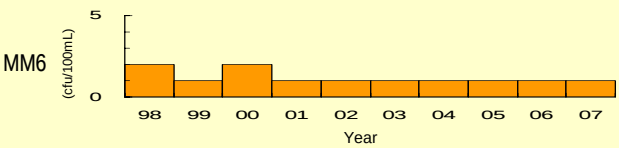
No data ; monitoring has not started

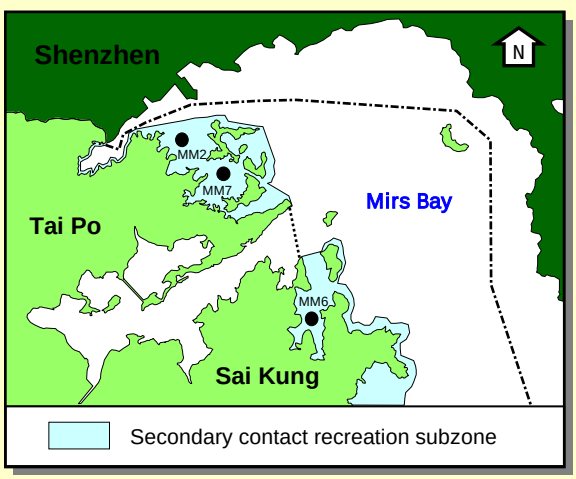
Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ (continued)

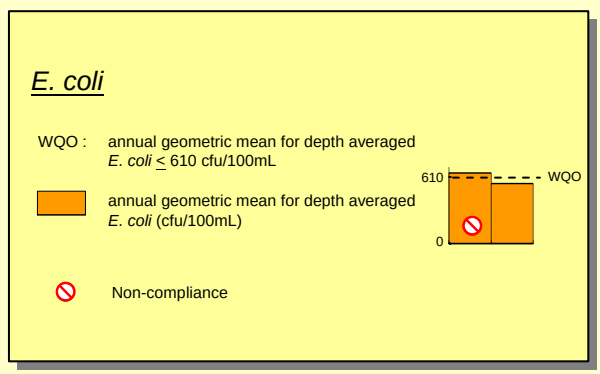
E. coli
(annual geometric mean)





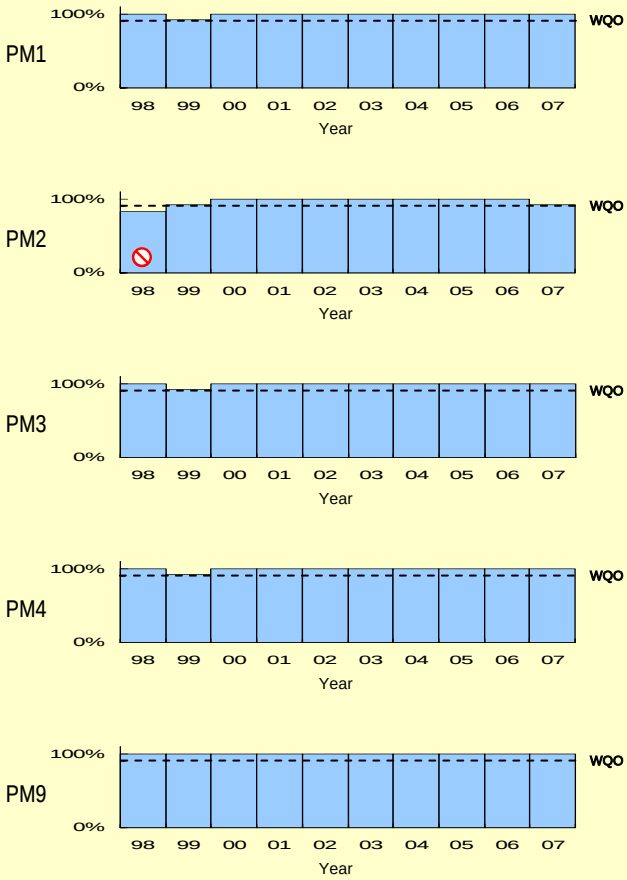




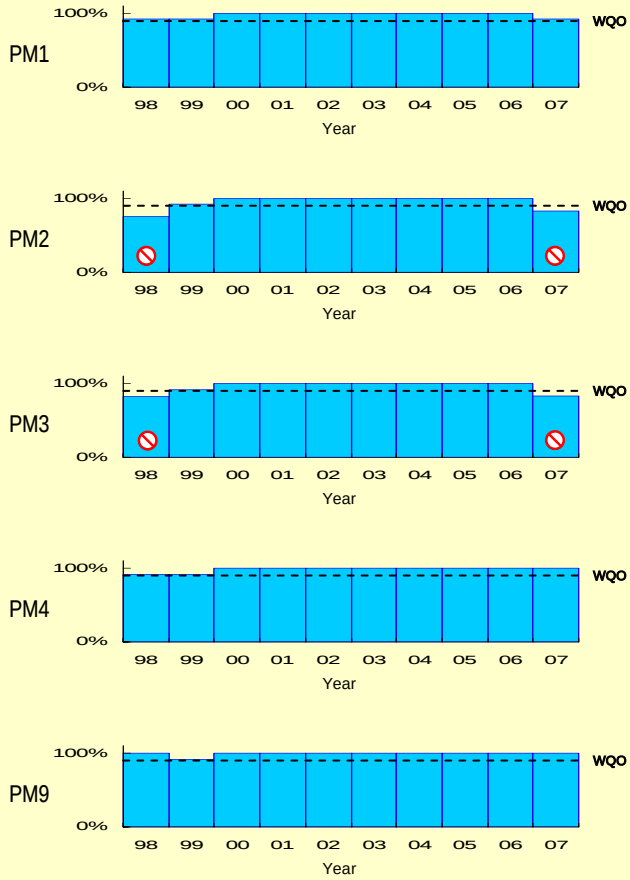


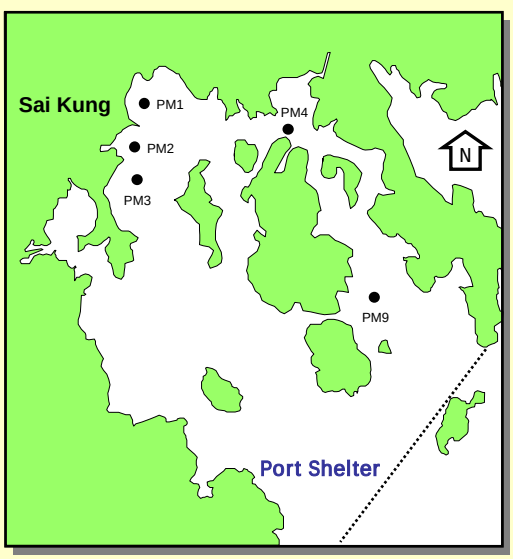
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



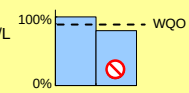


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

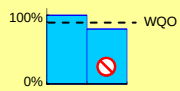
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

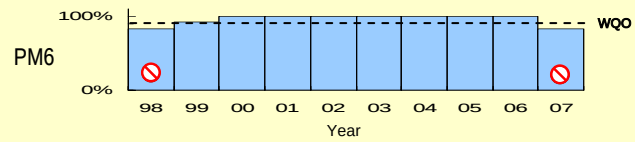
% sample with depth-averaged DO ≥ 4 mg/L

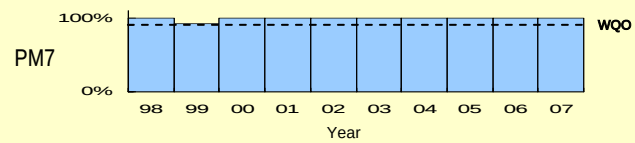


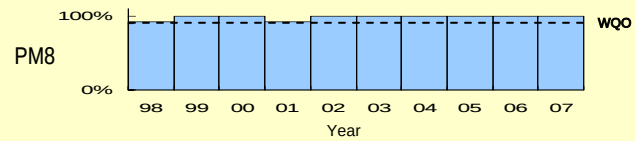
Non-compliance

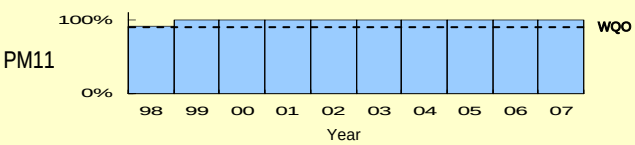
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

Dissolved Oxygen (DO)
(bottom)

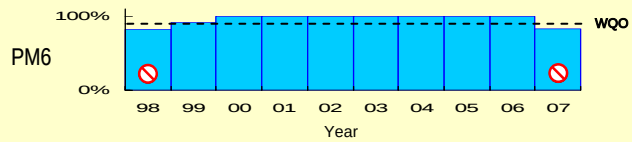


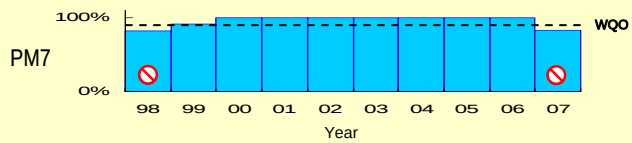


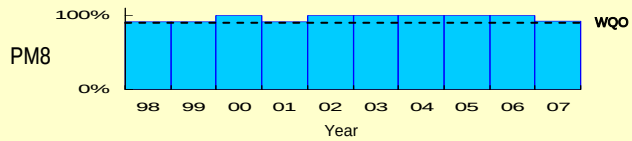


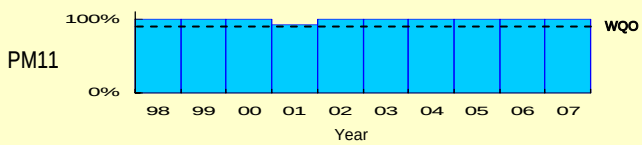


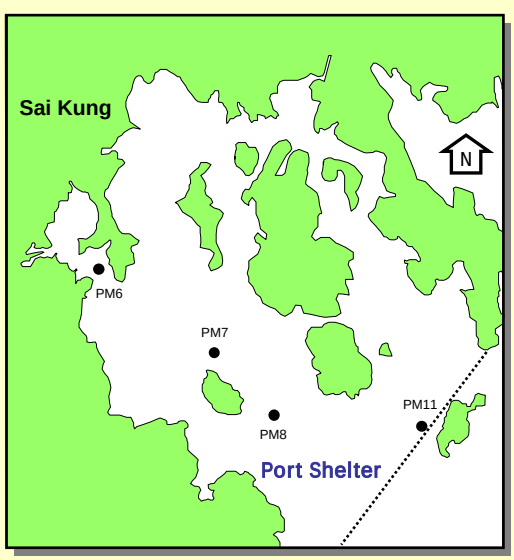
Dissolved Oxygen (DO)
(depth-averaged)









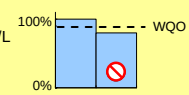


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

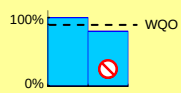
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

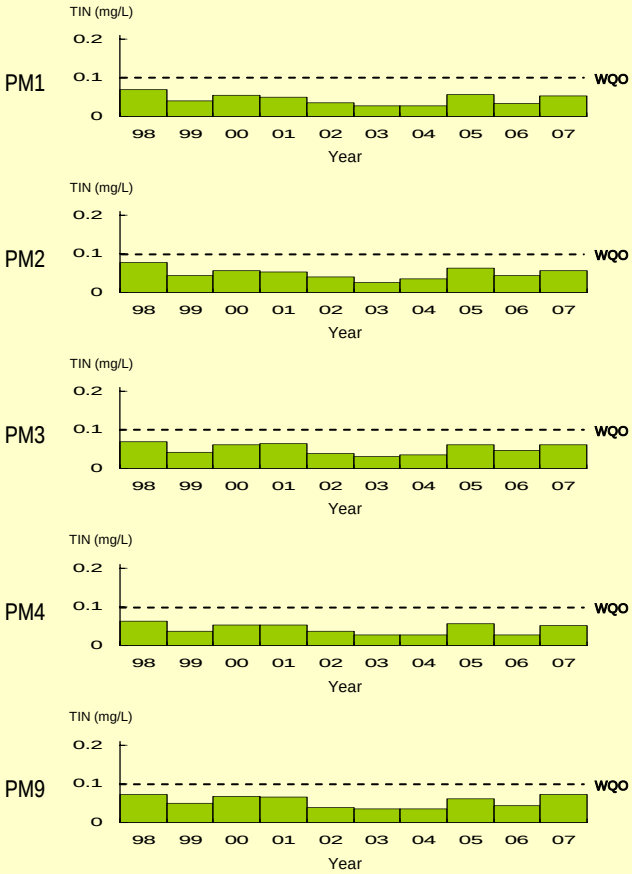
% sample with depth-averaged DO ≥ 4 mg/L



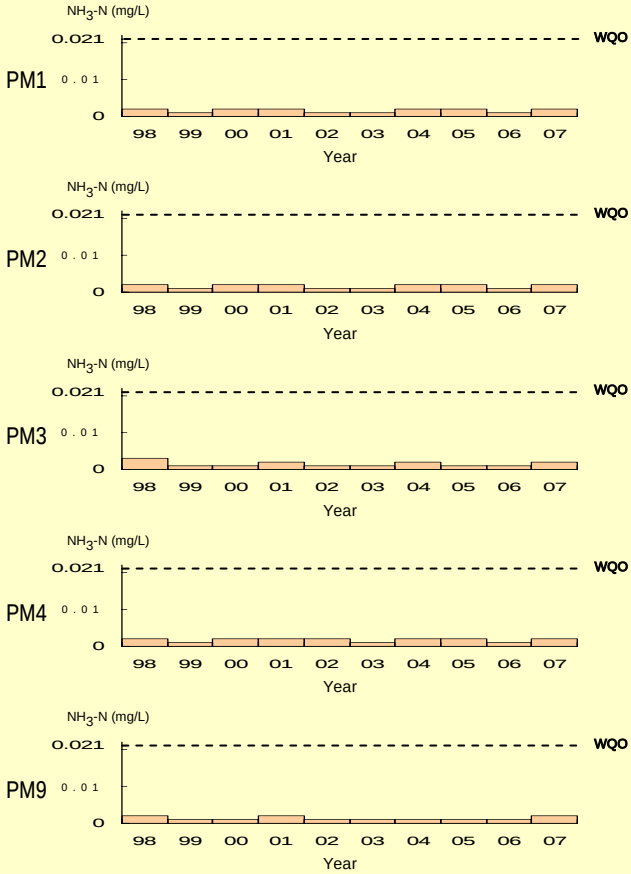
Non-compliance

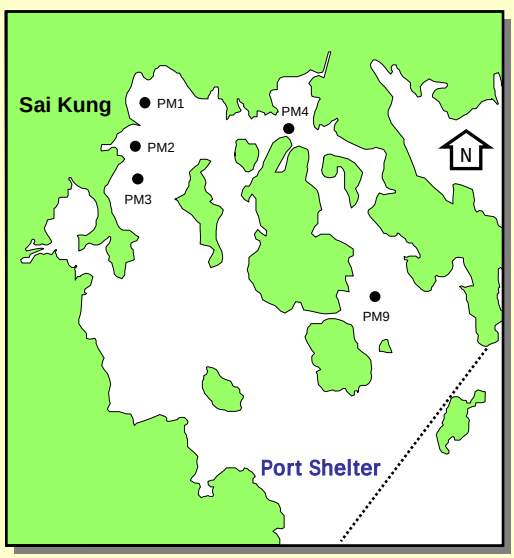
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



Unionised Ammonia (NH_3-N) (depth-averaged)





Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.1 mg/L

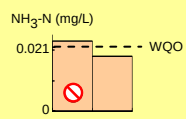
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

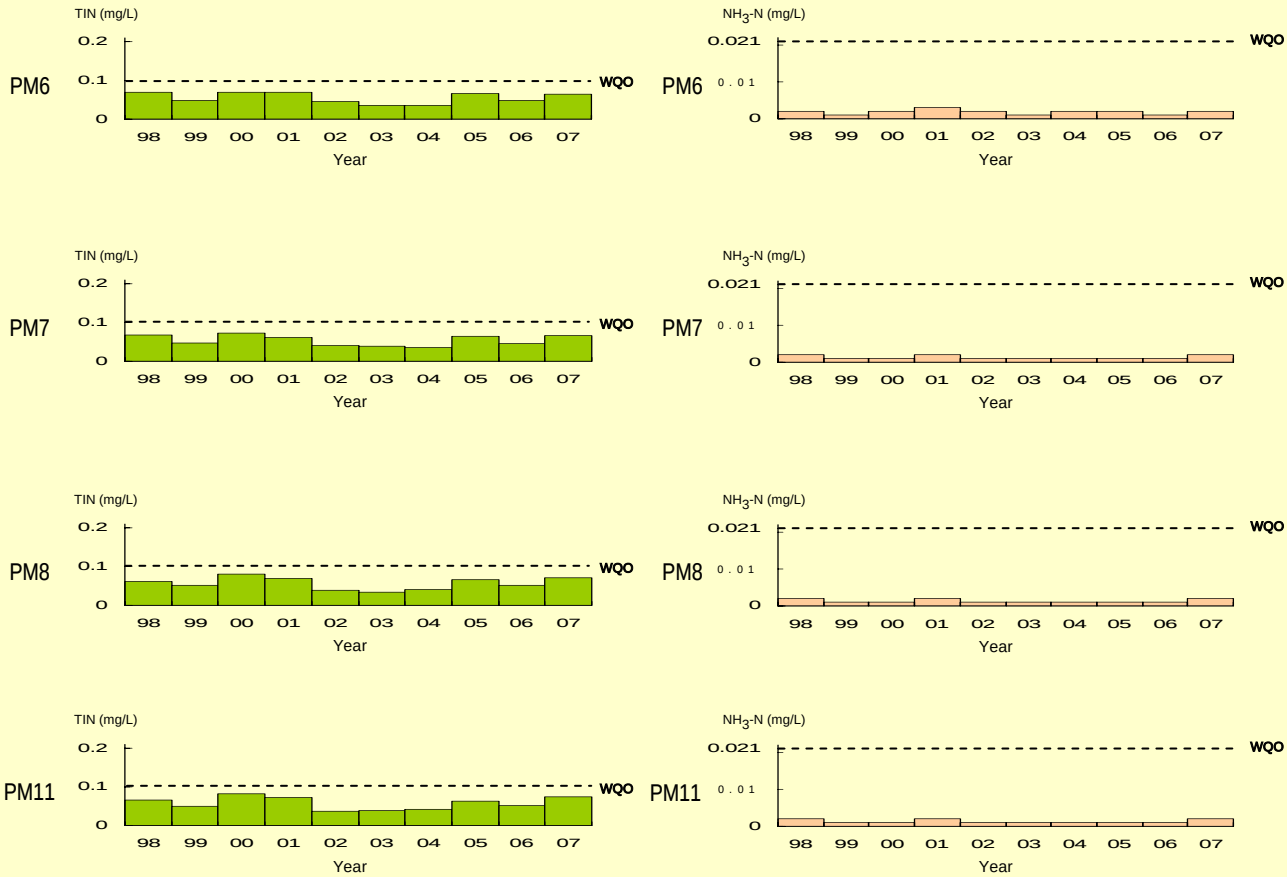
Non-compliance

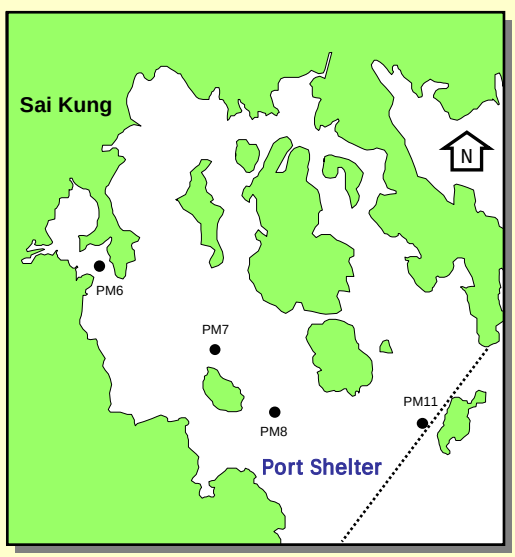


Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)

Unionised Ammonia (NH_3-N) (depth-averaged)

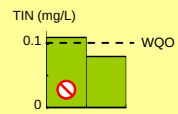




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN $\leq$ 0.1 mg/L

annual mean for depth-averaged TIN

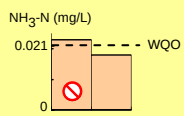


Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N $\leq$ 0.021 mg/L

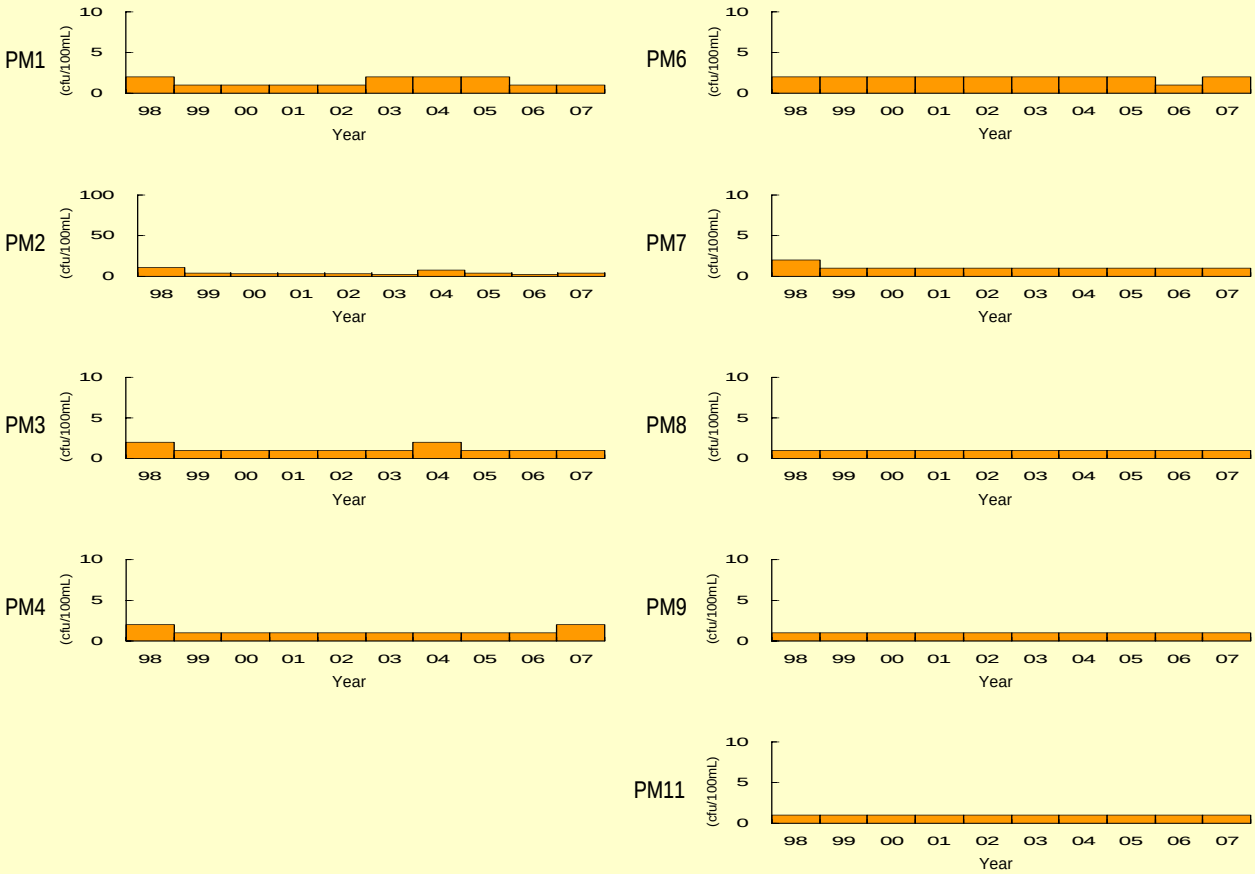
annual mean for depth-averaged NH_3-N

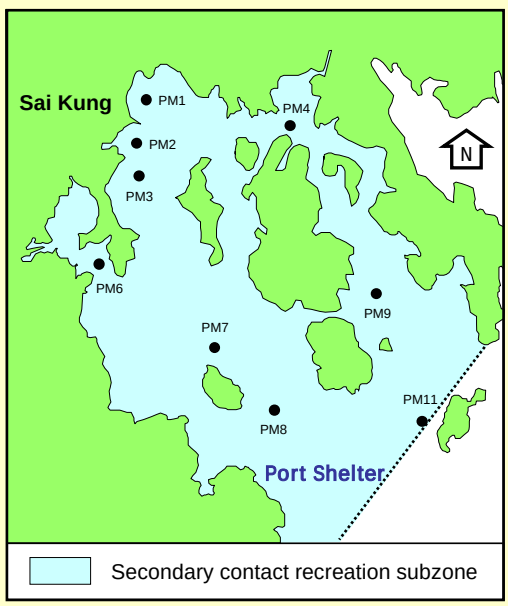
Non-compliance



Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

E. coli
(annual geometric mean)



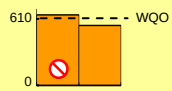


E. coli

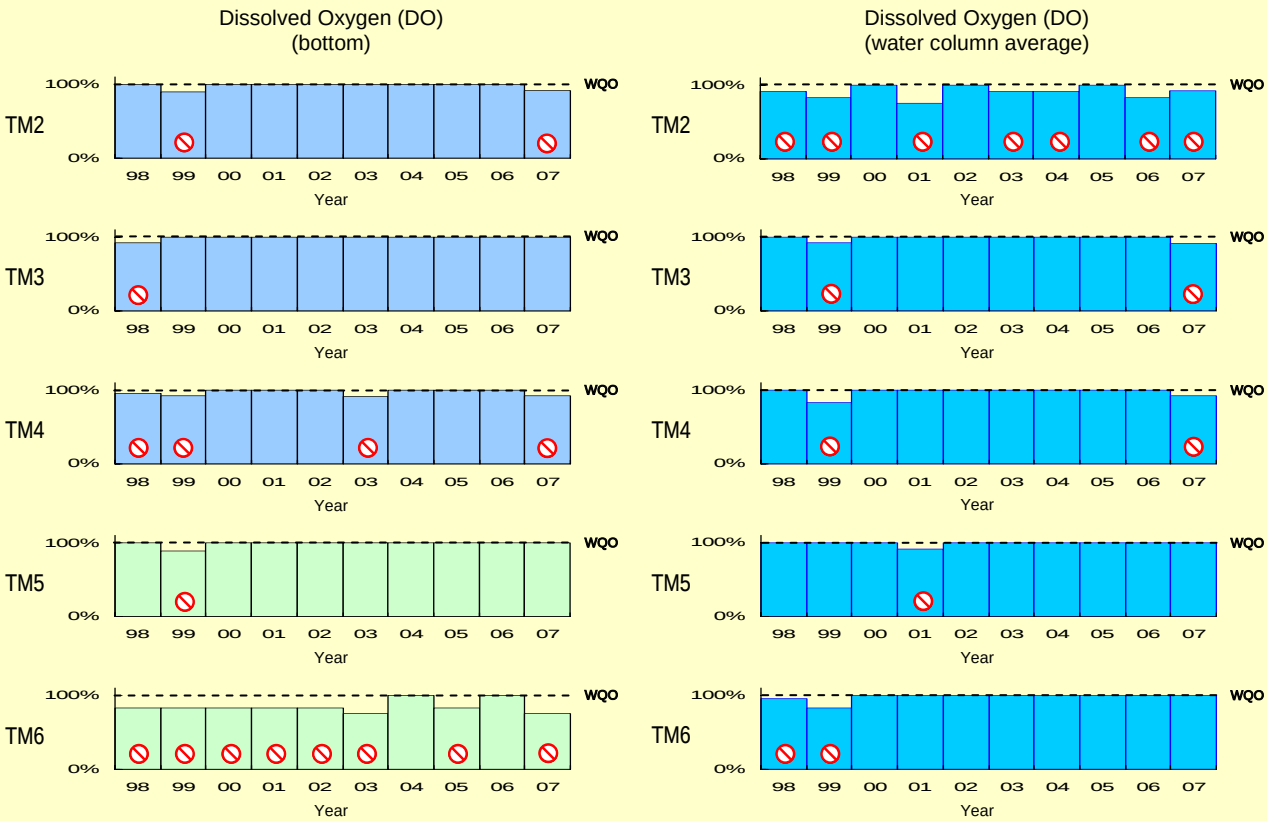
WQO : annual geometric mean for depth averaged *E. coli* ≤ 610 cfu/100mL

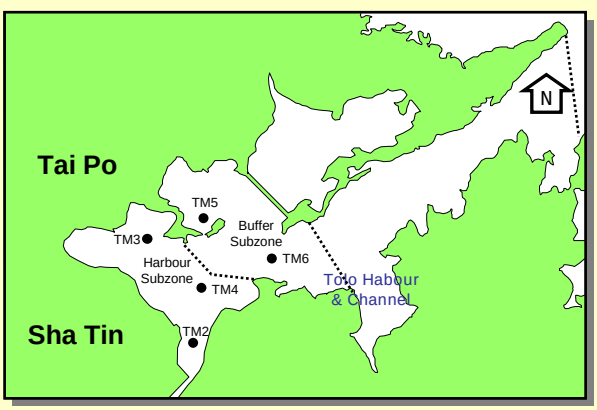
annual geometric mean for depth averaged *E. coli* (cfu/100mL)

Non-compliance



Levels of compliance with key Water Quality Objectives in the Tolo Harbour and Channel WCZ





Dissolved Oxygen (DO)

Harbour Subzone (TM2 - TM4)

1. Bottom

WQO : 100% sample with bottom DO ≥ 2 mg/L

% sample with bottom DO ≥ 2 mg/L

2. Water column average (surface to 2m above bottom)

WQO : 100% sample with water column average DO ≥ 4 mg/L

% sample with water column average DO ≥ 4 mg/L

Buffer Subzone (TM5 - TM6)

1. Bottom

WQO : 100% sample with bottom DO ≥ 3 mg/L

% sample with bottom DO ≥ 3 mg/L

2. Water column average (surface to 2m above bottom)

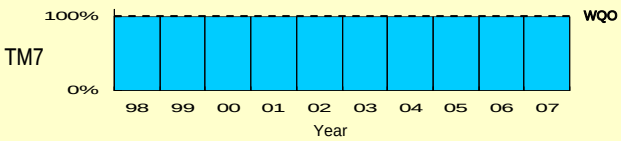
WQO : 100% sample with water column average DO ≥ 4 mg/L

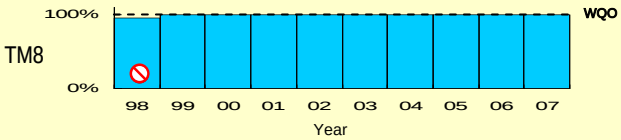
% sample with water column average DO ≥ 4 mg/L

Non-compliance

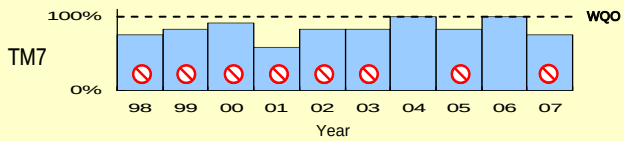
Levels of compliance with key Water Quality Objectives in the Tolo Harbour and Channel WCZ (continued)

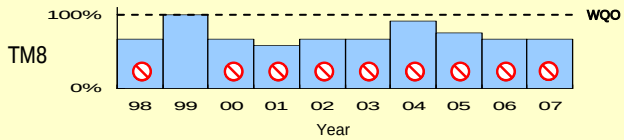
Dissolved Oxygen (DO)
(surface)



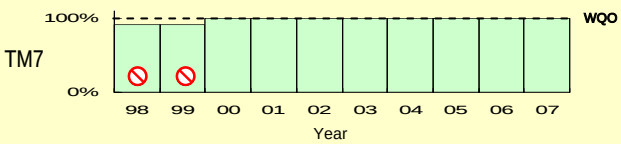


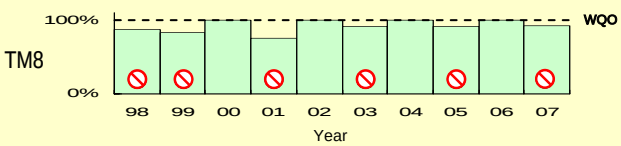
Dissolved Oxygen (DO)
(bottom)

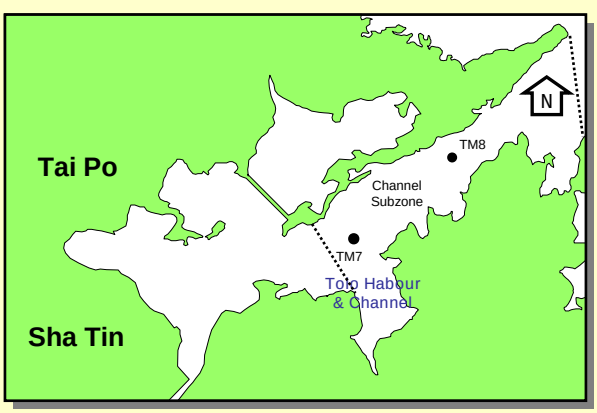




Dissolved Oxygen (DO)
(middle)







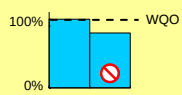
Dissolved Oxygen (DO)

Channel Subzone (TM7 - TM8)

1. Surface

WQO : 100% sample with surface DO ≥ 4 mg/L

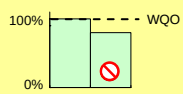
% sample with surface DO ≥ 4 mg/L



2. Middle

WQO : 100% sample with middle DO ≥ 4 mg/L

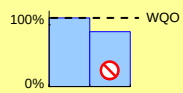
% sample with middle DO ≥ 4 mg/L



3. Bottom

WQO : 100% sample with bottom DO ≥ 4 mg/L

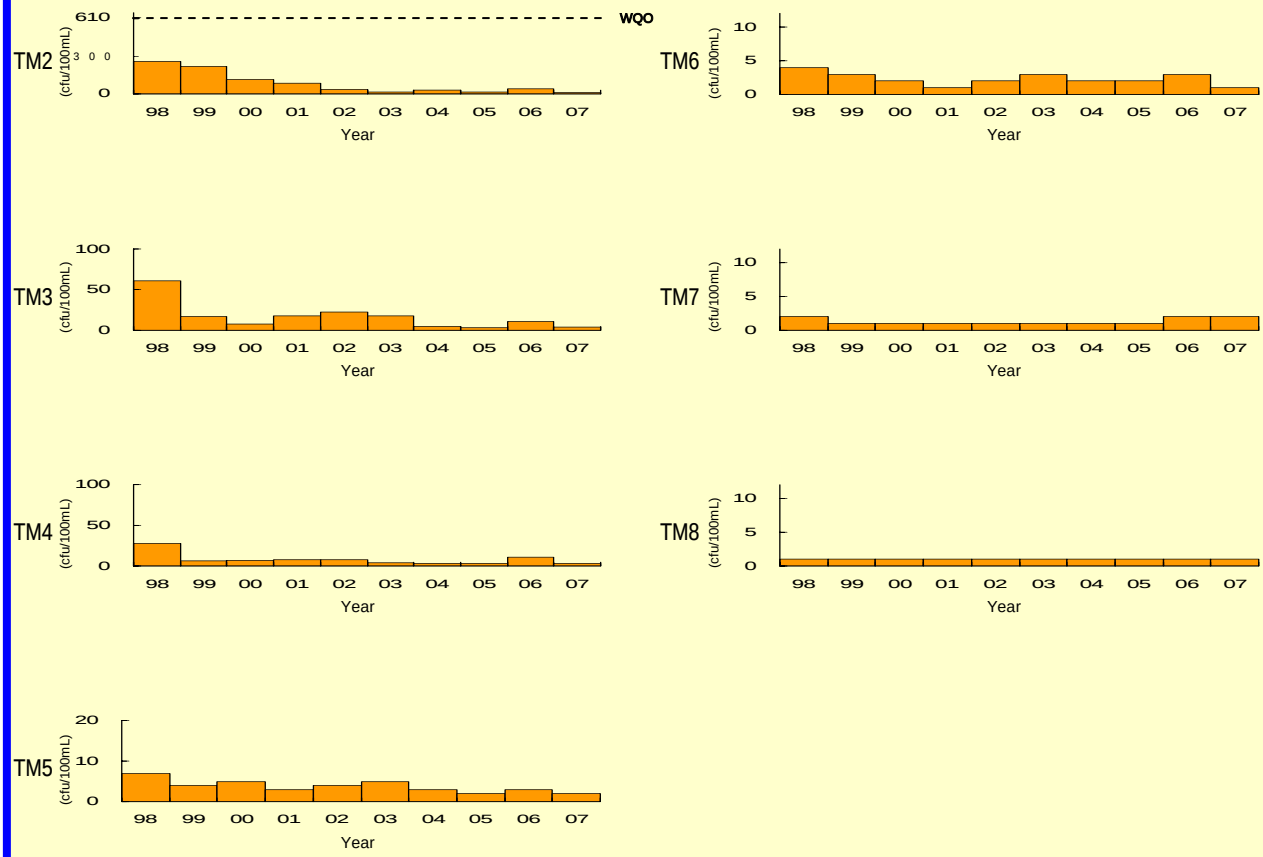
% sample with bottom DO ≥ 4 mg/L

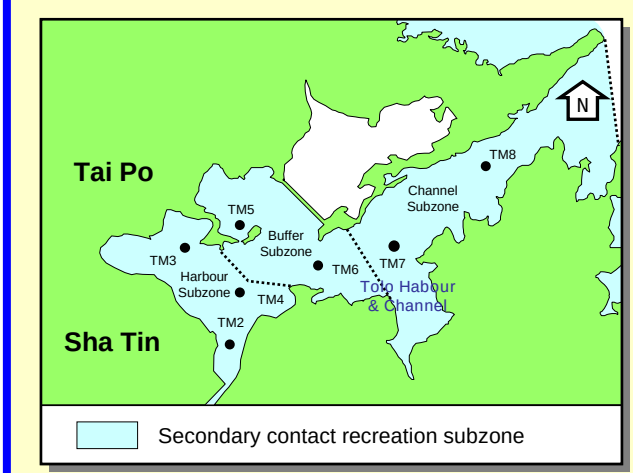


Non-compliance

Levels of compliance with key Water Quality Objectives in the Tolo Harbour And Channel WCZ (continued)

E. coli
(annual geometric mean)



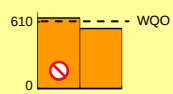


E. coli

WQO : annual geometric mean for depth averaged *E. coli* ≤ 610 cfu/100mL

annual geometric mean for depth averaged *E. coli* (cfu/100mL)

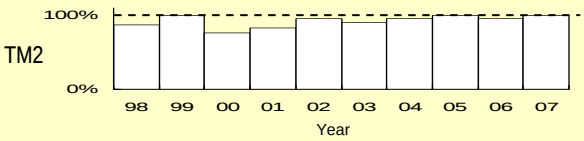
Non-compliance

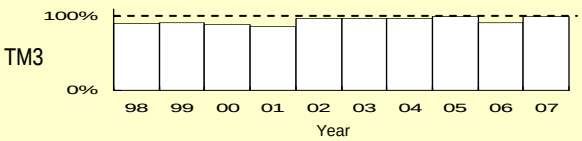


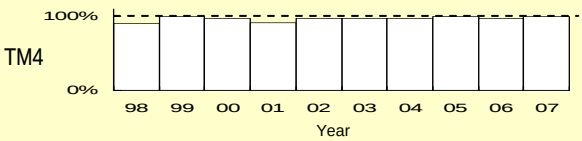
Levels of chlorophyll-*a* in the Tolo Harbour and Channel WCZ

Chlorophyll-*a*

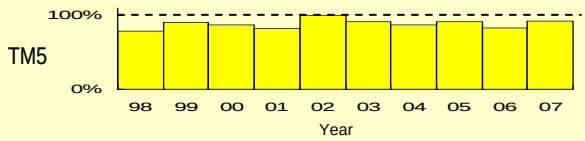
1. Harbour Subzone

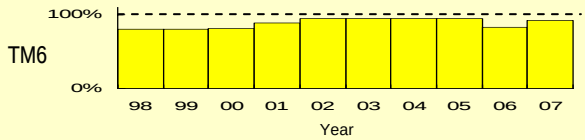




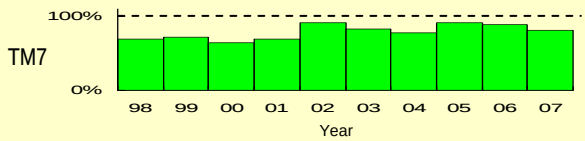


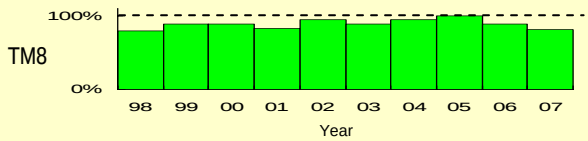
2. Buffer Subzone

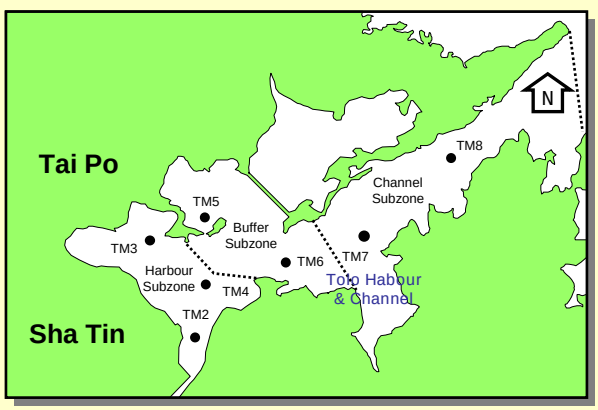




3. Channel Subzone







Chlorophyll-*a*

1. Harbour Subzone

% sample (S, M, B) with Chlorophyll-*a* ≤ 20 μg/L

WQO : Chlorophyll-*a* ≤ 20 μg/L

2. Buffer Subzone

% sample (S, M, B) with Chlorophyll-*a* ≤ 10 μg/L

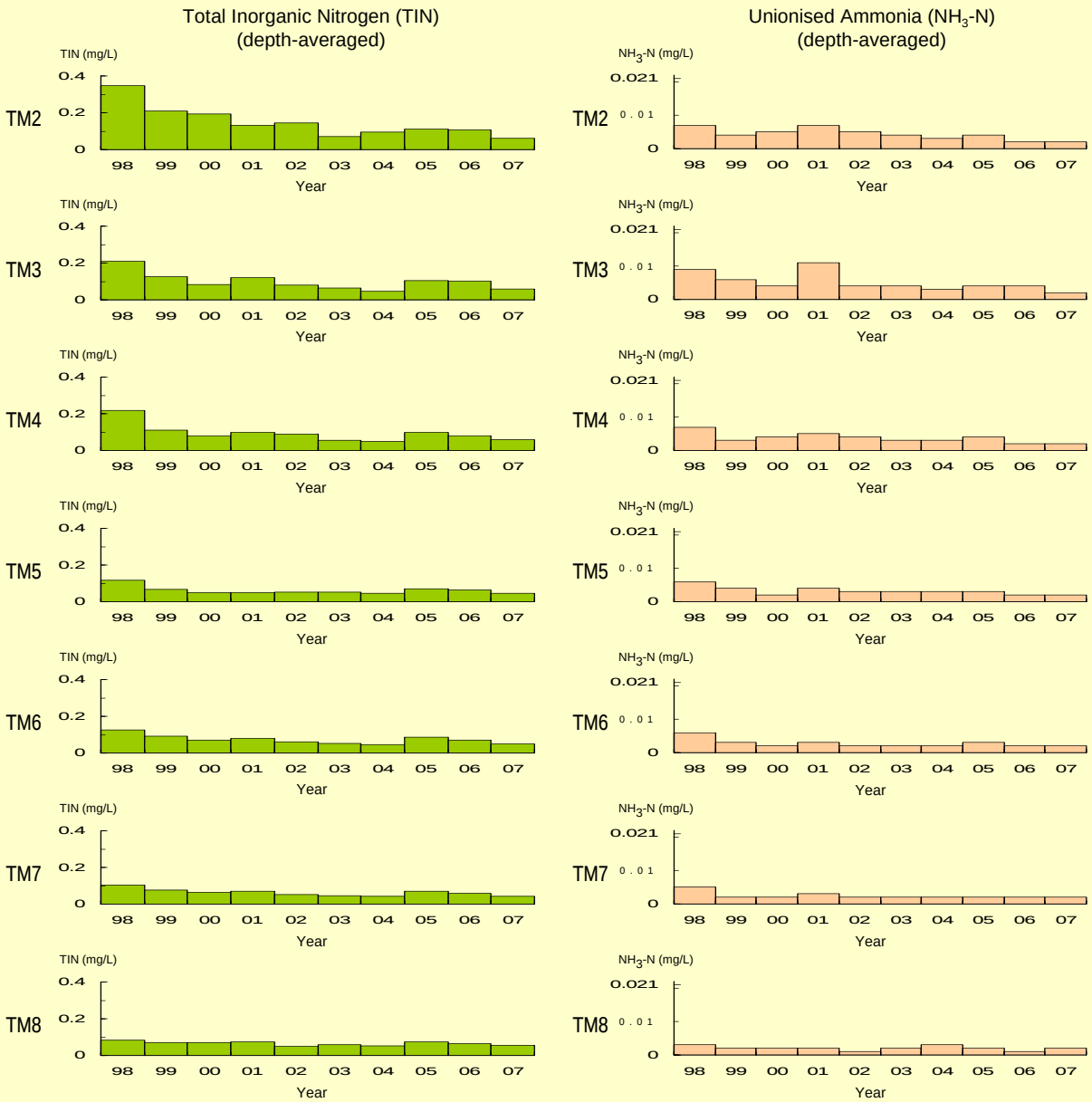
WQO : Chlorophyll-*a* ≤ 10 μg/L

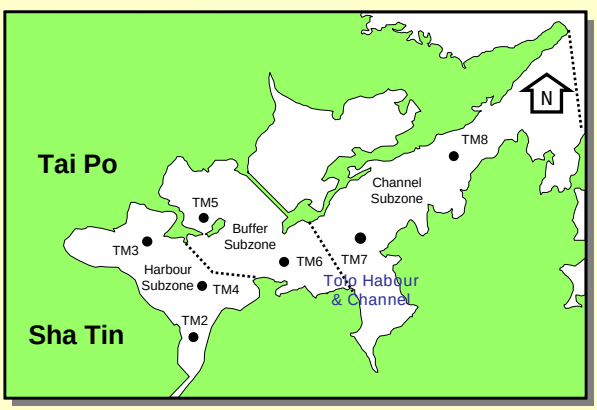
3. Channel Subzone

% sample (S, M, B) with Chlorophyll-*a* ≤ 6 μg/L

WQO : Chlorophyll-*a* ≤ 6 μg/L

Levels of total inorganic nitrogen and unionised ammonia in the Tolo Harbour and Channel WCZ





Total Inorganic Nitrogen (TIN)

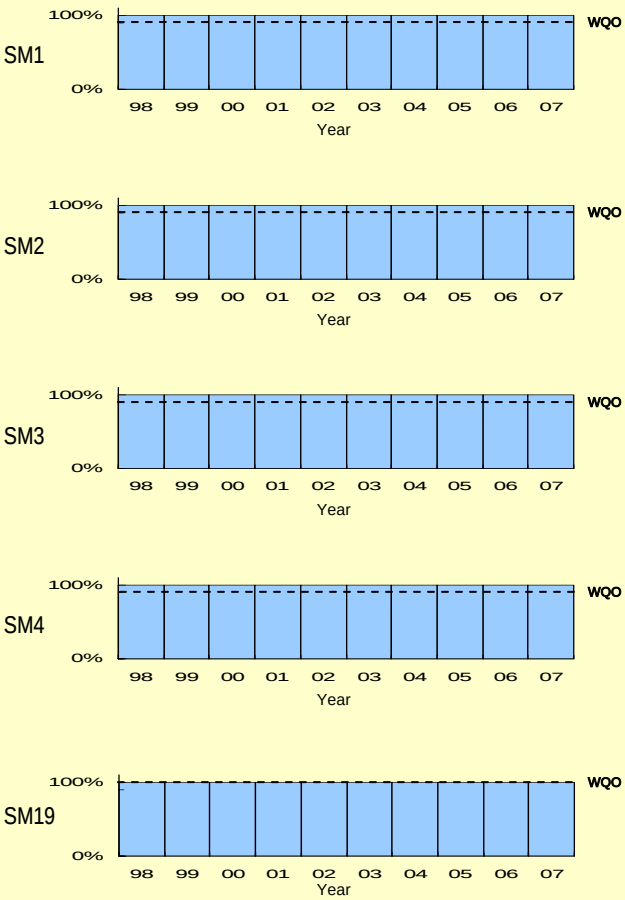
annual mean for depth-averaged TIN (mg/L)

Unionised Ammonia (NH_3-N)

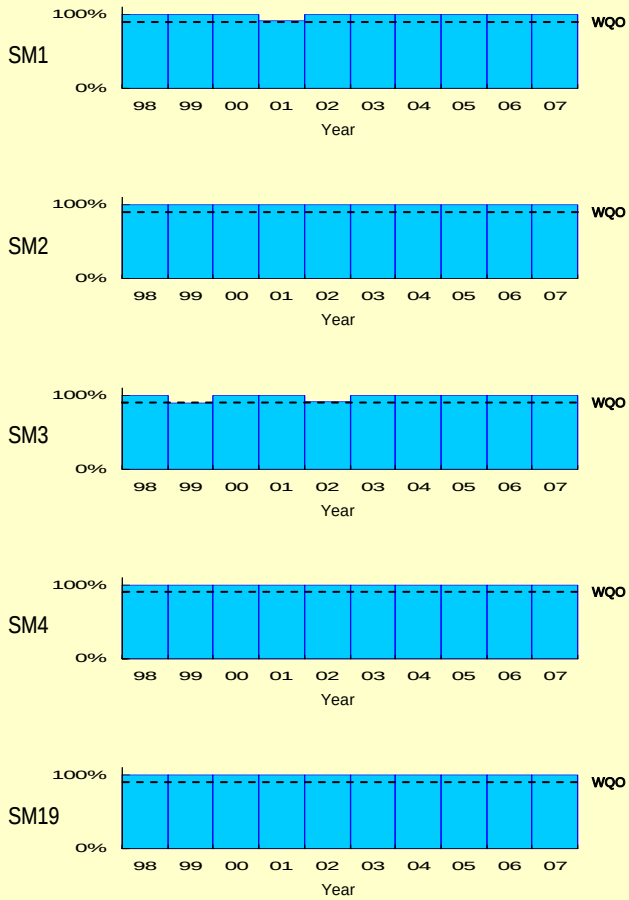
annual mean for depth-averaged NH_3-N (mg/L)

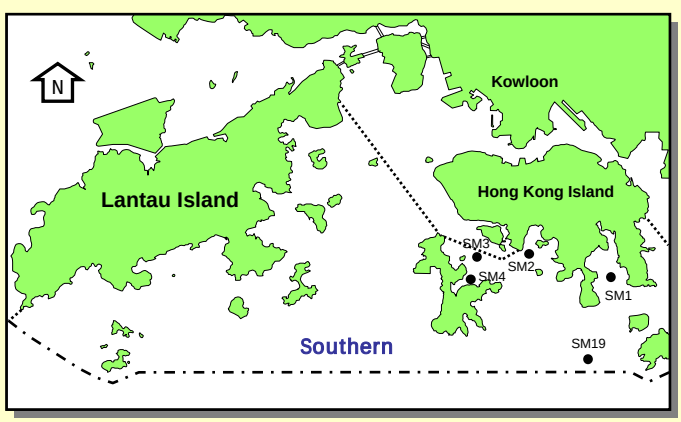
Levels of compliance with key Water Quality Objectives in the Southern WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



