Marine Water Quality in Hong Kong in 2008

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.

Acknowledgements

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Introduction

The Hong Kong Special Administrative Region (HKSAR) has a land area of 1,104km^2 and 1,651km^2 area of marine waters. It has long coastlines, including 461km in Kowloon Peninsula and New Territories and 728km in Hong Kong Island, Lantau Island and other small islands. There are more than 260 islands in the territory, each with an area greater than 500m^2. Its coastal waters 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.

Every month, the EPD conducts marine water quality monitoring at 76 sampling stations. The sediment quality monitoring is conducted at 45 stations twice a year. In addition, we monitor water and sediment quality of 17 typhoon shelters, marinas and dockyard(s) across Hong Kong. We also carry out monthly sampling of phytoplankton at 25 monitoring stations.

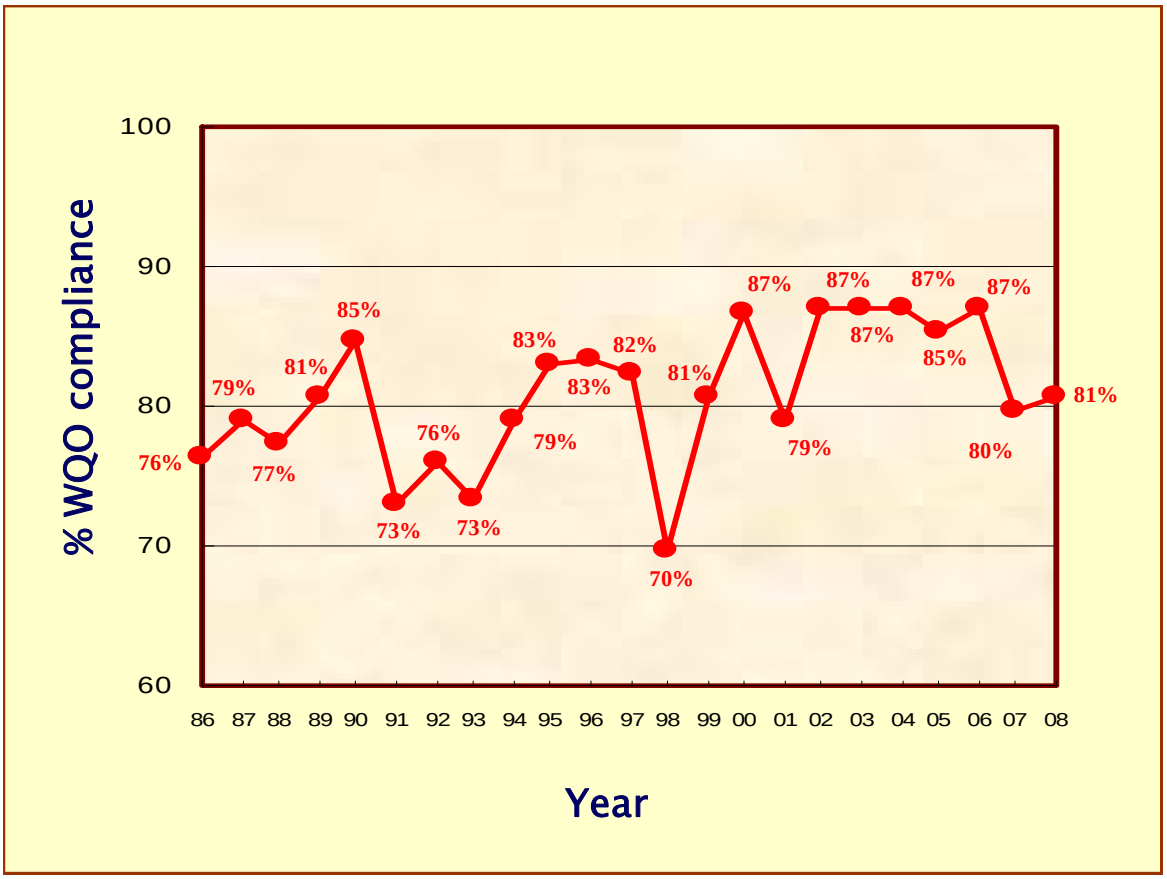
The EPD has a dedicated marine monitoring vessel "*Dr. Catherine Lam*". It is equipped with an advanced conductivity-temperature-depth (CTD) profiler linked to a computer-controlled rosette water sampler which takes field measurements and collects water samples at the same time. Marine sediments are 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 2008

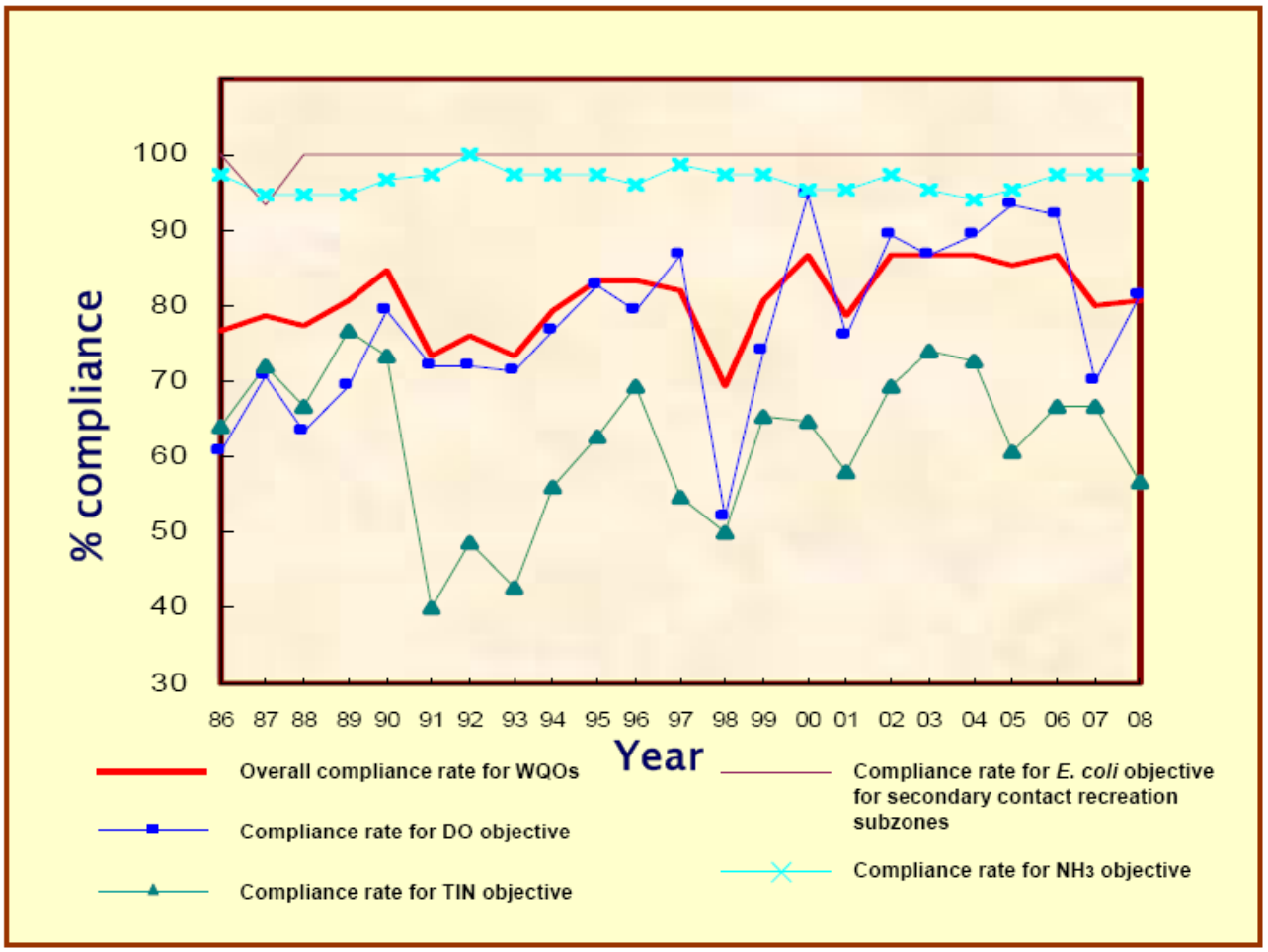
The overall WQO compliance rate of the whole territory is based on the combined individual compliance rates of all stations in the territory for the four important marine WQOs, namely Dissolved Oxygen (DO), Total Inorganic Nitrogen (TIN), Unionised Ammonia (NH_3) and *E. coli* bacteria.