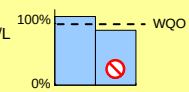


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

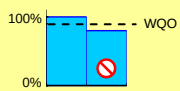
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

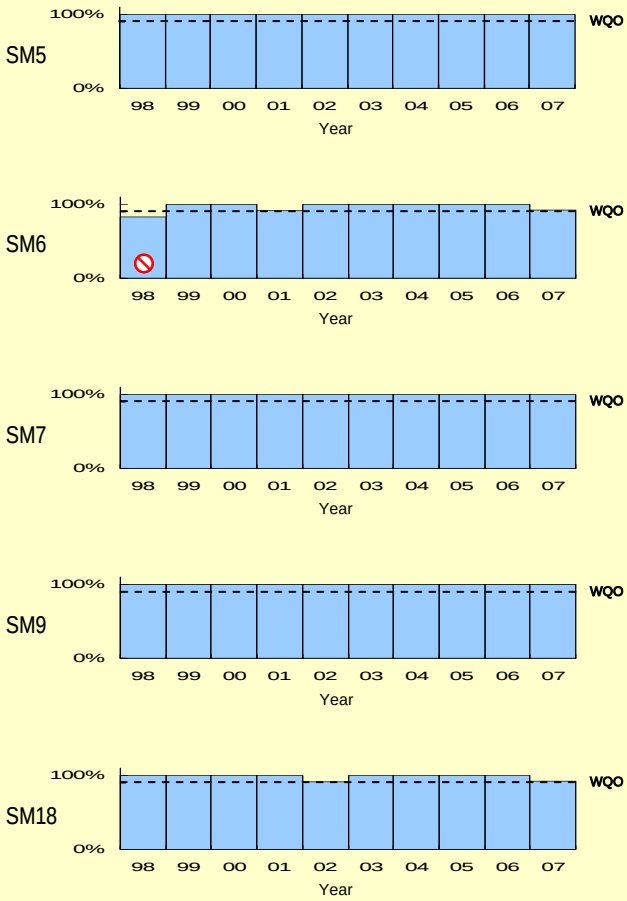
% sample with depth-averaged DO ≥ 4 mg/L



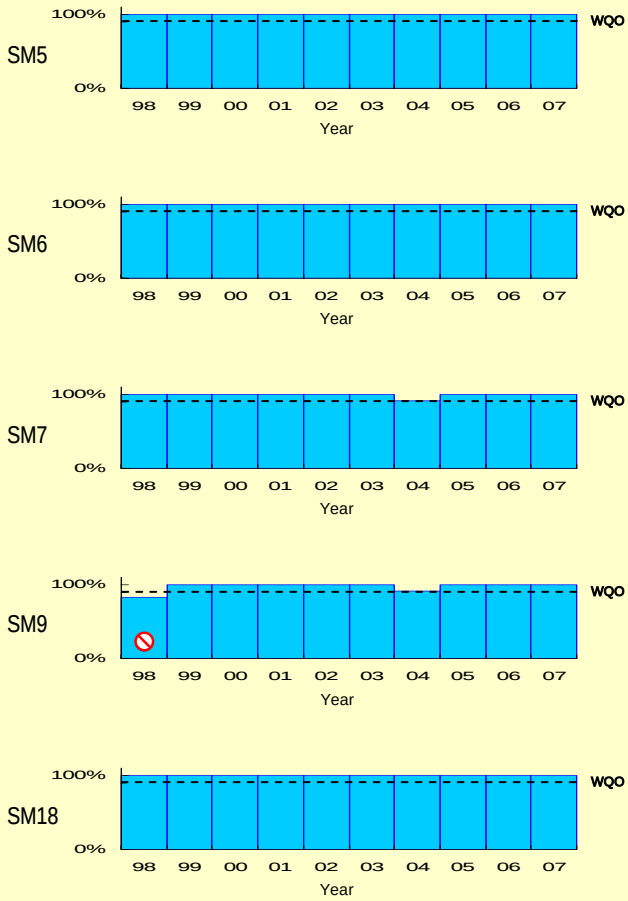
Non-compliance

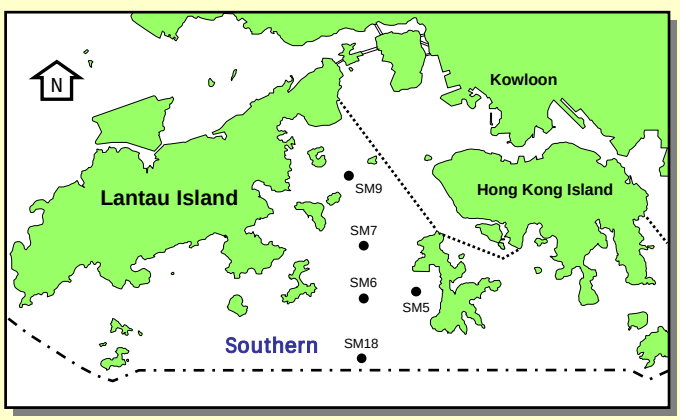
Levels of compliance with key Water Quality Objectives in the Sorthern WCZ (continued)

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



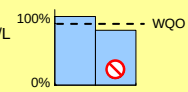


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

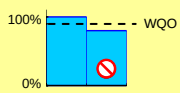
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

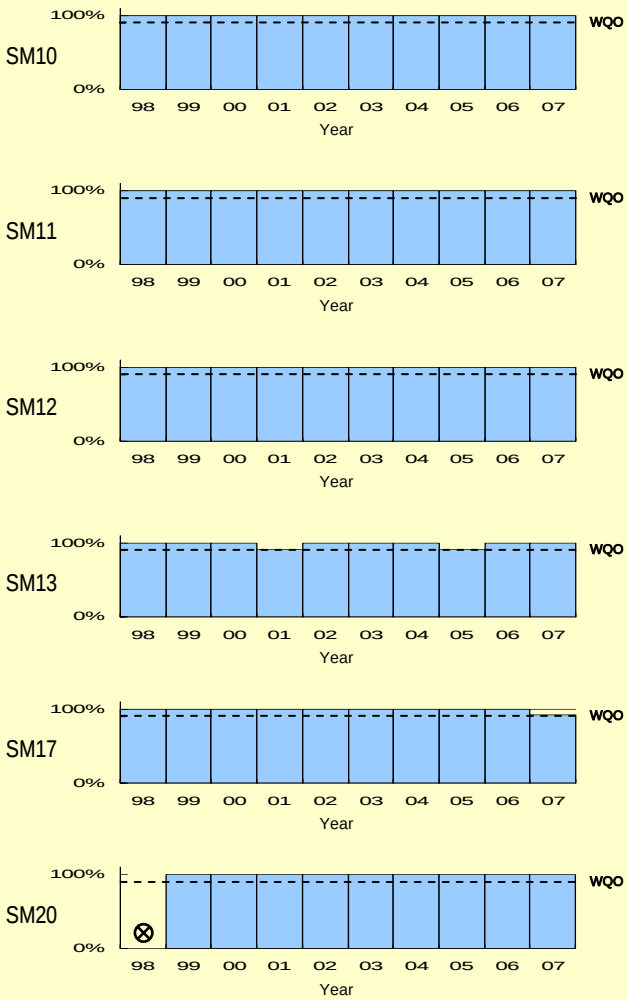
% sample with depth-averaged DO ≥ 4 mg/L



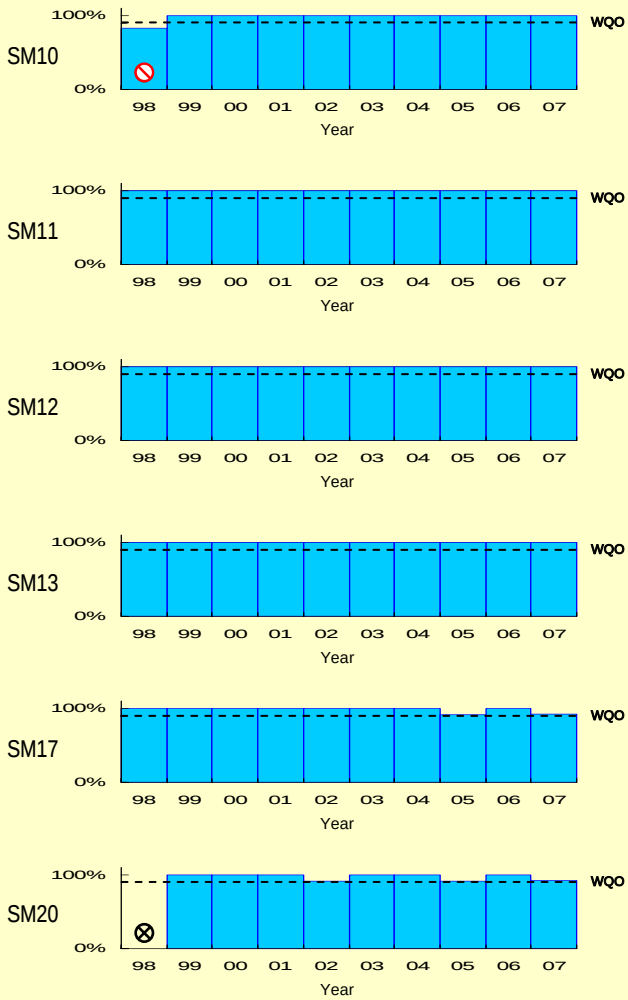
Non-compliance

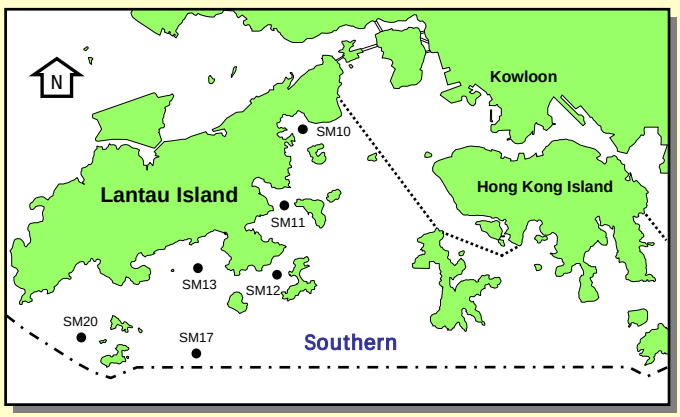
Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Dissolved Oxygen (DO) (bottom)



Dissolved Oxygen (DO) (depth-averaged)



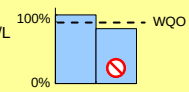


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

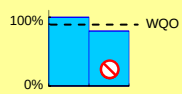
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

% sample with depth-averaged DO ≥ 4 mg/L



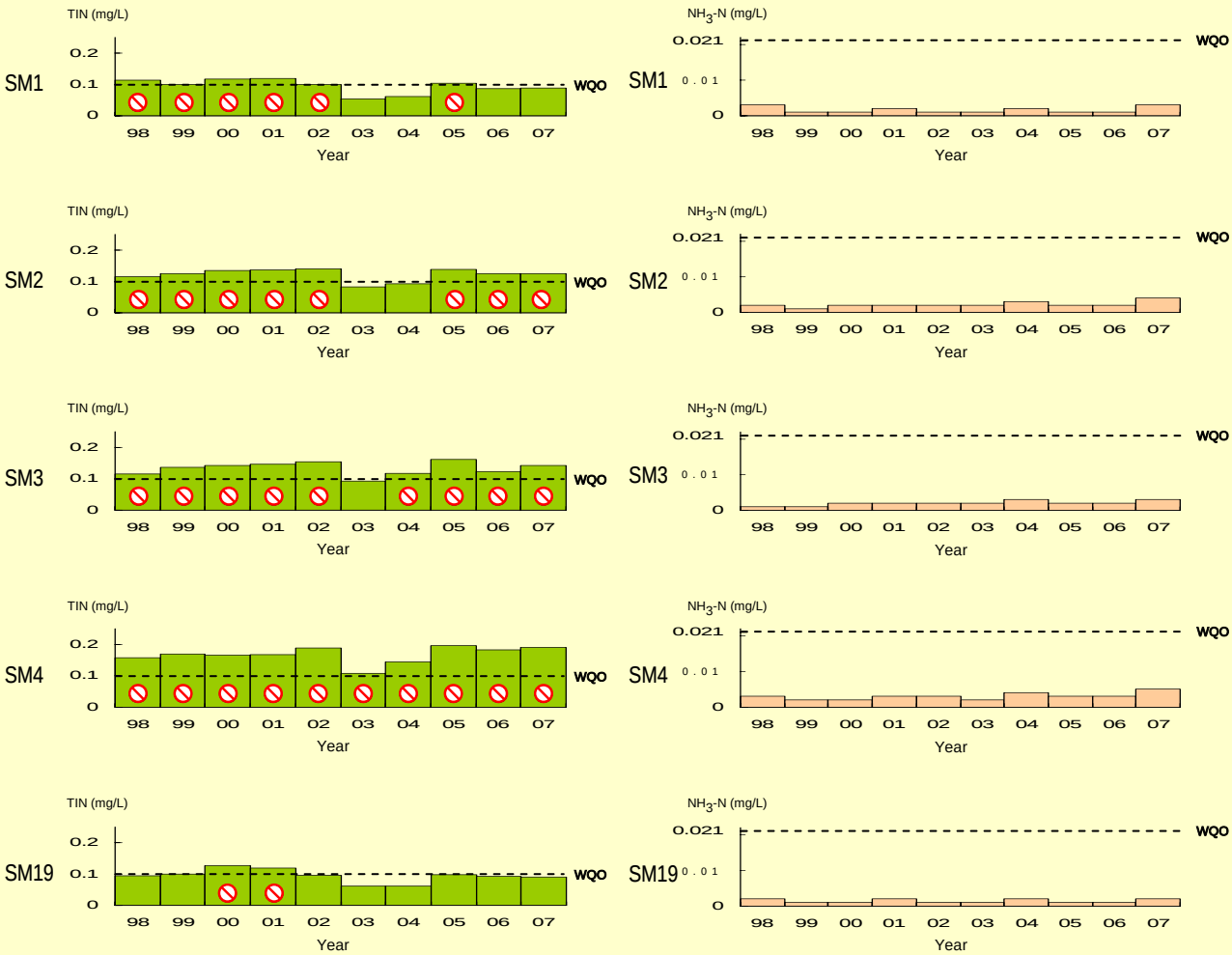
Non-compliance

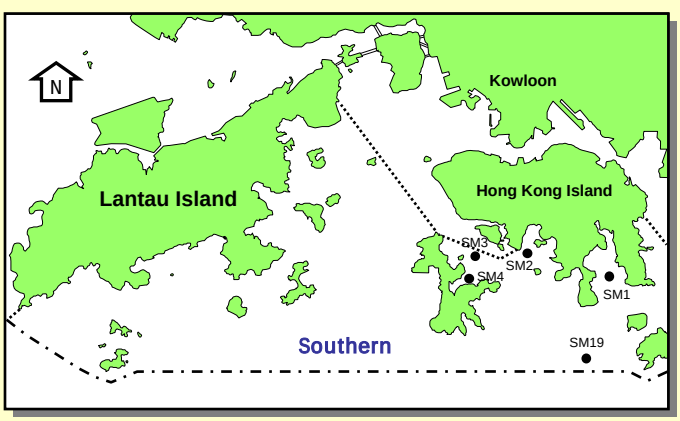
No data ; monitoring has not started

Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)

Unionised Ammonia (NH_3-N) (depth-averaged)





Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN $\leq$ 0.1 mg/L

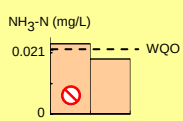
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N $\leq$ 0.021 mg/L

annual mean for depth-averaged NH_3-N

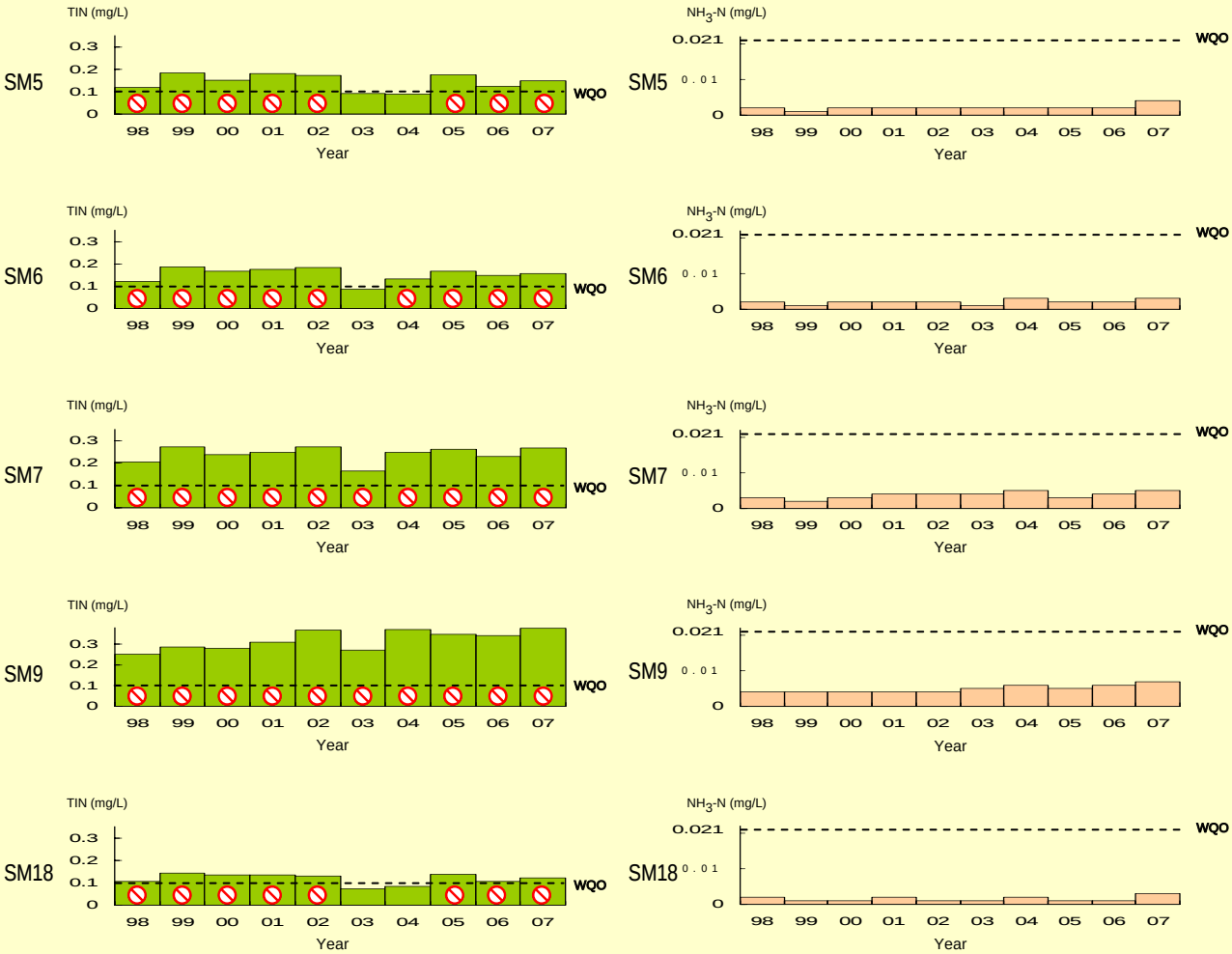
Non-compliance

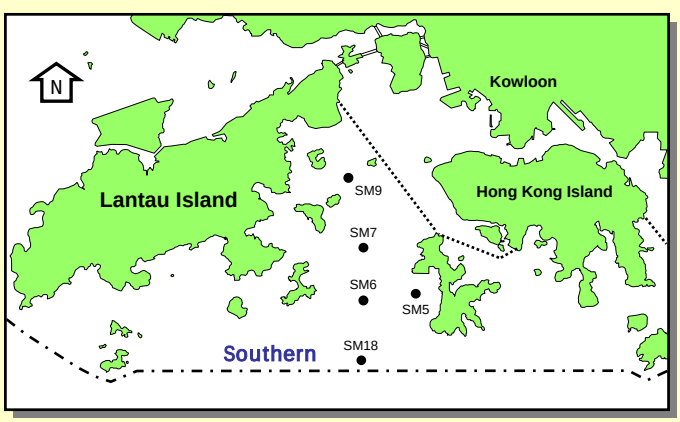


Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)

Unionised Ammonia (NH_3-N) (depth-averaged)

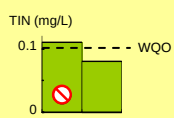




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN $\leq$ 0.1 mg/L

annual mean for depth-averaged TIN

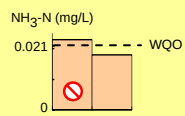


Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N $\leq$ 0.021 mg/L

annual mean for depth-averaged NH_3-N

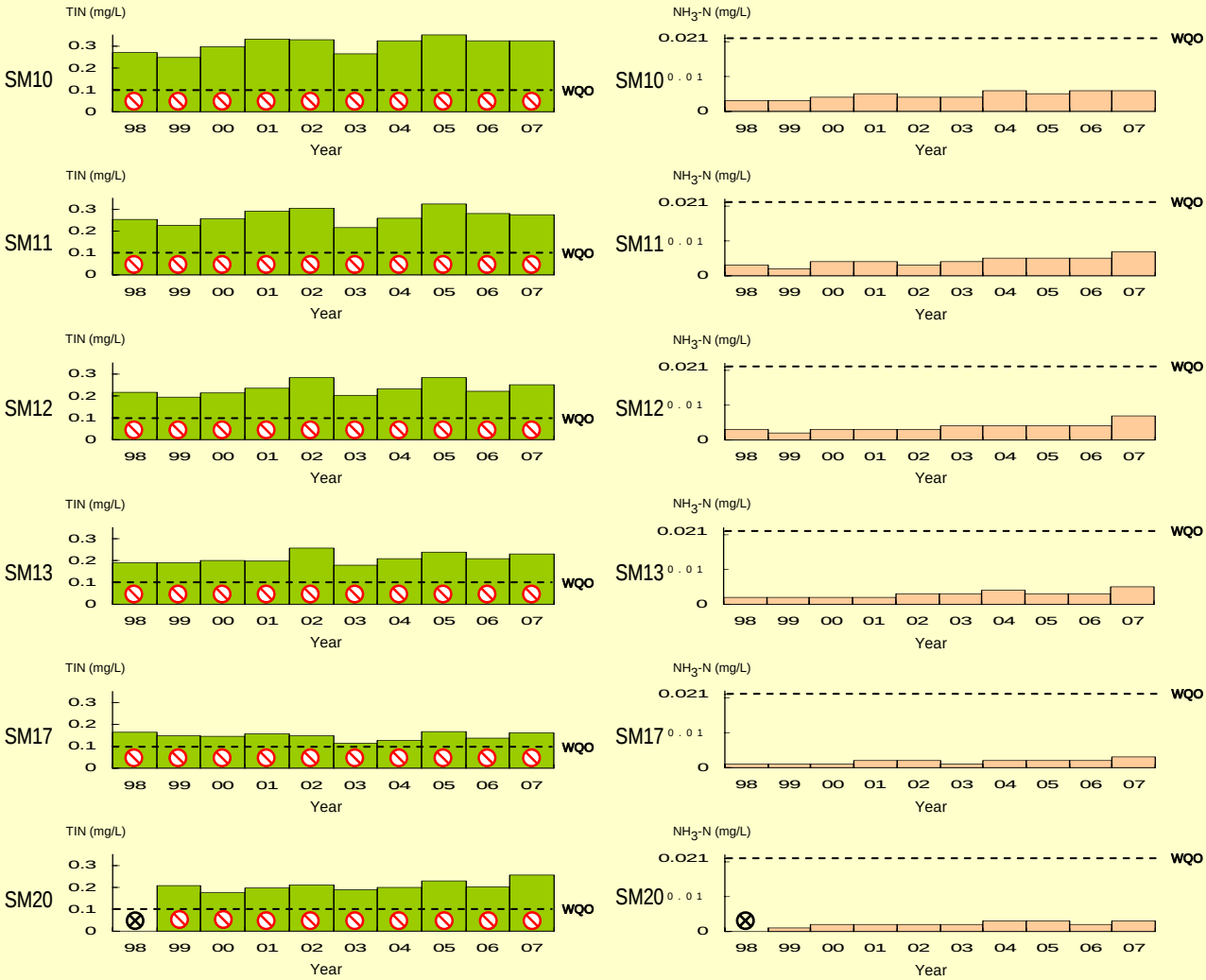
Non-compliance

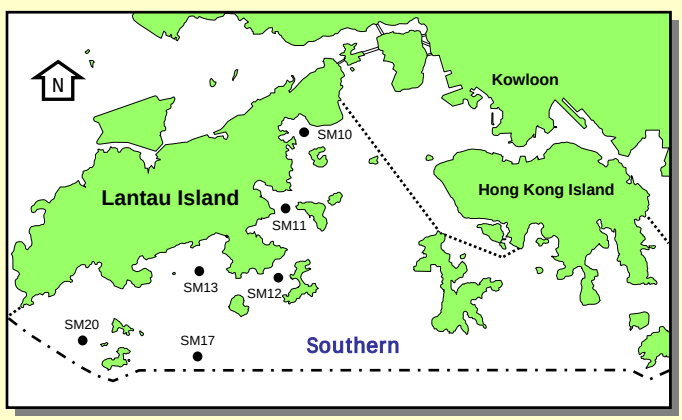


Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)

Unionised Ammonia (NH_3-N) (depth-averaged)





Total Inorganic Nitrogen (TIN)

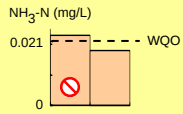
WQO : annual mean for depth-averaged TIN ≤ 0.1 mg/L

annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

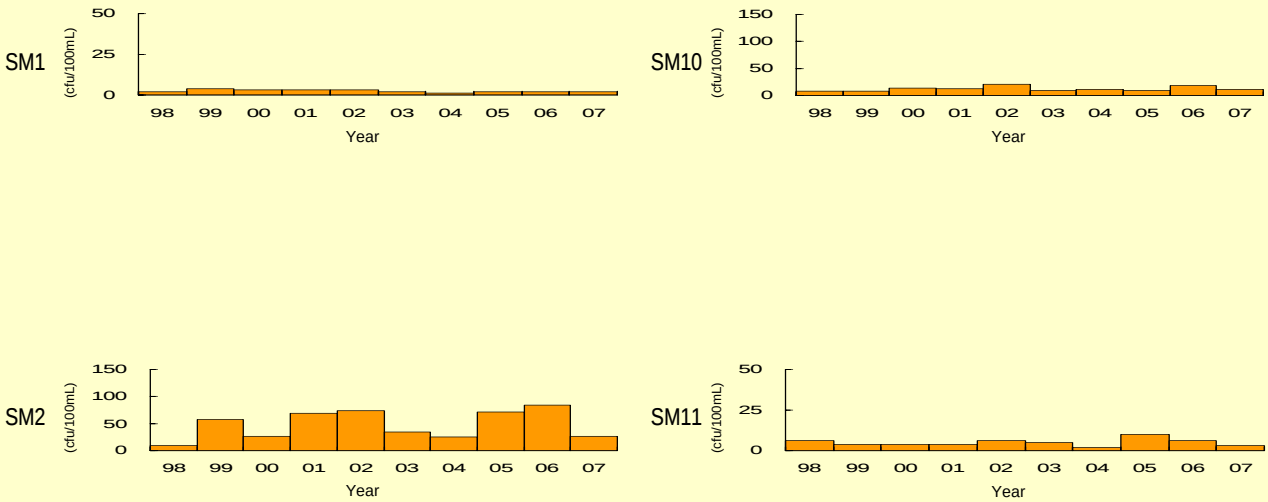


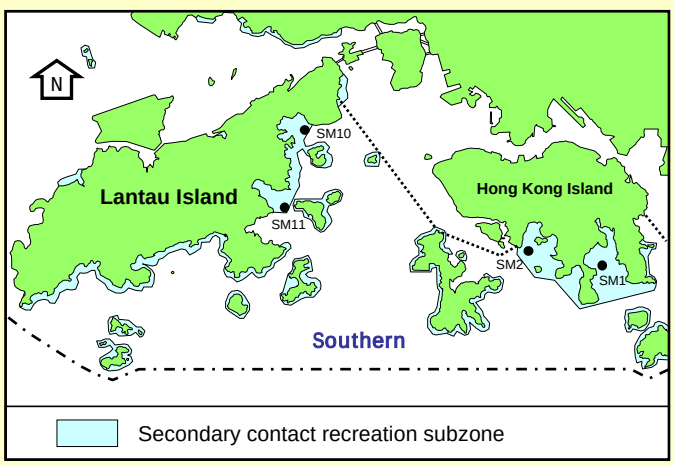
Non-compliance

No data ; monitoring has not started

Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

E. coli
(annual geometric mean)



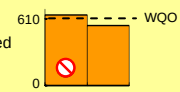


E. coli

WQO : annual geometric mean for depth averaged *E. coli* ≤ 610 cfu/100mL

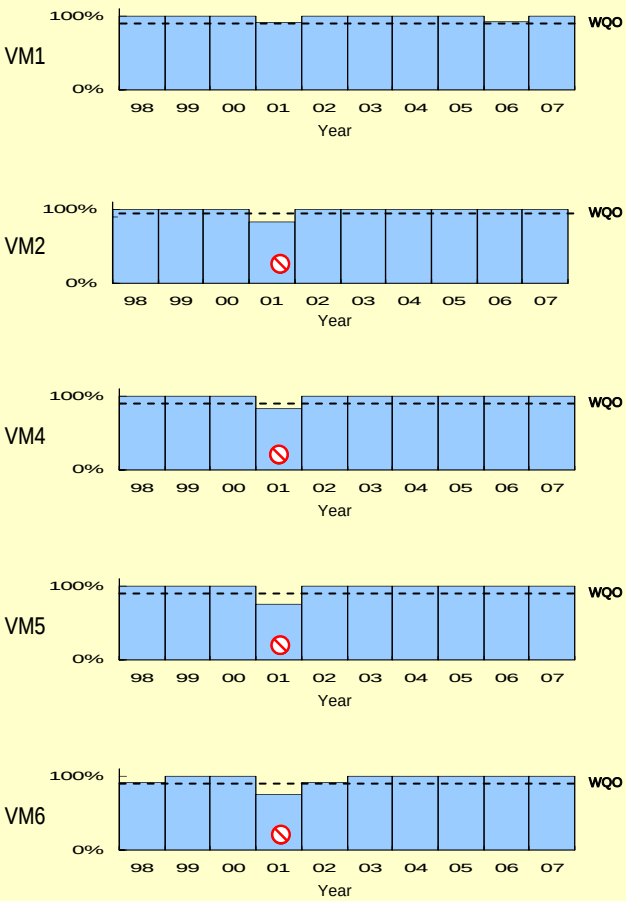
annual geometric mean for depth averaged *E. coli* (cfu/100mL)

Non-compliance

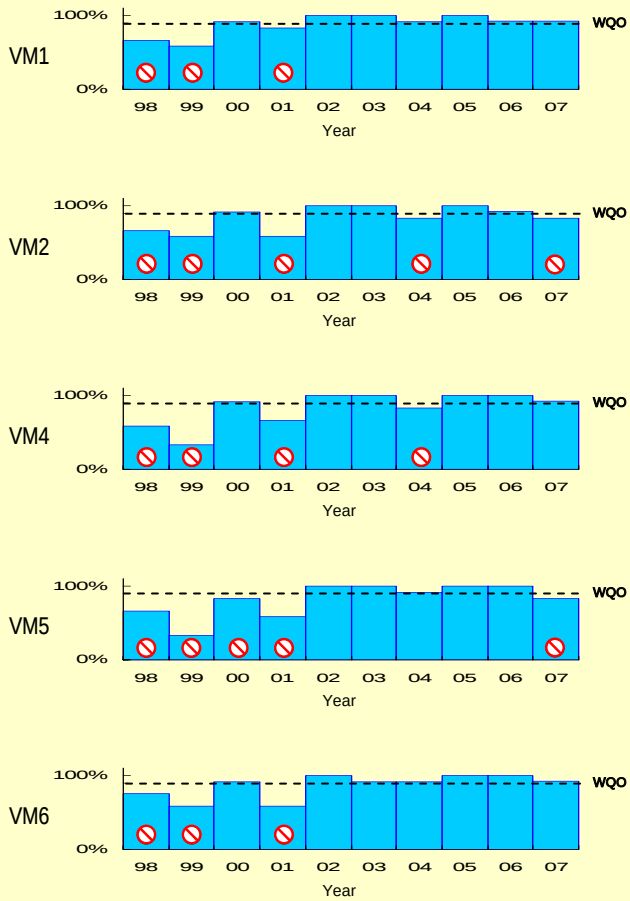


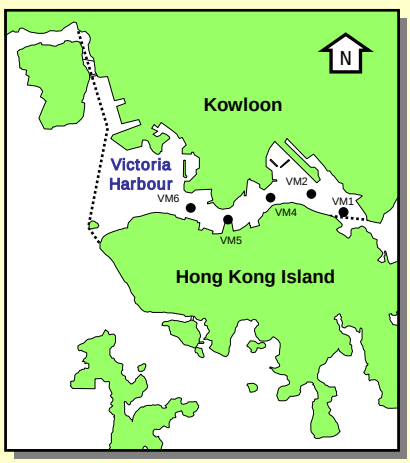
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



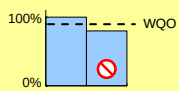


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

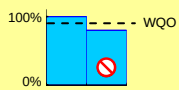
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

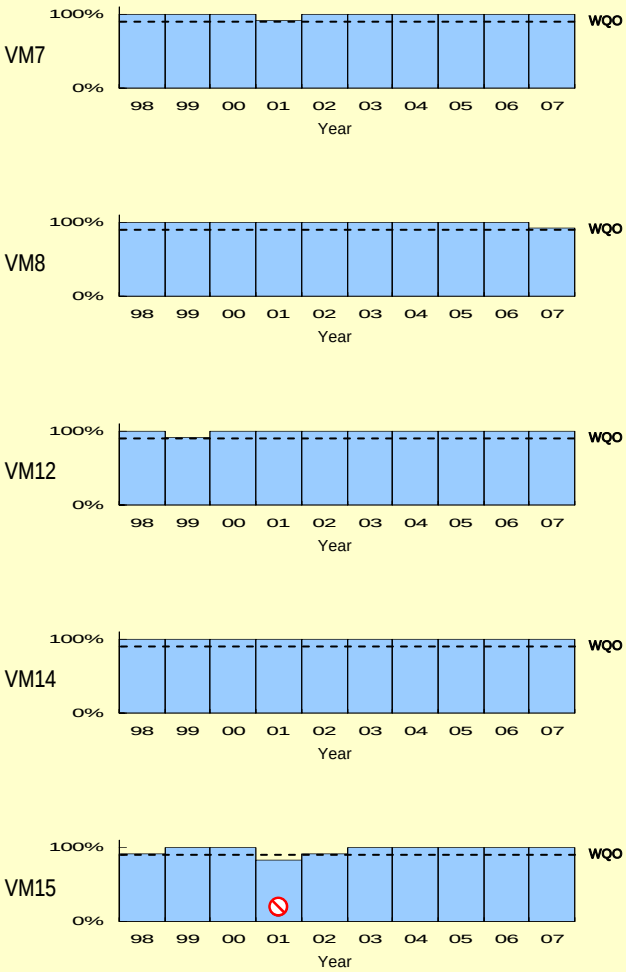
% sample with depth-averaged DO ≥ 4 mg/L



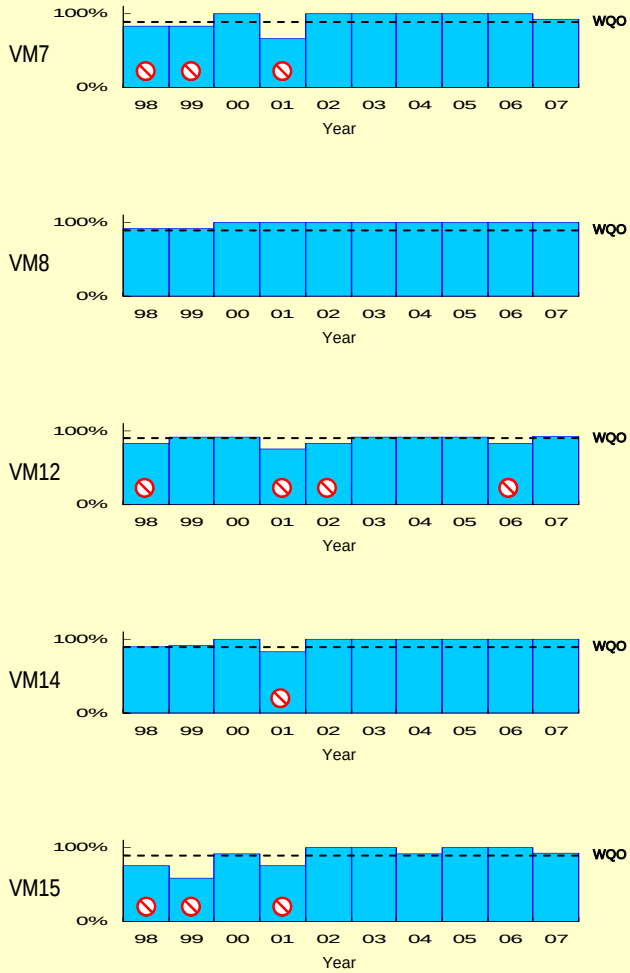
Non-compliance

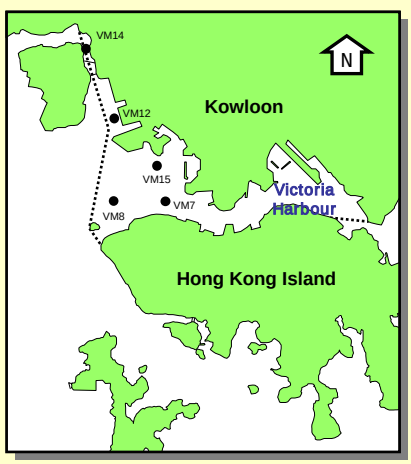
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



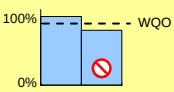


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

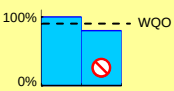
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

% sample with depth-averaged DO ≥ 4 mg/L

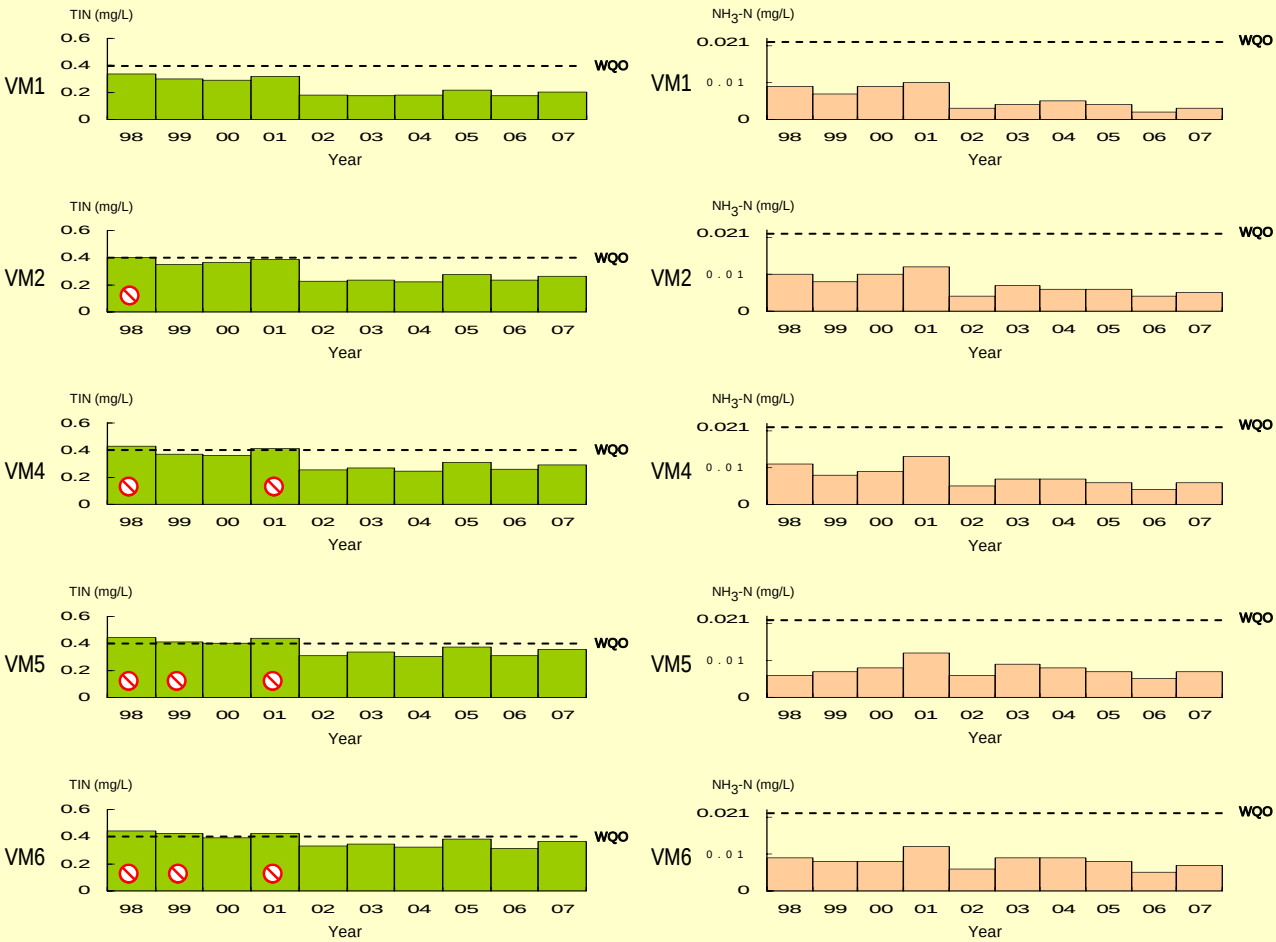


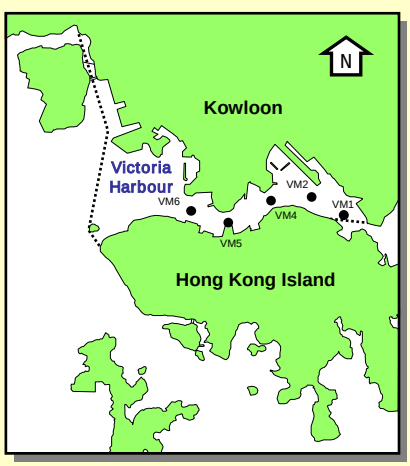
Non-compliance

Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)

Unionised Ammonia (NH_3-N)
(depth-averaged)





Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.4 mg/L

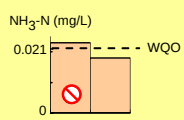
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

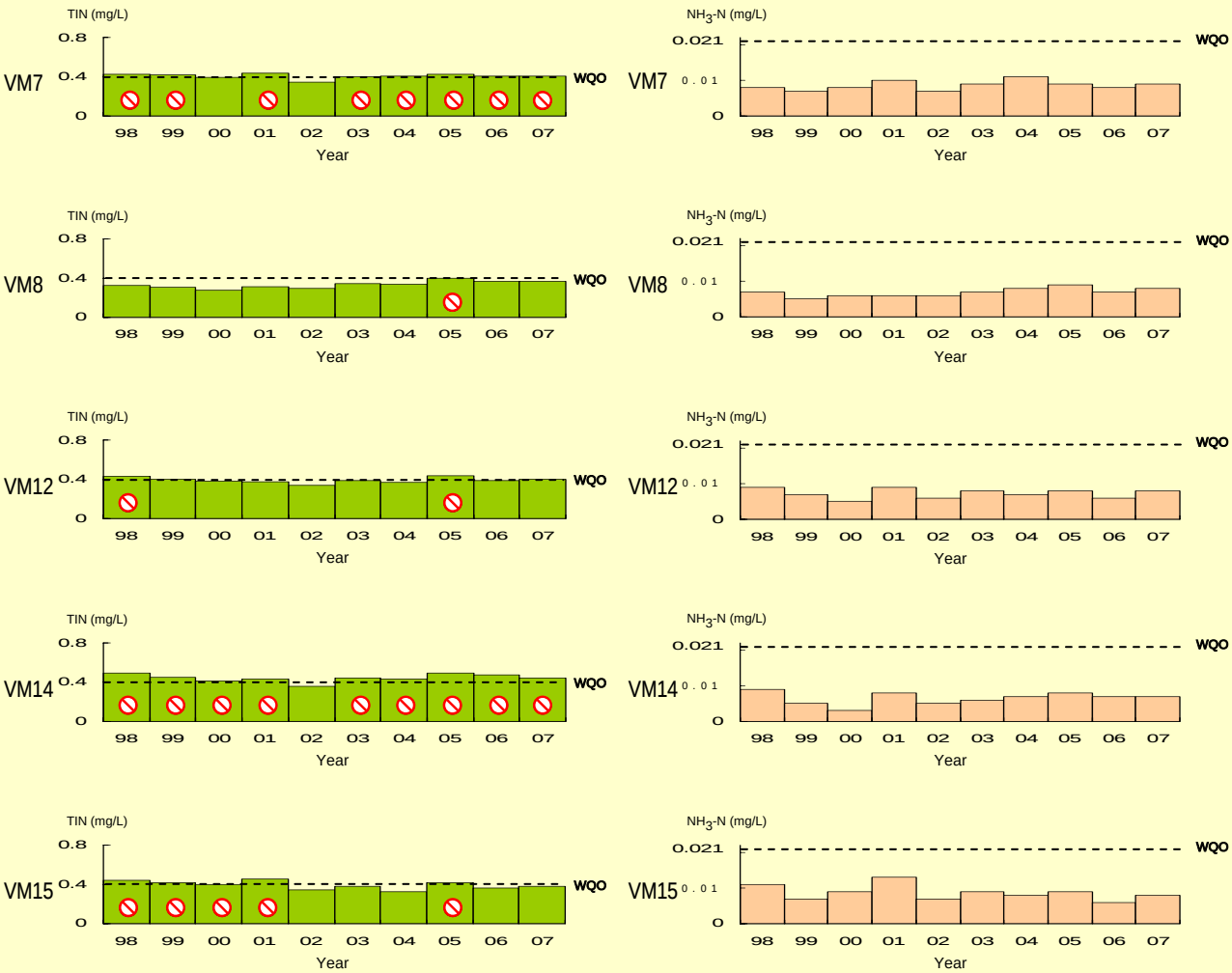
Non-compliance

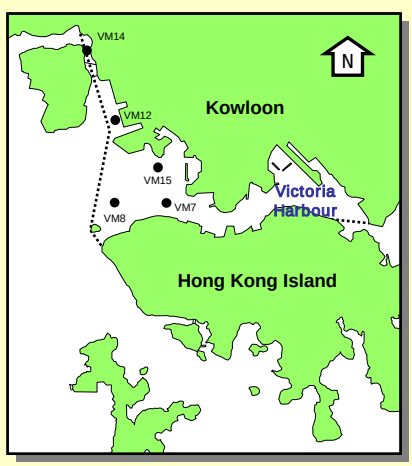


Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)

Unionised Ammonia (NH_3-N)
(depth-averaged)





Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.4 mg/L

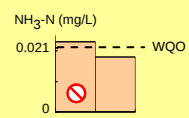
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

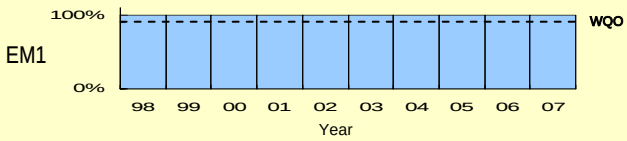
annual mean for depth-averaged NH_3-N

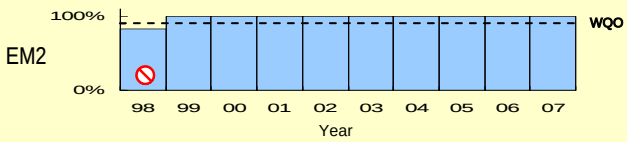
Non-compliance

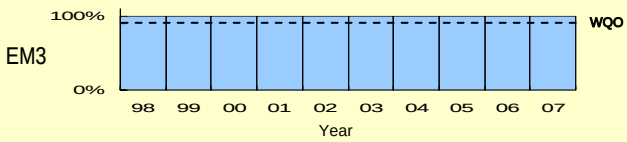


Levels of compliance with key Water Quality Objectives in the Eastern Buffer WCZ

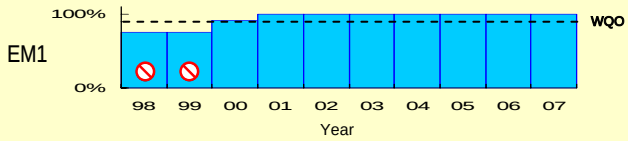
Dissolved Oxygen (DO)
(bottom)

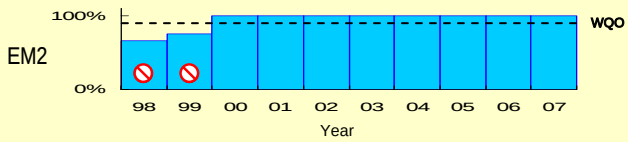


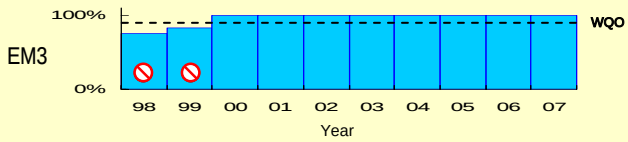


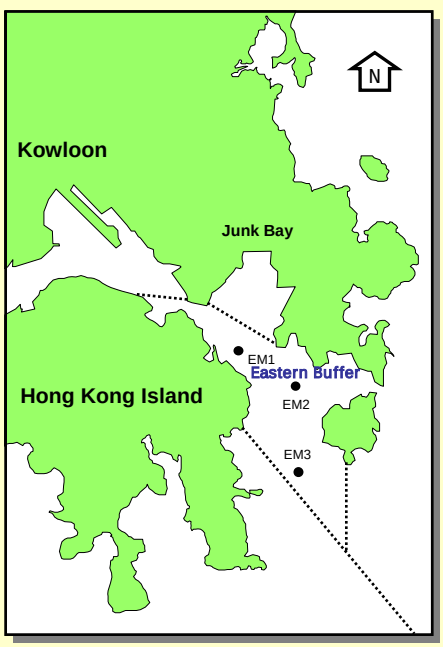


Dissolved Oxygen (DO)
(depth-averaged)







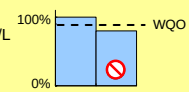


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

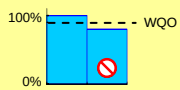
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

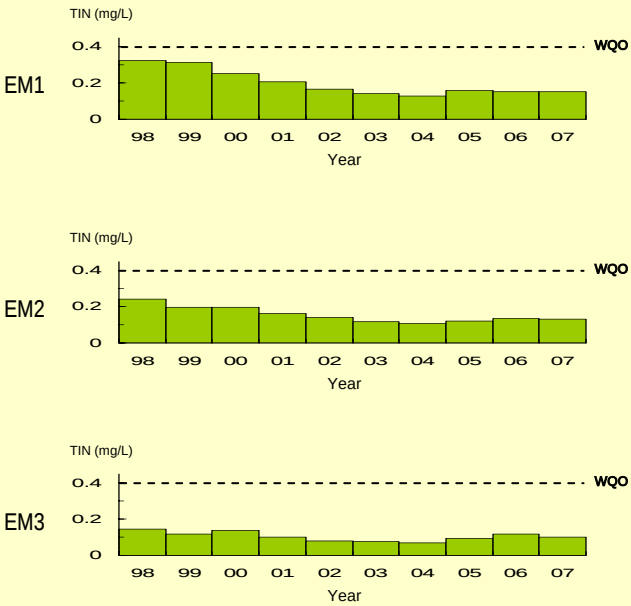
% sample with depth-averaged DO ≥ 4 mg/L



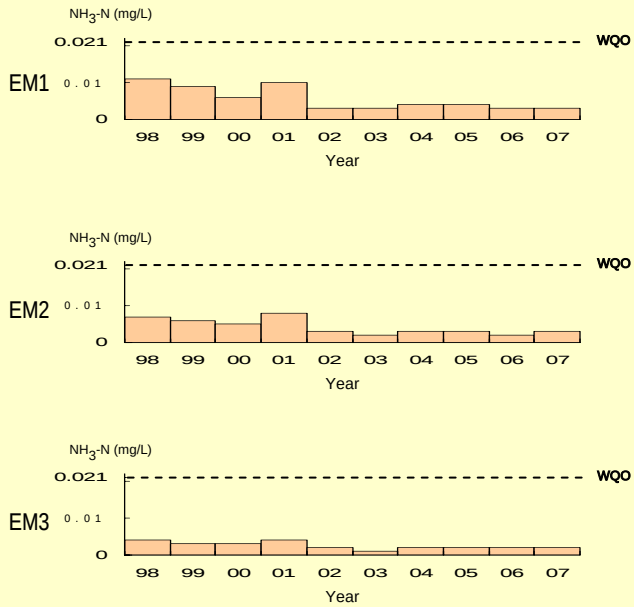
Non-compliance

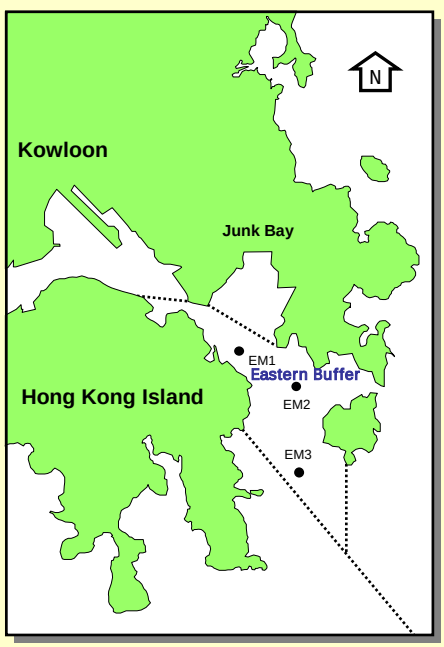
Levels of compliance with key Water Quality Objectives in the Eastern Buffer WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)



Unionised Ammonia (NH_3-N)
(depth-averaged)

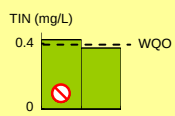




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.4 mg/L

annual mean for depth-averaged TIN

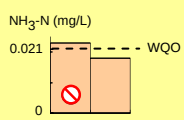


Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

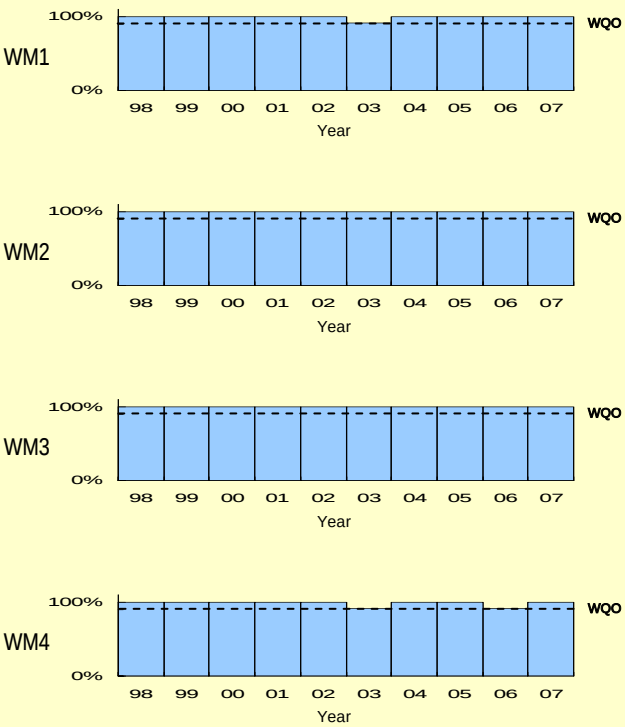
annual mean for depth-averaged NH_3-N

Non-compliance

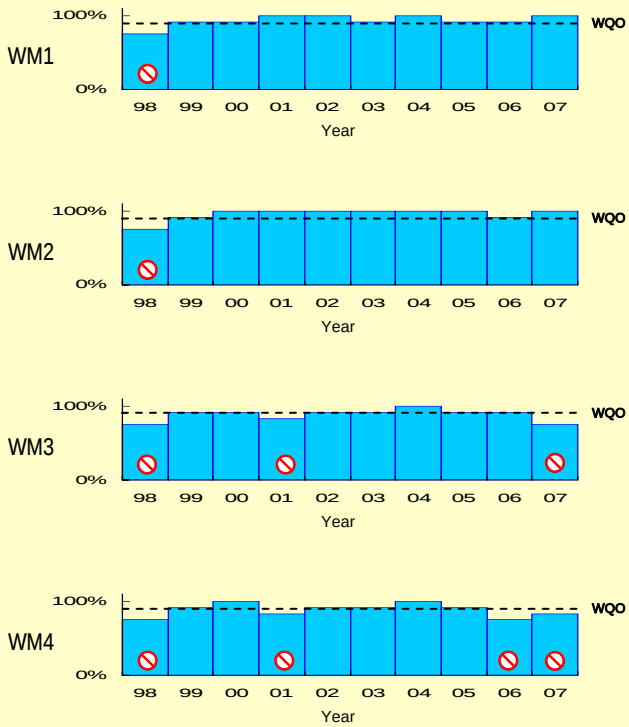


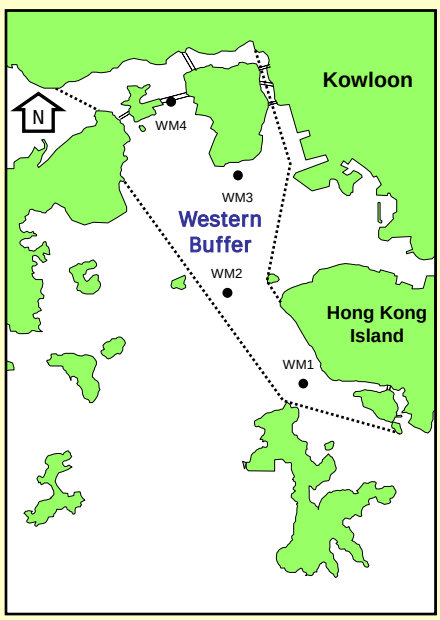
Levels of compliance with key Water Quality Objectives in the Western Buffer WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



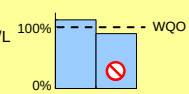


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

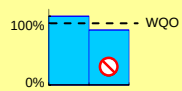
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

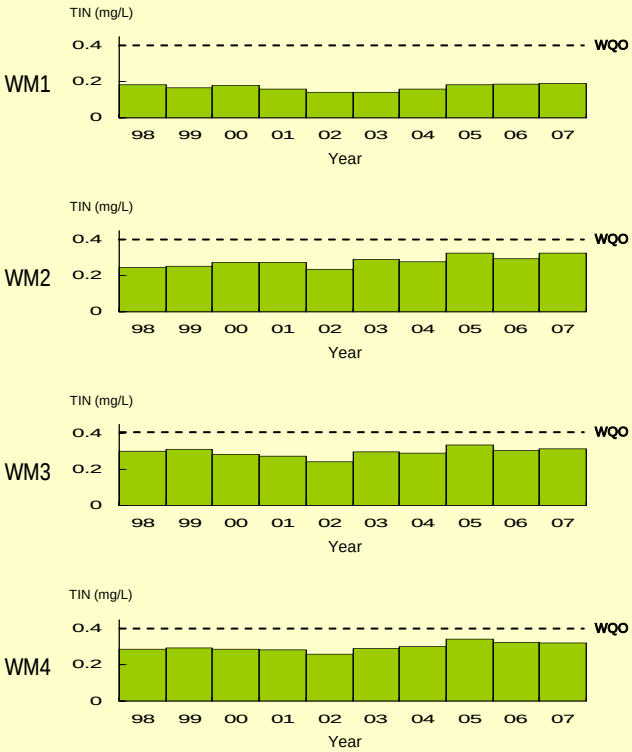
% sample with depth-averaged DO ≥ 4 mg/L



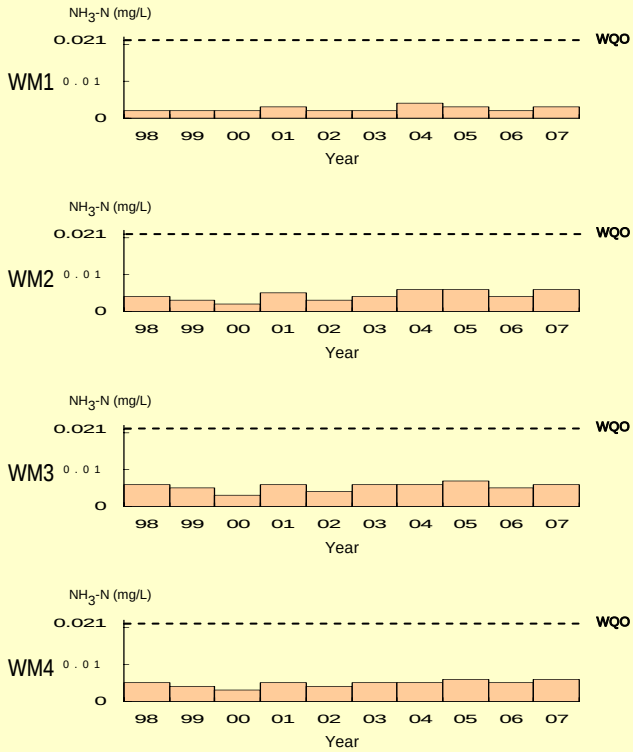
Non-compliance

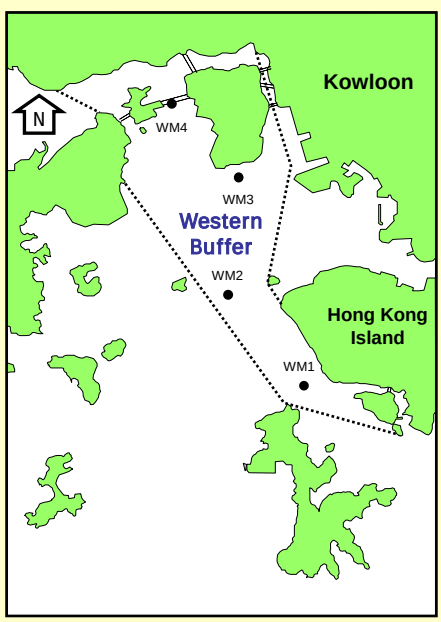
Levels of compliance with key Water Quality Objectives in the Western Buffer WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)



Unionised Ammonia (NH_3-N)
(depth-averaged)

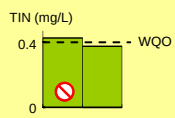




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN $\leq$ 0.4 mg/L

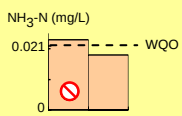
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N $\leq$ 0.021 mg/L

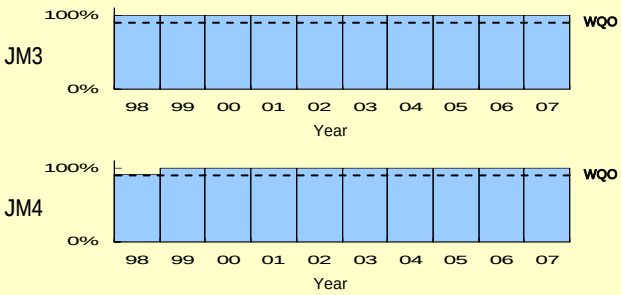
annual mean for depth-averaged NH_3-N



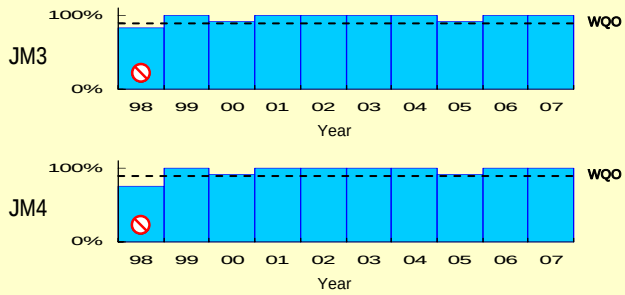
Non-compliance

Levels of compliance with key Water Quality Objectives in the Junk Bay WCZ

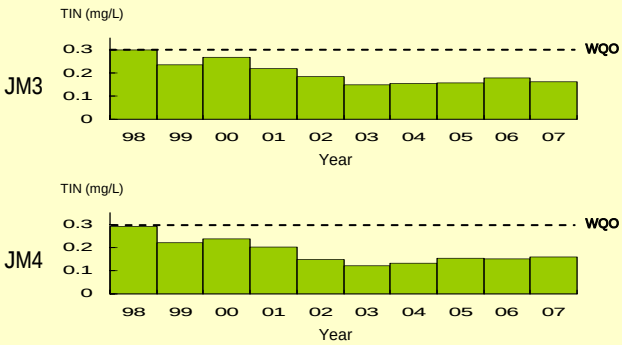
Dissolved Oxygen (DO)
(bottom)



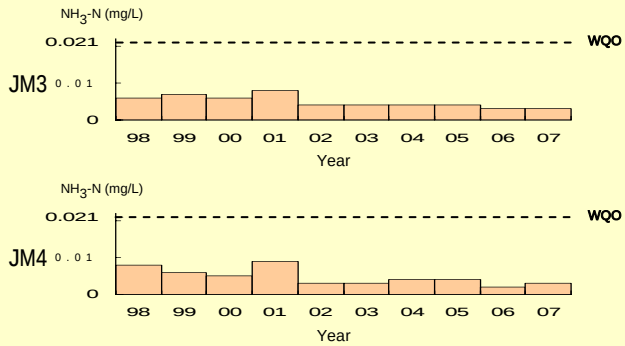
Dissolved Oxygen (DO)
(depth-averaged)

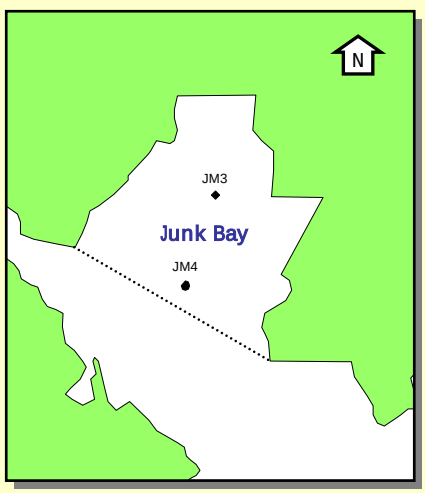


Total Inorganic Nitrogen (TIN)
(depth-averaged)



Unionised Ammonia (NH_3-N)
(depth-averaged)



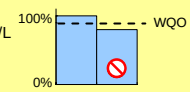


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

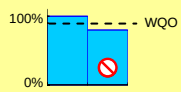
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

% sample with depth-averaged DO ≥ 4 mg/L



Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.3 mg/L

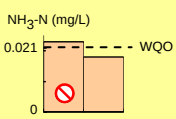
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

Non-compliance



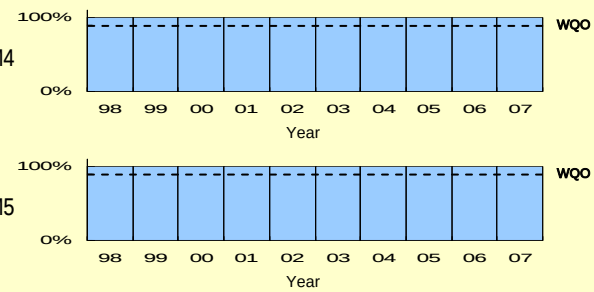
Levels of compliance with key Water Quality Objectives in the Deep Bay WCZ

Dissolved Oxygen (DO)
(bottom)

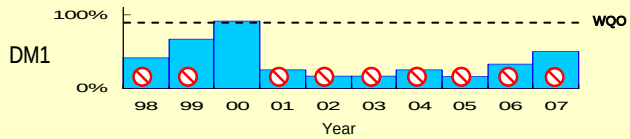
DM1 DO (bottom) not measured, water depth ≤ 3m

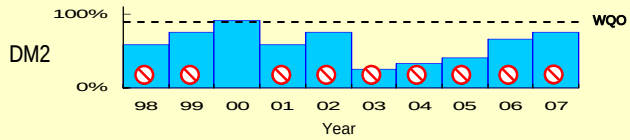
DM2 DO (bottom) not measured, water depth ≤ 3m

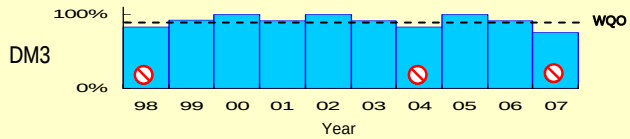
DM3 DO (bottom) not measured, water depth ≤ 3m

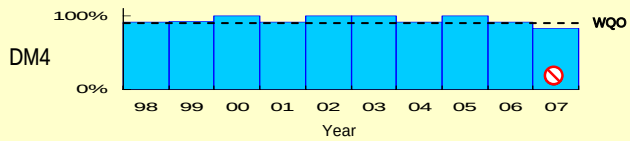


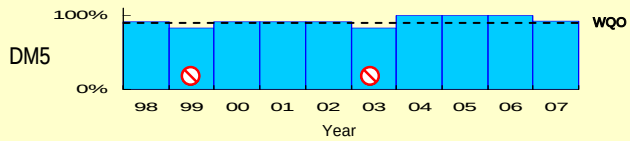
Dissolved Oxygen (DO)
(depth-averaged)

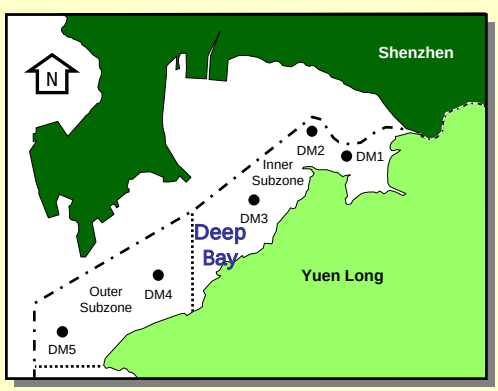










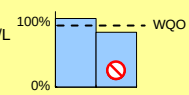


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

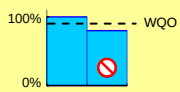
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

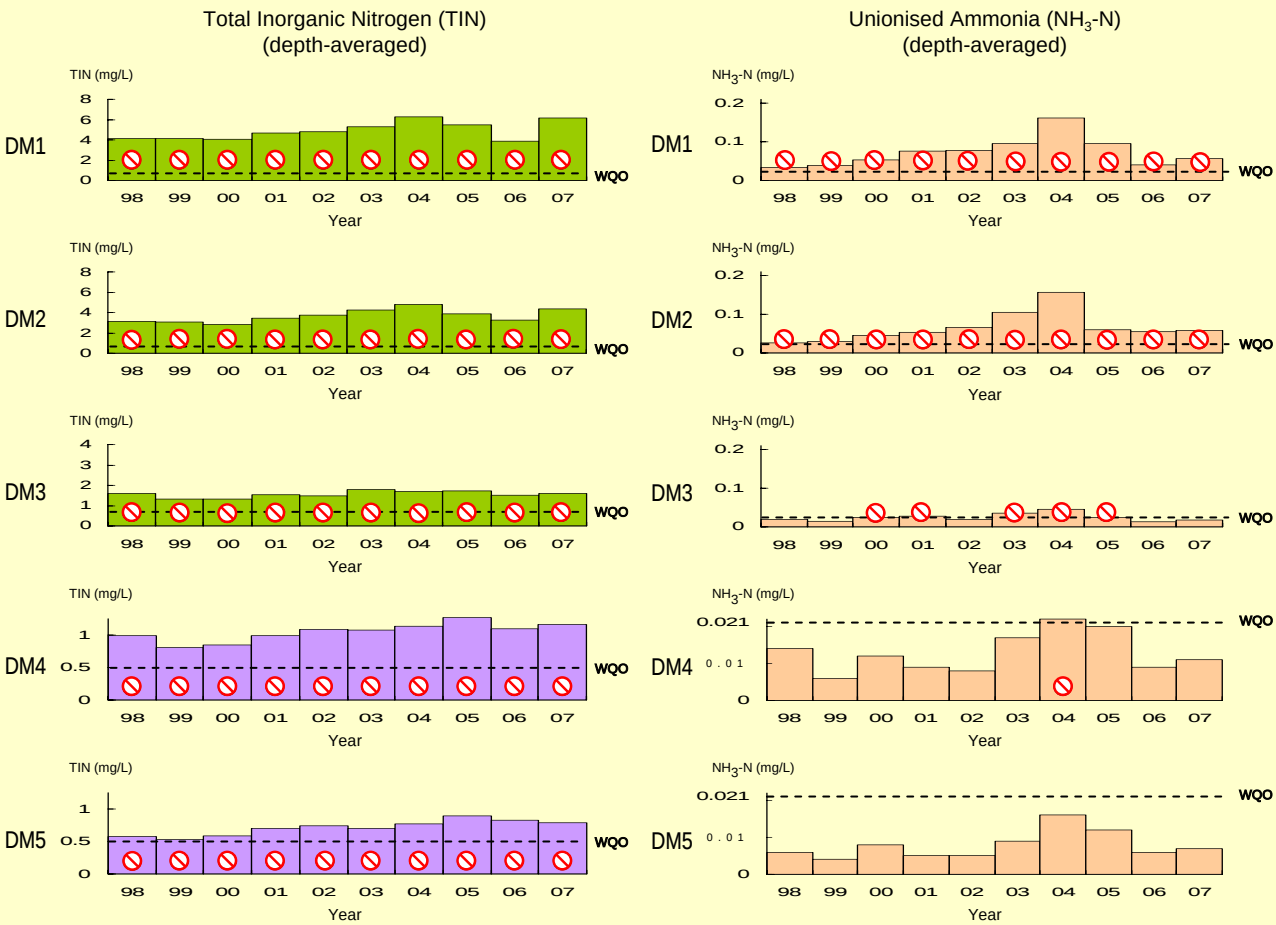
WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

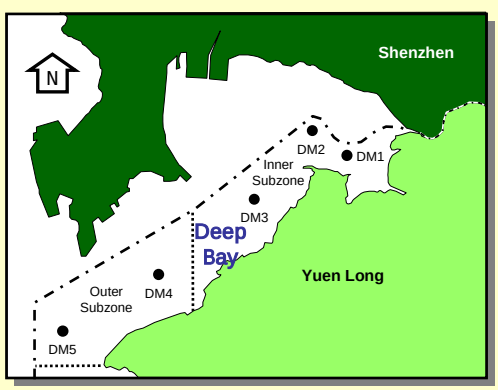
% sample with depth-averaged DO ≥ 4 mg/L



Non-compliance

Levels of compliance with key Water Quality Objectives in the Deep Bay WCZ (continued)





Total Inorganic Nitrogen (TIN)

Inner Subzone (DM1 - DM3)

WQO : annual mean for depth-averaged TIN ≤ 0.7 mg/L

annual mean for depth-averaged TIN

Outer Subzone (DM4 - DM5)

WQO : annual mean for depth-averaged TIN ≤ 0.5 mg/L

annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

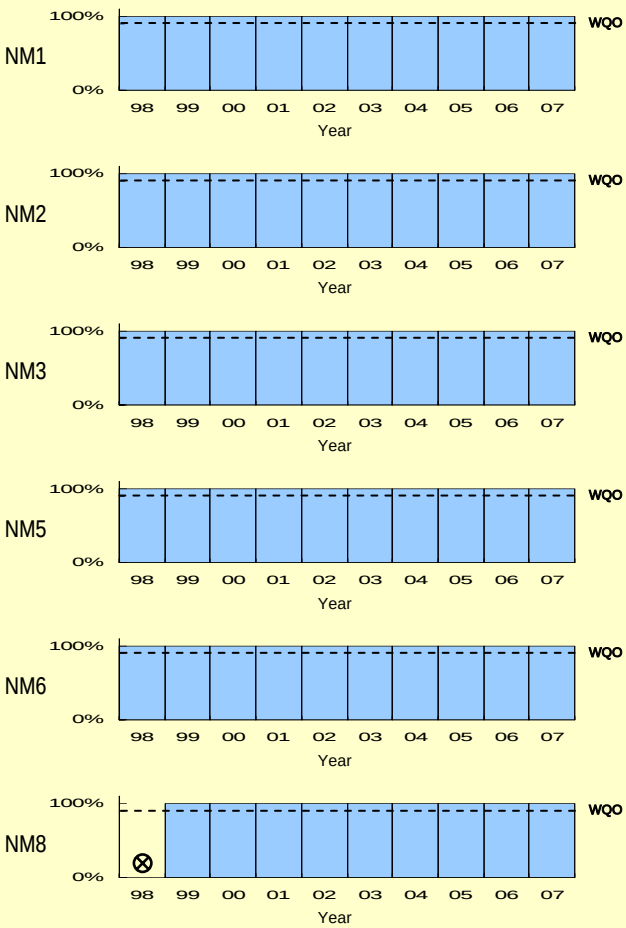
WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N

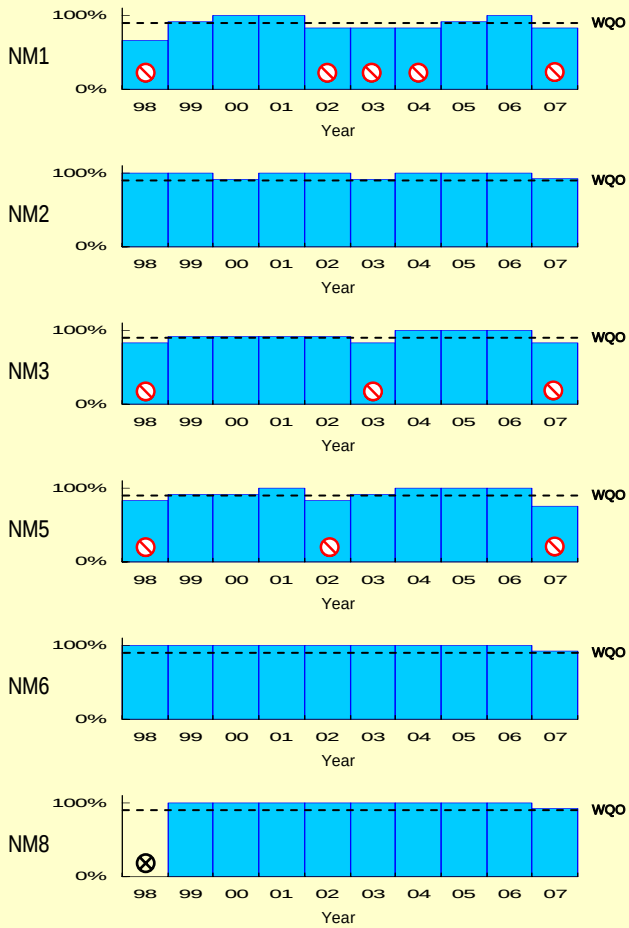
Non-compliance

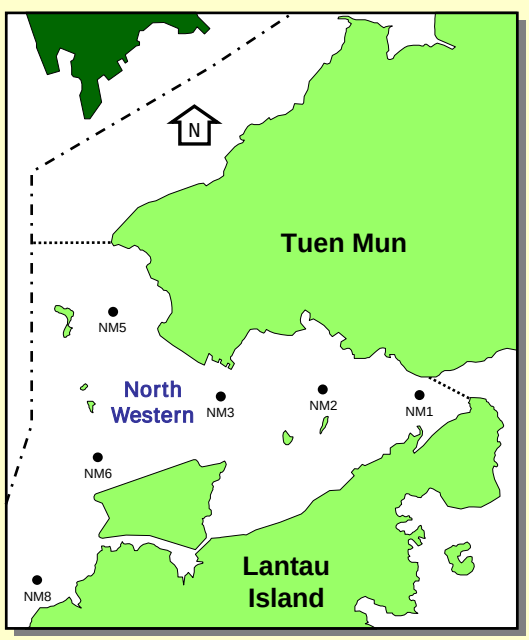
Levels of compliance with key Water Quality Objectives in the North Western WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



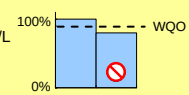


Dissolved Oxygen (DO)

1. Bottom

WQO : 90% sample with bottom DO ≥ 2 mg/L

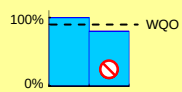
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

% sample with depth-averaged DO ≥ 4 mg/L

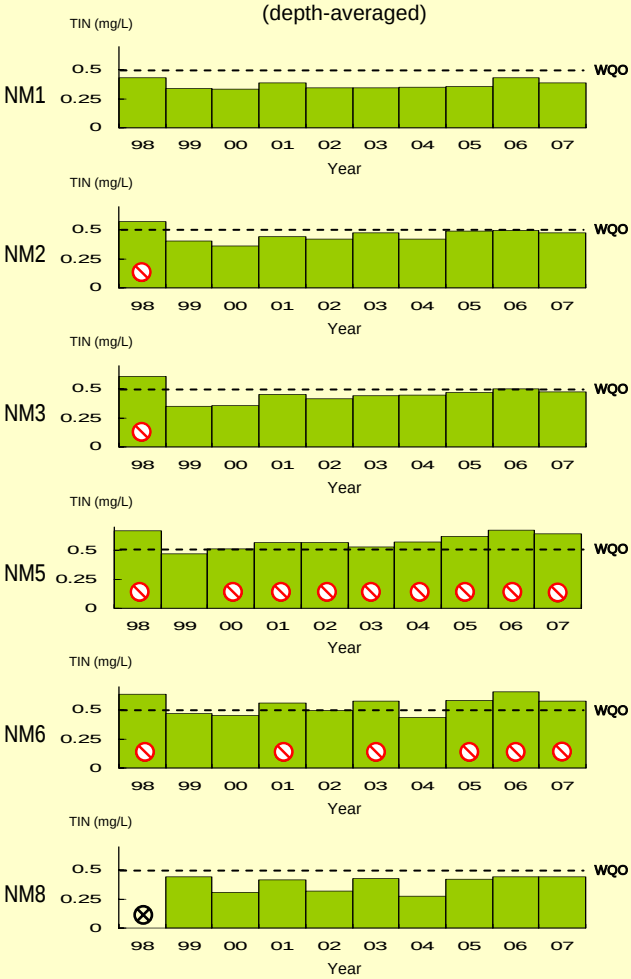


Non-compliance

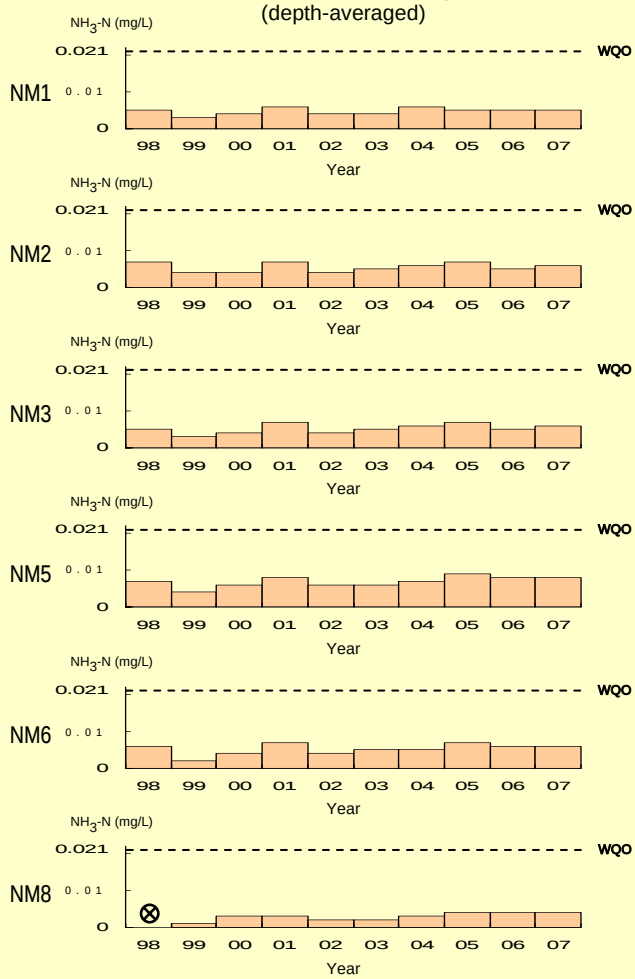
No data ; monitoring has not started

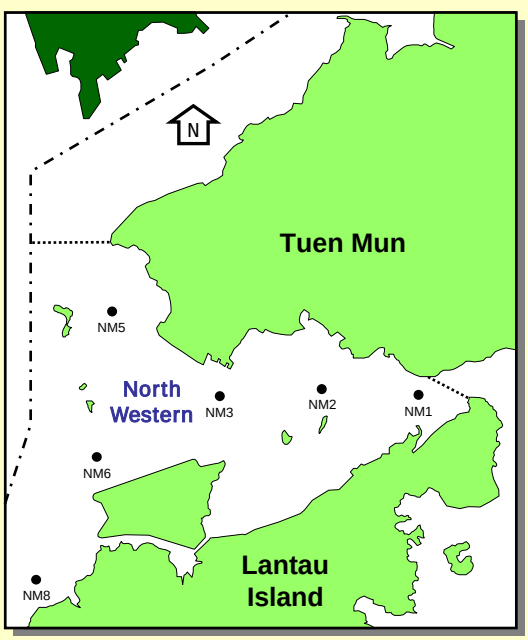
Levels of compliance with key Water Quality Objectives in the North Western WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



Unionised Ammonia (NH_3-N) (depth-averaged)

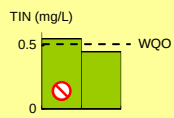




Total Inorganic Nitrogen (TIN)

WQO : annual mean for depth-averaged TIN ≤ 0.5 mg/L

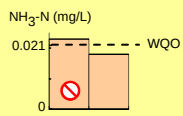
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

annual mean for depth-averaged NH_3-N



Non-compliance

No data ; monitoring has not started

Results of the Seasonal Kendall Test for water quality trends in the Mirs Bay WCZ, 1991 - 2007

Monitoring Station		MM1	MM2	MM3	MM4	MM5	MM6	MM7
Monitoring Period		1991 I 2007	1991 I 2007	1991 I 2007	1991 I 2007	1991 I 2007	1991 I 2007	1991 I 2007
Parameter	Water Depth							
Temperature (°C)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Salinity	Surface	-	↗	-	-	↗	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	-	-	↘	-	↘	↘	↘
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
pH	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Secchi disc depth (m)		-	↘	↘	↘	-	-	↘
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	↗	↗	-	-	-	↗
	Middle	-	↗	↗	-	-	-	↗
	Bottom	↗	↗	↗	-	-	-	↗
	Average	-	↗	↗	-	-	-	↗
Total volatile solids (mg/L)	Surface	-	-	-	-	-	-	-
	Middle	-	↗	↗	-	-	-	-
	Bottom	-	-	↗	-	-	-	-
	Average	-	↗	↗	-	-	-	↗
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-	-	↘	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	-	-	-	-	-	↘	-
	Middle	-	-	-	-	-	↘	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	↘	-
Nitrite nitrogen (mg/L)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	↗	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Total inorganic nitrogen (mg/L)	Surface	-	-	↘	-	-	↘	↘
	Middle	-	-	-	-	-	↘	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	↘	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	-	↘	↘	-
	Middle	↘	↘	↘	-	-	-	-
	Bottom	↘	↘	↘	↘	↘	-	-
	Average	↘	↘	↘	-	↘	↘	-
Total nitrogen (mg/L)	Surface	↘	↘	↘	-	↘	↘	-
	Middle	-	-	↘	-	-	-	-
	Bottom	-	-	↘	↘	↘	-	↘
	Average	↘	↘	↘	-	↘	↘	-
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	↘	↘	↘	↘	-	-	↘
	Middle	↘	↘	↘	-	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Chlorophyll-*a* (µg/L)	Surface	-	↗	↗	-	-	-	↗
	Middle	↗	↗	↗	-	-	-	↗
	Bottom	↗	↗	-	-	-	-	↗
	Average	↗	↗	↗	-	-	-	↗
E. coli (cfu/100mL)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Mirs Bay WCZ, 1986 - 2007 (continued)

Monitoring Station		MM8	MM13	MM14	MM15	MM16	MM17
Monitoring Period		1991 I 2007	1991 I 2007	1994 I 2007	1994 I 2007	1994 I 2007	1986 I 2007
Parameter	Water Depth						
Temperature (°C)	Surface	↗	-	-	-	-	↗
	Middle	-	-	-	-	-	↗
	Bottom	-	-	-	-	-	↗
	Average	-	-	-	-	-	↗
Salinity	Surface	↗	-	-	-	-	-
	Middle	-	↗	-	-	-	-
	Bottom	↗	-	-	-	-	-
	Average	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	-	-	-	-	-	↘
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	↗	-	-	-	↗
	Average	-	-	-	-	-	-
pH	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Secchi disc depth (m)		-	-	↘	↘	↘	-
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	-	-	-	-	↘
	Middle	-	-	-	-	-	↘
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	↘
Total volatile solids (mg/L)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	↗	↗	-	-
	Average	-	-	↗	↗	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-	-	↘
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	↘
	Average	-	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Nitrite nitrogen (mg/L)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	-	-	-	-	-	↘
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Total inorganic nitrogen (mg/L)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	-	-	-	↘
	Middle	↘	↘	-	-	-	↘
	Bottom	↘	↘	-	-	-	↘
	Average	↘	↘	-	-	-	↘
Total nitrogen (mg/L)	Surface	↘	↘	-	-	-	↘
	Middle	↘	↘	-	-	-	↘
	Bottom	↘	↘	-	-	-	↘
	Average	↘	↘	-	-	-	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	-
	Middle	↘	↘	↘	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	-
Total phosphorus (mg/L)	Surface	↘	↘	-	-	-	↘
	Middle	↘	↘	-	-	-	↘
	Bottom	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	-	-	↘
	Middle	-	-	-	-	-	↘
	Bottom	-	-	-	-	-	↘
	Average	-	-	-	-	-	↘
Chlorophyll-*a* (µg/L)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
E. coli (cfu/100mL)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	-	-
	Middle	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-
	Average	-	-	-	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. MM19 has seven years' data only, which are insufficient to perform Seasonal Kendall Test
4. ↗ significant increase
5. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Port Shelter WCZ, 1986 - 2007

Monitoring Station		PM1	PM2	PM3	PM4	PM6	PM7	PM8	PM9	PM11
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007
Parameter	Water Depth									
Temperature (°C)	Surface	↗	↗	↗	↗	↗	↗	↗	↗	-
	Middle	↗	↗	↗	↗	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	↗	↗	↗	↗	-
Salinity	Surface	↗	-	-	-	↗	-	-	-	-
	Middle	↗	-	-	-	↗	-	-	-	-
	Bottom	-	-	-	-	↗	-	-	-	-
	Average	↗	-	-	-	↗	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘	↘	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	↗	-	↗	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	↘	-	↘	-	↘	↘	↘	-
	Middle	-	-	↗	-	-	-	-	-	-
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗	-
	Average	-	-	-	-	-	-	-	-	-
pH	Surface	↘	-	↘	↘	↘	↘	↘	-	-
	Middle	↘	-	-	-	↘	↘	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	↘	↘	-	-	-
Secchi disc depth (m)		-	-	-	-	↗	-	-	-	-
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	↘	↘	-	↘	↘	↘	-	-
	Middle	↘	-	↘	↘	↘	-	-	-	-
	Bottom	-	↘	-	-	-	-	↗	↗	-
	Average	↘	↘	↘	↘	↘	-	-	-	-
Total volatile solids (mg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	↘	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	↘	-	-	↘	-	-	-	-
	Middle	-	-	-	-	↘	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	↘	-	-	↘	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Nitrite nitrogen (mg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Total inorganic nitrogen (mg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘	↘	-
	Middle	↘	↘	↘	↘	↘	↘	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	↘	↘	↘	-
Total nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘	↘	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	↘	↘	↘	-
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	-	↘	↘	-	-	-	↘
	Middle	↘	↘	-	-	-	-	-	-	↘
	Bottom	↘	-	-	-	-	-	-	-	↘
	Average	↘	↘	-	-	-	-	-	-	↘
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	-	-	↘	↘
	Middle	↘	↘	↘	-	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	-	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	↘	-	-	↘	-	-
	Middle	↘	↘	-	-	-	↘	↘	↘	-
	Bottom	↘	-	-	↘	-	-	-	-	-
	Average	↘	↘	-	↘	-	-	-	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-	-
E. coli (cfu/100mL)	Surface	-	↘	-	-	↘	-	-	-	-
	Middle	-	-	-	-	↘	-	-	-	-
	Bottom	-	↘	-	-	-	-	-	-	-
	Average	-	↘	-	-	↘	-	-	-	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	↘	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-	-
	Average	-	-	-	-	↘	-	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Tolo Habour and Channel WCZ, 1986 - 2007

Monitoring Station		TM2	TM3	TM4	TM5	TM6	TM7	TM8
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007
Parameter	Water Depth							
Temperature (°C)	Surface	↗	↗	↗	↗	↗	↗	↗
	Middle	NA	↗	↗	NA	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗
Salinity	Surface	↗	↗	↗	↗	↗	↗	↗
	Middle	NA	-	↗	NA	-	-	↗
	Bottom	↗	-	-	↗	-	-	↗
	Average	↗	↗	↗	↗	-	↗	↗
Dissolved Oxygen (mg/L)	Surface	-	↘	↘	↘	↘	↘	↘
	Middle	NA	-	-	NA	↗	-	↗
	Bottom	↗	↗	↗	-	↗	↗	↗
	Average	-	-	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	↘	↘	↘	↘	↘	↘
	Middle	NA	-	↗	NA	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	-	-	-	-	-
pH	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	-	-	↘	-	-	-
	Average	↘	↘	↘	↘	↘	↘	↘
Secchi disc depth (m)		↗	-	↗	↗	↗	-	-
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗	↗	↗
	Middle	NA	↗	↗	NA	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	↘	-	↘	-	↘	-	↘
	Middle	NA	↘	↘	NA	-	↘	↘
	Bottom	↘	-	-	-	↘	-	-
	Average	↘	-	↘	-	↘	↘	-
Total volatile solids (mg/L)	Surface	↘	-	↘	-	↘	↘	↘
	Middle	NA	-	↘	NA	↘	-	↘
	Bottom	↘	-	↘	↘	-	-	-
	Average	↘	-	↘	-	↘	↘	↘
5-day Biochemical Oxygen Demand (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	↘
	Bottom	↘	-	-	↘	-	-	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Ammonia nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	-	↘
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	-	-
	Average	↘	↘	↘	↘	↘	↘	-
Nitrite nitrogen (mg/L)	Surface	↘	↘	↘	-	-	-	-
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	↘	↘	-	↘	↘	↘
	Average	↘	↘	↘	-	↘	↘	↘
Nitrate nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	↘	-
Total inorganic nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	↘	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	-
	Bottom	↘	↘	↘	↘	↘	↘	-
	Average	↘	↘	↘	↘	↘	↘	-
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘	↘	↘
	Middle	NA	↘	↘	NA	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	-	-	-	-
	Middle	NA	-	-	NA	-	-	↘
	Bottom	-	-	-	-	-	↘	-
	Average	-	-	-	-	-	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-	↘	-	-	-	-
	Middle	NA	-	-	NA	-	-	-
	Bottom	-	-	-	-	-	↗	-
	Average	-	-	-	-	-	-	-
E. coli (cfu/100mL)	Surface	↘	-	↘	-	-	-	-
	Middle	NA	-	-	NA	-	-	-
	Bottom	↘	↘	↘	-	-	-	-
	Average	↘	↘	↘	-	↘	-	-
Faecal coliforms (cfu/100mL)	Surface	↘	-	-	-	-	-	-
	Middle	NA	-	-	NA	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. NA (Not Applicable) indicates the measurement was not made due to shallow water
4. ↗ significant increase
5. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Southern WCZ, 1986 - 2007

Monitoring Station		SM1	SM2	SM3	SM4	SM5	SM6	SM7	SM9
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1988 I 2007
Parameter	Water Depth								
Temperature (°C)	Surface	↗	↗	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗	↗
Salinity	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	↘	-	↘	↘	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	↘	↘	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	↘	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	↗
	Average	-	-	-	-	-	-	-	-
pH	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Secchi disc depth (m)		-	-	-	-	-	-	-	-
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	↗	-	-	-	↗	-	-
	Average	-	-	-	-	-	-	-	-
Total volatile solids (mg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	-	-	-	↗	-	-	-	↗
	Middle	-	-	-	↗	-	-	↗	↗
	Bottom	-	-	-	-	-	-	↗	↗
	Average	-	-	-	↗	-	-	↗	↗
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗	↗	↗	↗
	Middle	↗	↗	-	↗	-	-	-	↗
	Bottom	-	-	-	-	-	-	-	↗
	Average	-	↗	-	↗	-	-	↗	↗
Nitrate nitrogen (mg/L)	Surface	-	↗	-	↗	-	-	↗	↗
	Middle	↗	↗	-	↗	-	-	↗	↗
	Bottom	-	-	-	↗	-	-	↗	↗
	Average	-	↗	-	↗	-	-	↗	↗
Total inorganic nitrogen (mg/L)	Surface	-	↗	-	↗	-	-	↗	↗
	Middle	-	-	-	↗	-	-	↗	↗
	Bottom	-	-	-	↗	-	-	↗	↗
	Average	-	-	-	↗	-	-	↗	↗
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	-	-	-	↘	↘	-
	Middle	↘	↘	↘	-	-	-	-	-
	Bottom	↘	↘	↘	-	↘	↘	-	-
	Average	↘	↘	↘	-	-	↘	-	-
Total nitrogen (mg/L)	Surface	↘	↘	-	-	↘	-	-	-
	Middle	↘	↘	↘	-	-	↘	-	-
	Bottom	↘	↘	↘	-	↘	↘	-	-
	Average	↘	↘	↘	-	-	↘	-	-
Orthophosphate phosphorus (mg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Total phosphorus (mg/L)	Surface	-	↘	↘	-	↘	↘	-	↘
	Middle	↘	↘	↘	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘	↘	-	↘
	Average	↘	↘	↘	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	↘
	Bottom	-	-	-	-	-	-	-	↘
	Average	-	-	-	-	-	-	-	↘
Chlorophyll-*a* (µg/L)	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	↗	-
	Average	-	-	-	-	-	-	-	-
E. coli (cfu/100mL)	Surface	-	-	-	↗	-	-	↗	↗
	Middle	-	↗	↗	↗	-	-	↗	↗
	Bottom	-	-	-	↗	-	-	↗	↗
	Average	-	-	-	↗	-	-	↗	↗
Faecal coliforms (cfu/100mL)	Surface	-	↗	↗	↗	-	-	↗	↗
	Middle	-	↗	↗	↗	-	↗	↗	↗
	Bottom	-	-	-	↗	-	-	↗	↗
	Average	-	↗	↗	↗	-	-	↗	↗

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Southern WCZ, 1986 - 2007 (continued)

Monitoring Station		SM10	SM11	SM12	SM13	SM17	SM18	SM19
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1989 I 2007	1989 I 2007	1989 I 2007
Parameter	Water Depth							
Temperature (°C)	Surface	↗	↗	↗	↗	↗	↗	↗
	Middle	NA	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗
Salinity	Surface	-	-	-	-	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	-	↗	↗	-
	Average	-	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	-	-	-	-	-	-	↘
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	-	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	↗	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
pH	Surface	-	-	-	-	-	-	-
	Middle	NA	-	↘	↘	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	↘	↘	-	-	-
Secchi disc depth (m)		-	-	-	-	-	-	-
Turbidity (NTU)	Surface	↗	↗	↘	↗	↗	↗	↗
	Middle	NA	↗	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	-	-	↗	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	↗	-	↗	↗
	Average	-	-	-	-	-	-	↗
Total volatile solids (mg/L)	Surface	↗	-	-	-	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	-	↗	-	↗
	Average	-	-	-	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	↗	↗	↗	-	-	-	-
	Middle	NA	↗	↗	↗	-	-	-
	Bottom	↗	↗	↗	↗	-	-	-
	Average	↗	↗	↗	↗	-	-	-
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗	-	-
	Middle	NA	↗	↗	↗	-	-	-
	Bottom	↗	↗	↗	↗	-	-	-
	Average	↗	↗	↗	↗	↗	-	-
Nitrate nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗	-	-
	Middle	NA	↗	↗	↗	-	-	-
	Bottom	↗	↗	↗	↗	-	-	-
	Average	↗	↗	↗	↗	-	-	-
Total inorganic nitrogen (mg/L)	Surface	↗	↗	↗	↗	-	-	-
	Middle	NA	↗	↗	↗	-	-	-
	Bottom	↗	↗	↗	↗	-	-	-
	Average	↗	↗	↗	↗	-	-	-
Total Kjeldahl nitrogen (mg/L)	Surface	-	-	-	-	↘	↘	↘
	Middle	NA	-	-	-	↘	↘	↘
	Bottom	-	-	-	-	↘	↘	↘
	Average	-	-	-	-	↘	↘	↘
Total nitrogen (mg/L)	Surface	-	-	-	-	-	↘	↘
	Middle	NA	-	-	-	↘	↘	↘
	Bottom	-	-	-	-	↘	↘	↘
	Average	-	-	-	-	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	-	-	-	-	↘	↘	↘
	Middle	NA	-	-	-	↘	↘	↘
	Bottom	-	-	-	-	↘	↘	↘
	Average	-	-	-	-	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	↘	-	↘	↘	↘	↘
	Middle	NA	-	-	↘	↘	↘	↘
	Bottom	-	-	-	↘	↘	↘	↘
	Average	↘	↘	-	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	-	-	↘	-
	Middle	NA	-	-	-	-	↘	-
	Bottom	-	-	-	-	-	-	-
	Average	-	-	-	-	-	↘	-
Chlorophyll-*a* (µg/L)	Surface	↗	↗	↗	↗	-	-	-
	Middle	NA	-	↗	↗	-	-	-
	Bottom	↗	-	↗	-	-	-	-
	Average	↗	-	↗	-	-	-	-
E. coli (cfu/100mL)	Surface	-	-	-	-	-	-	-
	Middle	NA	-	-	-	-	-	-
	Bottom	-	-	-	↗	-	-	-
	Average	-	-	-	-	-	-	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	-	-	-
	Middle	NA	-	↗	↗	-	-	-
	Bottom	-	-	↗	↗	-	-	-
	Average	-	-	-	↗	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. NA (Not Applicable) indicates the measurement was not made due to shallow water
4. SM20 has nine years' data only, which are insufficient to perform Seasonal Kendall Test
5. ↗ significant increase
6. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Victoria Harbour WCZ, 1986 - 2007