The overall WQOs compliance for 2008 is 81%, slightly higher than that in 2007 (80%).



Overall compliance with the marine Water Quality Objectives
in Hong Kong, 1986-2008

The figure below shows that the compliance with the DO objective increased from 72% in 2007 to 82% in 2008. The compliance with the NH_3 and *E. coli* bacteria objectives remained the same in 2007 and 2008, and the compliance with the TIN objective decreased from 67% to 57%.



The overall compliance rate with the WQOs and the compliance rates for the four objectives in Hong Kong, 1986-2008

The decrease of compliance with the TIN objective in 2008 was mainly due to the fact that higher levels of TIN, compared with 2006 and 2007, were observed at the surface and mid-depth water in western and southern sides of Hong Kong (i.e. North Western WCZ and most of the Southern WCZ) in June and July of 2008. The increase in TIN was likely related to the increase in surface runoff due to the unusually heavy rainfalls observed during June and July 2008, which also led to lower surface and mid-depth salinity levels compared with the previous 2 years. According to the report of the Hong Kong Observatory, the monthly rainfall total of 1346.1 mm in June 2008 was a record high since 1884.

The heavy rainfall during 2008 has led to a regional increase of TIN levels in the Southern, North Western WCZs as well as the Victoria Harbour WCZ. The overall compliance rates in both Southern and North Western WCZs dropped from 72-73% in 2007 to 61-65% in 2008. Nevertheless, the Western Buffer WCZ achieved a 92% compliance rate which was the same as in 2006 but higher than that in 2007 (83%).

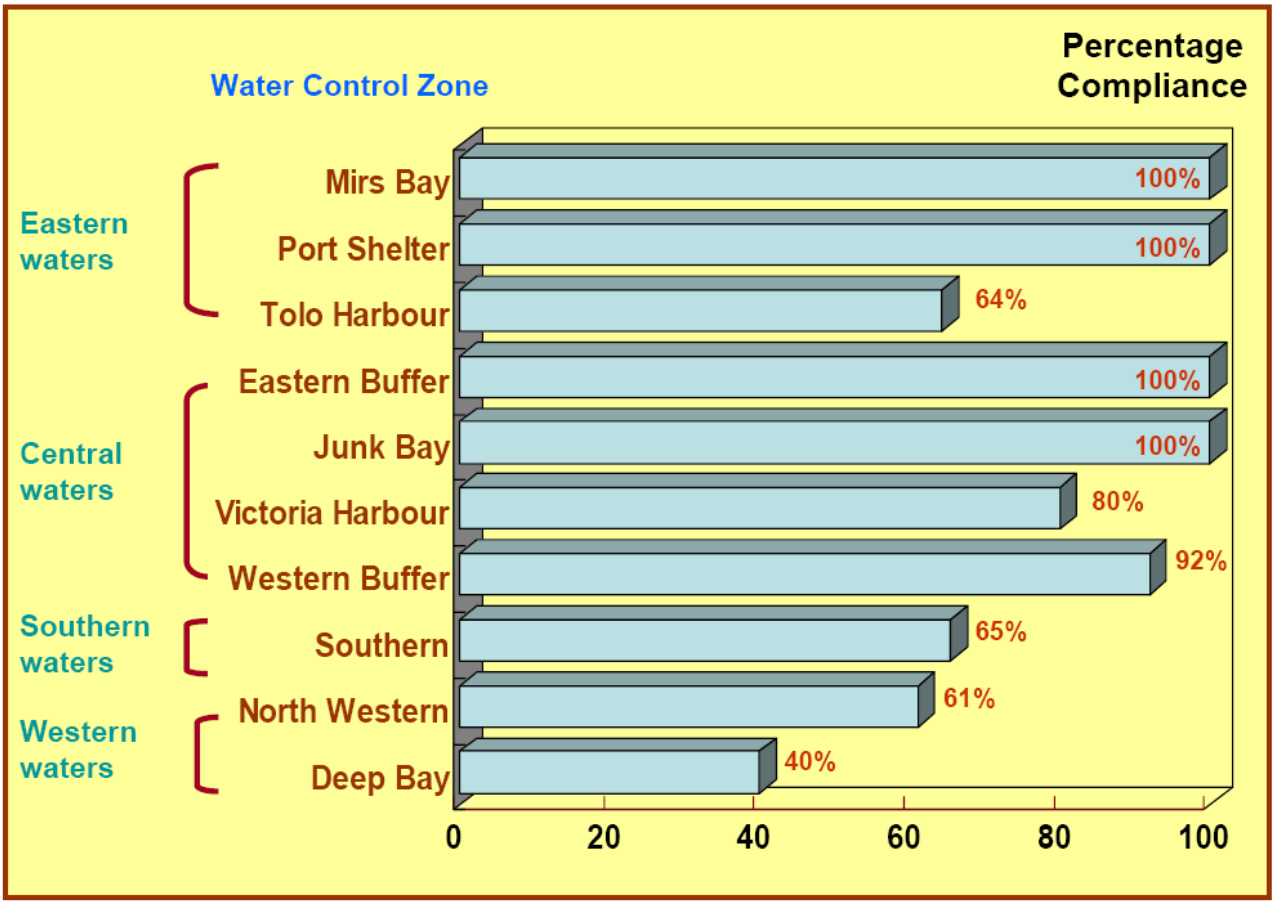
On the other hand, the overall compliance in the Victoria Harbour WCZ was lower in 2008 (80%) compared with that in 2007 (90%). The decrease of compliance was mainly due to the higher TIN levels in western harbour stations in June and July with four of them (VM7, 12, 14 and 15) failing to comply with the TIN objective. It should be noted that these 4 stations are also located along a transect in Rambler Channel from Tsuen Wan to the mouth of western Victoria Harbour via Stonecutters Island. The higher TIN levels could be due to the flushing effect of the unusually heavy rainfall events in Tsuen Wan and south-west Kowloon areas during June and July 2008.