Monitoring Station		VM1	VM2	VM4	VM5	VM6
Monitoring Period		1988 I 2007	1988 I 2007	1988 I 2007	1986 I 2007	1988 I 2007
Parameter	Water Depth					
Temperature (°C)	Surface	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗
Salinity	Surface	↗	↗	↗	-	↗
	Middle	↗	↗	↗	-	↗
	Bottom	↗	↗	↗	-	↗
	Average	↗	↗	↗	-	↗
Dissolved Oxygen (mg/L)	Surface	↗	-	-	↗	-
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗
Dissolved Oxygen (%)	Surface	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗
pH	Surface	↘	-	-	-	↘
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	↘
Secchi disc depth (m)		↗	↗	↗	↗	↗
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	↘	↘	↘	-	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	-	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Total volatile solids (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	↘	-	-	-
	Middle	↘	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	-	↘
	Average	↘	↘	↘	-	↘
Nitrite nitrogen (mg/L)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	↘	-	-	-	-
	Average	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	-	-	↗	↗	↗
	Middle	-	-	-	↗	↗
	Bottom	-	-	-	↗	↗
	Average	-	-	-	↗	↗
Total inorganic nitrogen (mg/L)	Surface	↘	↘	-	-	-
	Middle	↘	↘	-	-	-
	Bottom	↘	↘	↘	-	-
	Average	↘	↘	↘	-	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	-	↘
	Average	↘	↘	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	↘	-	↘	-	↘
	Middle	↘	↘	↘	-	-
	Bottom	↘	↘	-	-	-
	Average	↘	↘	↘	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
E. coli (cfu/100mL)	Surface	↘	-	↘	↗	-
	Middle	-	-	-	↗	-
	Bottom	-	-	-	↗	-
	Average	-	-	-	↗	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	↗	↗
	Middle	-	-	-	↗	↗
	Bottom	-	-	-	↗	↗
	Average	-	-	-	↗	↗

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Victoria Harbour WCZ, 1986 - 2007 (continued)

Monitoring Station		VM7	VM8	VM12	VM14	VM15
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1993 I 2007
Parameter	Water Depth					
Temperature (°C)	Surface	↗	↗	↗	↗	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	-
Salinity	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	↗	-	↗	↗	-
	Middle	↗	-	↗	↗	↗
	Bottom	↗	-	↗	↗	↗
	Average	↗	-	↗	↗	↗
Dissolved Oxygen (%)	Surface	↗	-	↗	↗	-
	Middle	↗	-	↗	↗	↗
	Bottom	↗	-	↗	↗	↗
	Average	↗	-	↗	↗	↗
pH	Surface	-	-	-	-	-
	Middle	-	↘	-	-	-
	Bottom	-	↘	-	-	-
	Average	-	↘	-	-	-
Secchi disc depth (m)		↗	↗	-	↗	↗
Turbidity (NTU)	Surface	↗	↗	↘	↗	↗
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗	↗
	Average	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	↘	-	-	↘
	Middle	↘	↘	-	-	↘
	Bottom	↘	-	-	-	↘
	Average	↘	-	-	-	↘
Total volatile solids (mg/L)	Surface	-	↘	-	-	↘
	Middle	↘	↘	-	↘	-
	Bottom	↘	-	-	-	-
	Average	↘	↘	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	↘	-
	Middle	-	-	↘	↘	-
	Bottom	-	-	-	↘	-
	Average	-	-	↘	↘	-
Ammonia nitrogen (mg/L)	Surface	-	↗	↘	↘	↘
	Middle	-	↗	↘	-	↘
	Bottom	-	-	-	-	↘
	Average	-	↗	↘	-	↘
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	-	-
	Middle	-	-	-	↗	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	↗	↗	↗	↗	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	-
Total inorganic nitrogen (mg/L)	Surface	-	↗	-	-	↘
	Middle	-	↗	-	↗	↘
	Bottom	-	-	-	↗	↘
	Average	-	↗	-	-	↘
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	-	↘	↘	↘
	Middle	↘	-	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	-	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	-	↘	↘	↘
	Middle	-	-	↘	↘	↘
	Bottom	-	-	↘	↘	↘
	Average	-	-	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	↘	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘	↘
	Average	↘	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	↘	↘
	Middle	-	-	-	-	↘
	Bottom	-	-	-	-	↘
	Average	-	-	-	-	↘
Chlorophyll-*a* (µg/L)	Surface	-	-	-	↗	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
E. coli (cfu/100mL)	Surface	↗	↗	-	-	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	-	-
	Average	↗	↗	↗	-	-
Faecal coliforms (cfu/100mL)	Surface	↗	↗	↗	-	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Eastern Buffer WCZ, 1986 - 2007

Monitoring Station		EM1	EM2	EM3
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007
Parameter	Water Depth			
Temperature (°C)	Surface	↗	↗	↗
	Middle	↗	↗	↗
	Bottom	↗	↗	↗
	Average	↗	↗	↗
Salinity	Surface	-	-	-
	Middle	-	-	↗
	Bottom	↗	-	↗
	Average	-	-	-
Dissolved Oxygen (mg/L)	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	-	-
	Average	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-
	Middle	↗	↗	-
	Bottom	↗	-	-
	Average	-	-	-
pH	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	-	-
	Average	-	-	-
Secchi disc depth (m)		-	-	-
Turbidity (NTU)	Surface	↗	↗	↗
	Middle	↗	↗	↗
	Bottom	↗	↗	↗
	Average	↗	↗	↗
Suspended Solids (mg/L)	Surface	↘	↘	-
	Middle	↘	-	-
	Bottom	-	-	-
	Average	↘	-	-
Total volatile solids (mg/L)	Surface	↘	↘	-
	Middle	↘	-	-
	Bottom	-	-	-
	Average	↘	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-
	Middle	↘	-	-
	Bottom	↘	-	-
	Average	↘	-	-
Ammonia nitrogen (mg/L)	Surface	↘	↘	↘
	Middle	↘	↘	-
	Bottom	↘	↘	-
	Average	↘	↘	↘
Nitrite nitrogen (mg/L)	Surface	-	-	-
	Middle	↘	↘	-
	Bottom	↘	↘	-
	Average	↘	↘	-
Nitrate nitrogen (mg/L)	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	-	-
	Average	-	-	-
Total inorganic nitrogen (mg/L)	Surface	-	-	-
	Middle	-	↘	-
	Bottom	↘	↘	-
	Average	↘	↘	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘
	Middle	↘	↘	↘
	Bottom	↘	↘	↘
	Average	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	↘	↘
	Middle	↘	↘	↘
	Bottom	↘	↘	↘
	Average	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	↘	↘
	Middle	-	↘	↘
	Bottom	↘	↘	-
	Average	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	↘	↘
	Middle	↘	↘	↘
	Bottom	↘	↘	↘
	Average	↘	↘	↘
Silica (mg/L)	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	-	-
	Average	-	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	-	-
	Average	-	-	-
E. coli (cfu/100mL)	Surface	-	↘	-
	Middle	-	-	↘
	Bottom	-	↘	↘
	Average	-	↘	↘
Faecal coliforms (cfu/100mL)	Surface	-	-	-
	Middle	-	-	-
	Bottom	-	↘	↘
	Average	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Western Buffer WCZ, 1986 - 2007

Monitoring Station		WM1	WM2	WM3	WM4
Monitoring Period		1988 I 2007	1988 I 2007	1986 I 2007	1986 I 2007
Parameter	Water Depth				
Temperature (°C)	Surface	↗	↗	↗	↗
	Middle	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗
	Average	↗	↗	↗	↗
Salinity	Surface	↗	↗	↗	-
	Middle	↗	-	↗	↗
	Bottom	↗	-	↗	↗
	Average	↗	↗	↗	↗
Dissolved Oxygen (mg/L)	Surface	-	-	-	-
	Middle	-	-	-	-
	Bottom	-	-	-	-
	Average	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	-
	Middle	-	-	-	-
	Bottom	-	-	-	-
	Average	-	-	-	-
pH	Surface	-	-	-	-
	Middle	-	↘	↘	↘
	Bottom	-	↘	↘	↘
	Average	-	↘	-	↘
Secchi disc depth (m)		-	-	-	-
Turbidity (NTU)	Surface	↗	↗	↗	↗
	Middle	↗	↗	↗	↗
	Bottom	↗	↗	↗	↗
	Average	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	-	↘	-
	Middle	-	-	-	-
	Bottom	↗	-	-	-
	Average	-	-	-	-
Total volatile solids (mg/L)	Surface	-	-	↘	-
	Middle	-	-	-	-
	Bottom	-	-	-	-
	Average	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-
	Middle	-	-	-	-
	Bottom	-	-	-	-
	Average	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	-	↗	-	↗
	Middle	-	↗	-	-
	Bottom	-	-	-	-
	Average	-	↗	-	-
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	↗
	Middle	-	↗	-	-
	Bottom	-	-	-	-
	Average	-	↗	-	↗
Nitrate nitrogen (mg/L)	Surface	-	-	↗	↗
	Middle	-	-	-	↗
	Bottom	-	-	-	-
	Average	-	-	-	↗
Total inorganic nitrogen (mg/L)	Surface	-	↗	↗	↗
	Middle	-	↗	-	↗
	Bottom	-	↗	-	-
	Average	-	↗	-	↗
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	↘
	Middle	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘
	Average	↘	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	-	-	-
	Middle	↘	-	↘	↘
	Bottom	↘	↘	↘	↘
	Average	↘	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	-	-	-
	Middle	-	-	-	-
	Bottom	-	-	↘	-
	Average	↘	-	↘	-
Total phosphorus (mg/L)	Surface	↘	↘	↘	↘
	Middle	↘	↘	↘	↘
	Bottom	↘	↘	↘	↘
	Average	↘	↘	↘	↘
Silica (mg/L)	Surface	↘	-	↘	-
	Middle	-	↘	↘	-
	Bottom	-	-	↘	-
	Average	-	↘	↘	↘
Chlorophyll-*a* (µg/L)	Surface	↗	-	-	-
	Middle	-	-	-	-
	Bottom	-	-	-	-
	Average	-	-	-	-
E. coli (cfu/100mL)	Surface	↗	↗	↗	↗
	Middle	-	↗	↗	↗
	Bottom	-	↗	↗	↗
	Average	-	↗	↗	↗
Faecal coliforms (cfu/100mL)	Surface	↗	↗	↗	↗
	Middle	-	↗	↗	↗
	Bottom	-	↗	↗	↗
	Average	-	↗	↗	↗

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Junk Bay WCZ, 1986 - 2007

Monitoring Station		JM3	JM4
Monitoring Period		1986 I 2007	1986 I 2007
Parameter	Water Depth		
Temperature (°C)	Surface	↗	↗
	Middle	↗	↗
	Bottom	↗	↗
	Average	↗	↗
Salinity	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
Dissolved Oxygen (mg/L)	Surface	-	-
	Middle	-	-
	Bottom	↗	-
	Average	-	-
Dissolved Oxygen (%)	Surface	-	-
	Middle	↗	↗
	Bottom	↗	↗
	Average	-	-
pH	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
Secchi disc depth (m)		-	-
Turbidity (NTU)	Surface	↗	↗
	Middle	↗	↗
	Bottom	↗	↗
	Average	↗	↗
Suspended Solids (mg/L)	Surface	-	↘
	Middle	-	-
	Bottom	-	-
	Average	↘	-
Total volatile solids (mg/L)	Surface	↘	-
	Middle	↘	↘
	Bottom	-	-
	Average	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
Ammonia nitrogen (mg/L)	Surface	↘	-
	Middle	↘	-
	Bottom	↘	↘
	Average	↘	-
Nitrite nitrogen (mg/L)	Surface	-	-
	Middle	-	-
	Bottom	-	↘
	Average	-	-
Nitrate nitrogen (mg/L)	Surface	-	↗
	Middle	-	-
	Bottom	-	-
	Average	-	-
Total inorganic nitrogen (mg/L)	Surface	↘	-
	Middle	↘	-
	Bottom	↘	-
	Average	↘	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘
	Middle	↘	↘
	Bottom	↘	↘
	Average	↘	↘
Total nitrogen (mg/L)	Surface	↘	↘
	Middle	↘	↘
	Bottom	↘	↘
	Average	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	-	-
	Middle	-	↘
	Bottom	↘	↘
	Average	-	-
Total phosphorus (mg/L)	Surface	↘	↘
	Middle	↘	↘
	Bottom	↘	↘
	Average	↘	↘
Silica (mg/L)	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
E. coli (cfu/100mL)	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-
Faecal coliforms (cfu/100mL)	Surface	-	-
	Middle	-	-
	Bottom	-	-
	Average	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ↗ significant increase
4. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Deep Bay WCZ, 1986 - 2007

Monitoring Station		DM1	DM2	DM3	DM4	DM5
Monitoring Period		1986 I 2007	1986 I 2007	1986 I 2007	1986 I 2007	1991 I 2007
Parameter	Water Depth					
Temperature (°C)	Surface	-	-	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	-	-	↗	↗	↗
Salinity	Surface	↘	↘	-	-	↗
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	↘	↘	-	-	↗
Dissolved Oxygen (mg/L)	Surface	↘	↘	↘	↘	↘
	Middle	NA	NA	NA	NA	↘
	Bottom	NA	NA	NA	↘	-
	Average	↘	↘	↘	↘	↘
Dissolved Oxygen (%)	Surface	↘	↘	↘	↘	↘
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	↘	-
	Average	↘	↘	↘	↘	-
pH	Surface	↘	↘	↘	↘	↘
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	↘	-
	Average	↘	↘	↘	↘	-
Secchi disc depth (m)		-	-	-	-	-
Turbidity (NTU)	Surface	-	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	-
	Average	-	↗	↗	↗	-
Suspended Solids (mg/L)	Surface	-	-	↗	-	-
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	-	-	-	-	-
Total volatile solids (mg/L)	Surface	-	↗	-	-	-
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	-	↗	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	↗	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	↗	↗
	Average	↗	↗	↗	↗	-
Ammonia nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	↗	↗	↗	↗	↗
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	↗	↗	↗	↗	↗
Nitrate nitrogen (mg/L)	Surface	-	-	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	-	-	↗	↗	↗
Total inorganic nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	↗	↗	↗	↗	↗
Total Kjeldahl nitrogen (mg/L)	Surface	↗	↗	↗	↗	-
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	↗	↗	↗	-	-
Total nitrogen (mg/L)	Surface	↗	↗	↗	↗	-
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	↗	-
	Average	↗	↗	↗	↗	-
Orthophosphate phosphorus (mg/L)	Surface	-	-	-	↗	↗
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	↗	-
	Average	-	-	-	↗	↗
Total phosphorus (mg/L)	Surface	-	-	-	-	↘
	Middle	NA	NA	NA	NA	↘
	Bottom	NA	NA	NA	-	↘
	Average	-	-	-	-	↘
Silica (mg/L)	Surface	-	-	-	-	-
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	-	-	-	-	-
Chlorophyll-*a* (µg/L)	Surface	-	↗	-	-	↗
	Middle	NA	NA	NA	NA	-
	Bottom	NA	NA	NA	-	-
	Average	-	↗	-	-	-
E. coli (cfu/100mL)	Surface	-	↗	-	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	-	↗	-	↗	↗
Faecal coliforms (cfu/100mL)	Surface	↗	↗	↗	↗	↗
	Middle	NA	NA	NA	NA	↗
	Bottom	NA	NA	NA	↗	↗
	Average	↗	↗	↗	↗	↗

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. NA (Not Applicable) indicates the measurement was not made due to the shallow water
4. ↗ significant increase
5. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the North Western WCZ, 1986 - 2007

Monitoring Station		NM1	NM2	NM3	NM5	NM6
Monitoring Period		1988 I 2007	1986 I 2007	1986 I 2007	1988 I 2007	1991 I 2007
Parameter	Water Depth					
Temperature (°C)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Salinity	Surface	-	-	-	-	↗
	Middle	↗	↗	-	-	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	-	-	-
Dissolved Oxygen (mg/L)	Surface	-	-	-	↘	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Dissolved Oxygen (%)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
pH	Surface	↘	-	-	↘	-
	Middle	↘	-	-	↘	-
	Bottom	↘	-	-	↘	-
	Average	↘	↘	-	↘	-
Secchi disc depth (m)		-	↗	↗	-	-
Turbidity (NTU)	Surface	↗	↗	↗	↗	↗
	Middle	↗	↗	↗	↗	↗
	Bottom	↗	↗	-	↗	↗
	Average	↗	↗	↗	↗	↗
Suspended Solids (mg/L)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Total volatile solids (mg/L)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	↗	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	-	-
	Average	-	-	-	-	-
Ammonia nitrogen (mg/L)	Surface	↗	↗	↗	↗	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	-
Nitrite nitrogen (mg/L)	Surface	↗	↗	↗	↗	↗
	Middle	-	↗	↗	↗	↗
	Bottom	-	↗	↗	↗	-
	Average	↗	↗	↗	↗	↗
Nitrate nitrogen (mg/L)	Surface	-	↗	↗	↗	-
	Middle	-	↗	↗	-	-
	Bottom	-	-	-	-	-
	Average	-	-	↗	-	-
Total inorganic nitrogen (mg/L)	Surface	↗	↗	↗	↗	-
	Middle	-	↗	↗	↗	-
	Bottom	-	↗	↗	↗	-
	Average	-	↗	↗	↗	-
Total Kjeldahl nitrogen (mg/L)	Surface	-	-	-	-	-
	Middle	↘	-	↘	-	-
	Bottom	↘	↘	-	-	-
	Average	-	↘	-	-	-
Total nitrogen (mg/L)	Surface	-	-	-	-	-
	Middle	↘	-	-	-	-
	Bottom	↘	↘	-	-	-
	Average	-	-	-	-	-
Orthophosphate phosphorus (mg/L)	Surface	-	-	-	↗	↘
	Middle	-	-	-	-	↘
	Bottom	-	-	-	-	↘
	Average	-	-	-	-	↘
Total phosphorus (mg/L)	Surface	↘	-	-	-	↘
	Middle	↘	-	-	↘	↘
	Bottom	↘	↘	-	-	↘
	Average	↘	↘	↘	-	↘
Silica (mg/L)	Surface	-	-	-	-	-
	Middle	-	-	-	-	-
	Bottom	-	-	-	↘	↘
	Average	-	-	-	-	-
Chlorophyll-*a* (µg/L)	Surface	-	-	-	-	↗
	Middle	-	-	-	-	↗
	Bottom	-	-	-	-	-
	Average	-	-	-	-	↗
E. coli (cfu/100mL)	Surface	↗	-	-	↗	-
	Middle	↗	-	↗	↗	-
	Bottom	↗	↗	-	↗	-
	Average	↗	↗	-	↗	-
Faecal coliforms (cfu/100mL)	Surface	↗	↗	-	↗	-
	Middle	↗	↗	↗	↗	-
	Bottom	↗	↗	↗	↗	-
	Average	↗	↗	↗	↗	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. NM8 has nine years' data only, which is insufficient to perform Seasonal Kendall Test
4. ↗ significant increase
5. ↘ significant decrease

Summary statistics for bottom sediment quality in the Tolo Harbour and Channel and Southern WCZs, 2003 - 2007

	Tolo Harbour and Channel				Hong Kong Island (South)		West Lamma Channel	
	Harbour Subzone	Buffer Subzone	Channel Subzone					
Parameter	TS2	TS3	TS4	TS5	SS1	SS2	SS3	SS4
Number of samples	10	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	74 (58 - 88)	76 (43 - 90)	71 (56 - 80)	89 (80 - 93)	66 (57 - 84)	83 (74 - 97)	73 (52 - 92)	74 (49 - 96)
Electrochemical Potential (mV)	-331 (-376) - (-288)	-333 (-364) - (-298)	-351 (-390) - (-314)	-339 (-360) - (-307)	-157 (-205) - (-91)	-170 (-242) - (-127)	-176 (-230) - (-116)	-166 (-235) - (-95)
Total Solids (%w/w)	35 (32 - 40)	32 (25 - 43)	37 (28 - 54)	32 (28 - 35)	58 (48 - 63)	47 (43 - 51)	51 (41 - 59)	47 (42 - 52)
Total Volatile Soilds (%w/w)	9.8 (8.6 - 11.0)	10.3 (7.2 - 12.0)	9.8 (5.0 - 12.0)	10.8 (8.4 - 12.0)	6.4 (5.0 - 9.6)	8.2 (6.7 - 14.0)	7.0 (6.0 - 8.7)	7.9 (5.8 - 16.0)
Chemical Oxygen Demand (mg/kg)	24000 (22000 - 27000)	23000 (19000 - 25000)	22000 (20000 - 23000)	21000 (19000 - 24000)	11000 (9100 - 13000)	14000 (11000 - 16000)	18000 (15000 - 25000)	16000 (14000 - 23000)
Total Carbon (%w/w)	0.8 (0.7 - 1.0)	0.7 (0.6 - 0.8)	0.9 (0.8 - 1.0)	0.9 (0.8 - 0.9)	0.9 (0.7 - 1.0)	0.7 (0.6 - 0.8)	0.9 (0.6 - 1.0)	0.8 (0.5 - 1.0)
Ammonical Nitrogen (mg/kg)	6.8 (0.1 - 11.0)	4.1 (<0.1 - 7.2)	9.7 (2.1 - 17.0)	13 (6.0 - 21.0)	5.4 (2.3 - 8.8)	8.7 (2.6 - 37.0)	5.4 (1.7 - 13.0)	3.4 (1.3 - 6.5)
Total Kjeldahl Nitrogen (mg/kg)	570 (440 - 700)	520 (350 - 630)	640 (480 - 810)	730 (590 - 870)	350 (210 - 490)	410 (230 - 510)	380 (240 - 470)	370 (240 - 500)
Total Phosphorus (mg/kg)	180 (160 - 220)	160 (140 - 200)	180 (150 - 210)	200 (160 - 230)	200 (110 - 240)	190 (150 - 230)	220 (180 - 270)	190 (150 - 250)
Total Sulphide (mg/kg)	160 (8 - 250)	120 (18 - 240)	170 (11 - 330)	160 (21 - 430)	28 (7 - 70)	48 (10 - 100)	33 (4 - 72)	41 (8 - 140)
Total Cyanide (mg/kg)	0.2 (<0.1 - 0.3)	0.2 (<0.1 - 0.2)	0.2 (<0.1 - 0.2)	0.2 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	8.2 (6.6 - 10.0)	8.6 (5.9 - 11.0)	7.7 (5.9 - 9.2)	6.0 (5.4 - 6.8)	6.4 (4.6 - 7.3)	8.4 (7.8 - 9.3)	7.0 (6.1 - 7.9)	7.3 (6.1 - 8.8)
Cadmium (mg/kg)	0.6 (0.3 - 0.8)	0.6 (0.4 - 0.7)	0.5 (0.2 - 0.6)	0.3 (0.2 - 0.3)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	26 (21 - 31)	24 (14 - 35)	25 (21 - 33)	34 (30 - 36)	24 (17 - 36)	33 (28 - 38)	32 (25 - 38)	34 (26 - 41)
Copper (mg/kg)	43 (26 - 54)	45 (25 - 60)	27 (18 - 39)	23 (19 - 26)	11 (7 - 18)	22 (19 - 25)	19 (15 - 23)	28 (18 - 38)
Lead (mg/kg)	84 (71 - 96)	95.6 (75 - 110)	68 (52 - 82)	51 (44 - 58)	27 (21 - 35)	37 (28 - 41)	35 (23 - 41)	38 (25 - 49)
Mercury (mg/kg)	0.09 (0.05 - 0.130)	0.07 (<0.05 - 0.11)	0.06 (<0.05 - 0.10)	0.06 (<0.05 - 0.09)	0.06 (<0.05 - 0.08)	0.09 (0.07 - 0.11)	0.1 (0.08 - 0.10)	0.11 (0.08 - 0.20)
Nickel (mg/kg)	17 (12 - 22)	15 (8 - 22)	17 (13 - 24)	26 (22 - 31)	17 (12 - 23)	24 (20 - 26)	23 (19 - 25)	22 (16 - 26)
Silver (mg/kg)	0.5 (0.3 - 0.6)	0.5 (0.4 - 0.7)	0.3 (<0.2 - 0.4)	0.2 (0.2 - 0.2)	<0.2 (<0.2 - <0.2)	0.3 (0.2 - 0.3)	0.2 (<0.2 - 0.2)	0.4 (0.2 - 0.6)
Zinc (mg/kg)	220 (140 - 320)	260 (170 - 380)	170 (120 - 220)	130 (110 - 150)	74 (56 - 110)	100 (93 - 120)	93 (75 - 110)	100 (75 - 130)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	91 (90 - 98)	90 (90 - 90)	90 (90 - 90)	90 (90 - 93)	92 (90 - 110)	91 (90 - 94)	91 (90 - 95)	93 (90 - 110)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	49 (24 - 120)	41 (21 - 85)	45 (27 - 87)	44 (16 - 72)	53 (26 - 190)	64 (30 - 130)	58 (23 - 110)	89 (40 - 160)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Southern, Junk Bay and Deep Bay WCZs, 2003 - 2007

	Lantau Island		Junk Bay	Inner Deep Bay		Outer Deep Bay	
Parameter	(East) SS5	(South) SS6	JS2	DS1	DS2	DS3	DS4
Number of samples	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	94 (79 - 99)	61 (44 - 96)	85 (74 - 96)	67 (8 - 92)	75 (47 - 90)	81 (44 - 96)	64 (37 - 88)
Electrochemical Potential (mV)	-207 (-299) - (-92)	-152 (-254) - (-62)	-217 (-323) - (-98)	-248 (-366) - (-143)	-169 (-267) - (-34)	-181 (-237) - (-88)	-174 (-211) - (-116)
Total Solids (%w/w)	38 (35 - 41)	63 (55 - 66)	44 (40 - 50)	48 (37 - 58)	48 (43 - 53)	49 (45 - 54)	56 (46 - 67)
Total Volatile Soilds (%w/w)	8.4 (7.3 - 9.9)	4.3 (3.6 - 4.7)	7.3 (5.6 - 9.5)	6.7 (4.3 - 8.8)	6.6 (5.0 - 8.3)	7.1 (5.8 - 9.8)	5.9 (4.0 - 8.1)
Chemical Oxygen Demand (mg/kg)	15000 (14000 - 17000)	10000 (8600 - 12000)	17000 (13000 - 19000)	22000 (15000 - 29000)	17000 (12000 - 22000)	16000 (12000 - 18000)	15000 (13000 - 18000)
Total Carbon (%w/w)	0.6 (0.5 - 0.6)	0.5 (0.4 - 0.6)	0.7 (0.6 - 0.8)	0.6 (0.4 - 1.0)	0.6 (0.5 - 0.7)	0.6 (0.5 - 0.7)	0.6 (0.4 - 0.8)
Ammonical Nitrogen (mg/kg)	8.2 (0.2 - 20.0)	5.0 (0.3 - 10.0)	5.2 (0.2 - 8.6)	114.2 (2.5 - 600.0)	9.5 (<0.05 - 53.0)	1.6 (<0.05 - 7.9)	2.7 (<0.05 - 15.0)
Total Kjeldahl Nitrogen (mg/kg)	500 (350 - 870)	270 (190 - 360)	450 (340 - 520)	520 (210 - 1700)	400 (160 - 700)	290 (160 - 430)	240 (100 - 410)
Total Phosphorus (mg/kg)	200 (150 - 340)	170 (130 - 200)	200 (170 - 210)	260 (110 - 530)	260 (140 - 340)	200 (120 - 270)	150 (70 - 240)
Total Sulphide (mg/kg)	70 (15 - 150)	15 (1 - 47)	87 (4 - 200)	340 (22 - 960)	140 (29 - 570)	59 (2 - 160)	12 (1 - 68)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.2 (<0.1 - 0.5)	0.2 (<0.1 - 0.6)	0.2 (<0.1 - 0.3)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	8.1 (7.4 - 9.0)	5.6 (5.2 - 6.1)	7.5 (6.7 - 8.9)	10.3 (7.1 - 13.0)	12.0 (9.9 - 14.0)	13.0 (7.7 - 15.0)	12.1 (7.6 - 18.0)
Cadmium (mg/kg)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	0.2 (0.1 - 0.3)	0.3 (<0.1 - 0.7)	0.3 (0.1 - 0.4)	0.3 (<0.1 - 0.4)	0.1 (<0.1 - 0.2)
Chromium (mg/kg)	43 (34 - 46)	22 (20 - 25)	50 (41 - 65)	41 (28 - 66)	40 (22 - 50)	44 (24 - 53)	32 (16 - 47)
Copper (mg/kg)	39 (30 - 42)	11 (8 - 13)	120 (77 - 150)	68 (16 - 210)	60 (26 - 91)	58 (12 - 77)	21 (9 - 64)
Lead (mg/kg)	52 (41 - 57)	25 (22 - 31)	57 (44 - 110)	58 (40 - 84)	53 (30 - 60)	54 (32 - 69)	40 (31 - 58)
Mercury (mg/kg)	0.16 (0.13 - 0.20)	0.07 (<0.05 - 0.10)	0.26 (0.22 - 0.41)	0.15 (<0.05 - 0.40)	0.14 (0.06 - 0.23)	0.13 (<0.05 - 0.16)	0.06 (<0.05 - 0.14)
Nickel (mg/kg)	28 (22 - 32)	15 (13 - 17)	25 (20 - 31)	36 (18 - 140)	26 (14 - 37)	30 (16 - 35)	19 (15 - 31)
Silver (mg/kg)	0.6 (0.5 - 0.6)	<0.2 (<0.2 - <0.2)	2.3 (1.6 - 3.0)	0.8 (0.2 - 2.9)	0.6 (0.2 - 0.8)	0.6 (<0.2 - 0.8)	0.2 (<0.2 - 0.5)
Zinc (mg/kg)	140 (110 - 160)	65 (56 - 74)	160 (130 - 200)	210 (100 - 560)	180 (91 - 230)	160 (81 - 230)	88 (69 - 140)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	90 (90 - 94)	90 (90 - 90)	96 (90 - 110)	130 (90 - 470)	92 (90 - 96)	92 (90 - 98)	91 (90 - 95)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	62 (44 - 83)	21 (19 - 25)	210 (90 - 400)	160 (18 - 880)	97 (54 - 150)	100 (29 - 280)	39 (16 - 82)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Port Shelter and Mirs Bay WCZs, 2003 - 2007

Parameter	Inner Port Shelter	Outer Port Shelter		Starling Inlet	Crooked Island		Port Island	Mirs Bay (North)
	PS3	PS5	PS6	MS1	MS2	MS7	MS17	MS3
Number of samples	10	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	91 (87 - 96)	52 (8 - 92)	79 (73 - 85)	86 (78 - 95)	82 (21 - 99)	91 (85 - 99)	88 (77 - 98)	88 (73 - 96)
Electrochemical Potential (mV)	-274 (-324) - (-188)	-170 (-249) - (-102)	-196 (-281) - (-73)	-322 (-376) - (-218)	-348 (-373) - (-298)	-360 (-382) - (-337)	-226 (-295) - (-152)	-250 (-327) - (-190)
Total Solids (%w/w)	36 (33 - 40)	54 (38 - 59)	49 (46 - 52)	40 (35 - 44)	32 (31 - 35)	30 (27 - 33)	36 (33 - 42)	40 (31 - 43)
Total Volatile Soilds (%w/w)	12.5 (11.0 - 14.0)	8.3 (6.5 - 10.0)	9.0 (7.8 - 11.0)	8.2 (7.1 - 11.0)	10.1 (8.6 - 15.0)	11.0 (9.5 - 15.0)	9.8 (7.6 - 15.0)	9.4 (8.0 - 12.0)
Chemical Oxygen Demand (mg/kg)	19000 (15000 - 22000)	13000 (10000 - 17000)	15000 (11000 - 19000)	20000 (17000 - 23000)	18000 (16000 - 20000)	18000 (16000 - 20000)	18000 (15000 - 20000)	18000 (15000 - 19000)
Total Carbon (%w/w)	1.1 (1.0 - 1.2)	1.8 (0.9 - 2.2)	1.3 (1.0 - 1.4)	0.7 (0.6 - 0.8)	0.7 (0.6 - 0.7)	0.7 (0.7 - 0.9)	0.8 (0.7 - 1.0)	0.8 (0.7 - 0.9)
Ammonical Nitrogen (mg/kg)	6.6 (3.7 - 14.0)	5.4 (1.3 - 12.0)	5.7 (2.4 - 9.1)	13.2 (0.2 - 26.0)	13.5 (5.0 - 25.0)	10.5 (6.1 - 18.0)	6.0 (0.2 - 14.0)	3.9 (<0.05 - 9.0)
Total Kjeldahl Nitrogen (mg/kg)	540 (280 - 700)	350 (210 - 450)	360 (210 - 520)	470 (270 - 630)	620 (510 - 670)	650 (340 - 780)	640 (420 - 770)	500 (340 - 700)
Total Phosphorus (mg/kg)	170 (87 - 210)	150 (83 - 190)	150 (89 - 210)	160 (95 - 250)	180 (170 - 190)	180 (140 - 200)	210 (180 - 250)	170 (120 - 220)
Total Sulphide (mg/kg)	65 (5 - 270)	9 (3 - 17)	20 (4 - 36)	130 (16 - 350)	140 (8 - 340)	65 (3 - 190)	59 (6 - 180)	20 (4 - 55)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.1)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	5.7 (4.7 - 6.5)	4.0 (2.3 - 5.3)	5.7 (5.1 - 6.6)	8.4 (7.2 - 9.3)	6.5 (5.8 - 7.9)	6.2 (5.7 - 7.6)	6.1 (4.4 - 7.3)	6.2 (5.1 - 7.1)
Cadmium (mg/kg)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	0.4 (0.2 - 0.5)	0.3 (0.1 - 0.3)	0.2 (0.1 - 0.3)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Chromium (mg/kg)	27 (20 - 31)	22 (15 - 30)	27 (23 - 30)	31 (26 - 35)	35 (28 - 38)	33 (31 - 35)	33 (25 - 41)	31 (27 - 33)
Copper (mg/kg)	23 (18 - 29)	11 (7 - 17)	12 (10 - 14)	37 (32 - 42)	20 (14 - 23)	20 (18 - 22)	16 (12 - 20)	13 (11 - 15)
Lead (mg/kg)	38 (30 - 43)	27 (20 - 38)	33 (30 - 35)	51 (38 - 56)	46 (39 - 51)	43 (36 - 51)	44 (28 - 53)	36 (32 - 40)
Mercury (mg/kg)	0.09 (0.08 - 0.11)	0.05 (<0.05 - 0.07)	0.05 (<0.05 - 0.05)	0.08 (0.07 - 0.10)	0.06 (<0.05 - 0.07)	0.08 (0.06 - 0.10)	0.06 (<0.05 - 0.06)	0.06 (<0.05 - 0.08)
Nickel (mg/kg)	19 (16 - 23)	17 (12 - 24)	21 (16 - 24)	19 (15 - 24)	24 (20 - 27)	24 (22 - 27)	26 (18 - 31)	22 (19 - 25)
Silver (mg/kg)	0.3 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	<0.2 (<0.2 - 0.2)	1.2 (0.8 - 1.4)	0.3 (<0.2 - 0.3)	0.2 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	<0.2 (<0.2 - <0.2)
Zinc (mg/kg)	100 (79 - 120)	72 (46 - 98)	80 (67 - 90)	120 (80 - 140)	110 (77 - 120)	100 (78 - 110)	100 (66 - 120)	92 (60 - 160)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 94)	90 (90 - 90)	90 (90 - 90)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	51 (24 - 77)	26 (17 - 34)	27 (20 - 38)	39 (29 - 58)	39 (24 - 73)	62 (28 - 200)	37 (29 - 54)	29 (20 - 41)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Mirs Bay WCZ, 2003 - 2007

Parameter	Mirs Bay (North) MS4	Mirs Bay (North) MS5	Long Harbour MS6	Waglan Island MS8	Mirs Bay (South) MS13	Mirs Bay (Central) MS14	Mirs Bay (Central) MS15	Mirs Bay (Central) MS16
Number of samples	10	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	92 (84 - 97)	87 (78 - 95)	91 (81 - 97)	94 (83 - 97)	91 (83 - 96)	89 (77 - 96)	87 (81 - 92)	81 (71 - 90)
Electrochemical Potential (mV)	-203 (-274) - (-109)	-200 (-255) - (-95)	-214 (-308) - (-104)	-184 (-249) - (-139)	-157 (-208) - (-104)	-165 (-250) - (-113)	-153 (-260) - (-78)	-145 (-259) - (-39)
Total Solids (%w/w)	36 (33 - 39)	41 (36 - 44)	34 (31 - 39)	47 (45 - 49)	49 (42 - 54)	51 (46 - 56)	52 (43 - 57)	55 (54 - 58)
Total Volatile Soilds (%w/w)	9.3 (8.1 - 13.0)	8.4 (7.1 - 12.0)	11.4 (9.8 - 16.0)	7.1 (5.8 - 8.9)	6.6 (5.5 - 8.4)	6.6 (5.4 - 8.7)	6.5 (5.5 - 8.8)	6.3 (5.5 - 8.0)
Chemical Oxygen Demand (mg/kg)	16000 (14000 - 18000)	16000 (13000 - 17000)	19000 (17000 - 21000)	13000 (10000 - 18000)	12000 (10000 - 18000)	12000 (9900 - 18000)	12000 (8400 - 21000)	13000 (9600 - 27000)
Total Carbon (%w/w)	0.7 (0.6 - 0.8)	0.7 (0.6 - 0.8)	0.9 (0.8 - 1.0)	0.6 (0.5 - 0.6)	0.6 (0.5 - 0.6)	0.6 (0.5 - 0.6)	0.6 (0.5 - 0.6)	0.7 (0.6 - 0.7)
Ammonical Nitrogen (mg/kg)	8.3 (0.1 - 20.0)	9.3 (0.1 - 23.0)	7.8 (0.4 - 16.0)	2.6 (0.3 - 9.3)	4.8 (0.8 - 21.0)	3.2 (0.1 - 9.1)	3.3 (0.2 - 9.5)	3.4 (0.9 - 7.8)
Total Kjeldahl Nitrogen (mg/kg)	600 (440 - 670)	570 (360 - 670)	730 (610 - 800)	430 (270 - 520)	410 (200 - 540)	420 (200 - 520)	410 (270 - 540)	400 (260 - 490)
Total Phosphorus (mg/kg)	190 (140 - 220)	200 (140 - 240)	230 (180 - 250)	210 (150 - 240)	220 (98 - 260)	220 (140 - 260)	220 (180 - 260)	220 (170 - 260)
Total Sulphide (mg/kg)	32 (1 - 81)	29 (5 - 97)	62 (8 - 210)	39 (2 - 180)	18 (1 - 70)	10 (2 - 20)	14 (1 - 27)	14 (1 - 44)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)
Arsenic (mg/kg)	6.2 (4.9 - 7.0)	6.3 (5.4 - 7.0)	5.7 (5.0 - 6.2)	6.7 (5.4 - 7.7)	7.8 (5.7 - 15.0)	7.2 (5.7 - 8.3)	6.2 (5.5 - 6.8)	6.2 (4.9 - 7.0)
Cadmium (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	36 (30 - 39)	31 (26 - 35)	32 (27 - 39)	32 (26 - 37)	34 (28 - 60)	31 (28 - 34)	30 (24 - 35)	26 (24 - 29)
Copper (mg/kg)	16 (13 - 17)	13 (11 - 15)	18 (15 - 20)	13 (11 - 16)	13 (10 - 22)	12 (10 - 13)	11 (9 - 13)	9 (7 - 11)
Lead (mg/kg)	41 (33 - 45)	41 (33 - 47)	43 (36 - 49)	33 (27 - 42)	33 (27 - 53)	32 (26 - 36)	31 (25 - 39)	29 (26 - 34)
Mercury (mg/kg)	0.06 (<0.05 - 0.07)	0.05 (<0.05 - 0.06)	0.07 (0.06 - 0.10)	0.05 (<0.05 - 0.06)	0.06 (<0.05 - 0.06)	0.05 (<0.05 - 0.05)	0.05 (<0.05 - 0.05)	0.05 (<0.05 - 0.05)
Nickel (mg/kg)	27 (23 - 32)	24 (19 - 27)	24 (21 - 27)	24 (20 - 29)	26 (20 - 45)	24 (21 - 27)	23 (18 - 28)	21 (19 - 24)
Silver (mg/kg)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	<0.2 (<0.2 - <0.2)	0.3 (<0.2 - 1.0)
Zinc (mg/kg)	98 (66 - 110)	92 (62 - 100)	110 (78 - 150)	87 (59 - 100)	91 (64 - 160)	83 (61 - 92)	80 (55 - 95)	71 (54 - 82)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)	90 (90 - 90)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	37 (28 - 57)	34 (22 - 63)	53 (35 - 74)	40 (20 - 120)	30 (21 - 47)	25 (18 - 32)	25 (19 - 36)	23 (18 - 29)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the North Western and Western Buffer WCZs, 2003 - 2007

Parameter	Pearl Island NS2	Pillar Point NS3	Urmston Road NS4	Chek Lap Kok (North) NS6	Tsing Yi (South) WS1	Hong Kong Island (West) WS2
Number of samples	10	10	10	10	9	10
Particle Size Fractionation <63µm (%w/w)	57 (35 - 63)	60 (23 - 87)	34 (12 - 61)	41 (10 - 81)	69 (37 - 93)	77 (66 - 92)
Electrochemical Potential (mV)	-161 (-230) - (-129)	-165 (-236) - (-86)	-197 (-242) - (-161)	-164 (-214) - (-58)	-210 (-298) - (-114)	-171 (-233) - (-93)
Total Solids (%w/w)	56 (51 - 64)	59 (49 - 70)	62 (56 - 65)	65 (51 - 76)	50 (42 - 65)	47 (45 - 54)
Total Volatile Soilds (%w/w)	6.3 (5.4 - 7.5)	5.6 (3.1 - 7.5)	5.3 (4.9 - 5.9)	4.4 (2.2 - 7.6)	6.7 (4.4 - 7.7)	6.9 (5.6 - 8.4)
Chemical Oxygen Demand (mg/kg)	15000 (14000 - 17000)	15000 (9700 - 23000)	16000 (12000 - 19000)	12000 (7500 - 16000)	18000 (13000 - 20000)	14000 (11000 - 17000)
Total Carbon (%w/w)	0.8 (0.6 - 1.0)	0.6 (0.5 - 1.0)	0.7 (0.6 - 0.8)	0.5 (0.4 - 0.8)	0.8 (0.6 - 1.1)	0.6 (0.5 - 0.7)
Ammonical Nitrogen (mg/kg)	2.9 (0.1 - 8.2)	4.1 (<0.05 - 16.0)	14.0 (0.2 - 30.0)	4.1 (<0.05 - 13.0)	9.5 (4.8 - 23.0)	5.3 (0.2 - 30.0)
Total Kjeldahl Nitrogen (mg/kg)	300 (120 - 520)	310 (120 - 440)	280 (160 - 350)	250 (130 - 400)	390 (270 - 480)	380 (260 - 540)
Total Phosphorus (mg/kg)	180 (84 - 290)	180 (86 - 250)	170 (92 - 230)	160 (100 - 260)	180 (130 - 260)	180 (140 - 210)
Total Sulphide (mg/kg)	20 (1 - 64)	18 (2 - 65)	30 (3 - 77)	14 (2 - 47)	100 (9 - 210)	61 (3 - 200)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	8.8 (7.2 - 14.0)	10.8 (8.3 - 14.0)	10.1 (9.1 - 11.0)	10.2 (7.1 - 16.0)	8.0 (4.7 - 9.9)	9.4 (7.1 - 12.0)
Cadmium (mg/kg)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	31 (24 - 43)	31 (20 - 42)	29 (26 - 36)	26 (18 - 37)	36 (23 - 41)	35 (32 - 40)
Copper (mg/kg)	33 (28 - 42)	28 (18 - 48)	28 (18 - 42)	17 (8 - 27)	49 (28 - 68)	24 (20 - 28)
Lead (mg/kg)	36 (31 - 50)	37 (27 - 45)	36 (29 - 46)	29 (20 - 46)	41 (28 - 53)	38 (32 - 43)
Mercury (mg/kg)	0.09 (0.07 - 0.10)	0.11 (0.06 - 0.15)	0.09 (0.06 - 0.20)	0.06 (<0.05 - 0.10)	0.13 (0.11 - 0.16)	0.08 (<0.05 - 0.09)
Nickel (mg/kg)	20 (15 - 27)	20 (11 - 24)	19 (16 - 22)	17 (10 - 24)	21 (12 - 27)	23.5 (21 - 26)
Silver (mg/kg)	0.4 (0.3 - 0.6)	0.3 (<0.2 - 0.4)	0.3 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	1.1 (0.5 - 1.7)	0.4 (0.2 - 0.5)
Zinc (mg/kg)	97 (77 - 130)	93 (62 - 120)	100 (99 - 110)	73 (42 - 100)	120 (78 - 130)	100 (91 - 120)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	91 (90 - 95)	91 (90 - 95)	92 (90 - 99)	90 (90 - 94)	94 (90 - 100)	91 (90 - 93)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	60 (35 - 120)	60 (38 - 110)	64 (35 - 120)	27 (16 - 49)	160 (68 - 420)	52 (22 - 120)

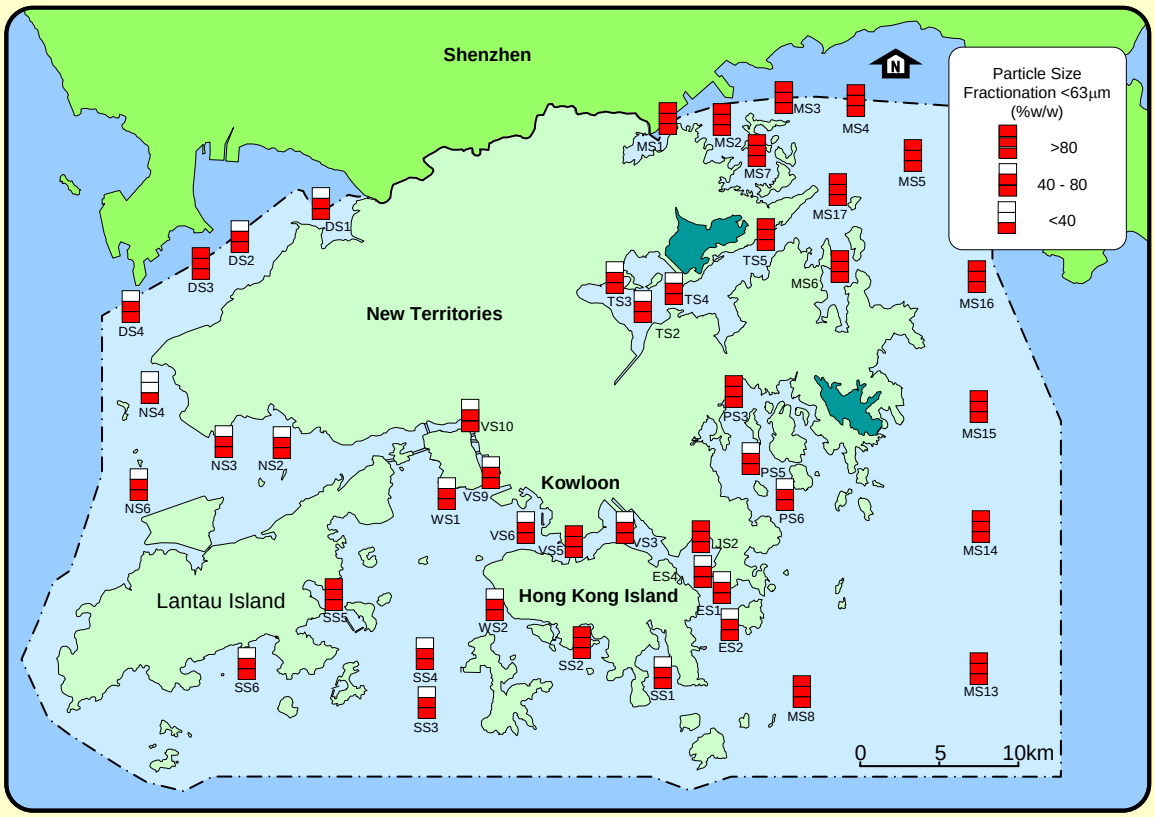
Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics for bottom sediment quality in the Eastern Buffer and Victoria Harbour WCZs, 2003 - 2007