Except for the nitrogen levels, the water quality in the Victoria Harbour WCZ continued to improve notably with a decrease in the levels of *E. coli* and an increase in the level of DO, particularly on the eastern side. These improvements were due to the implementation of the Harbour Area Treatment Scheme (HATS) Stage 1. The *E. coli* bacterial levels in the central and western harbour remained high but this problem should be alleviated after the implementation of the advanced disinfection facilities, under which effluents from the Stonecutters Island Sewage Treatment Works would undergo disinfection treatment starting at the end of 2009.

Barely affected by the record-breaking rainfall, the compliance rates of Port Shelter and Mirs Bay in the east side of Hong Kong improved from 92% and 89% in 2007 respectively to 100% in 2008 due to the increase in compliance with DO objective from lower levels (67% in Port shelter and 64% in Mirs Bay) in 2007 to full (100%) compliance in 2008. In the semi-enclosed Tolo Harbour, the overall WQO compliance rate maintained at 64% in 2008 while long term decreasing trends in two pollution related parameters (nutrient and *E. coli* bacteria) were observed.

The Eastern Buffer and Junk Bay WCZs which are located in the east side of Victoria Harbour also fully complied with the WQOs in 2008, the same as in the previous year.

While the Deep Bay WCZ continued to have the lowest water quality in the territory, the overall WQO compliance rate in Deep Bay in 2008 has rebounded from 27% in 2007 to 40% as in 2006. The increase of compliance was due to the fact that two outer stations, DM3 and DM4 met the DO objective this year. The TIN levels in Inner Deep Bay (DM1, DM2) decreased from 6.1 and 4.4 mg/L in 2007 to 3.7 and 3.4 mg/L in 2008 respectively, but similar to those in 2006. On the other hand, the TIN levels in Outer Deep Bay remained largely stable for the last six years.

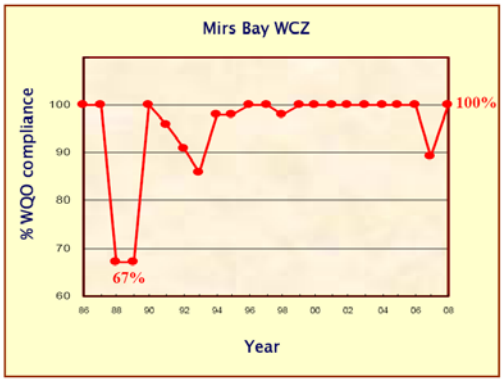


Level of compliance with the Water Quality Objectives in the ten Water Control Zones in 2008

Eastern Waters

The eastern waters cover an area of 900 km^2 which comprises Mirs Bay, Port Shelter and Tolo Harbour & Channel Water Control Zones (WCZs). These waterbodies have beautiful coastlines and good water quality in general which supports the growth of a diversity of marine life. Moreover, there are six gazetted bathing beaches (Kiu Tsui, Hap Mun Bay, Trio, Silverstrand, Clear Water Bay First and Clear Water Bay Second Beaches in Port Shelter), three marine parks (Yan Chau Tong, Hoi Ha Wan and Tung Ping Chau), 21 fish culture zones and several secondary contact recreation subzones.