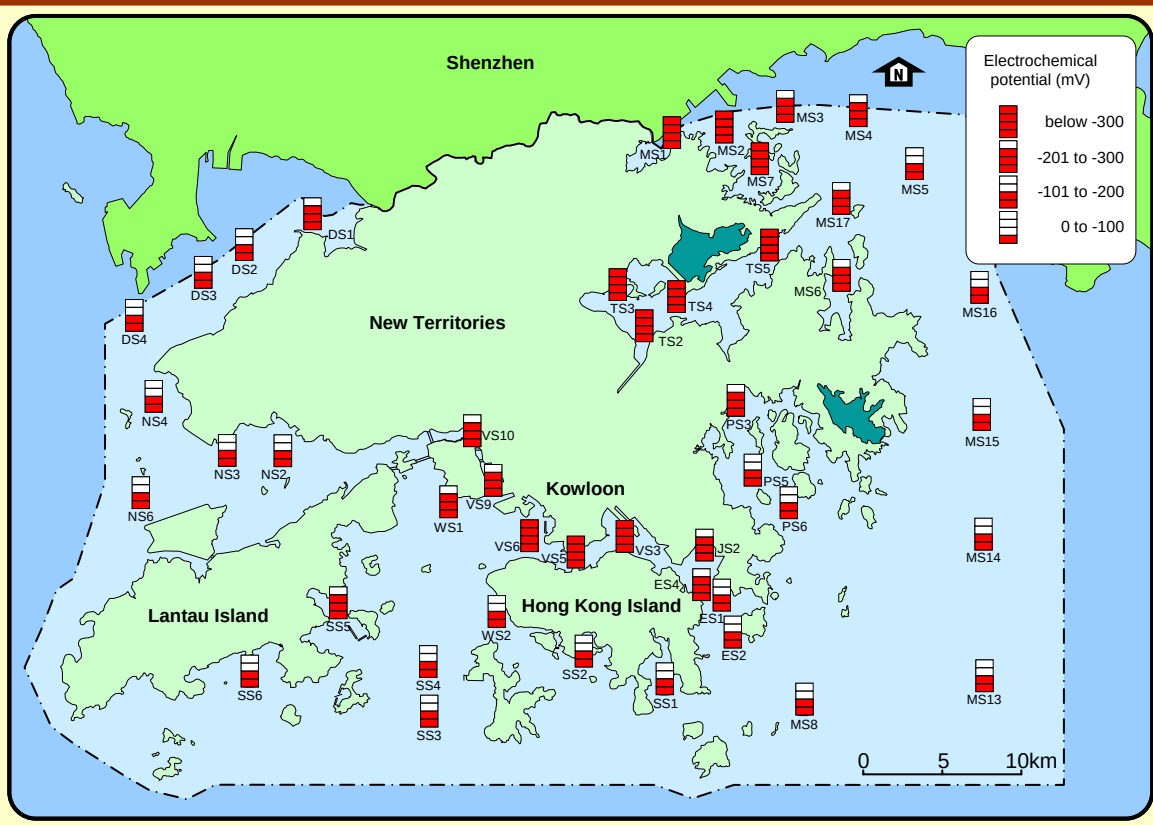
	Eastern Buffer			Victoria Harbour			Rambler Channel	
	Chai Wan	Tathong Channel		(East)	(Central)	(West)		
Parameter	ES1	ES2	ES4	VS3	VS5	VS6	VS9	VS10
Number of samples	10	10	10	10	10	9	10	10
Particle Size Fractionation <63µm (%w/w)	41 (21 - 94)	73 (15 - 98)	48 (24 - 87)	67 (10 - 91)	85 (76 - 95)	52 (25 - 78)	78 (57 - 88)	73 (18 - 97)
Electrochemical Potential (mV)	-188 (-272) - (-65)	-176 (-286) - (-120)	-231 (-349) - (-151)	-317 (-390) - (-183)	-368 (-409) - (-244)	-315 (-381) - (-169)	-215 (-323) - (-80)	-241 (-365) - (-121)
Total Solids (%w/w)	67 (51 - 71)	55 (38 - 66)	60 (48 - 70)	43 (35 - 63)	38 (36 - 40)	54 (37 - 70)	49 (40 - 54)	45 (34 - 66)
Total Volatile Soilds (%w/w)	4.5 (3.7 - 6.6)	6.0 (4.3 - 7.9)	5.5 (3.7 - 7.3)	7.2 (4.1 - 9.6)	8.9 (6.8 - 10.0)	7.1 (5.0 - 8.8)	6.6 (5.3 - 8.4)	7.0 (4.1 - 9.0)
Chemical Oxygen Demand (mg/kg)	12000 (8700 - 27000)	13000 (8000 - 21000)	15000 (11000 - 21000)	22000 (16000 - 26000)	29000 (25000 - 32000)	26000 (19000 - 32000)	17000 (12000 - 23000)	20000 (15000 - 27000)
Total Carbon (%w/w)	1.3 (0.8 - 1.8)	0.8 (0.7 - 0.9)	0.9 (0.7 - 1.0)	0.7 (0.6 - 0.9)	0.9 (0.7 - 1.1)	1.1 (0.7 - 1.6)	0.8 (0.6 - 1.1)	0.8 (0.5 - 1.5)
Ammonical Nitrogen (mg/kg)	5.7 (1.5 - 20.0)	11.7 (0.5 - 67.0)	4.6 (0.3 - 9.0)	9.9 (0.4 - 20.0)	34.6 (9.6 - 70.0)	12.3 (4.8 - 28.0)	9.1 (<0.1 - 49.0)	8.1 (<0.1 - 32.0)
Total Kjeldahl Nitrogen (mg/kg)	280 (190 - 430)	400 (210 - 590)	360 (200 - 470)	560 (350 - 1200)	660 (500 - 940)	400 (170 - 560)	310 (130 - 440)	410 (300 - 530)
Total Phosphorus (mg/kg)	140 (99 - 200)	180 (140 - 220)	160 (88 - 240)	200 (130 - 430)	210 (180 - 230)	210 (110 - 280)	150 (65 - 200)	190 (140 - 260)
Total Sulphide (mg/kg)	33 (3 - 140)	44 (7 - 180)	78 (8 - 310)	240 (24 - 590)	630 (41 - 1700)	200 (48 - 490)	60 (4 - 460)	270 (19 - 1100)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.3)	0.2 (<0.1 - 0.4)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.3 (<0.1 - 0.5)
Arsenic (mg/kg)	4.2 (3.5 - 5.4)	6.2 (4.9 - 7.1)	4.6 (3.5 - 6.3)	7.3 (5.2 - 9.0)	8.2 (7.2 - 10.0)	8.4 (5.5 - 11.0)	5.5 (3.0 - 8.5)	8.5 (4.6 - 11.0)
Cadmium (mg/kg)	0.1 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.2)	0.4 (0.2 - 0.6)	0.8 (0.6 - 1.0)	0.4 (0.2 - 0.5)	0.3 (<0.1 - 1.3)	0.7 (0.1 - 2.4)
Chromium (mg/kg)	20 (13 - 36)	29 (20 - 41)	26 (21 - 36)	46 (18 - 59)	60 (47 - 69)	38 (17 - 52)	45 (27 - 76)	86 (27 - 190)
Copper (mg/kg)	32 (17 - 87)	26 (16 - 42)	56 (39 - 75)	140 (57 - 190)	190 (150 - 230)	110 (57 - 210)	100 (8 - 280)	240 (65 - 760)
Lead (mg/kg)	26 (18 - 48)	32 (21 - 50)	29 (23 - 39)	53 (39 - 65)	66 (53 - 84)	89 (50 - 130)	39 (21 - 81)	58 (38 - 76)
Mercury (mg/kg)	0.19 (0.06 - 1.00)	0.08 (<0.05 - 0.14)	0.16 (0.10 - 0.30)	0.43 (0.21 - 0.72)	0.49 (0.41 - 0.63)	1.32 (0.26 - 8.00)	0.15 (<0.05 - 0.39)	0.22 (0.13 - 0.30)
Nickel (mg/kg)	12 (9 - 18)	20 (14 - 27)	14 (11 - 19)	21 (10 - 27)	27 (21 - 31)	19 (10 - 28)	27 (19 - 43)	41 (12 - 110)
Silver (mg/kg)	0.7 (0.2 - 2.0)	0.4 (<0.2 - 1.0)	1.4 (0.9 - 2.1)	4.3 (1.7 - 6.0)	8.0 (5.8 - 10.0)	3.0 (1.1 - 4.5)	2.0 (<0.2 - 6.0)	5.3 (1.3 - 11.0)
Zinc (mg/kg)	63 (42 - 100)	83 (56 - 120)	84 (72 - 110)	180 (93 - 250)	280 (230 - 340)	200 (140 - 240)	110 (66 - 210)	190 (90 - 260)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	19 (18 - 22)	20 (18 - 23)	29 (18 - 48)	19 (18 - 23)	21 (18 - 30)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	94 (90 - 130)	93 (90 - 110)	94 (90 - 120)	110 (90 - 140)	120 (90 - 180)	170 (110 - 410)	91 (90 - 100)	91 (90 - 99)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	96 (21 - 390)	79 (24 - 190)	160 (62 - 400)	390 (90 - 670)	580 (350 - 990)	1700 (360 - 5800)	76 (18 - 180)	160 (52 - 340)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

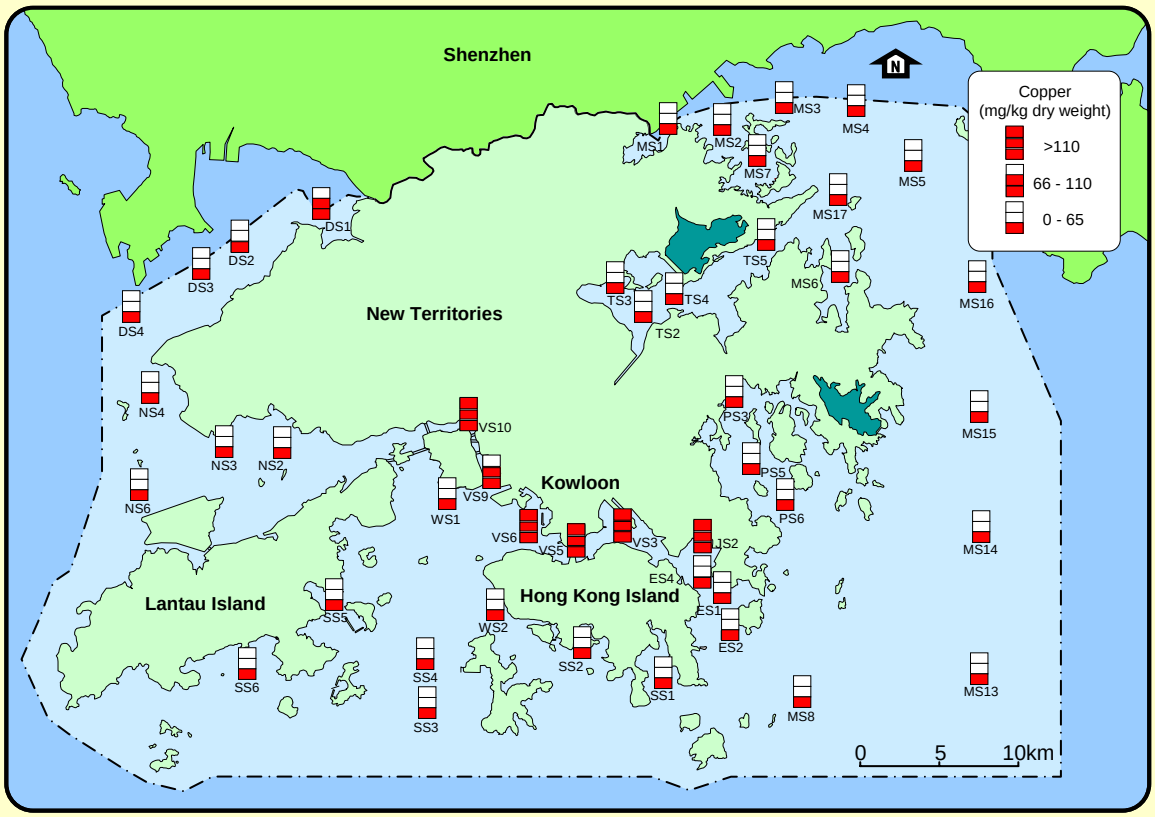
Particle Size Fractionation <63 µm in marine sediments in Hong Kong, 2003 – 2007



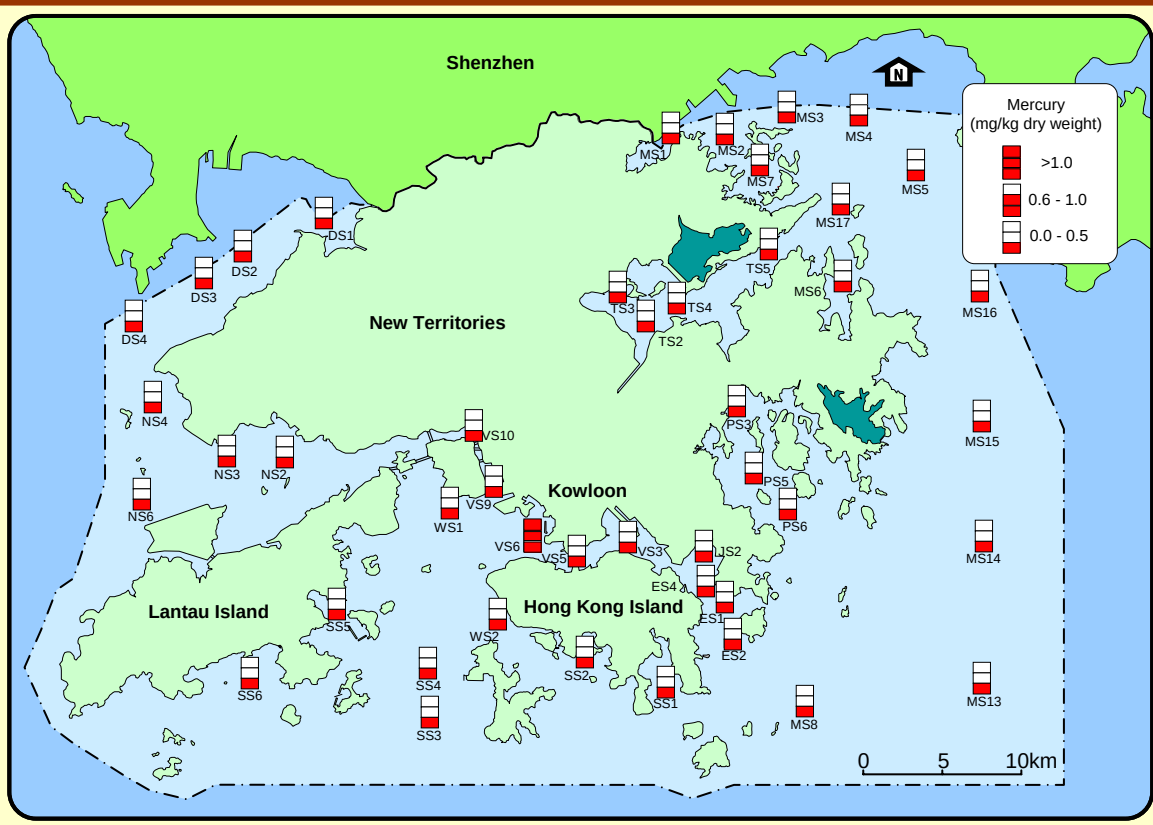
Electrochemical potential in marine sediments in Hong Kong, 2003 - 2007



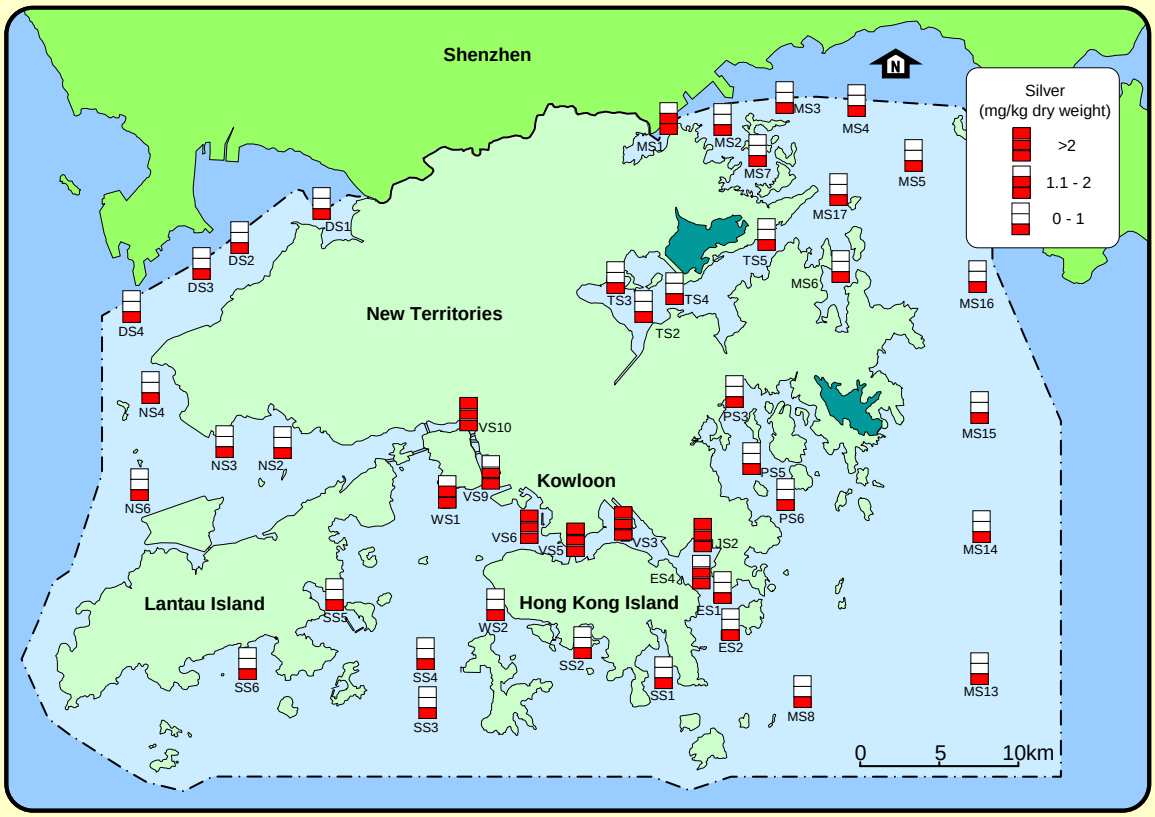
Copper in marine sediments in Hong Kong, 2003 - 2007



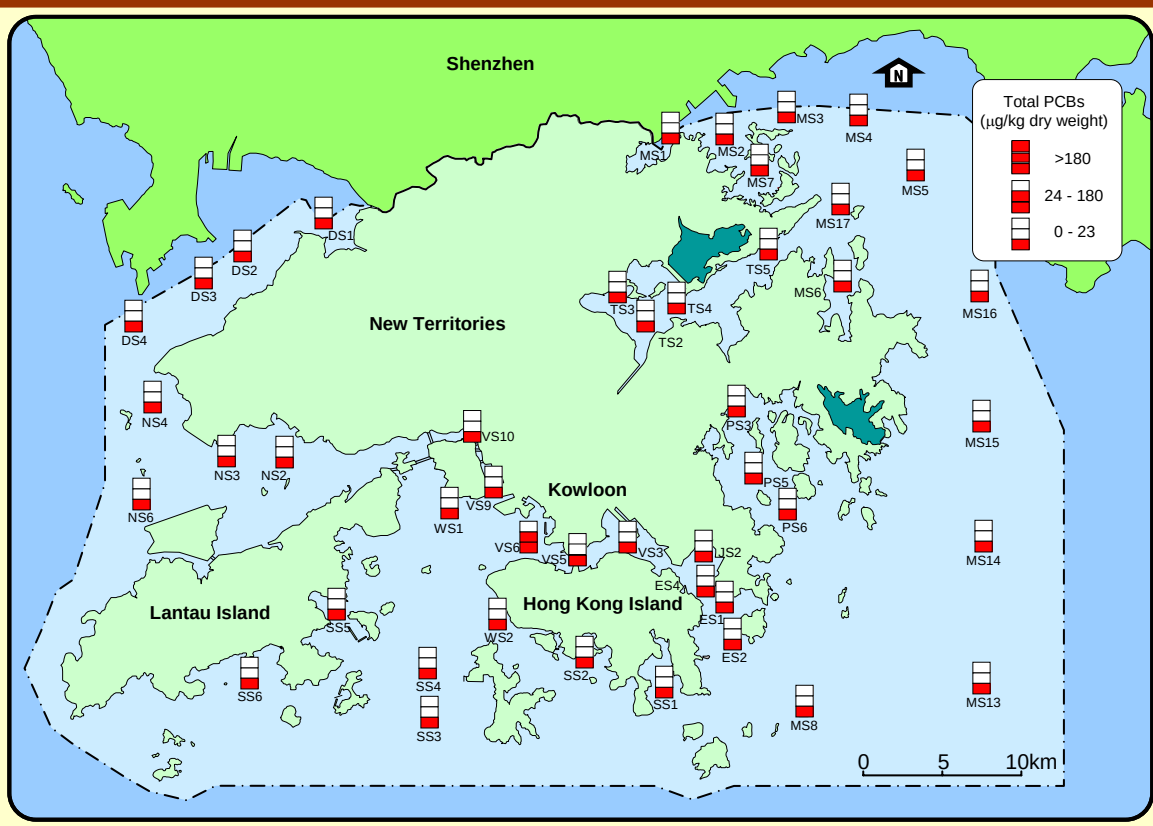
Mercury in marine sediments in Hong Kong, 2003 - 2007



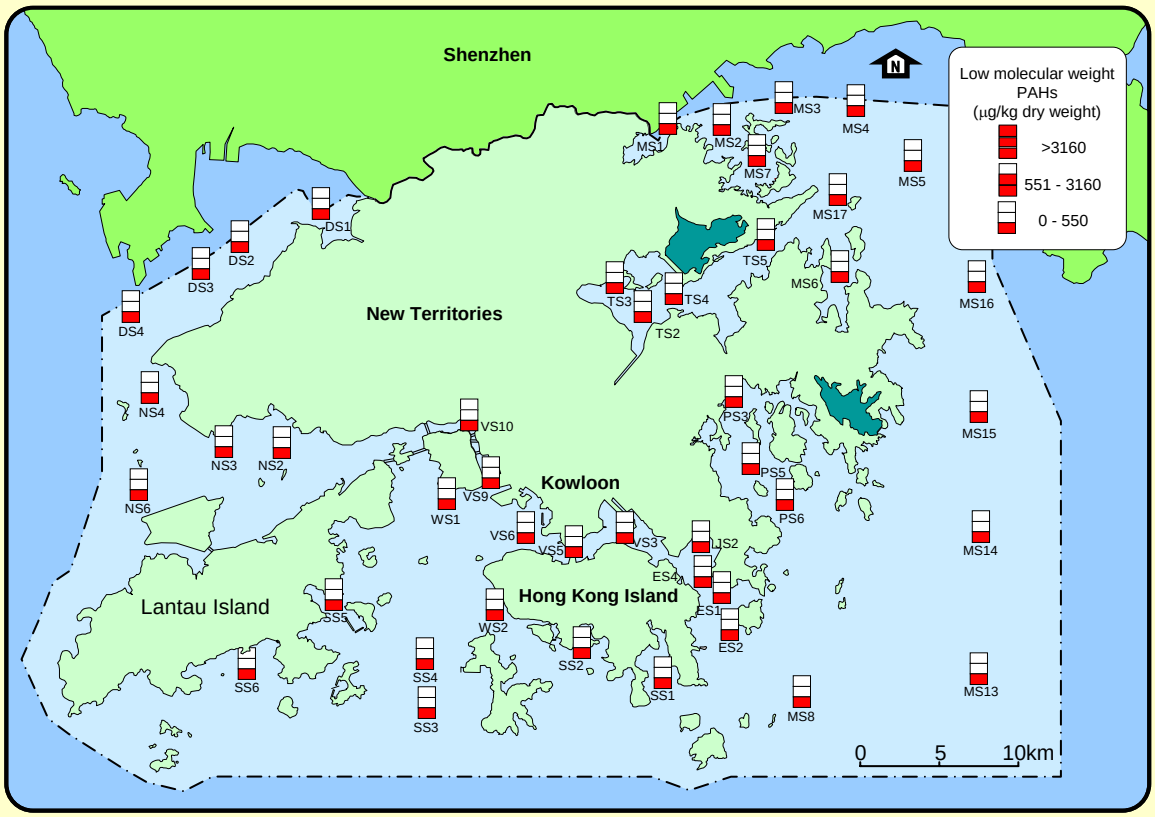
Silver in marine sediments in Hong Kong, 2003 - 2007



Total polychlorinated biphenyls (PCBs) in marine sediments in Hong Kong, 2003 - 2007

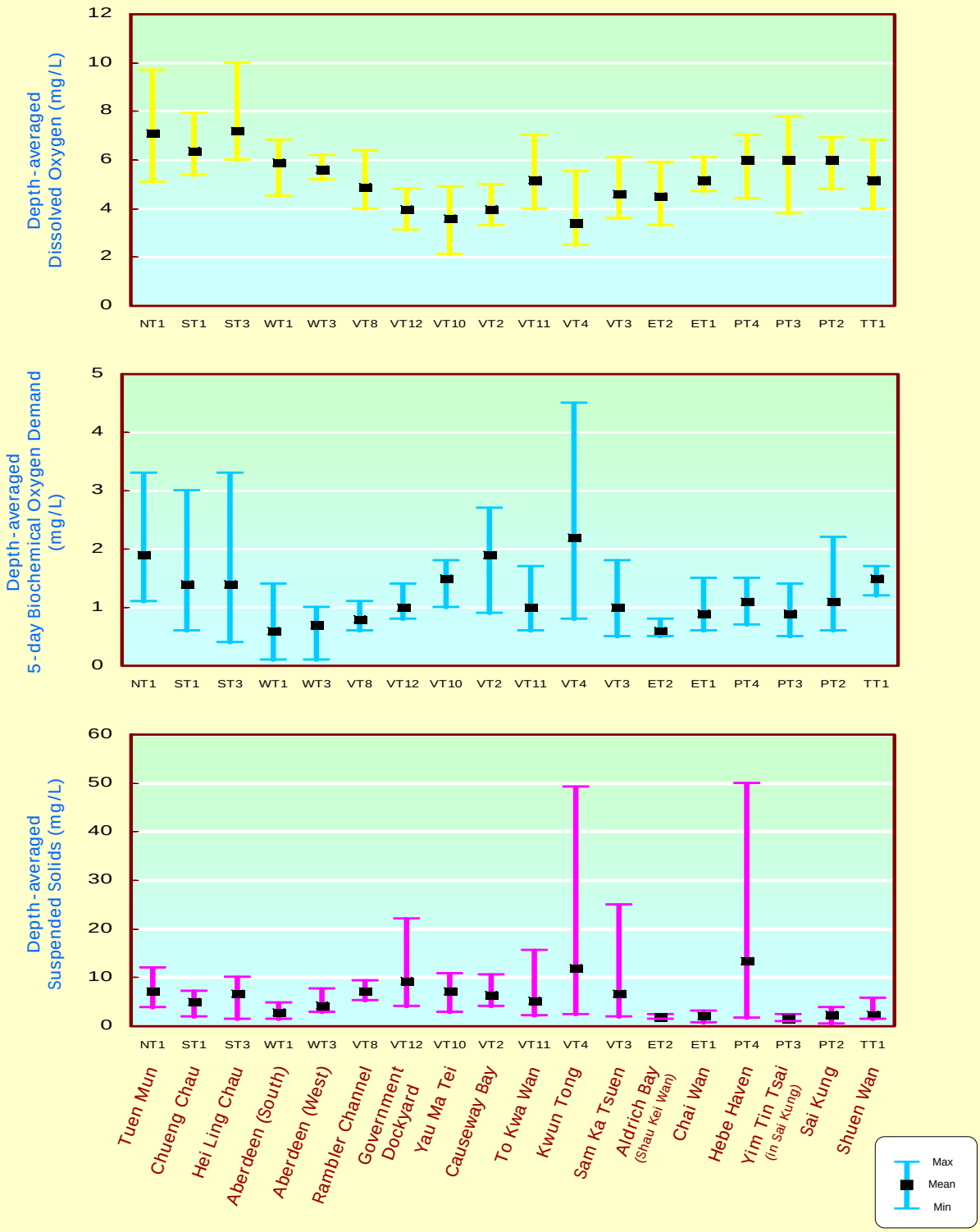


Low molecular weight polycyclic aromatic hydrocarbons (PAHs) in marine sediments in Hong Kong, 2003 - 2007

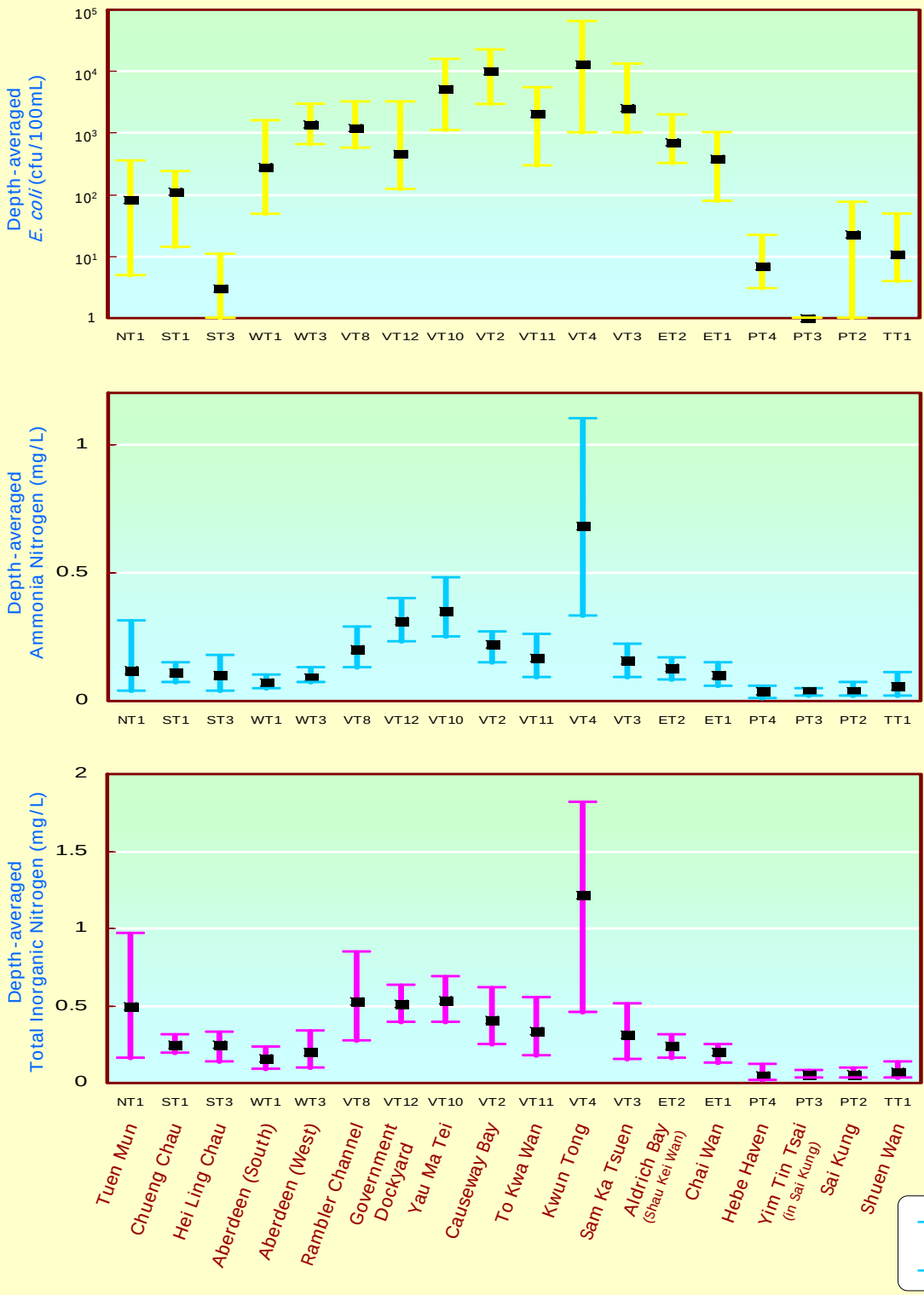


High molecular weight polycyclic aromatic hydrocarbons (PAHs) in marine sediments in Hong Kong, 2003 - 2007

Water quality of typhoon shelters in Hong Kong in 2007



Water quality of typhoon shelters in Hong Kong in 2007 (continued)



Results of the Seasonal Kendall Test for water quality trends in typhoon shelters, 1986 - 2007

Monitoring Station		NT1	ST1	WT3	WT1	VT8	VT10	VT2	VT11
Monitoring Period		1986 - 2007	1986 - 2007	1986 - 2007	1986 - 2007	1986 - 2007	1993 - 2007	1986 - 2007	1994 - 2007
Parameter	Water Depth								
Temperature (°C)	Surface	-	↗	-	↗	↗	-	↗	-
	Middle	-	-	-	-	↗	-	-	-
	Bottom	-	↗	-	-	↗	-	-	-
	Average	-	↗	-	-	↗	-	↗	-
Salinity	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	↗	-	-	-	-
	Bottom	-	-	↗	-	-	-	-	-
	Average	-	-	↗	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	↗	-	-	-	↗	-	↗	↗
	Middle	-	-	-	-	↗	↗	-	↗
	Bottom	↗	-	-	↗	↗	↗	↗	↗
	Average	↗	-	-	-	↗	-	↗	↗
Dissolved Oxygen (%)	Surface	↗	-	-	-	↗	-	↗	↗
	Middle	-	-	-	↗	↗	↗	-	↗
	Bottom	↗	↗	-	↗	↗	↗	↗	↗
	Average	↗	-	-	↗	↗	-	↗	↗
pH	Surface	-	↘	↘	↘	-	-	-	-
	Middle	-	-	↘	↘	-	-	-	-
	Bottom	-	-	↘	↘	-	-	-	-
	Average	-	↘	↘	↘	-	-	-	-
Secchi disc depth (m)		↗	-	↗	↗	-	↗	↗	-
Turbidity (NTU)	Surface	↗	-	-	-	↗	↗	↗	↗
	Middle	-	-	-	-	↗	-	-	↗
	Bottom	-	-	-	-	↗	-	↗	↗
	Average	↗	-	-	-	↗	-	↗	↗
Suspended Solids (mg/L)	Surface	-	-	-	-	-	↘	↘	-
	Middle	-	-	-	↘	-	↘	-	↘
	Bottom	-	-	-	-	-	-	-	-
	Average	-	-	-	-	-	↘	-	-
Total volatile solids (mg/L)	Surface	-	-	↘	↘	-	-	↘	-
	Middle	-	-	↘	↘	-	-	-	-
	Bottom	-	-	-	↘	↘	-	-	-
	Average	-	-	↘	↘	-	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	-	-	-	-	↘	-	↘	-
	Middle	-	-	-	-	↘	-	↘	-
	Bottom	-	-	-	-	↘	-	↘	-
	Average	-	-	-	-	↘	-	↘	-
Ammonia nitrogen (mg/L)	Surface	↘	-	-	-	↘	-	↘	↘
	Middle	-	-	-	-	↘	↘	↘	↘
	Bottom	-	-	-	-	-	↘	↘	↘
	Average	↘	-	-	-	↘	↘	↘	↘
Nitrite nitrogen (mg/L)	Surface	↗	-	-	-	-	-	-	-
	Middle	-	-	-	-	↗	-	-	-
	Bottom	-	-	-	-	↗	-	-	-
	Average	↗	-	-	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	↗	↗	-	-	↗	-	↗	-
	Middle	-	-	-	-	↗	↗	↗	-
	Bottom	↗	-	-	-	↗	-	↗	-
	Average	↗	-	-	-	↗	-	↗	-
Total inorganic nitrogen (mg/L)	Surface	-	-	-	-	-	↘	↘	↘
	Middle	-	-	-	-	-	↘	-	↘
	Bottom	↗	-	-	-	-	↘	↘	↘
	Average	-	-	-	-	-	↘	↘	↘
Total Kjeldahl nitrogen (mg/L)	Surface	↘	-	-	-	↘	↘	↘	↘
	Middle	-	-	-	-	↘	↘	-	↘
	Bottom	-	-	-	-	↘	↘	↘	↘
	Average	↘	-	-	-	↘	↘	↘	↘
Total nitrogen (mg/L)	Surface	↘	-	-	-	↘	↘	↘	↘
	Middle	-	-	-	-	↘	↘	-	↘
	Bottom	-	-	-	-	↘	↘	↘	↘
	Average	↘	-	-	-	↘	↘	↘	↘
Orthophosphate phosphorus (mg/L)	Surface	↘	-	-	-	↘	↘	↘	↘
	Middle	-	-	-	-	↘	↘	↘	↘
	Bottom	-	-	-	-	↘	↘	↘	↘
	Average	↘	-	-	-	↘	↘	↘	↘
Total phosphorus (mg/L)	Surface	↘	-	-	-	↘	↘	↘	↘
	Middle	-	-	-	-	↘	↘	-	↘
	Bottom	-	-	-	-	↘	↘	↘	↘
	Average	↘	-	-	-	↘	↘	↘	↘
Silica (mg/L)	Surface	-	-	-	-	-	↘	↘	↘
	Middle	-	-	-	-	-	↘	-	↘
	Bottom	-	-	-	-	-	↘	↘	↘
	Average	-	-	-	-	-	↘	↘	↘
Chlorophyll-*a* (µg/L)	Surface	↗	-	-	-	-	↗	-	-
	Middle	-	-	-	-	↗	↗	-	-
	Bottom	-	-	-	-	-	-	-	-
	Average	↗	-	-	-	-	↗	-	-
E. coli (cfu/100mL)	Surface	↘	-	-	↘	-	-	↘	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	-	-	↘	↘
	Average	↘	-	-	↘	-	-	↘	-
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	↗	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	-	-	↗	-	-	-
	Average	-	-	-	-	↗	-	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. VT12 has eight years of data only, which are insufficient to perform Seasonal Kendall Test
4. ↗ significant increase
5. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in typhoon shelters, 1986 - 2007 (continued)

Monitoring Station		VT4	VT3	ET2	ET1	PT4	PT2	PT3	TT1
Monitoring Period		1987 – 2007	1986 – 2007	1993 – 2007	1986 – 2007	1986 – 2007	1986 – 2007	1986 – 2007	1986 – 2007
Parameter	Water Depth								
Temperature (°C)	Surface	-	↗	-	↗	↗	↗	↗	↗
	Middle	-	-	-	↗	-	-	↗	-
	Bottom	-	↗	-	↗	↗	-	↗	-
	Average	-	↗	-	↗	↗	↗	↗	-
Salinity	Surface	-	-	-	-	-	-	-	-
	Middle	-	-	-	-	-	-	-	-
	Bottom	-	-	↗	-	-	-	-	-
	Average	-	-	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	Surface	↗	↗	↗	-	↘	↗	-	↘
	Middle	↗	↗	↗	-	-	-	-	-
	Bottom	↗	↗	↗	-	-	-	-	-
	Average	↗	↗	↗	-	-	↗	-	-
Dissolved Oxygen (%)	Surface	↗	↗	↗	-	↘	↗	-	↘
	Middle	↗	↗	↗	↗	-	-	-	-
	Bottom	↗	↗	↗	↗	-	-	-	-
	Average	↗	↗	↗	-	-	↗	-	-
pH	Surface	-	-	-	-	↘	-	-	↘
	Middle	↗	-	-	-	-	-	-	↘
	Bottom	-	-	-	-	↘	-	-	↘
	Average	↗	-	-	-	↘	-	-	↘
Secchi disc depth (m)		↗	-	↗	-	↗	↗	-	↗
Turbidity (NTU)	Surface	-	↗	↗	-	↗	-	↗	↗
	Middle	-	↗	↗	-	-	-	↗	↗
	Bottom	↗	↗	↗	↗	↗	↗	↗	↗
	Average	-	↗	↗	↗	↗	-	↗	↗
Suspended Solids (mg/L)	Surface	↘	↘	↘	-	-	-	-	-
	Middle	↘	-	↘	-	↘	-	↗	↘
	Bottom	↘	-	↘	-	-	-	-	-
	Average	↘	↘	↘	-	-	-	-	-
Total volatile solids (mg/L)	Surface	↘	-	-	↘	-	↘	-	-
	Middle	↘	↘	-	↘	-	-	-	↘
	Bottom	↘	↘	-	↘	-	-	-	-
	Average	↘	↘	-	↘	↘	-	-	-
5-day Biochemical Oxygen Demand (mg/L)	Surface	↘	↘	↘	-	↘	↘	-	↘
	Middle	↘	↘	-	-	-	-	-	↘
	Bottom	↘	↘	↘	-	-	-	-	↘
	Average	↘	↘	↘	-	↘	↘	-	↘
Ammonia nitrogen (mg/L)	Surface	↘	↘	↘	-	-	↘	↗	-
	Middle	↘	↘	↘	-	-	-	↗	-
	Bottom	↘	↘	↘	-	-	-	↗	-
	Average	↘	↘	↘	-	-	↘	↗	-
Nitrite nitrogen (mg/L)	Surface	↗	-	-	-	-	-	-	-
	Middle	↗	-	-	-	-	-	-	-
	Bottom	↗	-	↘	-	-	-	-	-
	Average	↗	-	↘	-	-	-	-	-
Nitrate nitrogen (mg/L)	Surface	↗	↗	-	-	-	-	↗	-
	Middle	↗	-	-	-	-	-	-	-
	Bottom	↗	-	↘	-	-	-	↗	-
	Average	↗	↗	-	-	-	↘	↗	-
Total inorganic nitrogen (mg/L)	Surface	-	↘	↘	-	-	↘	↗	-
	Middle	↘	↘	↘	-	-	-	↗	-
	Bottom	↘	-	↘	-	-	-	↗	-
	Average	↘	↘	↘	-	-	↘	↗	-
Total Kjeldahl nitrogen (mg/L)	Surface	↘	↘	↘	-	↘	-	↗	↘
	Middle	↘	↘	↘	-	-	-	↗	-
	Bottom	↘	↘	↘	-	↘	-	↗	-
	Average	↘	↘	↘	-	↘	-	↗	↘
Total nitrogen (mg/L)	Surface	↘	↘	↘	-	↘	-	-	↘
	Middle	↘	↘	↘	-	-	-	-	-
	Bottom	↘	↘	↘	-	↘	-	-	-
	Average	↘	↘	↘	-	↘	-	-	↘
Orthophosphate phosphorus (mg/L)	Surface	↗	↘	↘	-	↘	↘	-	↘
	Middle	↘	↘	↘	-	-	-	-	↘
	Bottom	↘	↘	↘	-	-	-	-	↘
	Average	-	↘	↘	-	-	-	-	↘
Total phosphorus (mg/L)	Surface	-	↘	↘	-	↘	-	-	↘
	Middle	↘	↘	↘	↘	-	-	-	↘
	Bottom	↘	↘	↘	-	↘	-	-	↘
	Average	↘	↘	↘	↘	↘	-	-	↘
Silica (mg/L)	Surface	-	↘	↘	↗	-	-	-	↗
	Middle	↘	-	↘	-	-	-	-	-
	Bottom	↘	↘	-	-	-	-	-	-
	Average	-	↘	↘	-	-	-	-	-
Chlorophyll-*a* (µg/L)	Surface	↗	-	-	-	-	-	-	-
	Middle	↗	-	-	-	-	-	-	-
	Bottom	↗	↗	-	-	-	-	-	-
	Average	↗	↗	-	-	-	-	-	↘
E. coli (cfu/100mL)	Surface	↘	↘	-	-	↘	↘	-	↘
	Middle	↘	-	↘	-	-	-	-	-
	Bottom	↘	↘	↘	-	↘	↘	-	↘
	Average	↘	↘	↘	-	↘	↘	-	↘
Faecal coliforms (cfu/100mL)	Surface	-	-	-	-	↘	↘	-	-
	Middle	↘	-	-	↗	-	-	-	-
	Bottom	↘	-	↘	-	↘	↘	-	↘
	Average	↘	-	↘	-	↘	↘	-	-

Note: 1. Results of the Seasonal Kendall Test statistically significant at $p < 0.05$
2. - indicates no significant trend
3. ST3 has eight years of data only, which are insufficient to perform Seasonal Kendall Test
4. ↗ significant increase
5. ↘ significant decrease

Summary of water quality statistics for typhoon shelters in 2007

Parameter		Tuen Mun NT1	Cheung Chau ST1	Hei Ling Chau ST3	Aberdeen (South) WT1	Aberdeen (West) WT3	Rambler Channel VT8
Number of samples		6	6	6	6	6	6
Temperature (°C)		24.3 (17.8 - 31.3)	24.0 (19.4 - 28.2)	24.2 (19.4 - 29.5)	23.3 (19.5 - 27.5)	23.3 (19.5 - 27.7)	23.1 (18.6 - 26.9)
Salinity		27.5 (13.5 - 32.8)	31.6 (26.7 - 33.4)	31.4 (26.6 - 33.3)	32.6 (30.2 - 33.7)	32.5 (29.4 - 33.6)	29.8 (25.0 - 33.0)
Dissolved Oxygen (mg/L)		7.1 (5.1 - 9.7)	6.4 (5.4 - 7.9)	7.2 (6.0 - 10.0)	5.9 (4.5 - 6.8)	5.6 (5.2 - 6.3)	4.9 (4.0 - 6.4)
	Bottom	N.M.	6.3 (5.4 - 7.3)	7.2 (5.5 - 10.4)	5.7 (4.6 - 6.7)	5.5 (4.8 - 6.2)	5.0 (3.7 - 6.6)
Dissolved Oxygen (% Saturation)		100 (73 - 140)	92 (81 - 117)	103 (80 - 153)	84 (68 - 100)	79 (74 - 83)	68 (58 - 84)
	Bottom	N.M.	90 (81 - 107)	103 (82 - 155)	80 (68 - 90)	78 (70 - 85)	69 (53 - 86)
pH		8.1 (7.5 - 8.6)	8.1 (7.6 - 8.9)	8.2 (7.5 - 9.1)	8.1 (7.5 - 8.7)	8.0 (7.4 - 8.5)	7.9 (7.6 - 8.0)
Secchi Disc Depth (m)		1.3 (1.0 - 1.8)	1.8 (1.0 - 2.5)	1.7 (1.3 - 2.3)	2.0 (1.5 - 2.5)	1.9 (1.5 - 2.4)	1.4 (1.1 - 1.8)
Turbidity (NTU)		12.5 (4.3 - 16.8)	11.5 (4.2 - 15.1)	13.0 (4.2 - 18.0)	10.3 (8.1 - 13.1)	10.2 (4.3 - 14.3)	14.0 (4.0 - 24.9)
Suspended Solids (mg/L)		7.1 (3.8 - 12.0)	5.0 (1.9 - 7.1)	6.7 (1.4 - 10.1)	2.8 (1.5 - 4.7)	4.3 (2.8 - 7.8)	7.3 (5.2 - 9.4)
5-day Biochemical Oxygen Demand (mg/L)		1.9 (1.1 - 3.3)	1.4 (0.6 - 3.0)	1.4 (0.4 - 3.3)	0.6 (0.1 - 1.4)	0.7 (0.1 - 1.0)	0.8 (0.6 - 1.1)
Ammonia Nitrogen (mg/L)		0.12 (0.04 - 0.31)	0.11 (0.07 - 0.15)	0.10 (0.04 - 0.18)	0.07 (0.05 - 0.10)	0.09 (0.07 - 0.13)	0.20 (0.13 - 0.29)
Unionised Ammonia (mg/L)		0.006 (0.001 - 0.010)	0.008 (0.001 - 0.027)	0.009 (0.001 - 0.031)	0.005 (<0.001 - 0.016)	0.005 (<0.001 - 0.012)	0.007 (0.002 - 0.010)
Nitrite Nitrogen (mg/L)		0.046 (0.011 - 0.074)	0.022 (0.011 - 0.033)	0.025 (0.011 - 0.040)	0.015 (0.004 - 0.029)	0.016 (0.004 - 0.030)	0.049 (0.013 - 0.110)
Nitrate Nitrogen (mg/L)		0.335 (0.067 - 0.880)	0.116 (0.090 - 0.167)	0.124 (0.074 - 0.210)	0.074 (0.028 - 0.130)	0.091 (0.014 - 0.230)	0.280 (0.090 - 0.610)
Total Inorganic Nitrogen (mg/L)		0.50 (0.16 - 0.97)	0.25 (0.19 - 0.31)	0.25 (0.14 - 0.33)	0.16 (0.09 - 0.23)	0.20 (0.10 - 0.35)	0.52 (0.27 - 0.85)
Total Kjeldahl Nitrogen (mg/L)		0.37 (0.29 - 0.46)	0.31 (0.25 - 0.47)	0.30 (0.23 - 0.49)	0.20 (0.16 - 0.28)	0.22 (0.15 - 0.27)	0.37 (0.30 - 0.42)
Total Nitrogen (mg/L)		0.75 (0.38 - 1.38)	0.44 (0.37 - 0.64)	0.45 (0.37 - 0.59)	0.28 (0.19 - 0.42)	0.33 (0.17 - 0.53)	0.70 (0.50 - 1.01)
Orthophosphate Phosphorus (mg/L)		0.018 (0.002 - 0.039)	0.016 (0.003 - 0.028)	0.016 (0.003 - 0.029)	0.013 (0.006 - 0.020)	0.017 (0.008 - 0.025)	0.034 (0.029 - 0.043)
Total Phosphorus (mg/L)		0.05 (0.04 - 0.07)	0.04 (0.04 - 0.05)	0.04 (0.04 - 0.05)	0.03 (0.02 - 0.04)	0.04 (0.02 - 0.05)	0.06 (0.05 - 0.07)
Silica (as SiO_2) (mg/L)		1.3 (0.1 - 3.8)	0.7 (0.3 - 1.0)	0.7 (0.3 - 1.2)	0.8 (0.5 - 1.3)	0.8 (0.5 - 1.3)	1.5 (0.6 - 3.4)
Chlorophyll-*a* (µg/L)		16.6 (1.2 - 37.0)	14.2 (2.1 - 52.7)	12.6 (1.5 - 43.3)	4.6 (0.8 - 21.5)	3.3 (0.7 - 13.7)	3.1 (0.9 - 6.4)
E.coli (count/100mL)		83 (5 - 360)	110 (14 - 240)	3 (1 - 11)	280 (48 - 1600)	1400 (660 - 2900)	1200 (570 - 3200)
Faecal Coliforms (count/100mL)		570 (140 - 3800)	390 (68 - 1000)	6 (1 - 21)	1600 (250 - 9500)	3900 (2600 - 5700)	3100 (1100 - 7300)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

4. N.M. - not measured

Summary of water quality statistics for typhoon shelters in 2007

Parameter		Government Dockyard VT12	Yau Ma Tei VT10	Causeway Bay VT2	To Kwa Wan VT11	Kwun Tong VT4	Sam Ka Tsuen VT3
Number of samples		6	6	6	6	6	6
Temperature (°C)		23.8 (18.8 - 27.3)	23.5 (18.6 - 26.7)	23.3 (18.4 - 26.5)	23.3 (18.2 - 26.3)	23.2 (18.6 - 26.1)	23.0 (18.0 - 26.2)
Salinity		30.9 (27.1 - 32.4)	31.0 (27.5 - 32.9)	31.2 (28.1 - 33.1)	31.7 (28.6 - 33.3)	31.1 (28.2 - 32.3)	31.8 (28.9 - 33.4)
Dissolved Oxygen (mg/L)		4.0 (3.1 - 4.8)	3.6 (2.1 - 4.9)	4.0 (3.3 - 5.0)	5.2 (4.0 - 7.0)	3.4 (2.5 - 5.5)	4.6 (3.6 - 6.1)
	Bottom	4.1 (3.1 - 5.5)	3.8 (2.3 - 5.0)	4.1 (3.4 - 5.5)	5.2 (4.0 - 7.1)	3.8 (1.6 - 6.0)	4.8 (3.6 - 6.3)
Dissolved Oxygen (% Saturation)		56 (46 - 65)	50 (31 - 64)	56 (48 - 65)	72 (58 - 91)	47 (37 - 71)	63 (53 - 79)
	Bottom	57 (46 - 71)	52 (34 - 67)	58 (49 - 71)	73 (59 - 92)	53 (23 - 78)	67 (52 - 81)
pH		7.8 (7.5 - 8.0)	7.8 (7.5 - 8.0)	7.8 (7.4 - 8.1)	7.9 (7.4 - 8.1)	7.7 (7.4 - 7.9)	7.9 (7.5 - 8.1)
Secchi Disc Depth (m)		1.5 (1.0 - 1.6)	1.4 (1.1 - 1.8)	1.5 (1.4 - 1.6)	1.6 (0.9 - 2.0)	1.3 (0.9 - 2.8)	1.8 (1.1 - 2.3)
Turbidity (NTU)		14.5 (4.0 - 20.9)	13.4 (4.0 - 21.4)	12.1 (4.8 - 22.5)	12.3 (4.0 - 19.1)	16.9 (6.2 - 51.2)	13.4 (4.1 - 20.1)
Suspended Solids (mg/L)		9.3 (4.1 - 22.0)	7.1 (2.9 - 10.9)	6.6 (4.1 - 10.5)	5.2 (2.1 - 15.5)	12.0 (2.3 - 49.1)	6.7 (1.9 - 25.0)
5-day Biochemical Oxygen Demand (mg/L)		1.0 (0.8 - 1.4)	1.5 (1.0 - 1.8)	1.9 (0.9 - 2.7)	1.0 (0.6 - 1.7)	2.2 (0.8 - 4.5)	1.1 (0.5 - 1.8)
Ammonia Nitrogen (mg/L)		0.31 (0.23 - 0.40)	0.35 (0.25 - 0.48)	0.22 (0.15 - 0.27)	0.17 (0.09 - 0.26)	0.68 (0.33 - 1.10)	0.16 (0.09 - 0.22)
Unionised Ammonia (mg/L)		0.008 (0.002 - 0.012)	0.010 (0.003 - 0.013)	0.007 (0.001 - 0.013)	0.007 (0.001 - 0.011)	0.012 (0.005 - 0.016)	0.005 (0.001 - 0.010)
Nitrite Nitrogen (mg/L)		0.033 (0.019 - 0.050)	0.034 (0.017 - 0.054)	0.029 (0.010 - 0.059)	0.028 (0.011 - 0.055)	0.211 (0.030 - 0.526)	0.023 (0.007 - 0.050)
Nitrate Nitrogen (mg/L)		0.168 (0.102 - 0.235)	0.155 (0.076 - 0.257)	0.161 (0.055 - 0.290)	0.139 (0.046 - 0.260)	0.335 (0.103 - 0.737)	0.129 (0.037 - 0.255)
Total Inorganic Nitrogen (mg/L)		0.51 (0.39 - 0.63)	0.54 (0.39 - 0.69)	0.41 (0.25 - 0.62)	0.34 (0.18 - 0.55)	1.22 (0.46 - 1.82)	0.31 (0.15 - 0.51)
Total Kjeldahl Nitrogen (mg/L)		0.51 (0.45 - 0.59)	0.59 (0.48 - 0.69)	0.47 (0.42 - 0.57)	0.36 (0.27 - 0.44)	1.04 (0.55 - 1.47)	0.33 (0.28 - 0.38)
Total Nitrogen (mg/L)		0.71 (0.60 - 0.82)	0.78 (0.57 - 0.91)	0.66 (0.48 - 0.81)	0.53 (0.36 - 0.75)	1.59 (0.68 - 2.19)	0.48 (0.32 - 0.67)
Orthophosphate Phosphorus (mg/L)		0.054 (0.041 - 0.067)	0.051 (0.038 - 0.069)	0.044 (0.035 - 0.056)	0.036 (0.030 - 0.049)	0.326 (0.093 - 0.516)	0.033 (0.021 - 0.043)
Total Phosphorus (mg/L)		0.08 (0.07 - 0.10)	0.08 (0.07 - 0.09)	0.07 (0.06 - 0.08)	0.06 (0.05 - 0.08)	0.37 (0.12 - 0.53)	0.06 (0.04 - 0.07)
Silica (as SiO_2) (mg/L)		1.3 (0.7 - 2.6)	1.3 (0.6 - 2.4)	1.2 (0.6 - 2.4)	1.0 (0.4 - 2.1)	2.2 (1.1 - 3.2)	1.0 (0.5 - 2.1)
Chlorophyll-a (µg/L)		4.8 (1.0 - 8.9)	3.8 (0.8 - 6.1)	2.7 (0.7 - 4.9)	3.6 (0.9 - 6.3)	6.5 (1.1 - 12.1)	2.7 (1.2 - 4.9)
E.coli (count/100mL)		460 (120 - 3200)	5200 (1100 - 16000)	10000 (2900 - 22000)	2100 (290 - 5500)	13000 (1000 - 64000)	2600 (1000 - 13000)
Faecal Coliforms (count/100mL)		1300 (250 - 11000)	15000 (3500 - 46000)	23000 (6700 - 48000)	4500 (620 - 10000)	28000 (3100 - 130000)	6000 (2400 - 33000)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary of water quality statistics for typhoon shelters in 2007