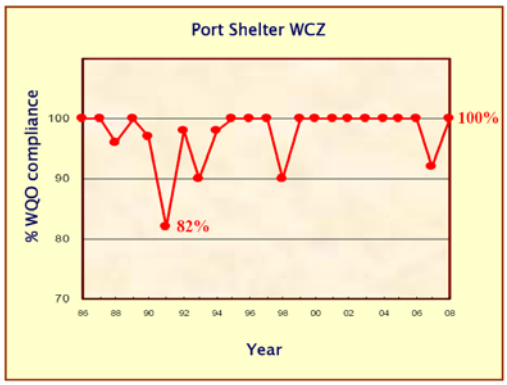
Mirs Bay Water Control Zone



In 2008, the Mirs Bay WCZ fully met the WQOs for DO, TIN, NH_3 and *E. coli*. In fact, the WQO compliance of the Mirs Bay WCZ has been maintained at 100% since 1999, except for 2007 which was 89% due to a lower DO compliance of 64%. The *E. coli* counts in Mirs Bay were generally very low (e.g. 1 to 2 cfu / 100mL) with Starling Inlet, which borders between Shenzhen and Sha Tau Kok, recorded a slightly higher count. The chlorophyll-*a* level in Mirs Bay remained stable in the past few years, indicating that there was little sign of increased algal growth in the bay.

Water sports in Mirs Bay

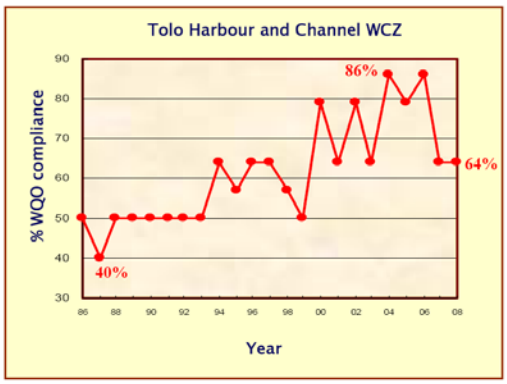
Port Shelter Water Control Zone



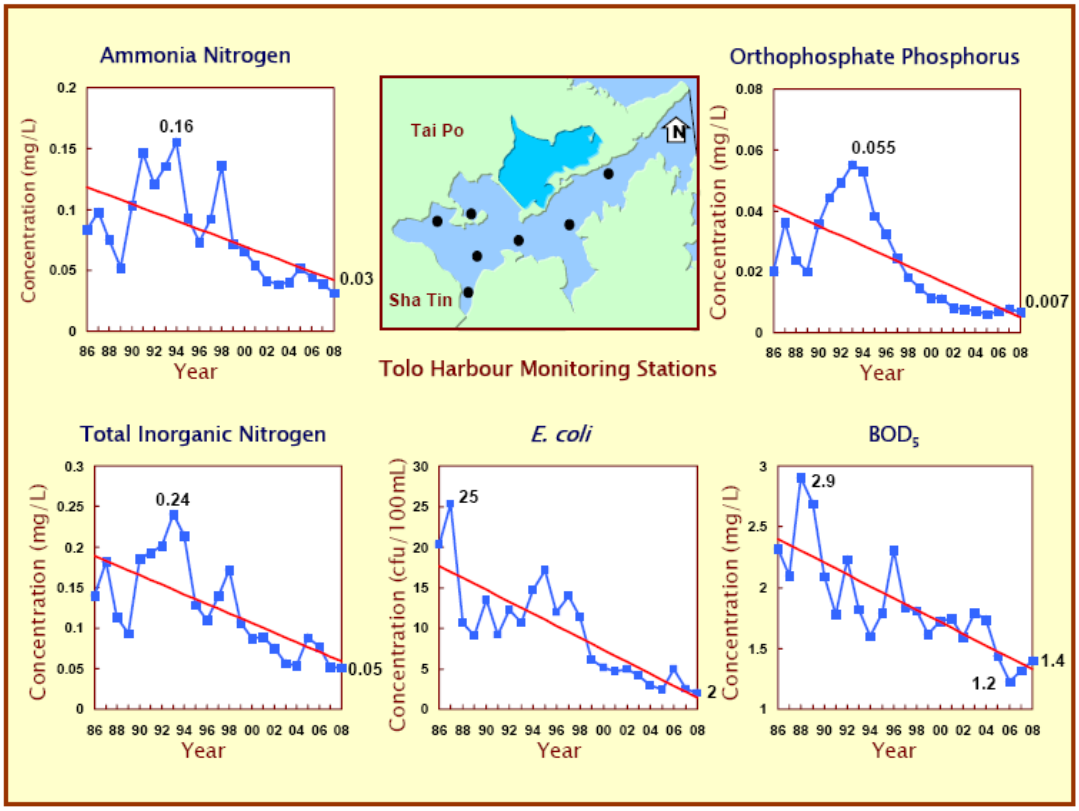
The water quality in the Port Shelter WCZ was amongst the best in the territory with high DO and low levels of nutrients and *E. coli* bacteria. Similar to Mirs Bay, the WQO compliance of the Port Shelter WCZ has been maintained at 100% from 1999 to 2008 except for 2007 which was due to a lower DO compliance. Port Shelter maintained its excellent bacteriological quality (*E. coli* <5 cfu/100mL) in 2008, making it an ideal place for swimming, yachting and water sport activities.