Parameter		Aldrich Bay (Shau Kei Wan) ET2	Chai Wan ET1	Hebe Haven PT4	Yim Tin Tsai PT3	Sai Kung PT2	Shuen Wan TT1
Number of samples		6	6	6	6	6	6
Temperature (°C)		23.0 (19.5 - 25.5)	23.4 (19.4 - 26.5)	23.7 (17.0 - 28.2)	23.3 (17.2 - 27.8)	23.9 (17.5 - 29.6)	24.0 (17.9 - 27.9)
Salinity		32.7 (31.5 - 33.5)	32.5 (30.6 - 33.5)	32.5 (31.7 - 33.1)	33.0 (32.5 - 33.5)	32.5 (30.8 - 33.4)	32.4 (31.5 - 33.6)
Dissolved Oxygen (mg/L)		4.5 (3.3 - 5.9)	5.2 (4.8 - 6.1)	6.0 (4.4 - 7.1)	6.0 (3.8 - 7.8)	6.0 (4.8 - 6.9)	5.2 (4.1 - 6.8)
	Bottom	4.5 (2.5 - 6.2)	5.3 (4.7 - 6.6)	5.2 (3.4 - 7.1)	6.0 (3.7 - 7.8)	6.2 (4.4 - 7.2)	4.7 (2.0 - 6.6)
Dissolved Oxygen (% Saturation)		63 (49 - 79)	74 (69 - 81)	84 (67 - 98)	85 (57 - 109)	85 (73 - 90)	75 (62 - 93)
	Bottom	62 (36 - 82)	75 (68 - 88)	74 (50 - 99)	84 (54 - 108)	86 (64 - 101)	66 (29 - 95)
pH		7.9 (7.7 - 8.0)	8.0 (7.7 - 8.2)	8.1 (7.7 - 8.4)	8.2 (7.8 - 8.5)	8.2 (7.8 - 8.5)	7.9 (7.6 - 8.2)
Secchi Disc Depth (m)		2.7 (2.0 - 3.0)	2.3 (2.0 - 3.0)	2.1 (1.5 - 3.0)	2.5 (1.9 - 3.8)	2.7 (2.0 - 4.3)	2.4 (1.2 - 3.5)
Turbidity (NTU)		10.7 (7.1 - 15.4)	21.3 (7.0 - 78.6)	12.0 (4.3 - 20.8)	9.1 (4.0 - 14.4)	9.4 (4.1 - 17.1)	11.4 (4.3 - 19.0)
Suspended Solids (mg/L)		1.9 (1.5 - 2.5)	2.1 (0.8 - 3.1)	13.5 (1.7 - 50.0)	1.7 (1.0 - 2.5)	2.3 (0.5 - 3.9)	2.4 (1.5 - 5.7)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.5 - 0.8)	0.9 (0.6 - 1.5)	1.1 (0.7 - 1.5)	0.9 (0.5 - 1.4)	1.1 (0.6 - 2.2)	1.5 (1.2 - 1.7)
Ammonia Nitrogen (mg/L)		0.13 (0.08 - 0.17)	0.10 (0.06 - 0.15)	0.04 (0.01 - 0.06)	0.04 (0.02 - 0.05)	0.04 (0.02 - 0.07)	0.06 (0.02 - 0.11)
Unionised Ammonia (mg/L)		0.004 (0.001 - 0.007)	0.004 (0.001 - 0.007)	0.002 (<0.001 - 0.006)	0.002 (<0.001 - 0.005)	0.003 (<0.001 - 0.011)	0.003 (<0.001 - 0.005)
Nitrite Nitrogen (mg/L)		0.018 (0.005 - 0.027)	0.016 (0.004 - 0.023)	0.002 (0.002 - 0.003)	0.002 (0.002 - 0.002)	0.002 (0.002 - 0.003)	0.003 (0.002 - 0.004)
Nitrate Nitrogen (mg/L)		0.092 (0.037 - 0.140)	0.084 (0.035 - 0.130)	0.013 (0.002 - 0.056)	0.017 (0.002 - 0.031)	0.012 (0.005 - 0.031)	0.010 (0.004 - 0.024)
Total Inorganic Nitrogen (mg/L)		0.24 (0.16 - 0.31)	0.20 (0.13 - 0.25)	0.05 (0.02 - 0.12)	0.06 (0.03 - 0.08)	0.06 (0.03 - 0.10)	0.07 (0.03 - 0.14)
Total Kjeldahl Nitrogen (mg/L)		0.26 (0.20 - 0.32)	0.24 (0.18 - 0.32)	0.22 (0.14 - 0.39)	0.16 (0.13 - 0.19)	0.17 (0.13 - 0.24)	0.26 (0.24 - 0.32)
Total Nitrogen (mg/L)		0.37 (0.28 - 0.46)	0.34 (0.25 - 0.44)	0.23 (0.14 - 0.45)	0.18 (0.13 - 0.21)	0.18 (0.14 - 0.25)	0.28 (0.24 - 0.35)
Orthophosphate Phosphorus (mg/L)		0.031 (0.020 - 0.038)	0.020 (0.012 - 0.033)	0.008 (0.005 - 0.013)	0.008 (0.005 - 0.013)	0.010 (0.004 - 0.025)	0.009 (0.004 - 0.015)
Total Phosphorus (mg/L)		0.05 (0.03 - 0.05)	0.04 (0.03 - 0.05)	0.04 (0.02 - 0.07)	0.02 (0.02 - 0.04)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)
Silica (as SiO_2) (mg/L)		0.9 (0.4 - 1.7)	0.7 (0.3 - 1.5)	0.8 (0.3 - 2.1)	0.9 (0.5 - 1.9)	0.9 (0.4 - 2.0)	0.5 (0.1 - 1.3)
Chlorophyll-a (µg/L)		1.7 (0.9 - 2.4)	4.4 (0.9 - 8.3)	4.8 (1.7 - 7.7)	3.4 (0.6 - 6.5)	4.8 (1.4 - 8.9)	6.3 (2.0 - 9.6)
E.coli (count/100mL)		710 (330 - 2000)	380 (80 - 1000)	7 (3 - 22)	1 (1 - 1)	23 (1 - 77)	11 (4 - 49)
Faecal Coliforms (count/100mL)		1900 (970 - 7800)	1300 (460 - 3300)	38 (18 - 73)	3 (1 - 53)	160 (23 - 600)	45 (15 - 190)

Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

2. Data presented are annual arithmetic means of the depth-averaged results except for *E. coli* and faecal coliforms which are annual geometric means.

3. Data in brackets indicate the ranges.

Summary statistics of bottom sediment quality of typhoon shelters, 2003- 2007

Parameter	Tuen Mun NS5	Cheung Chau SS7	Hei Ling Chau SS8	Rambler Channel VS17	Government Dockyard VS21	Yau Ma Tei VS19	Causeway Bay VS12
Number of samples	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	64 (39 - 94)	75 (7 - 95)	94 (87 - 98)	67 (42 - 78)	94 (85 - 99)	78 (60 - 95)	78 (27 - 95)
Electrochemical Potential (mV)	-235 ((-353)-(-169))	-248 ((-310)-(-150))	-218 ((-278)-(-81))	-290 ((-371)-(-184))	-329 ((-388)-(-246))	-364 ((-403)-(-278))	-355 ((-407)-(-251))
Total Solids (%w/w)	47 (36 - 58)	41 (34 - 51)	37 (30 - 45)	46 (40 - 52)	37 (33 - 46)	47 (40 - 55)	41 (34 - 68)
Total Volatile Soilds (%w/w)	7.0 (5.8 - 9.2)	7.3 (5.4 - 8.8)	8.2 (7.4 - 11.0)	7.3 (6.5 - 8.1)	7.8 (6.0 - 9.6)	6.9 (5.6 - 8.6)	8.8 (3.9 - 11.0)
Chemical Oxygen Demand (mg/kg)	21000 (17000 - 25000)	19000 (17000 - 22000)	14000 (13000 - 16000)	27000 (16000 - 36000)	18000 (11000 - 21000)	21000 (15000 - 26000)	31000 (29000 - 36000)
Total Carbon (%w/w)	0.8 (0.6 - 1.0)	0.7 (0.5 - 0.8)	0.5 (0.5 - 0.5)	0.9 (0.7 - 1.3)	0.5 (0.5 - 0.6)	0.8 (0.7 - 1.0)	0.9 (0.7 - 1.1)
Ammonical Nitrogen (mg/kg)	7.2 (0.1 - 21.0)	11.3 (4.6 - 21.0)	9.8 (1.9 - 21.0)	7.9 (0.1 - 20.0)	6.9 (1.8 - 17.0)	30.2 (13.0 - 45.0)	35.6 (3.7 - 65.0)
Total Kjeldahl Nitrogen (mg/kg)	380 (230 - 620)	480 (330 - 550)	420 (290 - 560)	450 (330 - 540)	350 (290 - 410)	480 (320 - 600)	650 (290 - 820)
Total Phosphorus (mg/kg)	210 (150 - 300)	260 (190 - 370)	170 (140 - 210)	210 (150 - 300)	190 (150 - 220)	220 (190 - 240)	210 (150 - 260)
Total Sulphide (mg/kg)	150 (5 - 750)	140 (33 - 250)	93 (12 - 200)	550 (31 - 2500)	150 (3 - 630)	310 (74 - 960)	350 (66 - 960)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.3)	0.1 (<0.1 - 0.3)	0.1 (<0.1 - 0.2)	0.3 (<0.1 - 0.4)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.2 (<0.1 - 0.3)
Arsenic (mg/kg)	7.8 (5.8 - 9.0)	7.7 (6.2 - 9.0)	7.4 (6.8 - 8.4)	8.1 (6.5 - 9.7)	8.3 (7.5 - 9.2)	6.0 (4.0 - 8.8)	8.2 (2.9 - 9.7)
Cadmium (mg/kg)	0.3 (<0.1 - 0.7)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.8 (0.5 - 1.2)	0.3 (0.1 - 0.4)	0.5 (0.2 - 0.9)	1.0 (0.2 - 1.2)
Chromium (mg/kg)	34 (22 - 53)	55 (45 - 67)	42 (34 - 47)	150 (85 - 280)	51 (43 - 56)	40 (26 - 54)	66 (15 - 83)
Copper (mg/kg)	45 (13 - 72)	120 (65 - 250)	38 (33 - 43)	260 (130 - 490)	150 (24 - 180)	97 (38 - 160)	260 (48 - 310)
Lead (mg/kg)	55 (32 - 85)	50 (35 - 61)	50 (41 - 58)	83 (70 - 140)	53 (28 - 65)	48 (24 - 79)	83 (24 - 110)
Mercury (mg/kg)	0.08 (<0.05 - 0.10)	0.25 (0.12 - 0.60)	0.14 (0.12 - 0.18)	0.27 (0.14 - 0.49)	0.20 (<0.05 - 0.20)	0.27 (0.09 - 0.44)	0.75 (0.18 - 1.30)
Nickel (mg/kg)	19 (14 - 23)	21 (16 - 24)	27 (22 - 32)	61 (37 - 130)	30 (25 - 36)	25 (18 - 32)	28 (7 - 34)
Silver (mg/kg)	1.8 (<0.2 - 11.0)	0.4 (0.2 - 0.5)	0.6 (0.5 - 0.7)	5.8 (3.3 - 9.5)	1.9 (0.3 - 2.4)	2.1 (0.8 - 3.7)	7.4 (0.8 - 10.0)
Zinc (mg/kg)	160 (87 - 300)	160 (110 - 230)	140 (120 - 160)	270 (170 - 350)	230 (110 - 270)	210 (110 - 340)	330 (66 - 450)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	50 (19 - 92)	20 (18 - 24)	21 (18 - 30)	44 (18 - 82)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	95 (90 - 110)	96 (90 - 120)	91 (90 - 95)	120 (96 - 240)	95 (90 - 120)	110 (90 - 130)	130 (90 - 170)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	260 (63 - 530)	360 (62 - 1400)	64 (38 - 80)	860 (360 - 1800)	170 (21 - 280)	380 (190 - 670)	690 (170 - 1000)

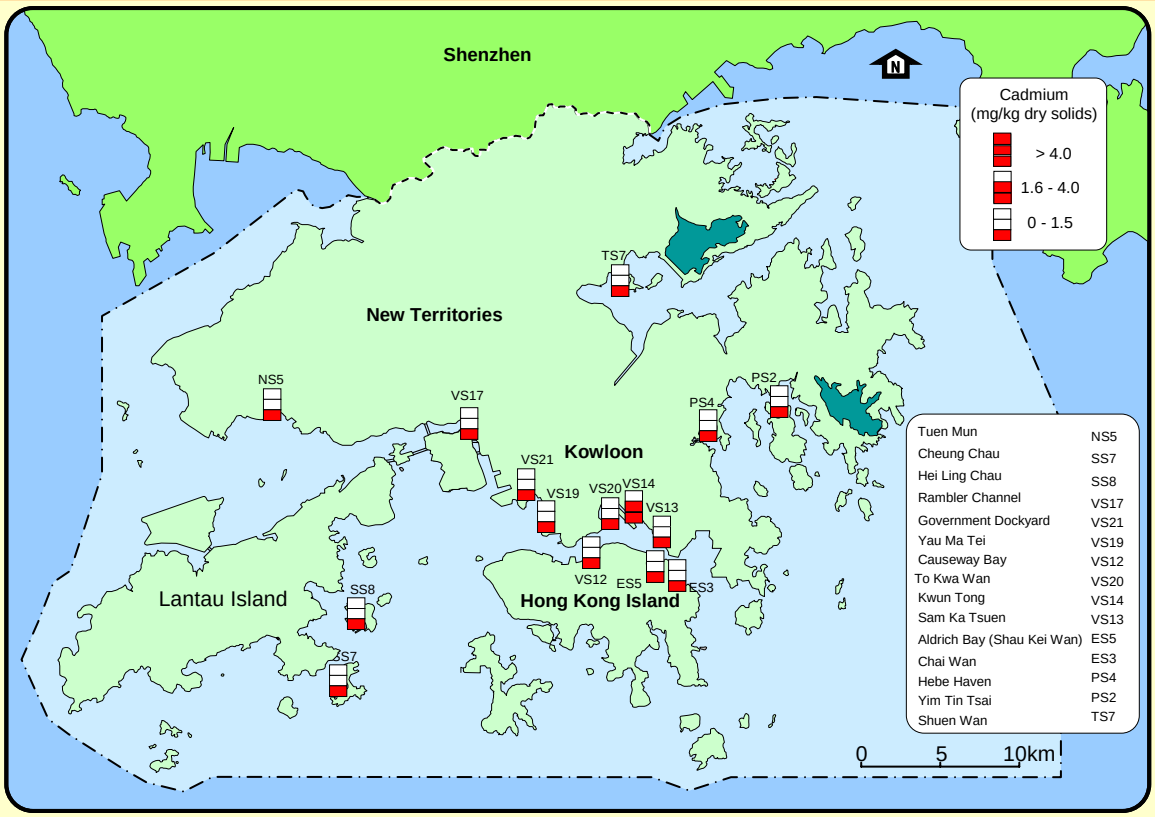
Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics of bottom sediment quality of typhoon shelters, 2003- 2007 (continued)

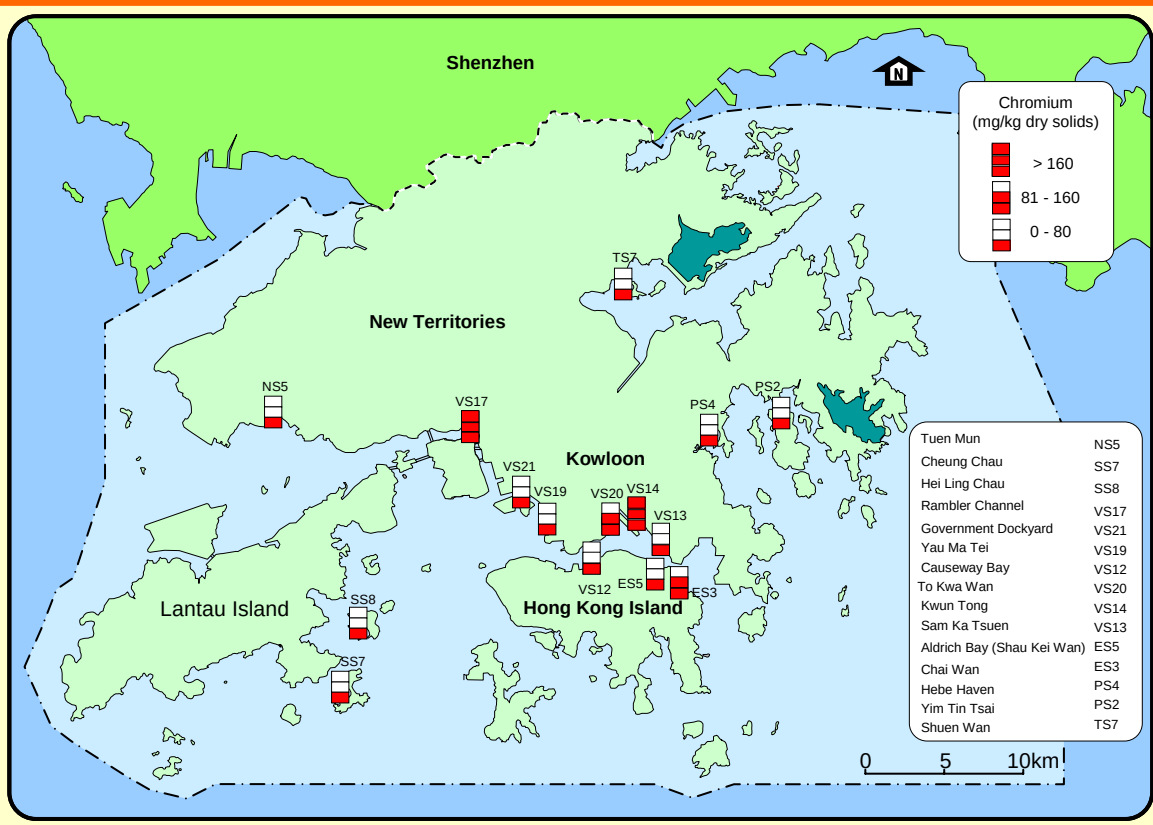
Parameter	To Kwa Wan VS20	Kwun Tong VS14	Sam Ka Tsuen VS13	Aldrich Bay (Shau Kei Wan) ES5	Chai Wan ES3	Hebe Haven PS4	Yim Tin Tsai PS2	Shuen Wan TS7
Number of samples	9	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	66 (45 - 87)	64 (36 - 81)	84 (70 - 90)	81 (8 - 97)	80 (25 - 96)	92 (85 - 97)	81 (25 - 93)	59 (45 - 69)
Electrochemical Potential (mV)	-354 ((-400)-(-173))	-394 ((-437)-(-373))	-257 ((-408)-(-56))	-399 ((-413)-(-345))	-330 ((-380)-(-260))	-273 ((-317)-(-207))	-225 ((-326)-(-160))	-356 ((-388)-(-289))
Total Solids (%w/w)	48 ((37 - 53))	39 ((27 - 45))	41 ((38 - 43))	32 ((27 - 35))	41 ((36 - 45))	37 ((35 - 40))	47 ((34 - 65))	38 ((29 - 51))
Total Volatile Soilds (%w/w)	7.6 (6.2 - 9.3)	9.5 (7.0 - 11.0)	9.8 (8.7 - 12.0)	10.3 (9.0 - 11.0)	8.4 (7.9 - 8.9)	9.9 (8.5 - 13.0)	10.6 (6.6 - 15.0)	8.7 (6.8 - 10.0)
Chemical Oxygen Demand (mg/kg)	36000 (29000 - 44000)	37000 (25000 - 44000)	26000 (21000 - 30000)	28000 (21000 - 33000)	26000 (19000 - 32000)	23000 (17000 - 26000)	19000 (13000 - 30000)	28000 (23000 - 32000)
Total Carbon (%w/w)	1.2 (1.0 - 1.4)	1.2 (0.7 - 1.5)	0.9 (0.8 - 1.0)	0.8 (0.7 - 0.9)	0.8 (0.7 - 0.9)	0.8 (0.7 - 0.8)	1.9 (0.9 - 4.4)	0.8 (0.7 - 1.2)
Ammonical Nitrogen (mg/kg)	19.0 (7.1 - 34.0)	32.8 (11.0 - 51.0)	12.8 (4.0 - 28.0)	32.9 (4.2 - 61.0)	4.7 (1.3 - 9.9)	4.5 (1.5 - 7.9)	10.3 (1.7 - 28.0)	8.7 (3.9 - 12.0)
Total Kjeldahl Nitrogen (mg/kg)	540 (420 - 630)	730 (410 - 890)	550 (380 - 700)	580 (470 - 670)	510 (400 - 630)	500 (290 - 610)	470 (180 - 850)	610 (310 - 890)
Total Phosphorus (mg/kg)	210 (170 - 250)	240 (160 - 310)	250 (200 - 340)	200 (150 - 250)	230 (180 - 270)	170 (120 - 200)	140 (48 - 200)	220 (160 - 430)
Total Sulphide (mg/kg)	230 (12 - 730)	940 (25 - 2500)	550 (8 - 2300)	1000 (330 - 1600)	230 (18 - 680)	69 (8 - 150)	51 (6 - 110)	300 (63 - 1300)
Total Cyanide (mg/kg)	0.2 (<0.1 - 0.2)	0.4 (0.1 - 0.5)	0.3 (0.2 - 0.5)	0.2 (<0.1 - 0.3)	0.2 (<0.1 - 0.2)	0.2 (0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.2 (<0.1 - 0.4)
Arsenic (mg/kg)	7.6 (6.0 - 8.7)	7.0 (5.5 - 8.6)	7.4 (6.4 - 8.5)	8.1 (6.9 - 10.0)	9.6 (8.4 - 12.0)	8.4 (7.3 - 9.6)	3.9 (0.6 - 5.6)	9.1 (7.0 - 12.0)
Cadmium (mg/kg)	1.0 (0.7 - 1.6)	3.1 (2.0 - 4.4)	0.8 (0.7 - 0.9)	0.7 (0.5 - 0.9)	0.6 (0.4 - 0.9)	0.2 (0.2 - 0.3)	<0.1 (<0.1 - <0.1)	0.5 (0.2 - 0.7)
Chromium (mg/kg)	92 (69 - 100)	300 (210 - 490)	57 (44 - 90)	70 (57 - 89)	110 (75 - 180)	29 (23 - 33)	18 (9 - 23)	23 (15 - 33)
Copper (mg/kg)	710 (580 - 830)	2000 (1400 - 2500)	180 (150 - 230)	330 (230 - 430)	320 (230 - 540)	52 (44 - 61)	17 (8 - 27)	130 (52 - 240)
Lead (mg/kg)	110 (87 - 130)	120 (75 - 140)	110 (84 - 120)	85 (67 - 130)	91 (63 - 140)	40 (37 - 43)	33 (16 - 39)	98 (77 - 120)
Mercury (mg/kg)	1.26 (0.85 - 2.00)	0.82 (0.58 - 1.20)	0.70 (0.34 - 1.20)	0.41 (0.27 - 0.69)	0.48 (0.38 - 0.63)	0.14 (0.11 - 0.16)	0.07 (<0.05 - 0.15)	0.15 (0.07 - 0.27)
Nickel (mg/kg)	38 (33 - 45)	84 (63 - 110)	20 (16 - 25)	30 (26 - 36)	32 (22 - 55)	9 (7 - 12)	12 (7 - 18)	12 (8 - 20)
Silver (mg/kg)	5.3 (3.5 - 6.8)	9.6 (6.3 - 12.0)	2.9 (2.2 - 3.8)	6.8 (4.2 - 9.0)	18.2 (8.9 - 32.0)	0.3 (0.3 - 0.4)	0.2 (<0.2 - 0.2)	0.5 (0.2 - 0.7)
Zinc (mg/kg)	270 (220 - 320)	460 (370 - 550)	320 (280 - 380)	400 (320 - 550)	320 (230 - 500)	160 (140 - 170)	85 (38 - 140)	320 (170 - 470)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	110 (70 - 140)	230 (150 - 470)	50 (22 - 110)	21 (18 - 29)	45 (29 - 71)	18 (18 - 20)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	14000 (1800 - 42000)	130 (110 - 170)	110 (93 - 180)	100 (90 - 120)	120 (100 - 170)	90 (90 - 93)	90 (90 - 90)	91 (90 - 96)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	120000 (21000 - 290000)	1100 (750 - 2000)	570 (400 - 1500)	740 (370 - 1200)	560 (270 - 920)	70 (37 - 100)	45 (21 - 120)	110 (46 - 180)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

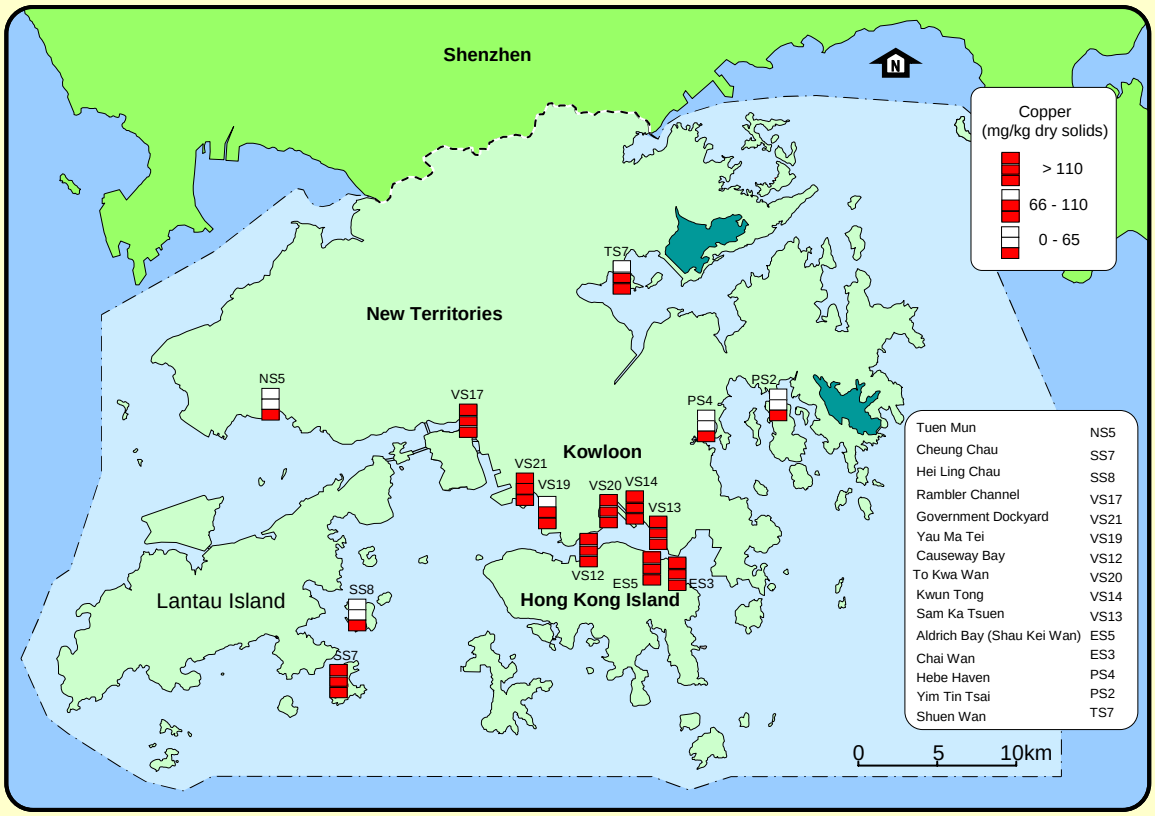
Cadmium in typhoon shelter sediments in Hong Kong, 2003 - 2007



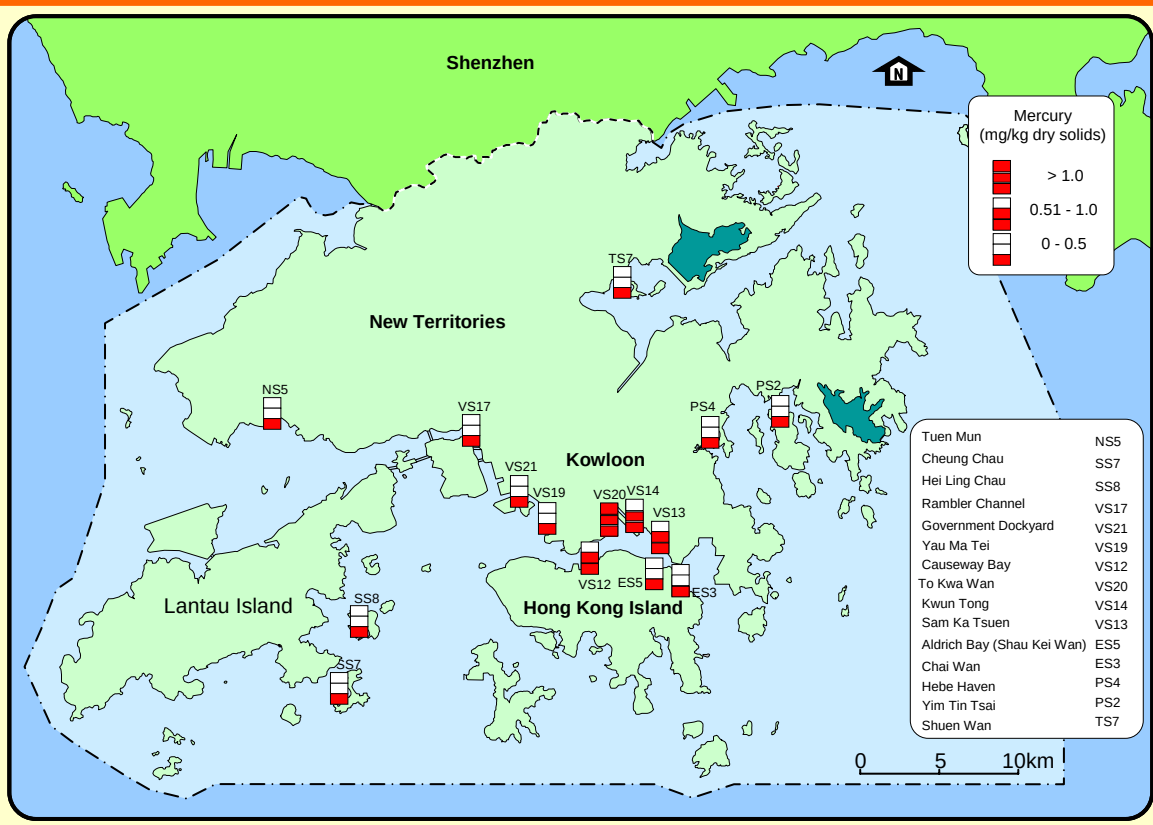
Chromium in typhoon shelter sediments in Hong Kong, 2003 - 2007



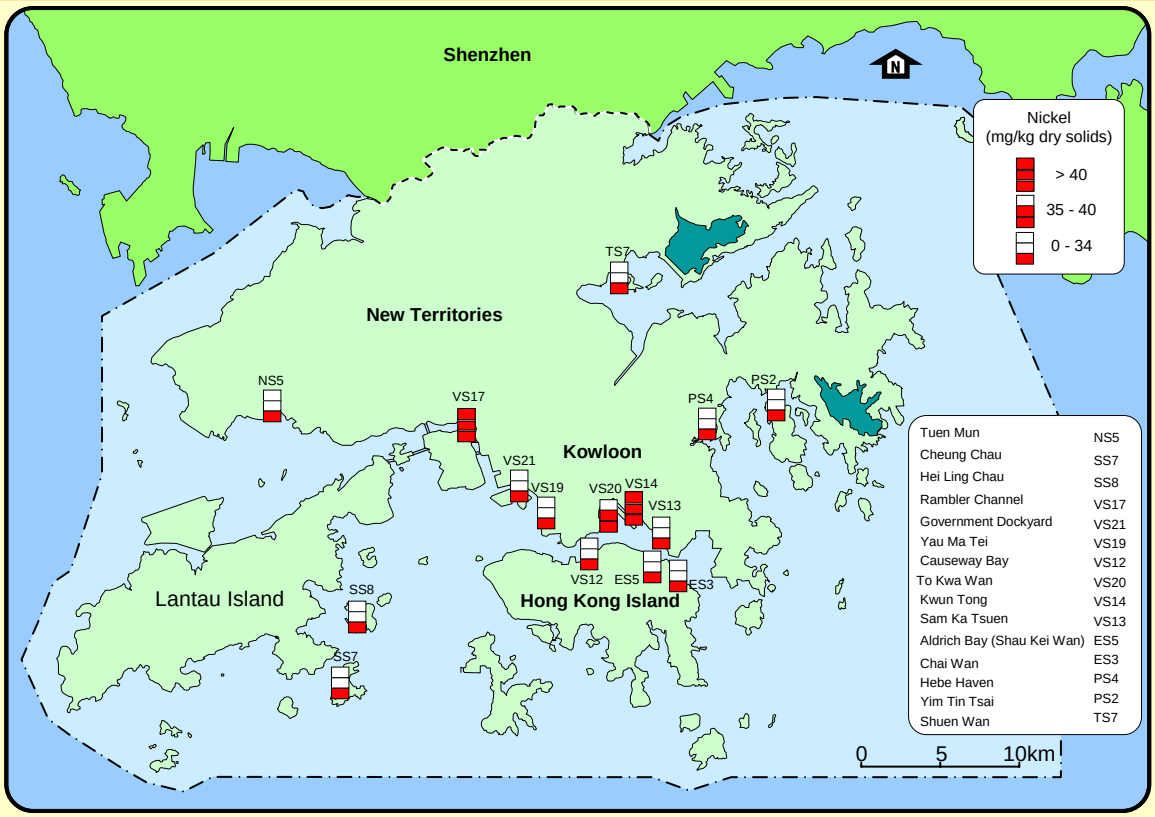
Copper in typhoon shelter sediments in Hong Kong, 2003 - 2007



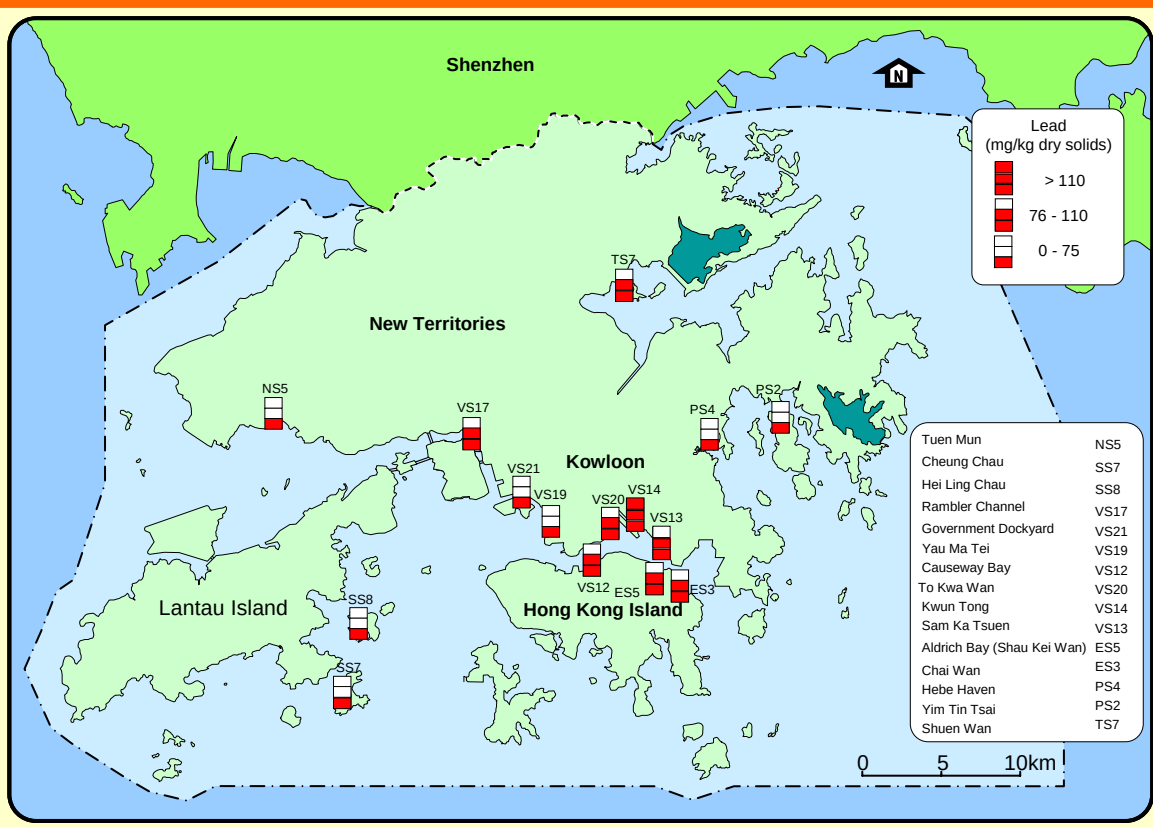
Mercury in typhoon shelter sediments in Hong Kong, 2003 - 2007



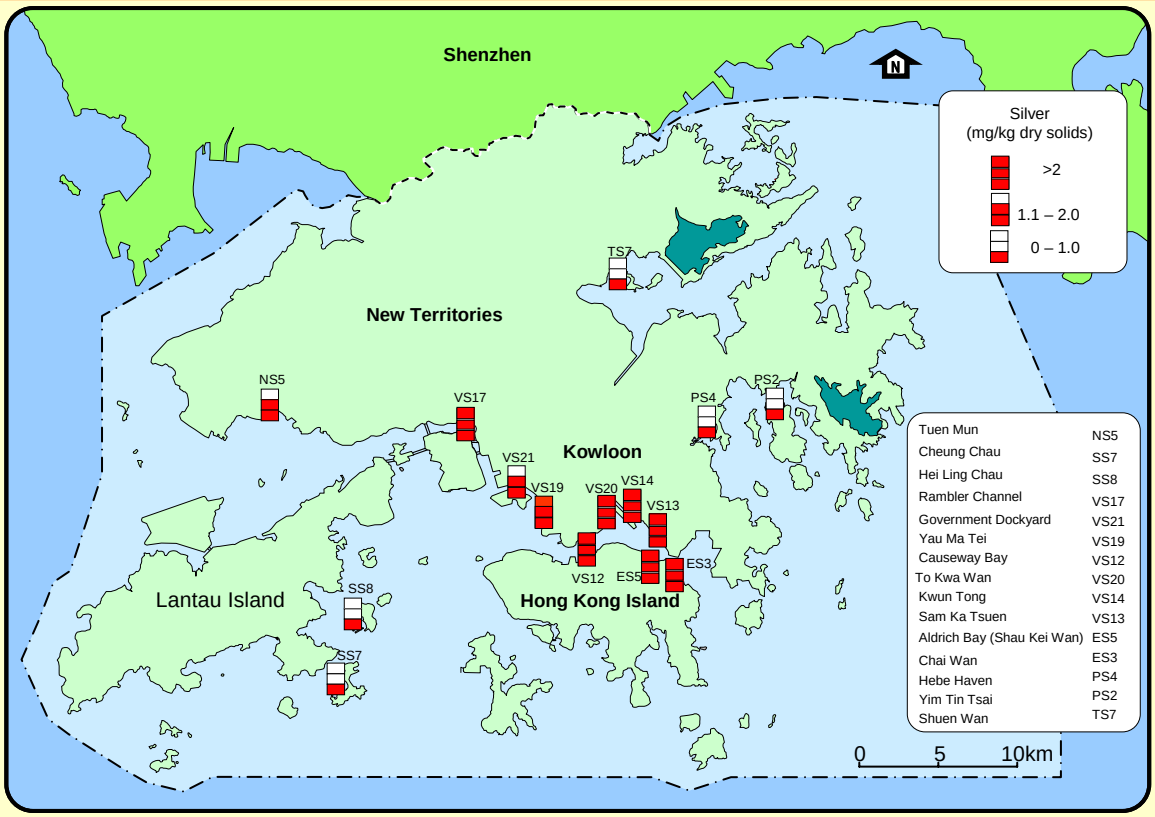
Nickel in typhoon shelter sediments in Hong Kong, 2003 - 2007



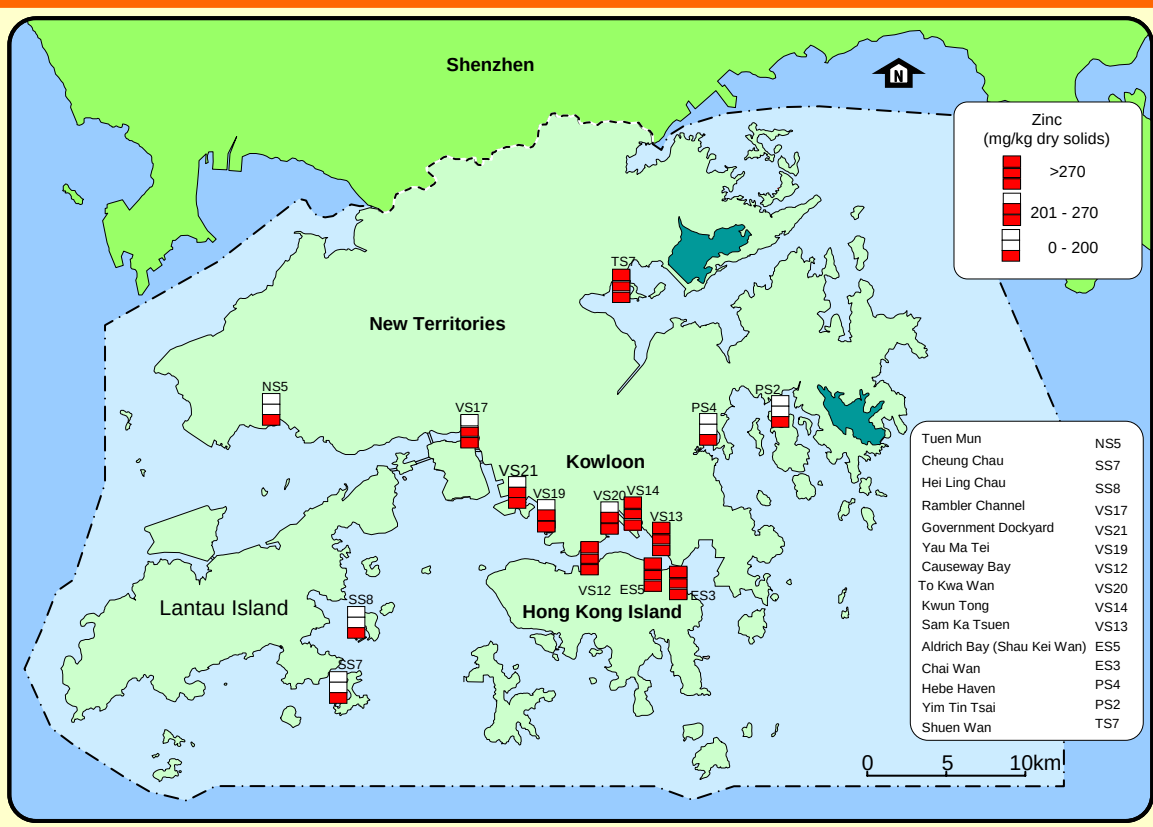
Lead in typhoon shelter sediments in Hong Kong, 2003 - 2007



Silver in typhoon shelter sediments in Hong Kong, 2003 - 2007

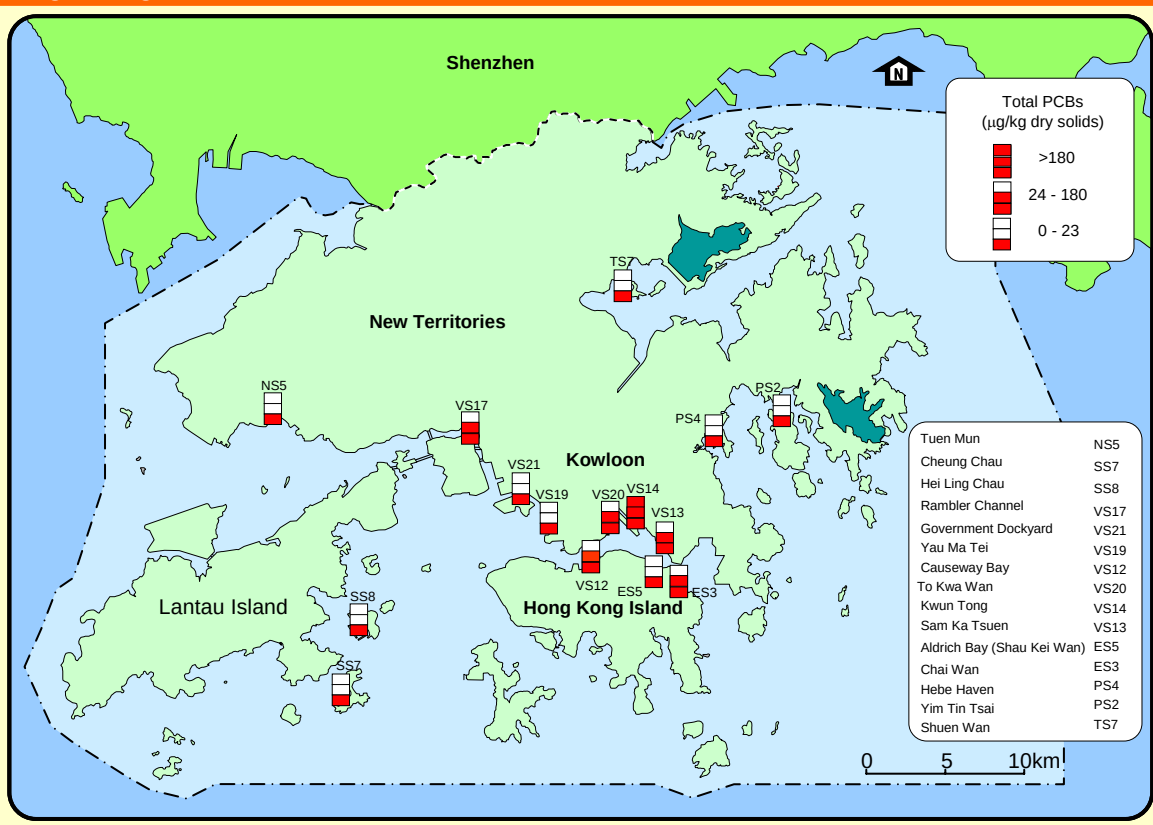


Zinc in typhoon shelter sediments in Hong Kong, 2003 - 2007

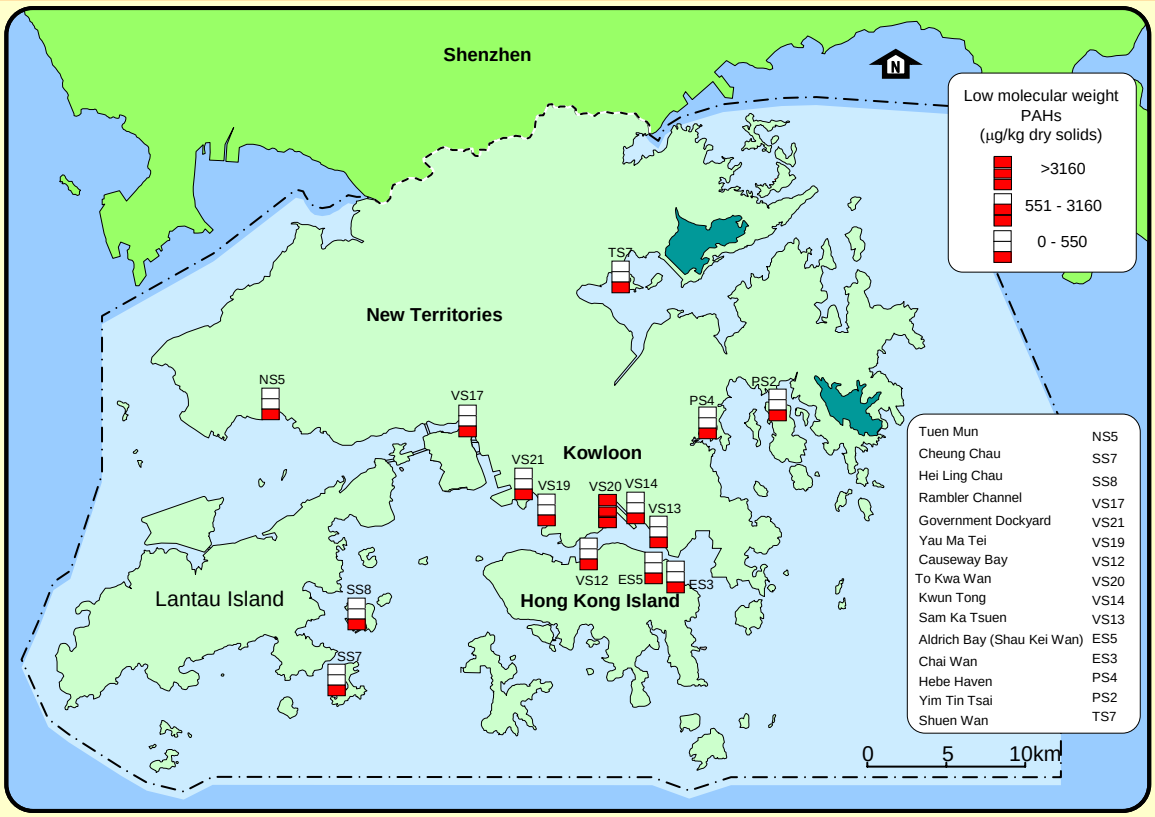


Arsenic in typhoon shelter sediments in Hong Kong, 2003 - 2007

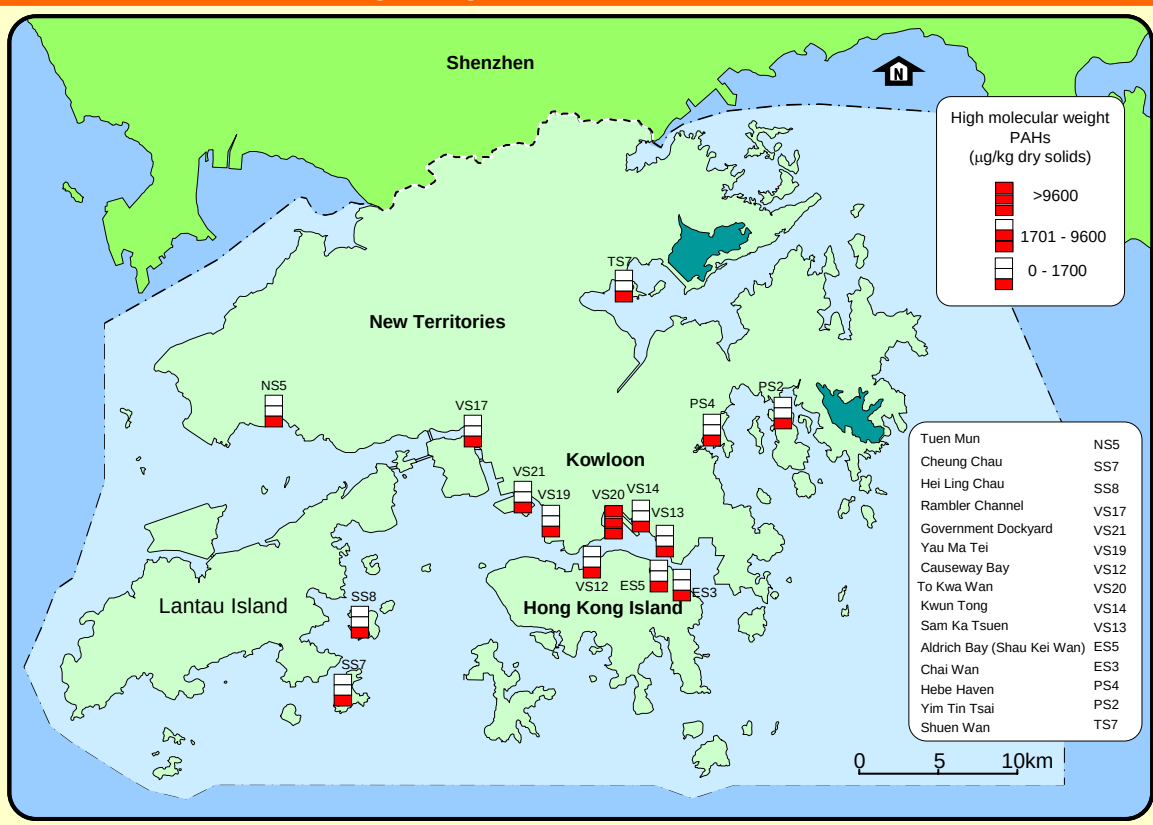
Total polychlorinated biphenyls (PCBs) in typhoon shelter sediments in Hong Kong, 2003 - 2007



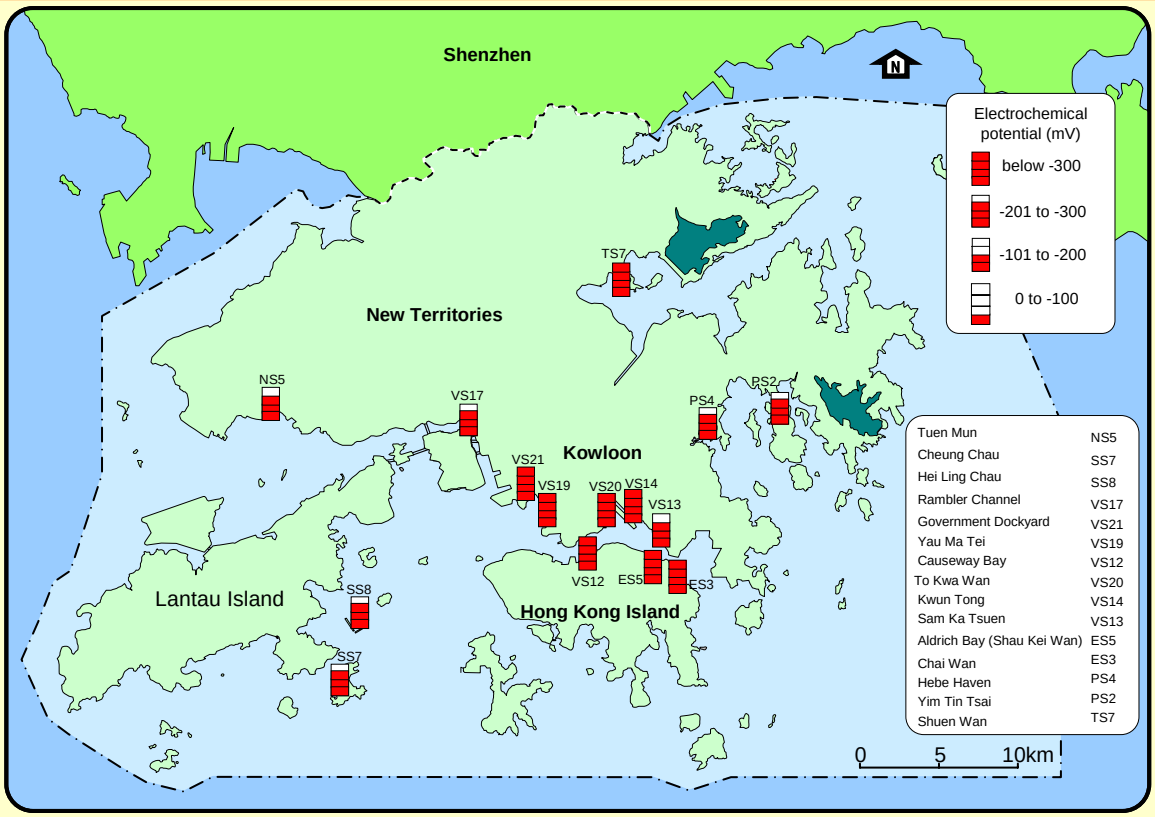
Low molecular weight polycyclic aromatic hydrocarbons (PAHs) in typhoon shelter sediments in Hong Kong, 2003 - 2007



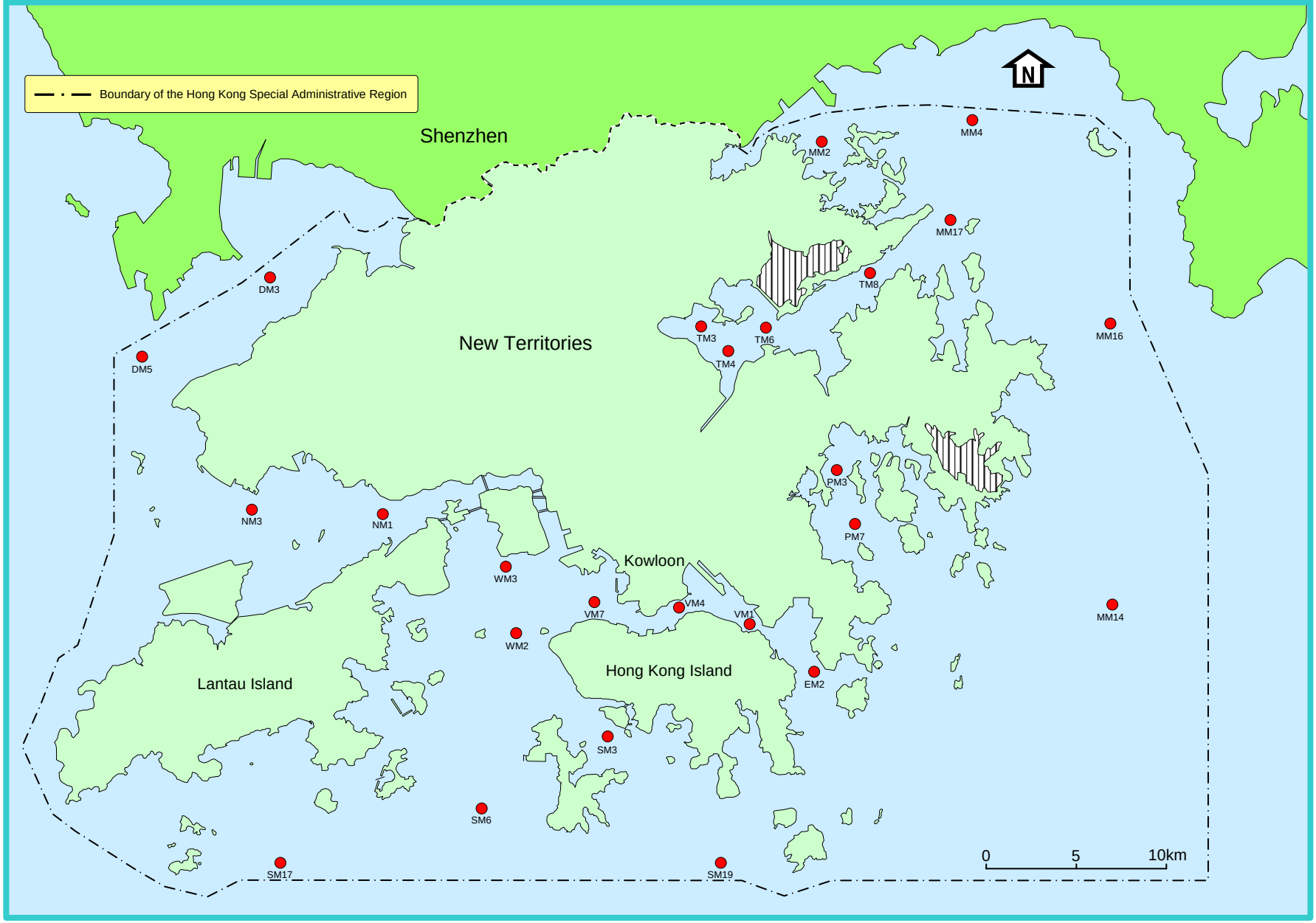
High molecular weight polycyclic aromatic hydrocarbons (PAHs) in typhoon shelter sediments in Hong Kong, 2003 - 2007



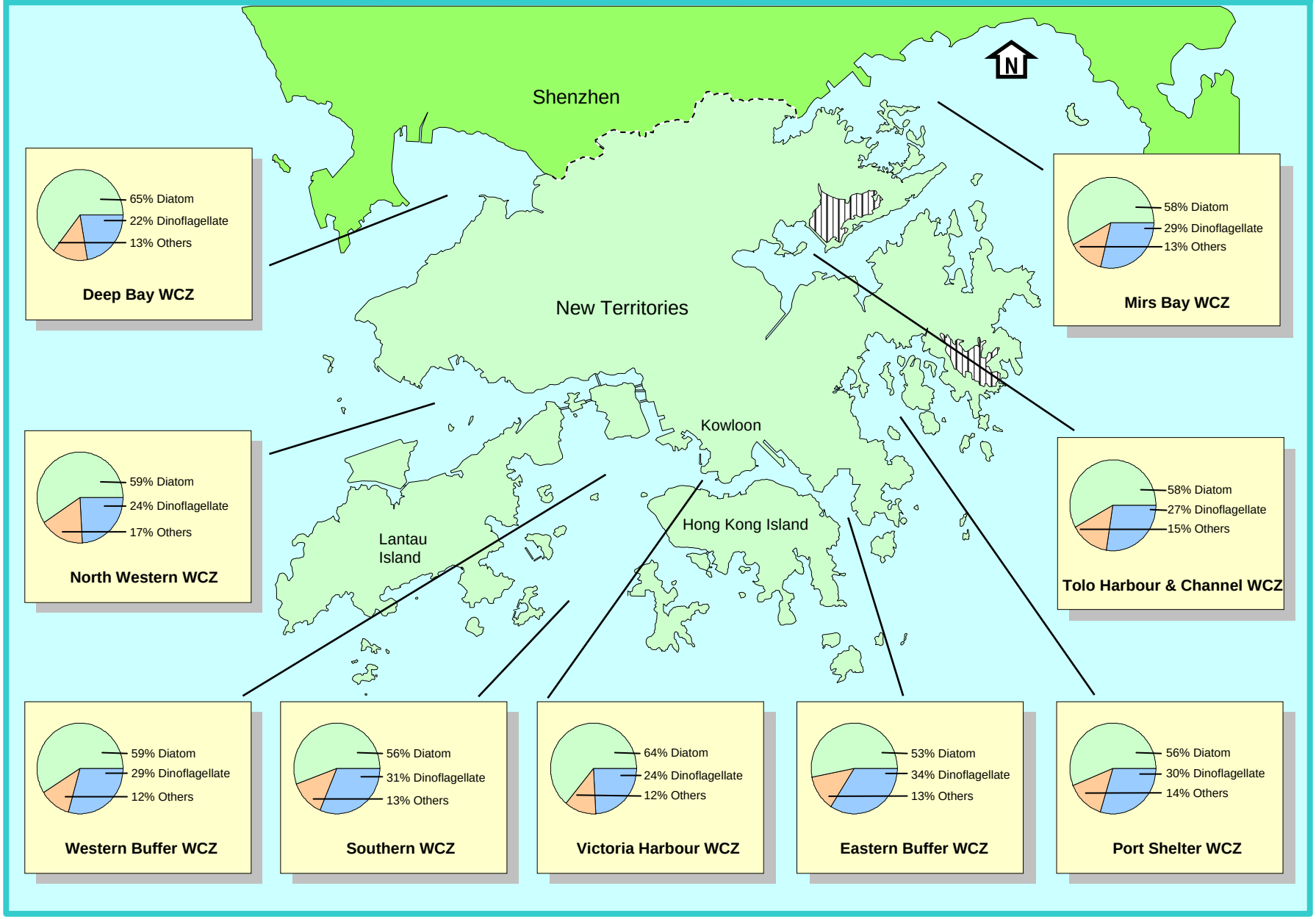
Electrochemical potential in typhoon shelter sediments in Hong Kong, 2003- 2007



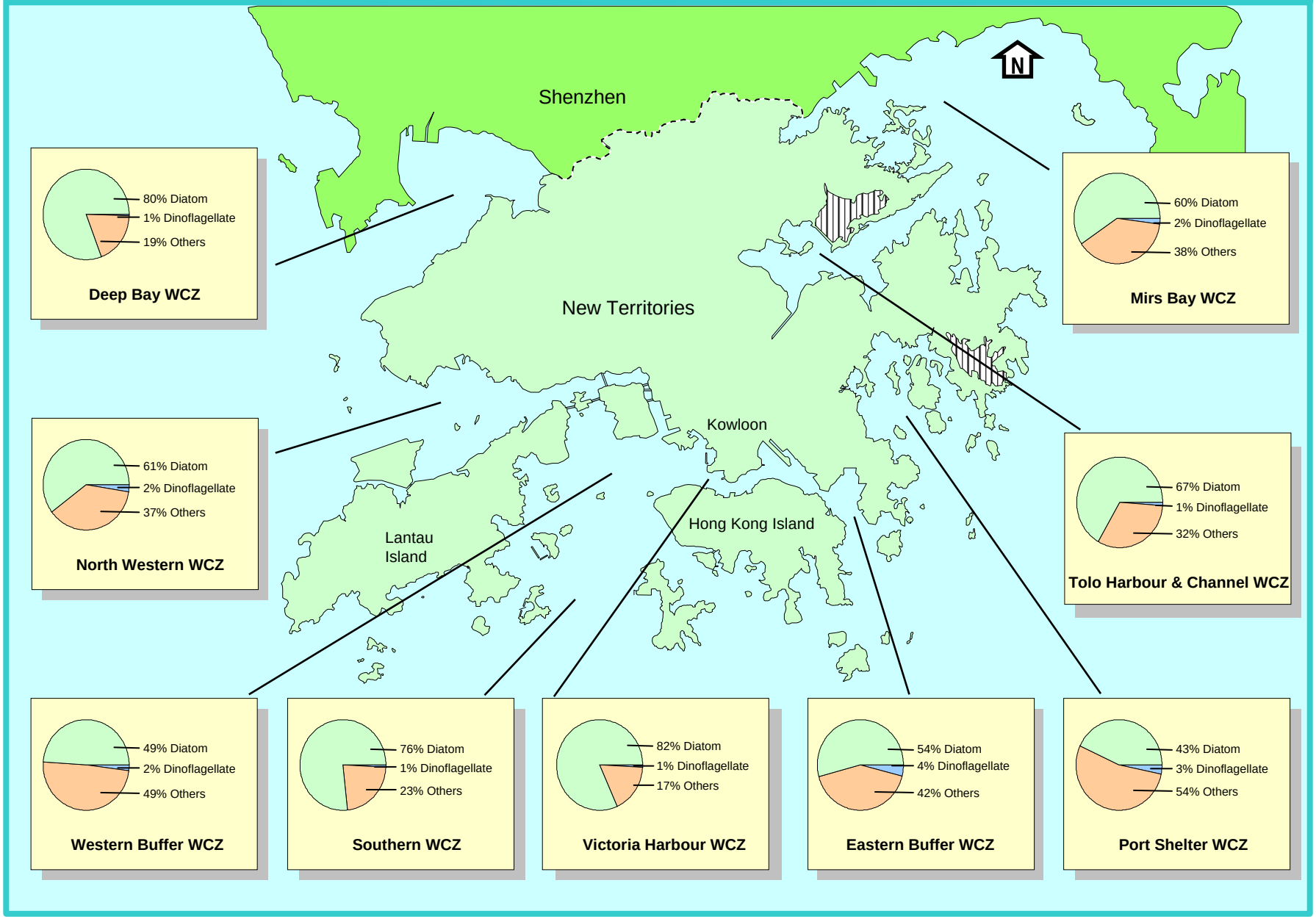
Phytoplankton monitoring stations in Hong Kong waters in 2007



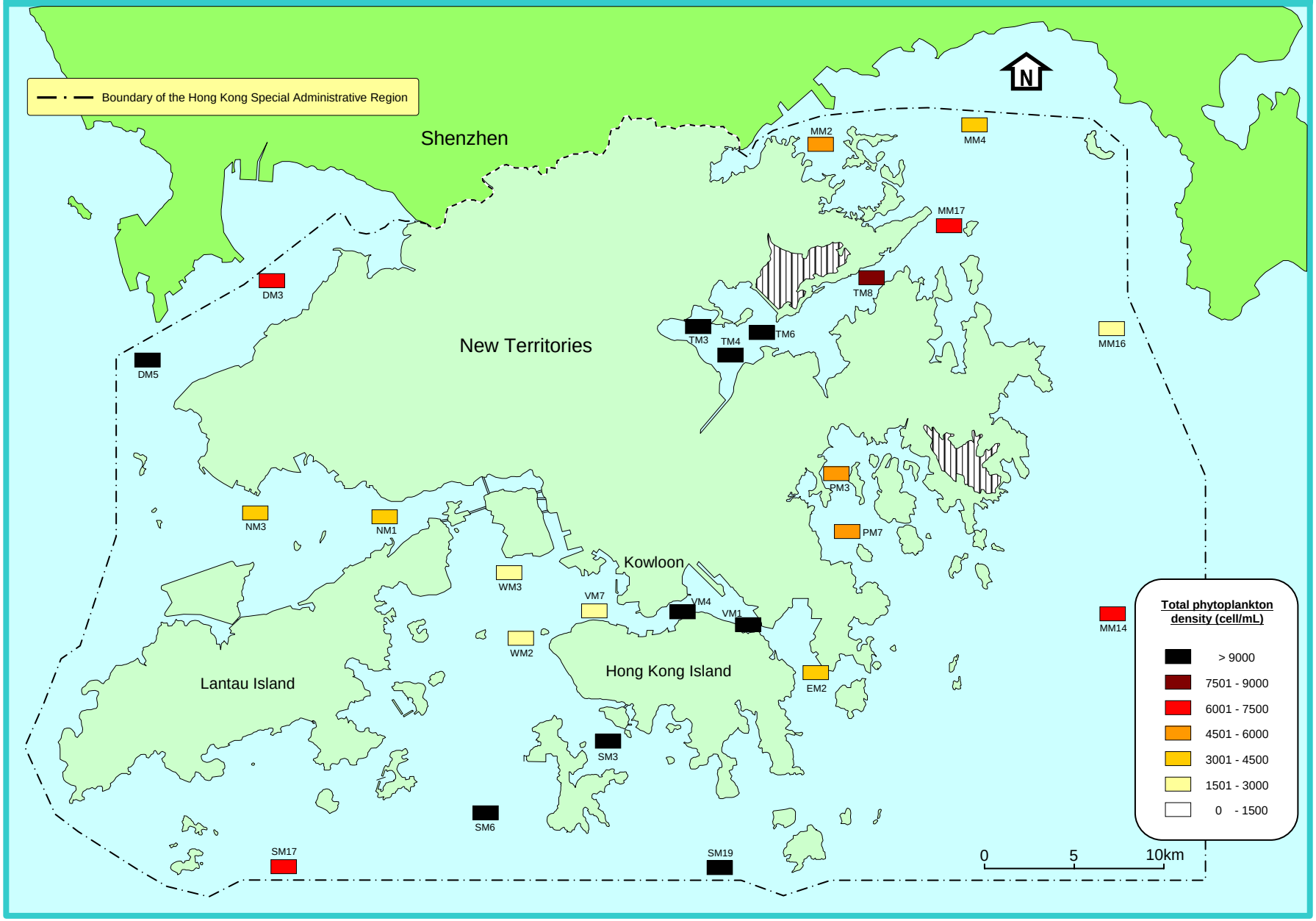
Percentage contribution of phytoplankton groups to the total number of species in the nine Water Control Zones (2007)



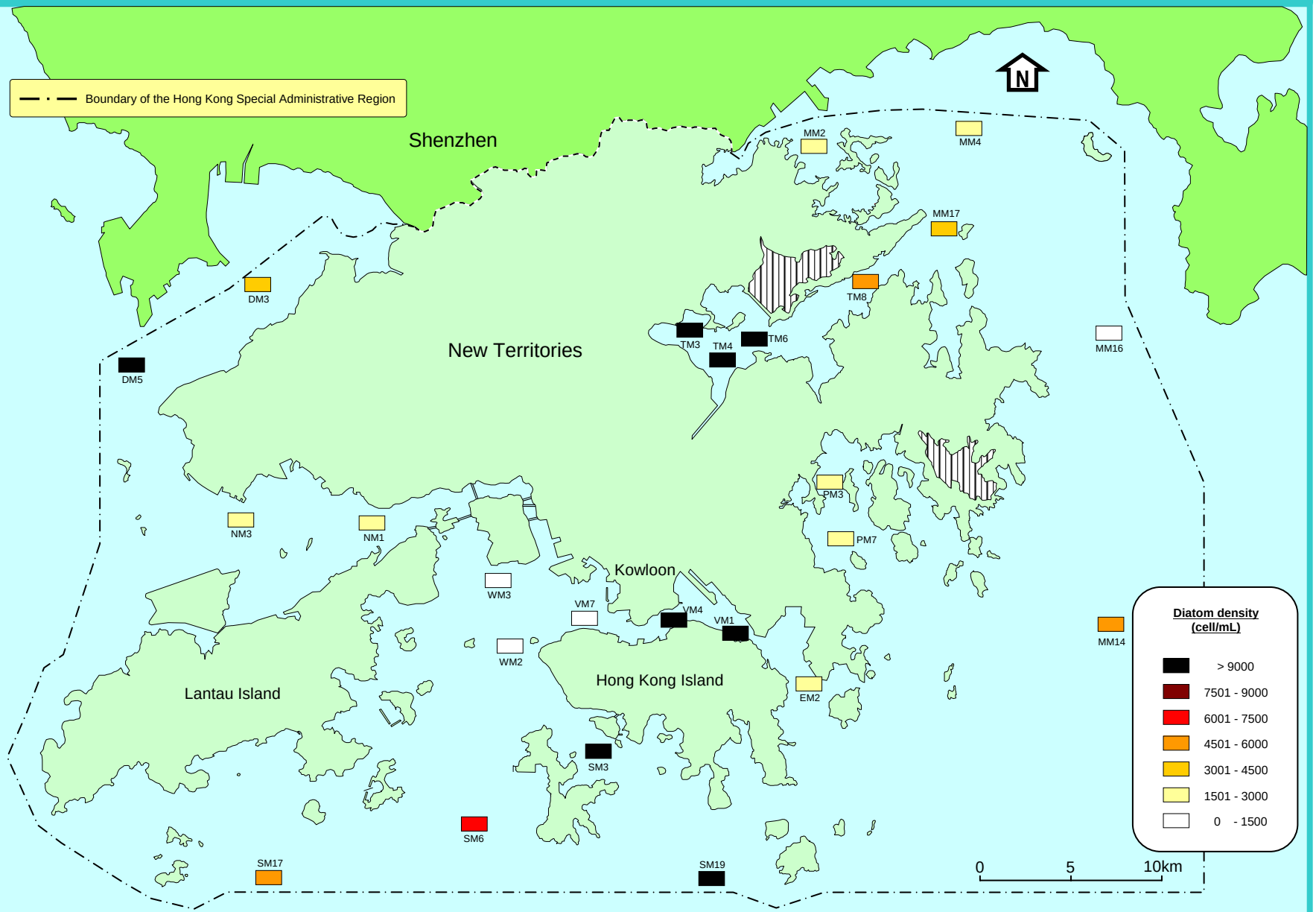
Percentage contribution of phytoplankton groups to the total density in the nine Water Control Zones (2007)



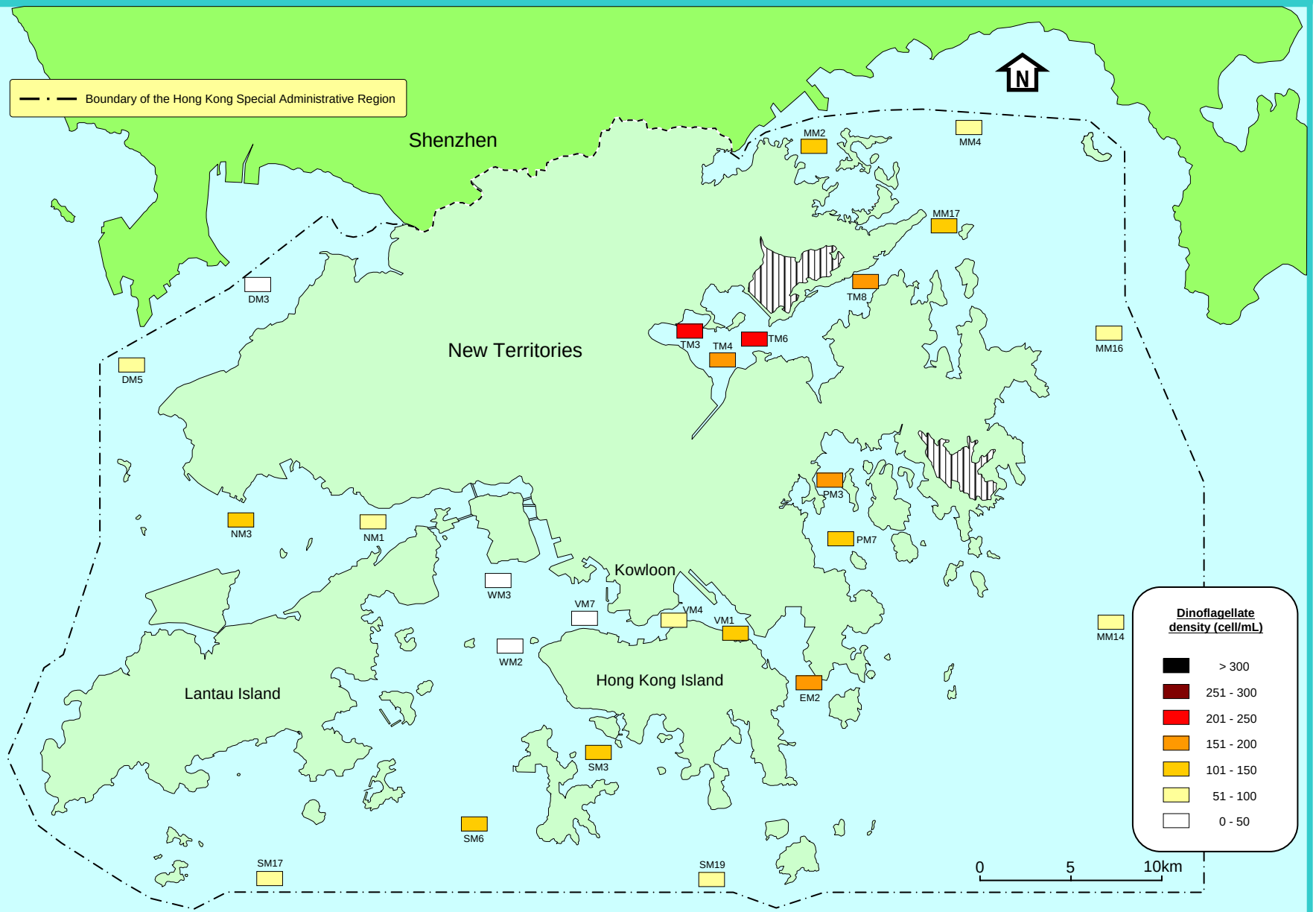
Annual mean densities (cell/mL) of total phytoplankton at 25 monitoring stations in Hong Kong waters in 2007



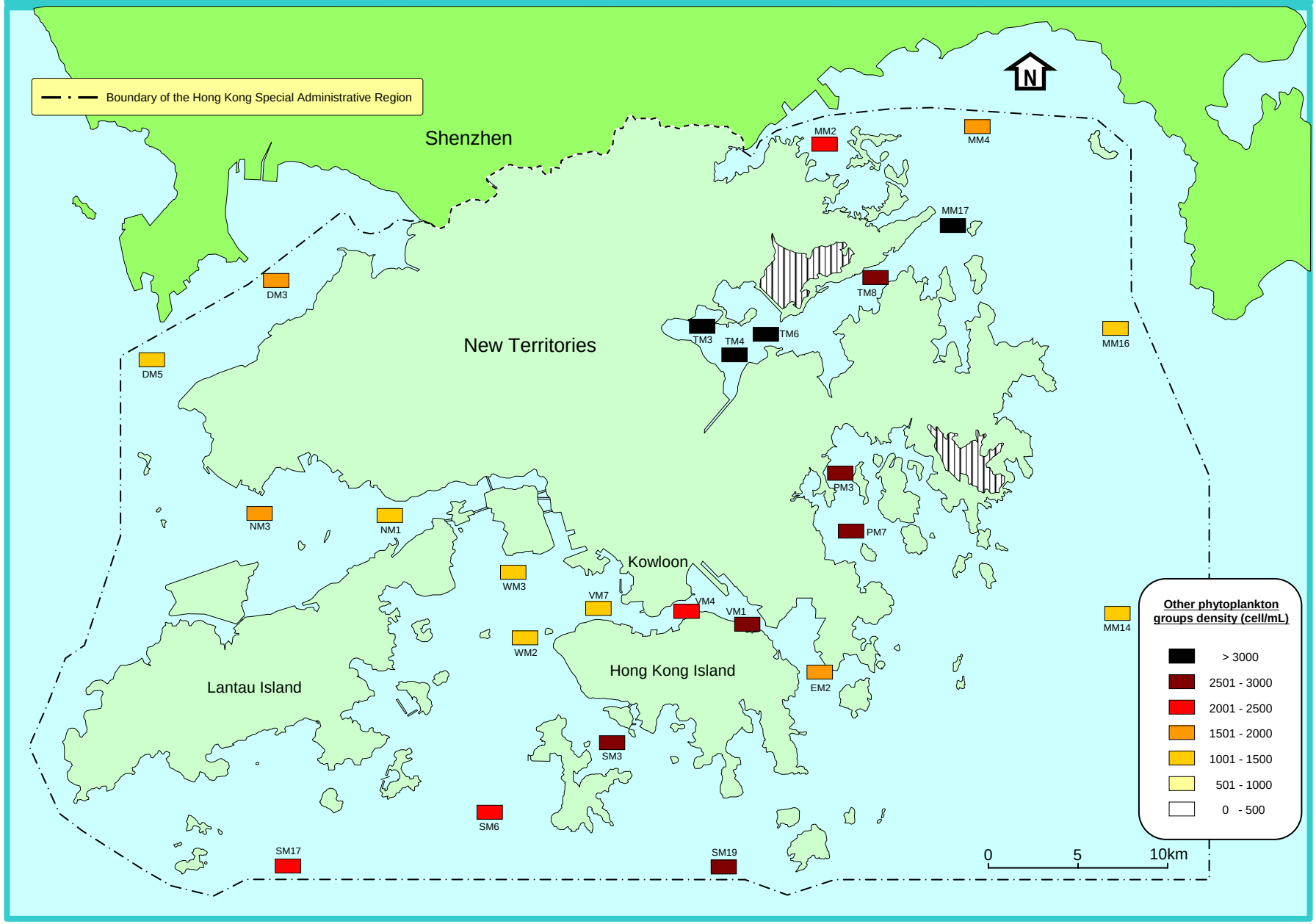
Annual mean densities (cell/mL) of diatoms at 25 monitoring stations in Hong Kong waters in 2007



Annual mean densities (cell/mL) of dinoflagellates at 25 monitoring stations in Hong Kong waters in 2007

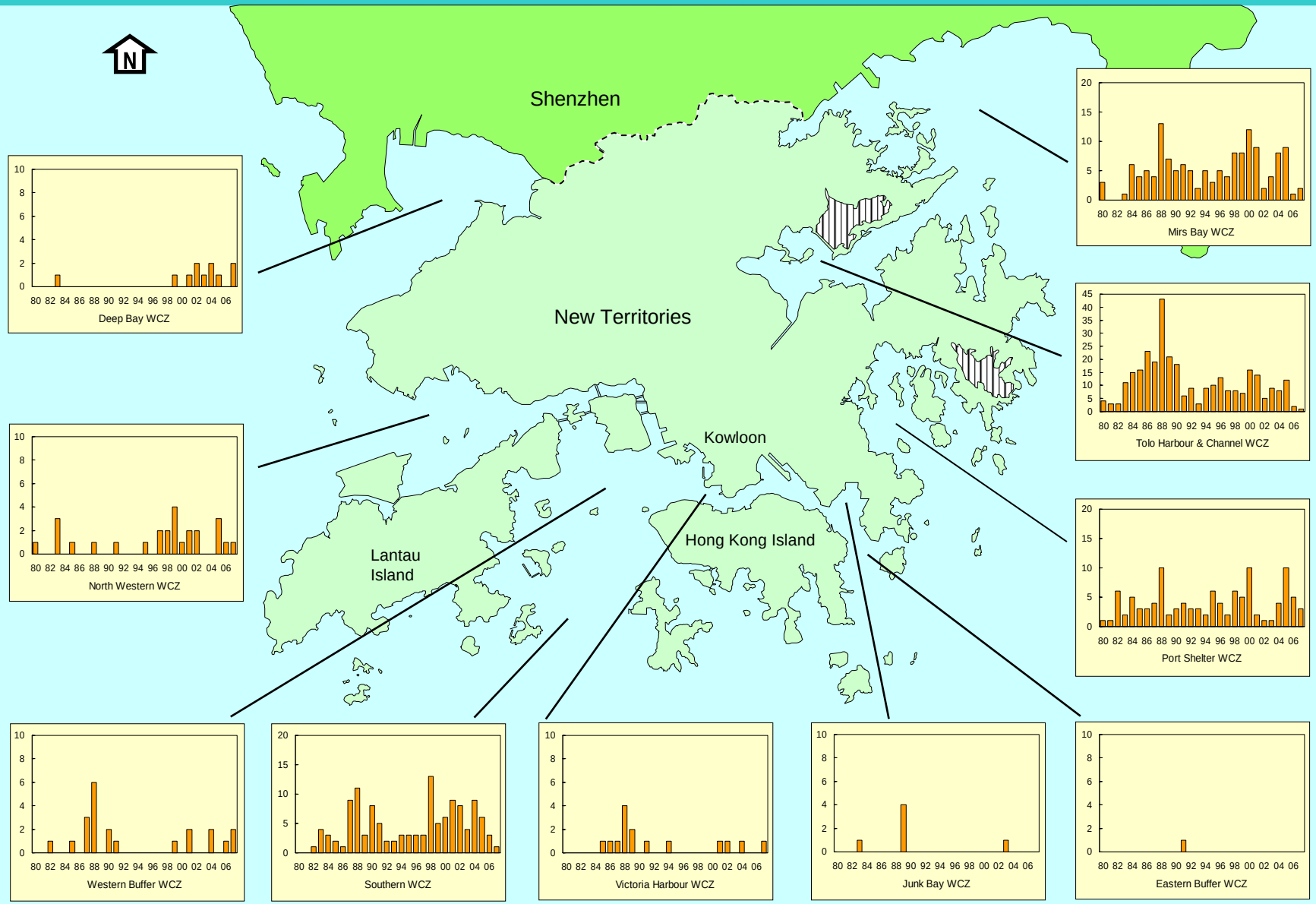


Annual mean densities (cell/mL) of other phytoplankton groups at 25 monitoring stations in Hong Kong waters in 2007



Frequency of red tides in 10 Water Control Zones in Hong Kong, 1980 - 2007

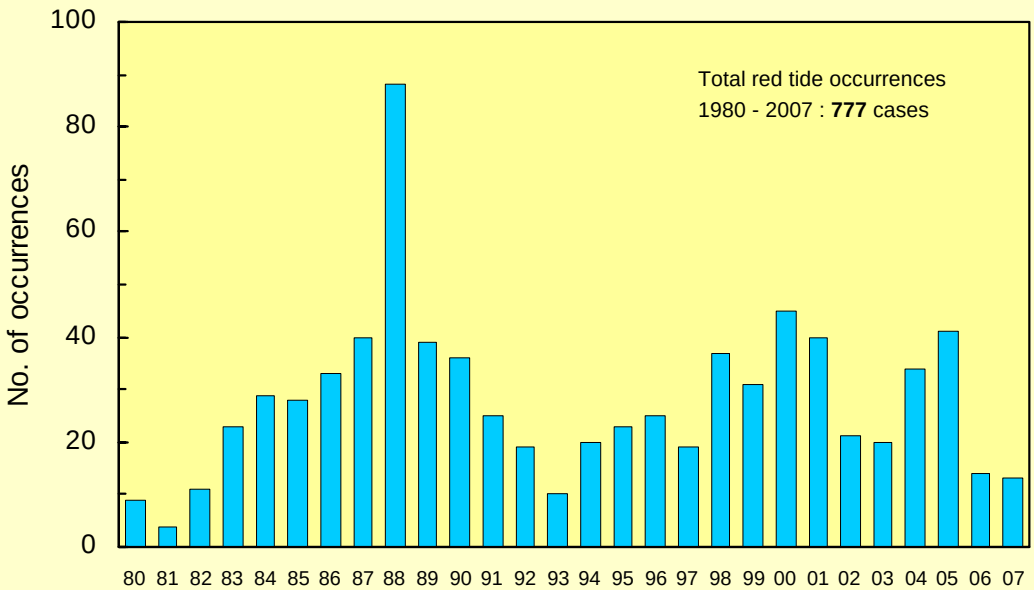
Source: Agriculture, Fisheries and Conservation Department and Environmental Protection Department



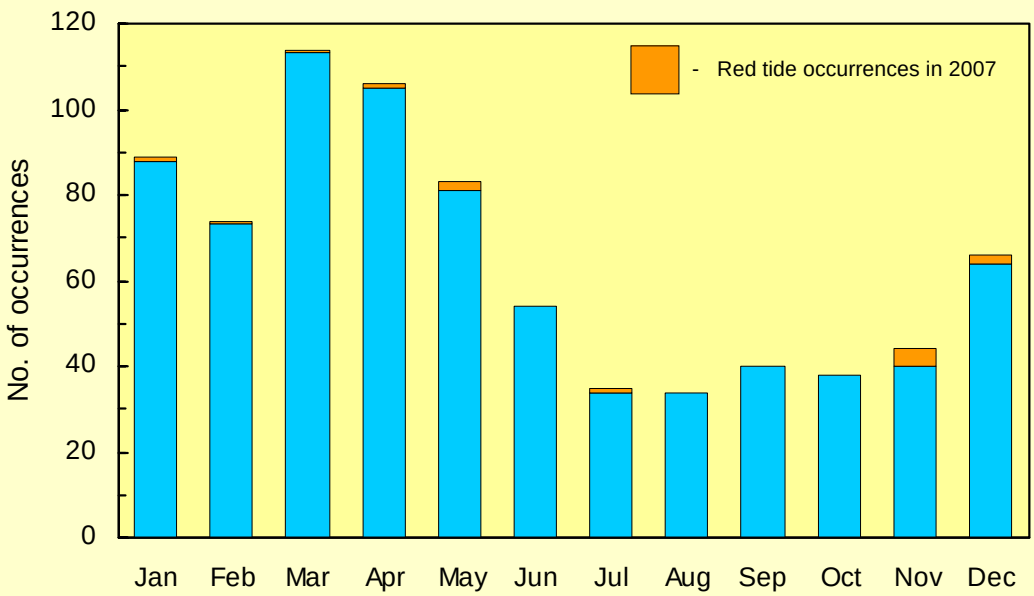
Occurrence of red tides in Hong Kong waters, 1980 – 2007

(Sources: Agriculture, Fisheries and Conservation Department and Environmental Protection Department)

Yearly Distribution

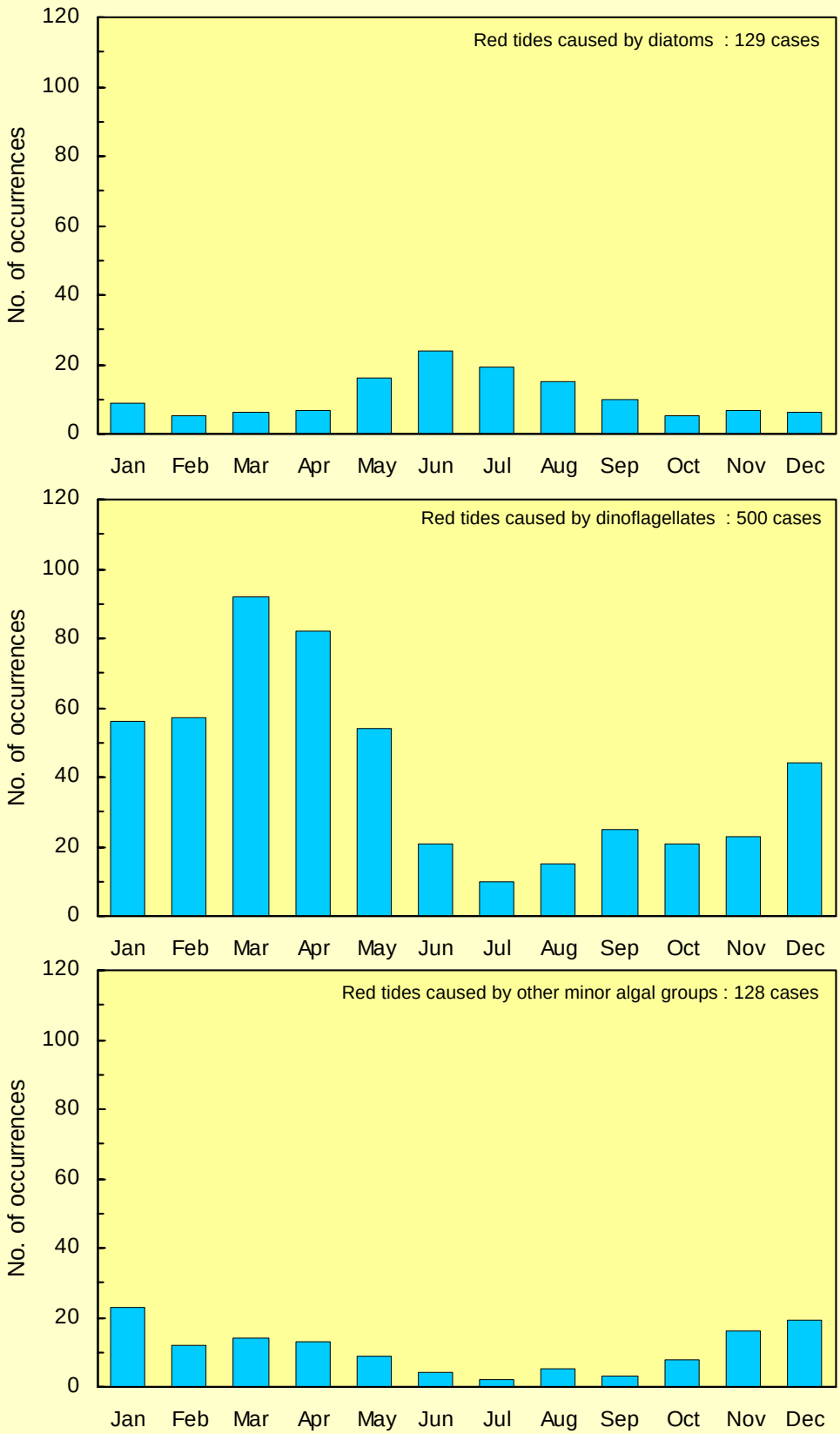


Monthly Distribution



Seasonal occurrence of red tides caused by different phytoplankton groups in Hong Kong, 1980 – 2007

(Sources: Agriculture, Fisheries and Conservation Department and Environmental Protection Department)



Abundance and frequency of the dominant phytoplankton species in different Water Control Zones (WCZs) in 2007.

Species	% Abundance[1]	Frequency[2]	Species	% Abundance[1]	Frequency[2]	Species	% Abundance[1]	Frequency[2]
Tolo Harbour & Channel			**Port Shelter**			**North Western**		
Diatoms			Diatoms			Diatoms		
Chaetoceros spp.	42.1	12	*Chaetoceros* spp.	27.5	12	*Skeletonema costatum*	43.9	12
Pseudo-nitzschia pungens	11.5	7	*Skeletonema costatum*	18.8	8	*Thalassiosira* spp.	32.5	12
Leptocylindrus danicus	10.4	11	*Thalassiosira* spp.	17.3	12	*Chaetoceros* spp.	14.8	8
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Gymnodinium spp.	39.7	12	*Gymnodinium vestifici*	27.3	12	*Scrippsiella* spp.	29.1	9
Gymnodinium vestifici	18.5	10	*Scrippsiella* spp.	20.9	10	*Gymnodinium vestifici*	18.3	12
Scrippsiella spp.	14.0	12	*Gymnodinium* spp.	19.7	11	*Gymnodinium* spp.	17.6	10
Others			Others			Others		
small flagellates	87.5	12	small flagellates	86.2	12	small flagellates	72.7	12
Plagioselmis prolonga	8.7	12	*Plagioselmis prolonga*	11.1	12	*Plagioselmis prolonga*	14.8	12
Teleaulax acuta	2.1	12	*Teleaulax acuta*	1.9	11	*Teleaulax acuta*	6.8	12
Mirs Bay			**Victoria Harbour**			**Western Buffer**		
Diatoms			Diatoms			Diatoms		
Chaetoceros spp.	23.7	12	*Skeletonema costatum*	58.9	12	*Skeletonema costatum*	45.5	11
Skeletonema costatum	18.7	10	*Chaetoceros* spp.	17.4	11	*Chaetoceros* spp.	24.0	9
Thalassiosira spp.	12.9	12	*Asterionellopsis glacialis*	7.9	2	*Thalassiosira* spp.	12.4	12
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Gymnodinium spp.	27.9	12	*Gymnodinium vestifici*	34.4	12	*Gymnodinium vestifici*	28.2	10
Gymnodinium vestifici	23.8	11	*Gymnodinium* spp.	20.9	12	*Gymnodinium* spp.	18.6	10
Scrippsiella spp.	21.1	12	*Gyrodinium fusiforme*	14.0	9	*Scrippsiella* spp.	14.9	9
Others			Others			Others		
small flagellates	84.6	12	small flagellates	83.9	12	small flagellates	83.3	12
Plagioselmis prolonga	12.9	12	*Plagioselmis prolonga*	13.0	12	*Plagioselmis prolonga*	13.0	12
Teleaulax acuta	2.1	12	*Teleaulax acuta*	2.9	12	*Teleaulax acuta*	3.4	11
Eastern Buffer			**Southern**			**Deep Bay**		
Diatoms			Diatoms			Diatoms		
Skeletonema costatum	25.9	10	*Skeletonema costatum*	43.4	12	*Skeletonema costatum*	89.4	11
Chaetoceros spp.	19.6	10	*Chaetoceros* spp.	13.4	11	*Thalassiosira* spp.	6.0	12
Thalassiosira spp.	14.3	12	*Pseudo-nitzschia pungens*	11.9	6	*Chaetoceros* spp.	3.1	11
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Scrippsiella spp.	29.5	9	*Gymnodinium vestifici*	26.1	12	*Gymnodinium* spp.	39.0	12
Gymnodinium spp.	23.5	10	*Gymnodinium* spp.	22.6	12	*Scrippsiella* spp.	34.5	9
Gymnodinium vestifici	21.0	10	*Scrippsiella* spp.	19.3	12	*Gymnodinium vestifici*	10.8	6
Others			Others			Others		
small flagellates	81.1	12	small flagellates	90.0	12	small flagellates	79.6	12
Plagioselmis prolonga	14.6	12	*Plagioselmis prolonga*	8.3	12	*Plagioselmis prolonga*	11.3	12
Teleaulax acuta	3.9	10	*Teleaulax acuta*	1.5	12	*Teleaulax acuta*	8.4	12

[1] % of species/group in diatoms, dinoflagellates and other phytoplankton

[2] Number of occurrences out of 12 sampling occasions.