Yachting is a popular sport in Port Shelter

Tolo Harbour and Channel Water Control Zone



The Tolo Harbour WCZ achieved an overall WQO compliance rate of 64% in 2008, same as that in 2007. The harbour's landlocked situation with low water exchange rate with Mirs Bay often leads to stratification of the water column inside Tolo Harbour particularly during the hot summer months. The stratification of water column prevents the mixing of upper and lower water masses and leads to low oxygen conditions in the deeper water. As a result, the harbour water often experienced a lower compliance rate with the DO objective (around 30% in 2008) compared with other WCZs.



Water quality changes in the Tolo Harbour WCZ(1986 – 2008)

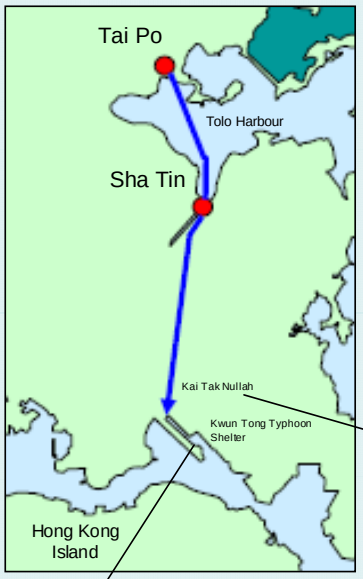
Nevertheless, since the implementation of the Tolo Harbour Action Plan (including control of livestock wastes, improvement of sewage treatment facilities, export of treated effluent outside harbour and extension of village sewerage) in mid-80s, there has been a steady recovery of the water quality (the decrease in the levels of pollutants, as reflected by the 5-day Biochemical Oxygen Demand (BOD_5), *E. coli*, nitrogen and orthophosphate phosphorus measurements) in Tolo Harbour in the past decade.

In 2008, the Tolo Harbour WCZ achieved a 90% compliance with the chlorophyll-*a* objective, as in the past five years. The low (<10 cfu/100mL) *E. coli* levels in the WCZ in 2008 fully (100%) complied with the WQO for secondary contact recreational use, which is designated for the entire WCZ.

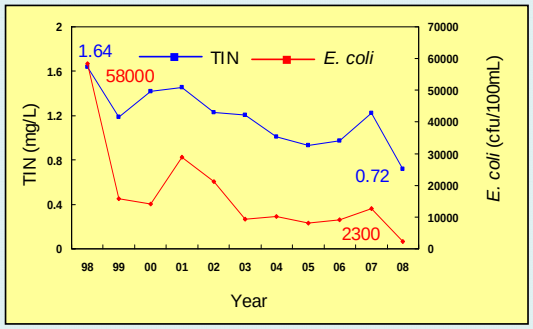
Water quality of Tolo Harbour

Tolo Harbour Effluent Export Scheme (THEES)

THEES helps to solve the pollution problem in Tolo Harbour in the 80's by conveying the treated effluent from Tai Po and Shatin STWs to Victoria Harbour (Kwun Tong Typhoon Shelter) via a long tunnel and Kai Tak Nullah. The water quality in Tolo Harbour has shown encouraging signs of improvement since the full implementation of the scheme in 1998, and has improved by 70% in terms of total inorganic nitrogen from 1998 to 2008.