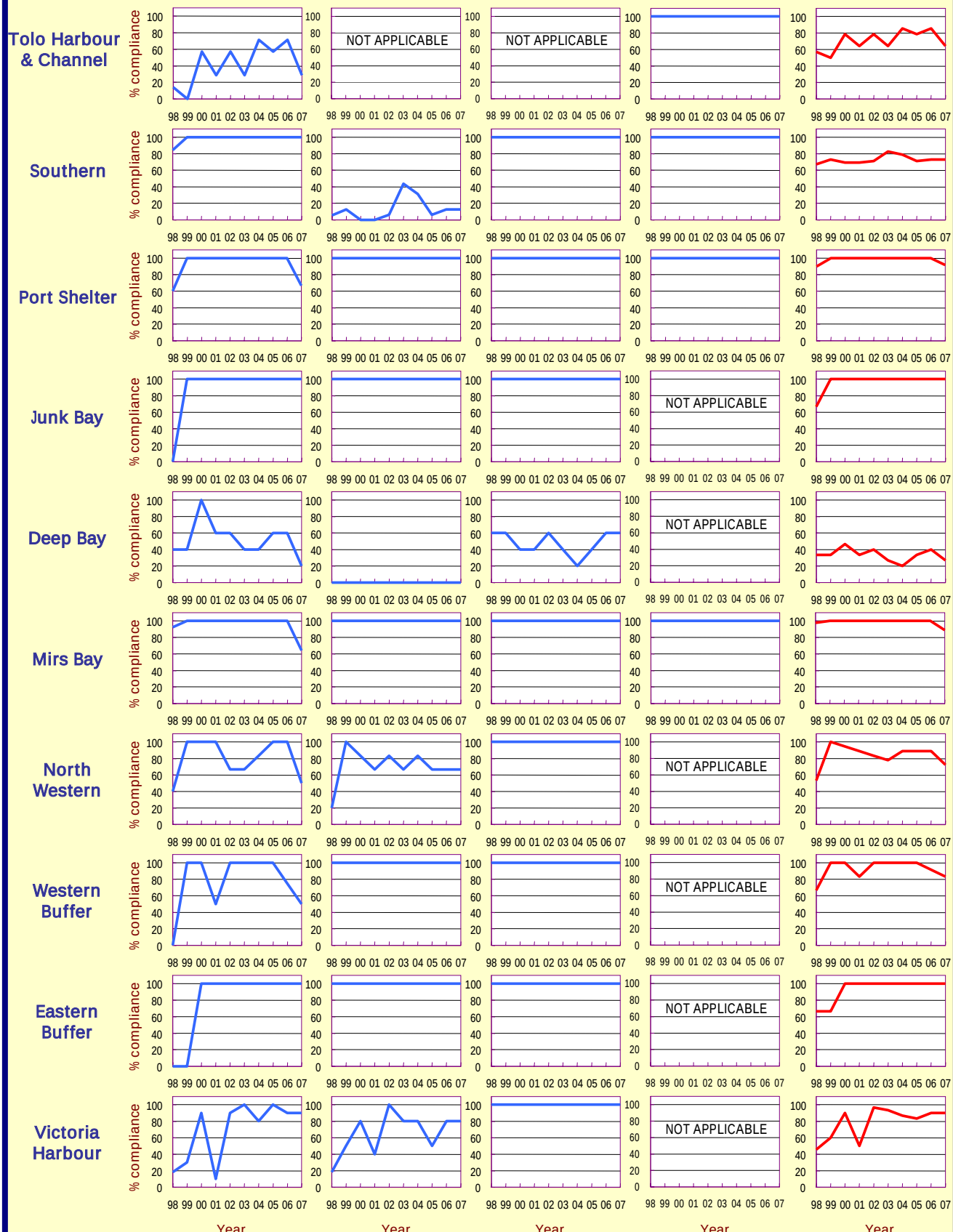
Occurrence and distribution of red tide species in different Water Control Zones (WCZs), 1980 -2007

Species	Number of occurrences										
	Tolo Harbour & Channel WCZ	Mirs Bay WCZ	Eastern Buffer WCZ	Port Shelter WCZ	Junk Bay WCZ	Victoria Harbour WCZ	Southern Waters WCZ	North Western WCZ	Western Buffer WCZ	Deep Bay WCZ	Total
Noctiluca scintillans	58	66		52			53	5	7		241
Skeletonema costatum	23	3		1	3	9	10	3	9	1	62
Mesodinium rubrum	8	8		8	1		16	6		2	49
Gonyaulax polygramma	21	8		12			6	1			48
Prorocentrum minimum	44	1									45
Ceratium furca	15	7		13							35
Prorocentrum triestinum	33										33
Scrippsiella trochoidea	15	4		2			1				22
Heterosigma akashiwo	14	2						3		1	20
Heterocapsa circularisquama	13	3									16
Prorocentrum sigmoides	14	1		1							16
Prorocentrum dentatum	8	3		1			1				13
Trichodesmium erythraeum		6		4			3				13
Thalassiosira nordenskioeldii	2	3				1	4		2		12
Prorocentrum micans	4	4		1		1	1				11
Karenia mikimotoi	6	1		3							10
Leptocylindrus minimus	10										10
Cryptomonas spp.	8										8
Dactyliosolen fragilissimus	6	1		1							8
Thalassiosira mala	6						2				8
Akashiwo sanguinea	2	2						2		1	7
Chaetoceros spp.	6			1							7
Karenia digitata	1	3		2			1				7
Thalassiosira proschkinae	6	1									7
Plagioselmis prolonga	6										6
Cochlodinium spp.	2							2	1	1	6
Gyrodinium instriatum						1	1	2	1	1	6
Phaeocystis globosa		1					4			1	6
Thalassiosira spp.	2				1		2				5
Dictyocha speculum		2		2			1				5
Eutreptiella spp.	4										4
Haematococcus pluvialis	4										4
Leptocylindrus danicus	3	1									4
Pseudo-nitzschia pseudodelicatissima	1						2		1		4
Chaetoceros curvisetus			1		1		1				3
Chattonella ovata		2		1							3
Chattonella marina	2	1									3
Gymnodinium simplex	3										3
Karenia longicanalis	1	1					1				3
Pseudo-nitzschia seriata	1					2					3
Prorocentrum balticum	1	1		1							3
Teleaulax acuta	3										3
Trichodesmium spp.		1		1			1				3
Alexandrium tamarense				2							2
Cerataulina pelagica	2										2
Chaetoceros socialis							2				2
Chattonella spp.	1						1				2
Cochlodinium polykrikoides							2				2
Eucampia zodiacus							1	1			2
Gymnodinium spp. X				2							2
Heterocapsa rotundata	2										2
Nitzschia longissima	1						1				2
Prorocentrum spp.	1	1									2
Thalassiosira weissflogii										2	2
Alexandrium catenella					1						1
Chaetoceros pseudocrinitus	1										1
Chaetoceros pseudocurvisetus							1				1
Chaetoceros spp.0105	1										1
Chaetoceros tenuissimus		1									1
Chlamydomonas spp.	1										1
Chlamydomonas uva-maris	1										1
Cyclotella caspia	1										1
Cyclotella spp.	1										1
Cyttarocylis spp.				1							1
Cylindrotheca closterium	1										1
Guinardia delicatula	1										1
Guinardia striata	1										1
Gymnodinium spp.		1									1
Gyrodinium spirale							1				1
Hermesinum adriaticum		1									1
Karlodinium micrum		1									1
Katodinium rotundatum								1			1
Leptocylindrus spp.							1				1
Navicula spp.										1	1
Odontella mobiliensis	1										1
Odontella sinensis	1										1
Pedinomonadaceae spp.	1										1
Protoperidinium quinquecorne	1										1
Pseudo-nitzschia spp.							1				1
Thalassomonas spp.	1										1
Trichodesmium thiebautii							1				1
Total : 81 species	377	142	1	112	7	14	123	26	21	11	834

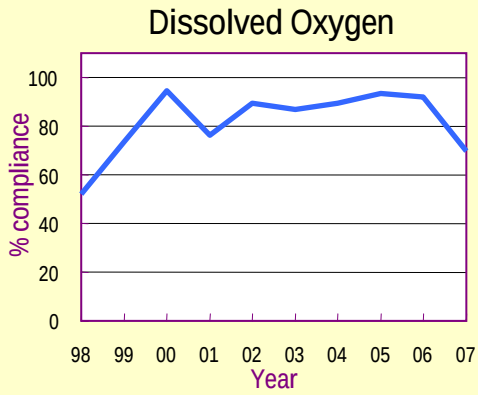
Note: a red tide incident may involve more than one causative species.

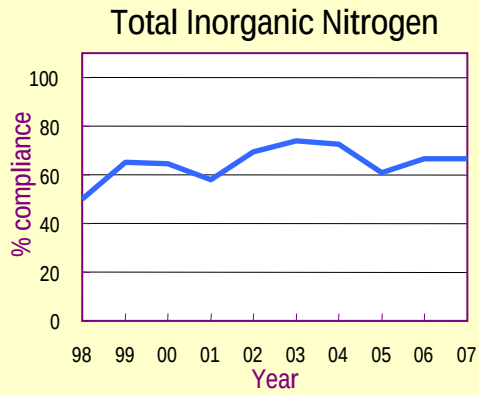
Source: Agriculture, Fisheries and Conservation Department and Environmental Protection Department

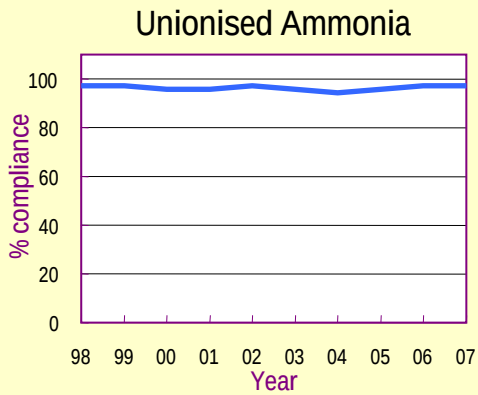
Level of compliance with key marine Water Quality Objectives for 10 Water Control Zones in Hong Kong, 1998 - 2007

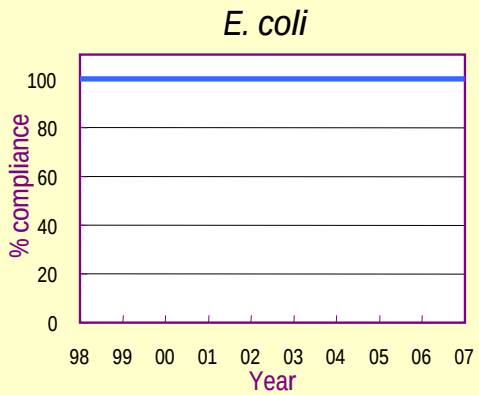


Level of compliance with key marine Water Quality Objectives in Hong Kong, 1998 - 2007

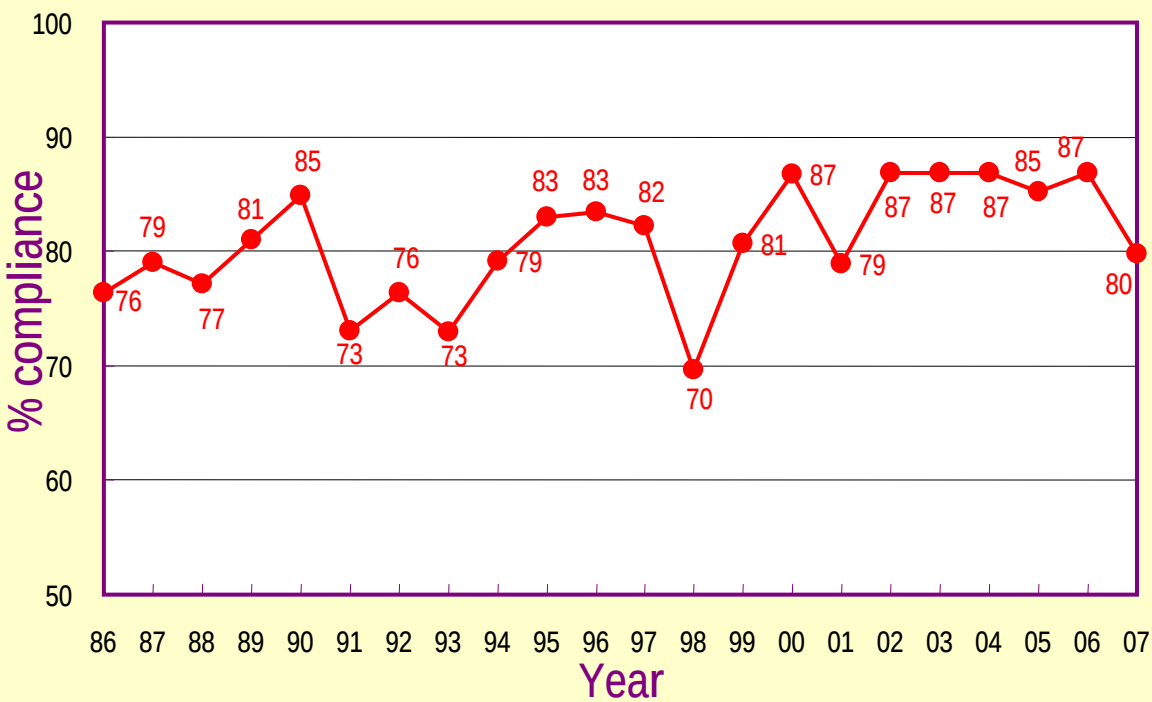




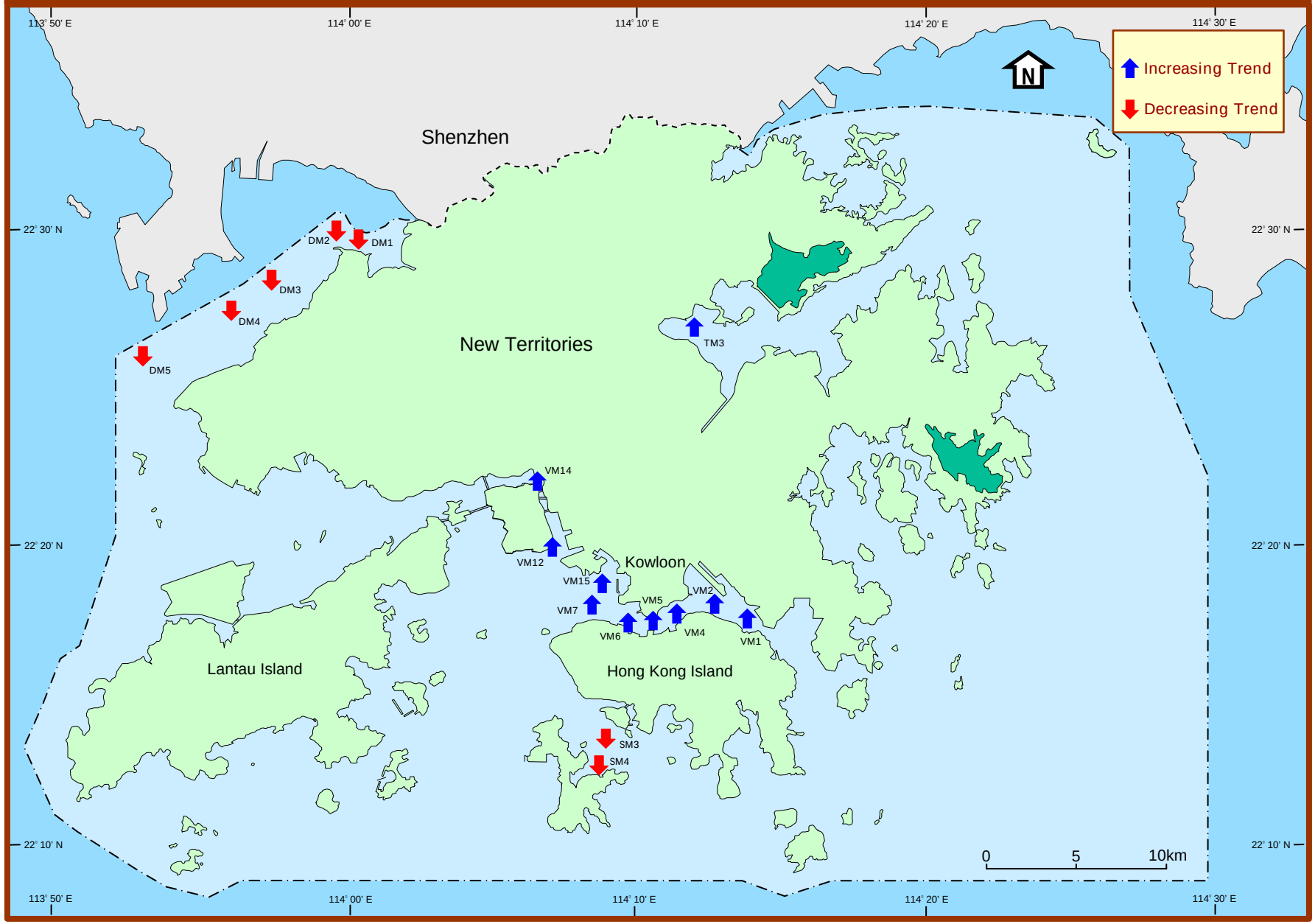


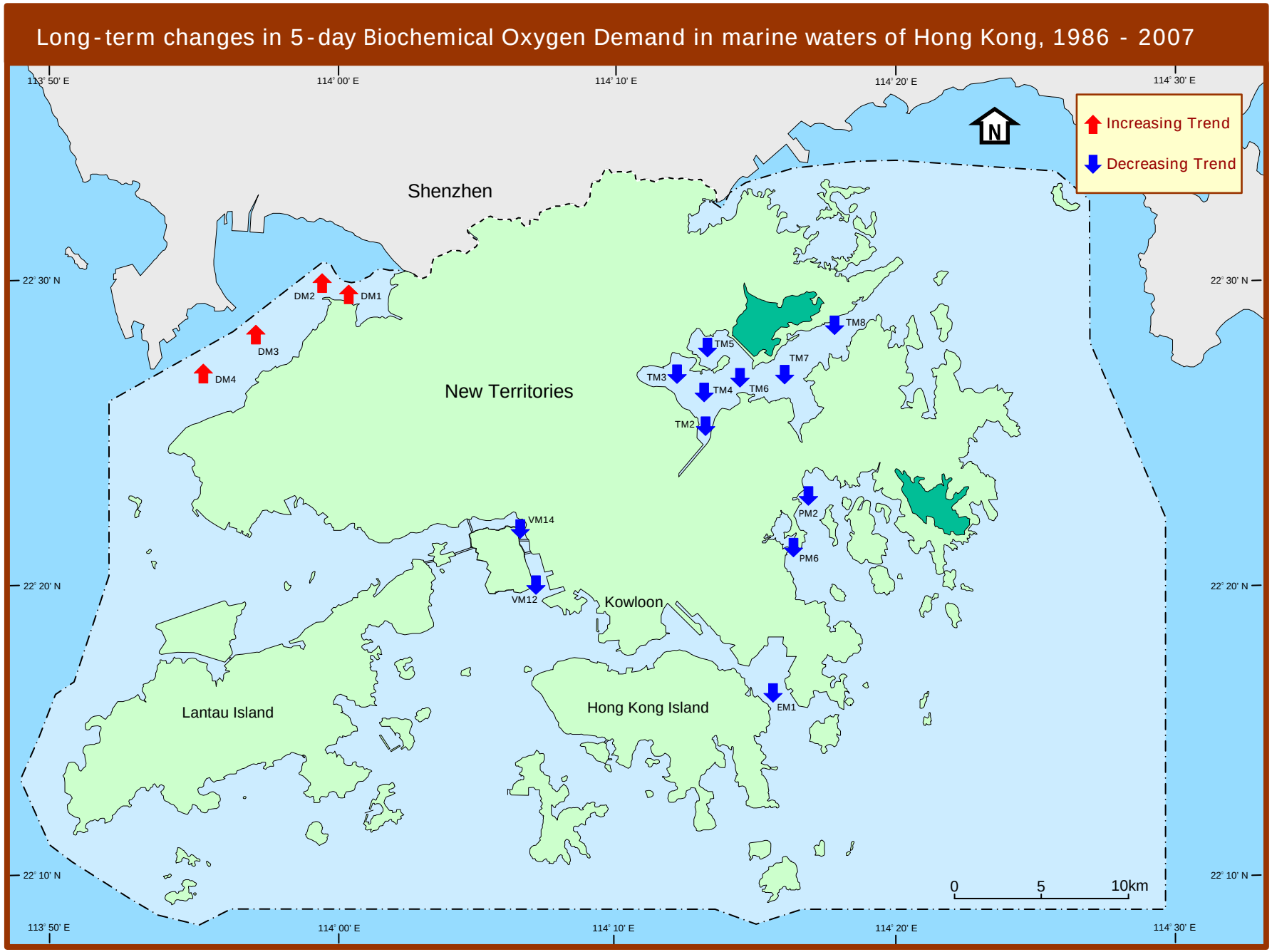


Overall level of compliance with key marine Water Quality Objectives in Hong Kong, 1986 - 2007

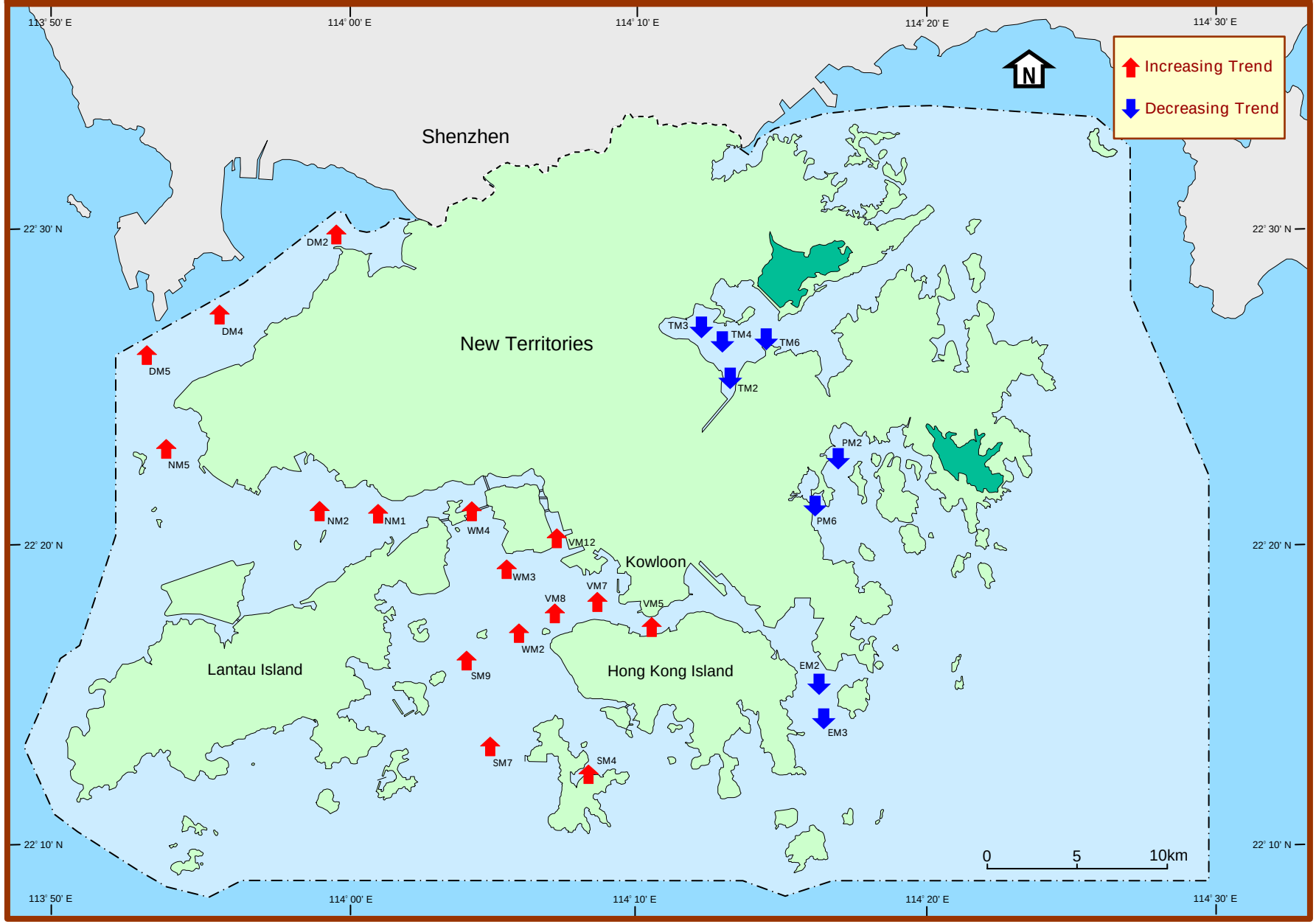


Long-term changes in dissolved oxygen in marine waters of Hong Kong, 1986 - 2007

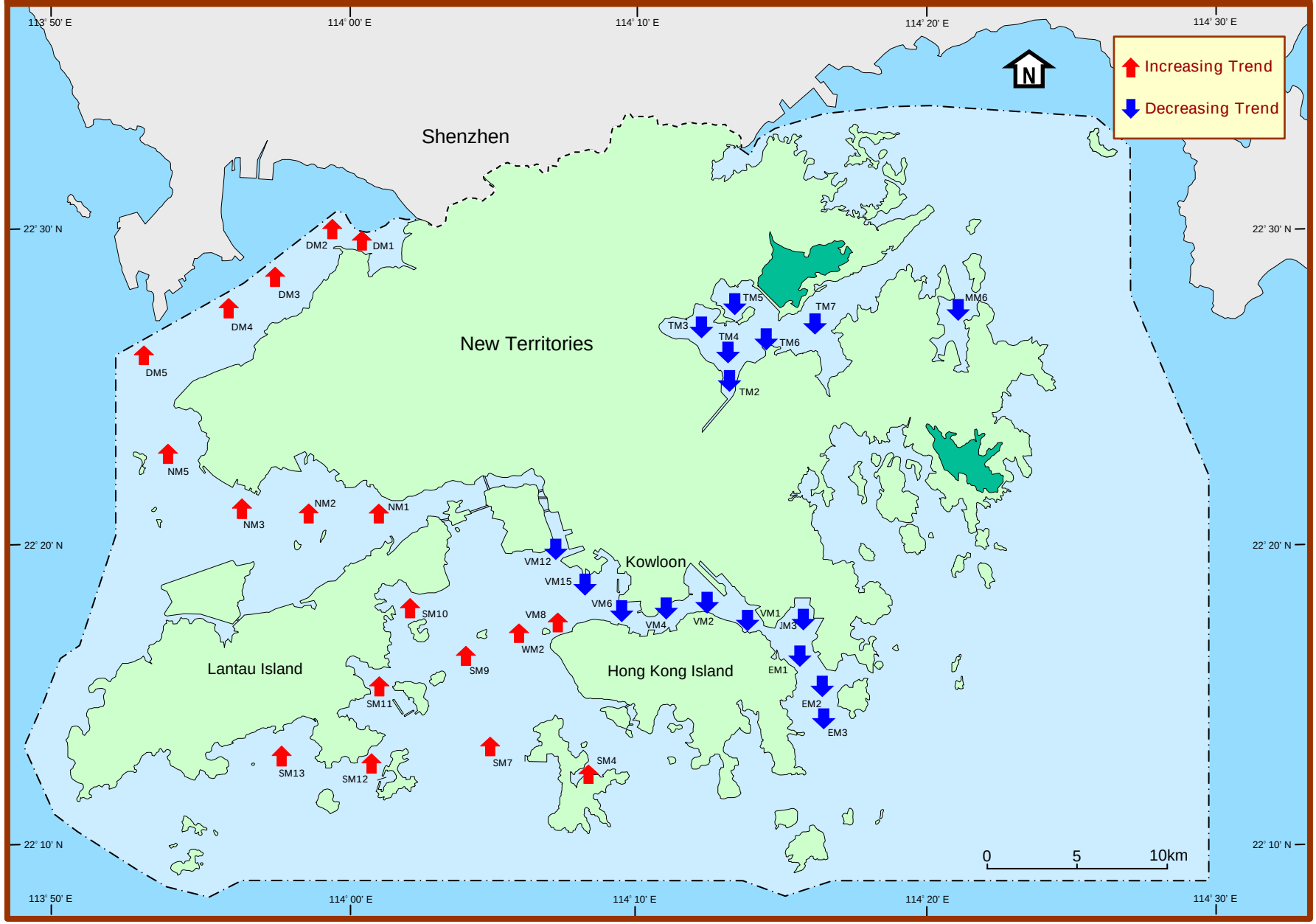


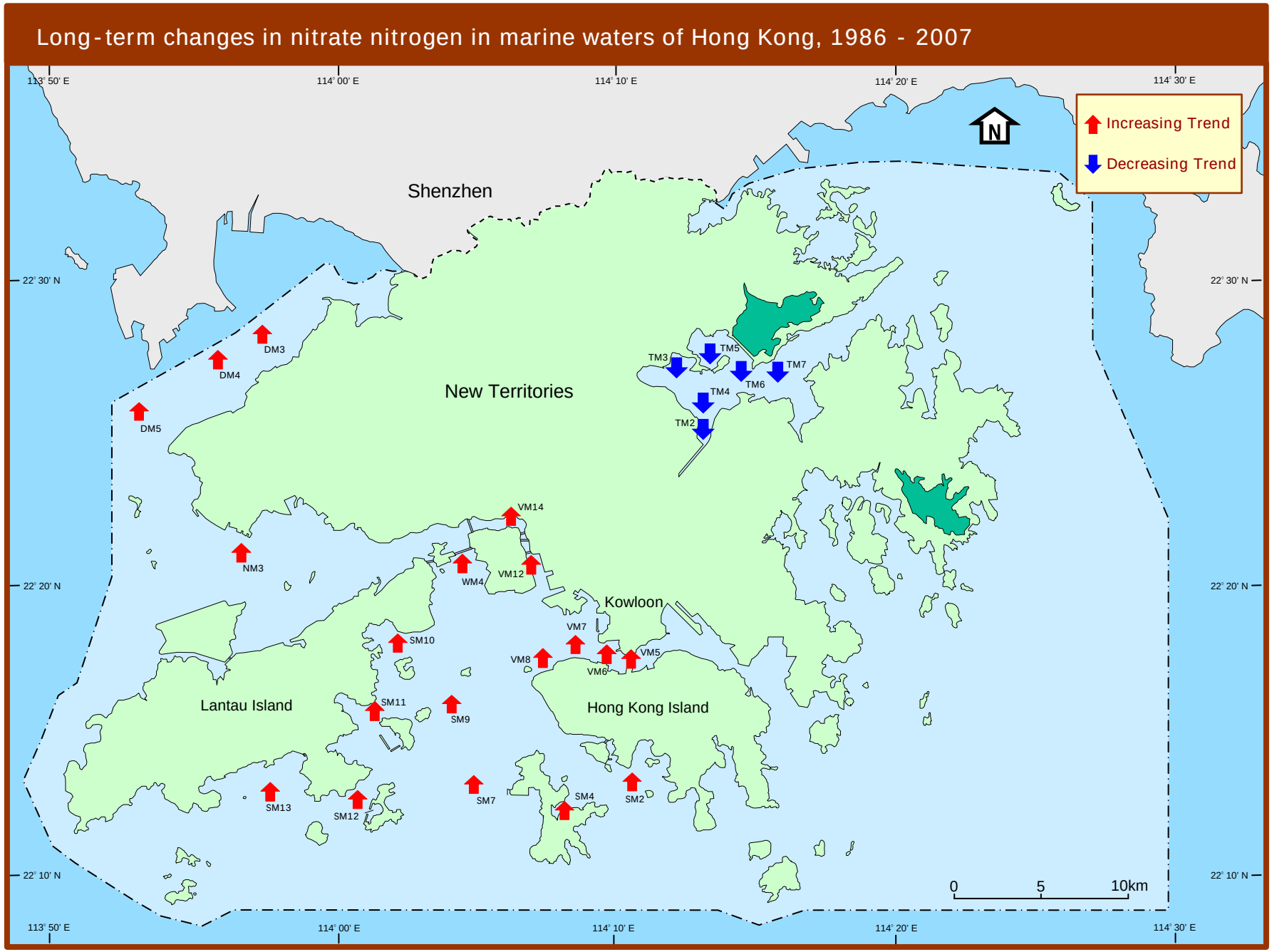

Long-term changes in 5-day Biochemical Oxygen Demand in marine waters of Hong Kong, 1986 - 2007
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
N
Increasing Trend
Decreasing Trend
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
DM1
DM2
DM3
DM4
TM2
TM3
TM4
TM5
TM6
TM7
TM8
VM12
VM14
PM2
PM6
EM1
0
5
10km

Long-term changes in *E. coli* in marine waters of Hong Kong, 1986 - 2007

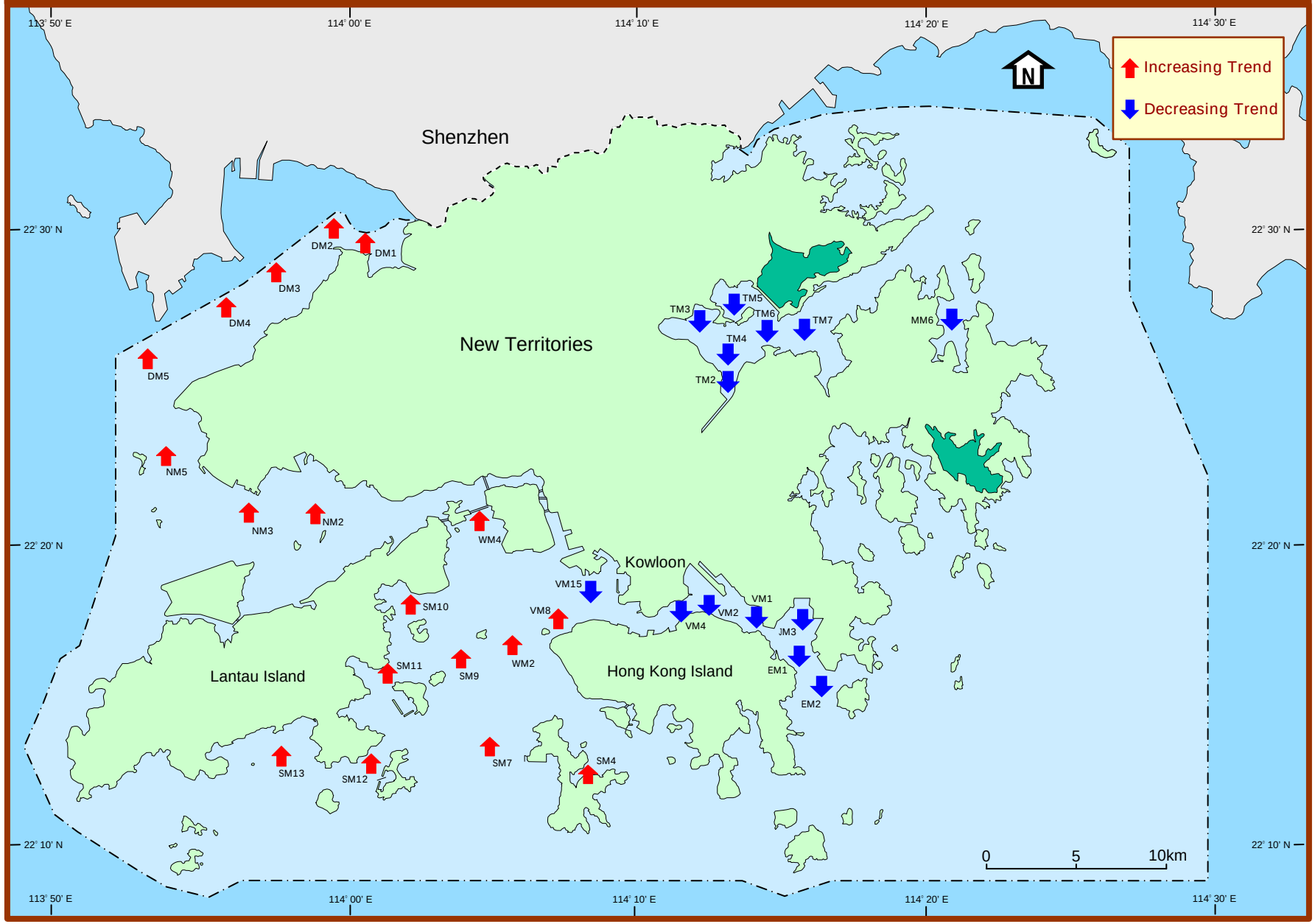


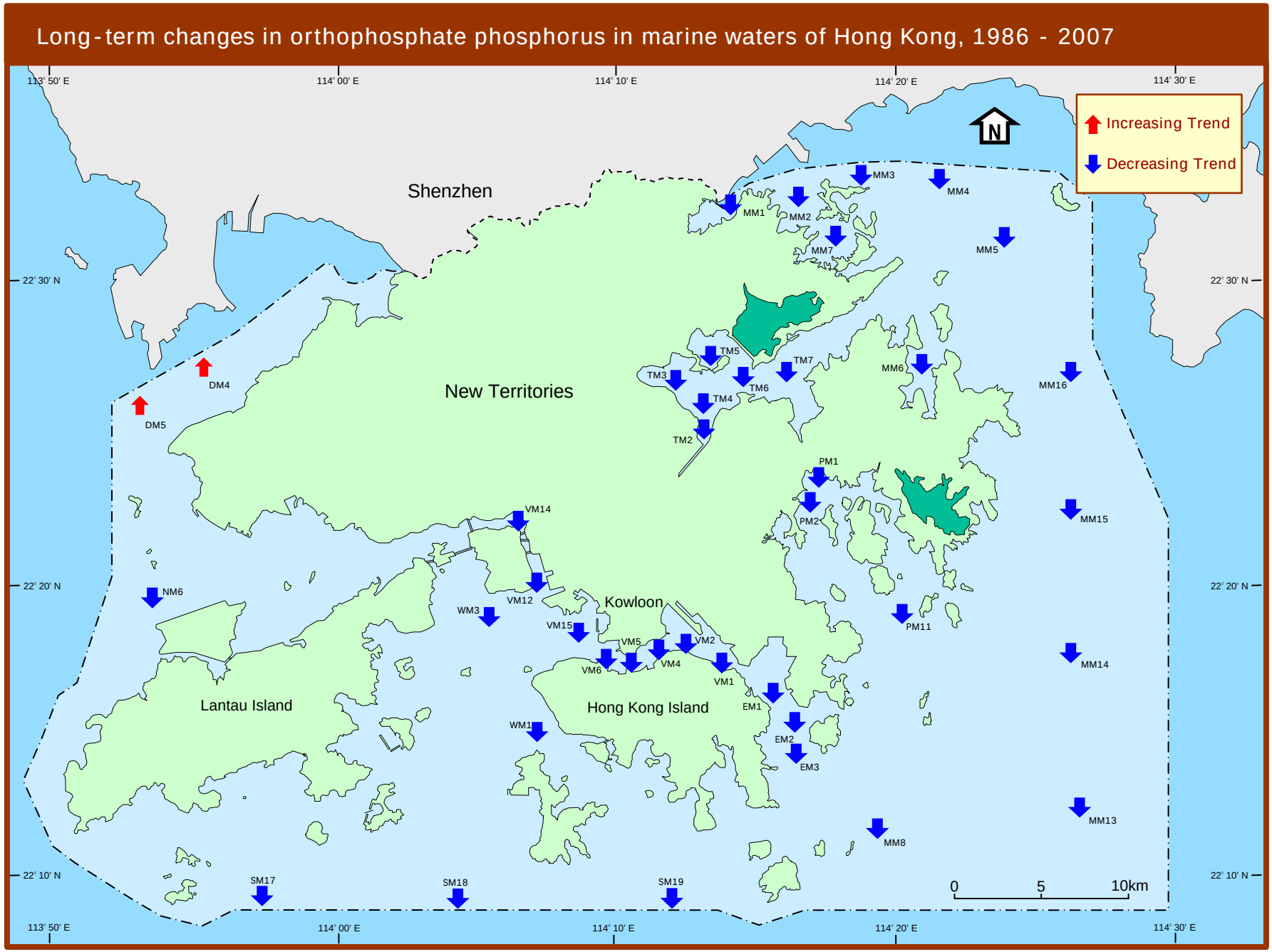
Long-term changes in ammonia nitrogen in marine waters of Hong Kong, 1986 - 2007

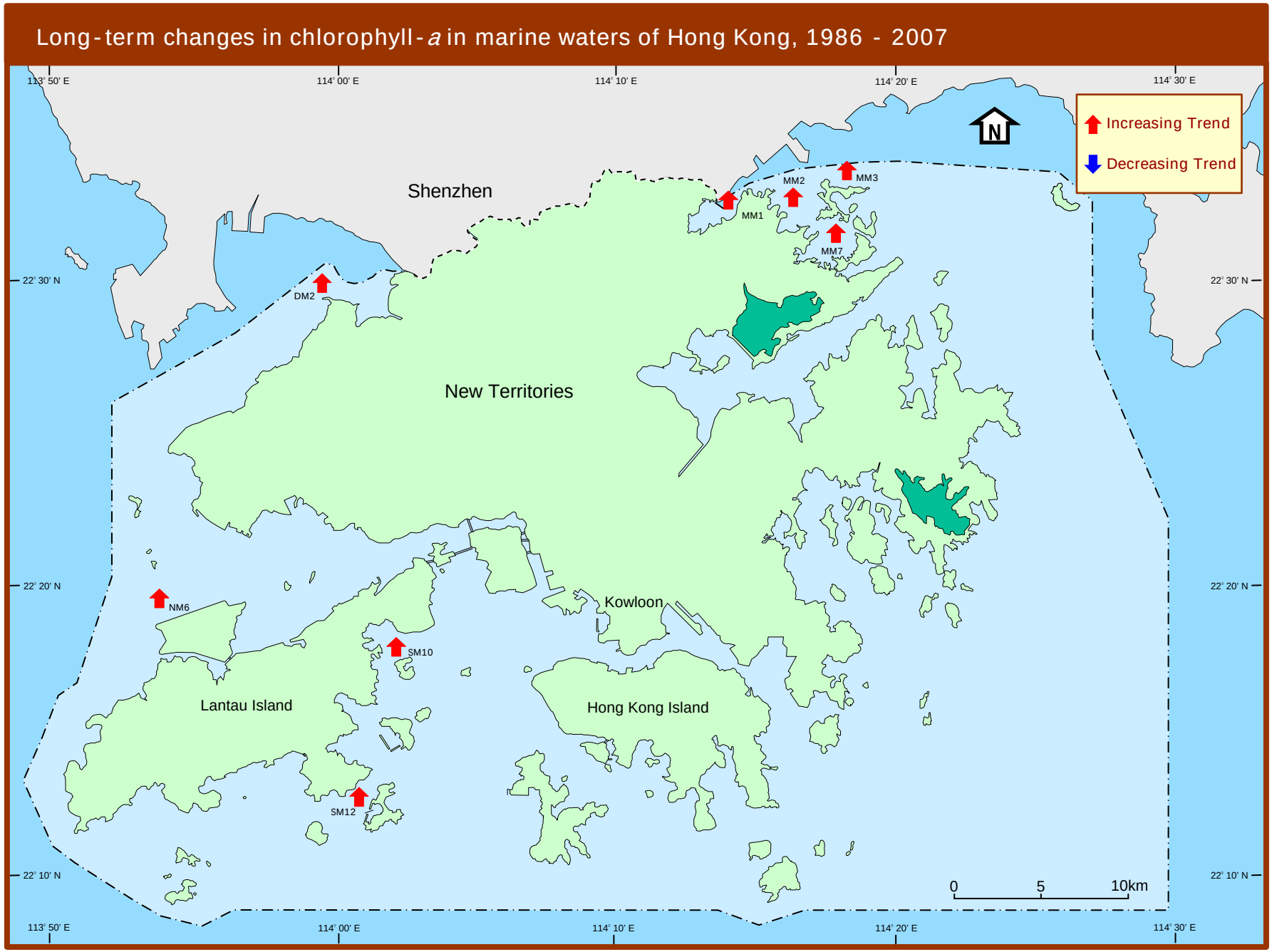



Long-term changes in nitrate nitrogen in marine waters of Hong Kong, 1986 - 2007
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
N
Increasing Trend
Decreasing Trend
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
DM3
DM4
DM5
NM3
VM14
WM4
VM12
VM7
VM8
VM6
VM5
SM10
SM11
SM9
SM13
SM12
SM7
SM4
SM2
TM3
TM5
TM7
TM6
TM4
TM2
0
5
10km

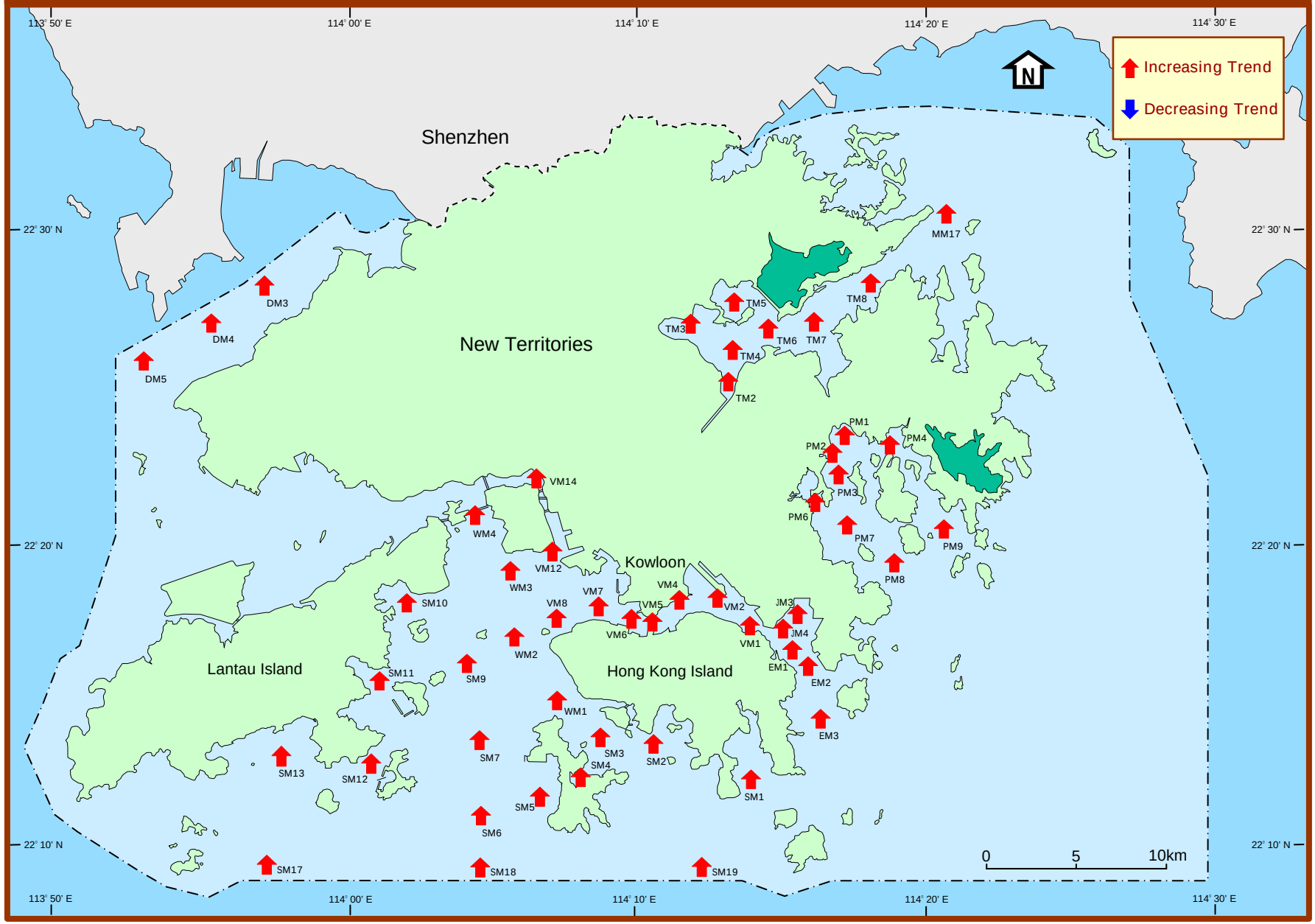
Long-term changes in total inorganic nitrogen in marine waters of Hong Kong, 1986 - 2007

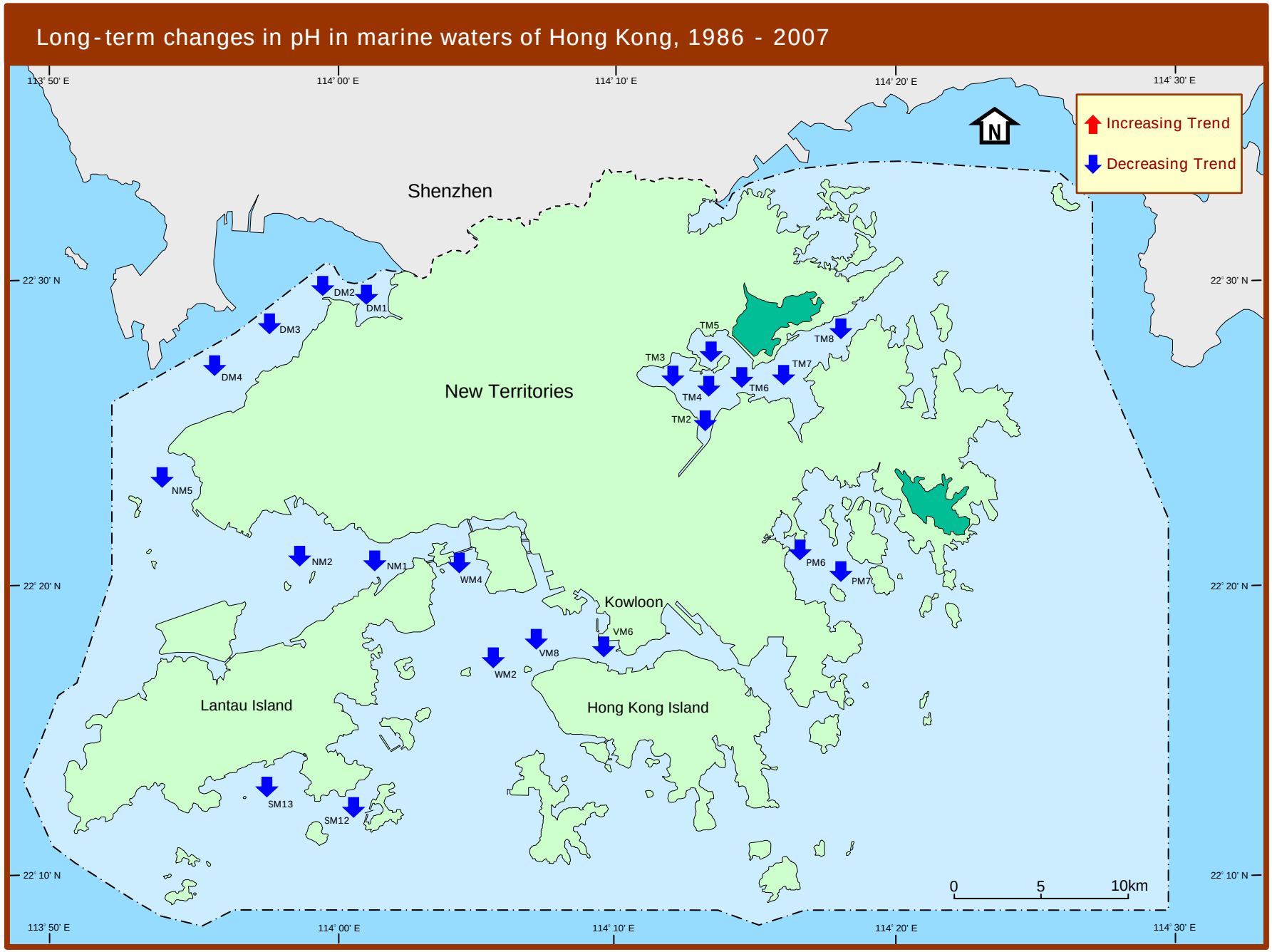



Long-term changes in orthophosphate phosphorus in marine waters of Hong Kong, 1986 - 2007
Increasing Trend
Decreasing Trend
N
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
MM1
MM2
MM3
MM4
MM5
MM6
MM7
MM8
MM13
MM14
MM15
MM16
TM2
TM3
TM4
TM5
TM6
TM7
PM1
PM2
PM11
DM4
DM5
NM6
VM1
VM2
VM4
VM5
VM6
VM12
VM14
VM15
WM1
WM3
EM1
EM2
EM3
SM17
SM18
SM19
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
0
5
10km


Long-term changes in chlorophyll-*a* in marine waters of Hong Kong, 1986 - 2007
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
N
Increasing Trend
Decreasing Trend
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
MM1
MM2
MM3
MM7
DM2
NM6
SM10
SM12
0
5
10km

Long-term changes in temperature in marine waters of Hong Kong, 1986 - 2007




Long-term changes in pH in marine waters of Hong Kong, 1986 - 2007
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
N
Increasing Trend
Decreasing Trend
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
DM1
DM2
DM3
DM4
TM2
TM3
TM4
TM5
TM6
TM7
TM8
NM1
NM2
NM5
WM2
WM4
VM6
VM8
PM6
PM7
SM12
SM13
0
5
10km