Kai Tak Nullah



Water quality of Kwun Tong Typhoon Shelter

THEES also helps to improve the water quality of Kwun Tong Typhoon Shelter and Kai Tak Nullah. The water quality of the typhoon shelter has improved by 60% in terms of total inorganic nitrogen from 1998 to 2008

Central Waters

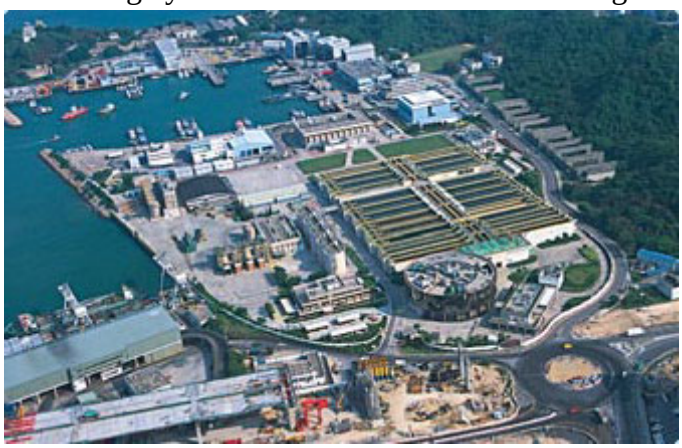
"*Dr. Catherine Lam*" in Victoria Harbour

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 Victoria Harbour now undergoes chemically enhanced primary treatment, resulting in a substantial reduction of 70% (in term of organic pollutants) pollution load into the harbour. This also leads to an improvement of water quality in the harbour which can be observed particularly in the eastern part of the waters.

Victoria Harbour Water Control Zone

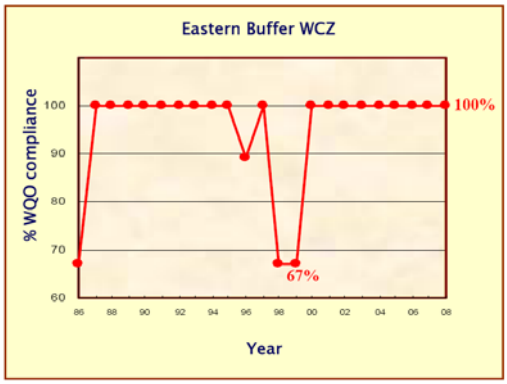
In 2008, the Victoria Harbour WCZ achieved a 80% compliance with the WQOs which was lower compared with 2007. The decrease in compliance was mainly due to an increase of TIN levels in the Harbour. Nevertheless, most of the non-compliance was at the level marginally exceeding the TIN objective (0.4 mg/L). Overall speaking, the water quality improvements (i.e. increase in DO, decreases in nutrients and *E. coli*) in eastern Victoria Harbour have largely been maintained since HATS Stage 1.

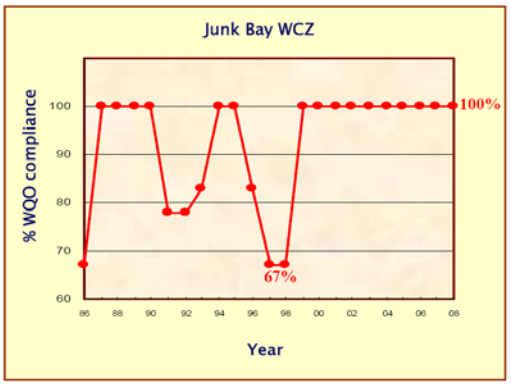
The western harbour area (i.e. VM7 and VM8) around the Stonecutters Island Sewage Treatment Works outfall continues to have elevated levels of *E. coli* bacteria comparing with those before HATS. On the other hand, the *E. coli* level in this area decreased from its peak (7600 cfu/100mL) recorded in 2006 to 4700 cfu/100mL in 2008.



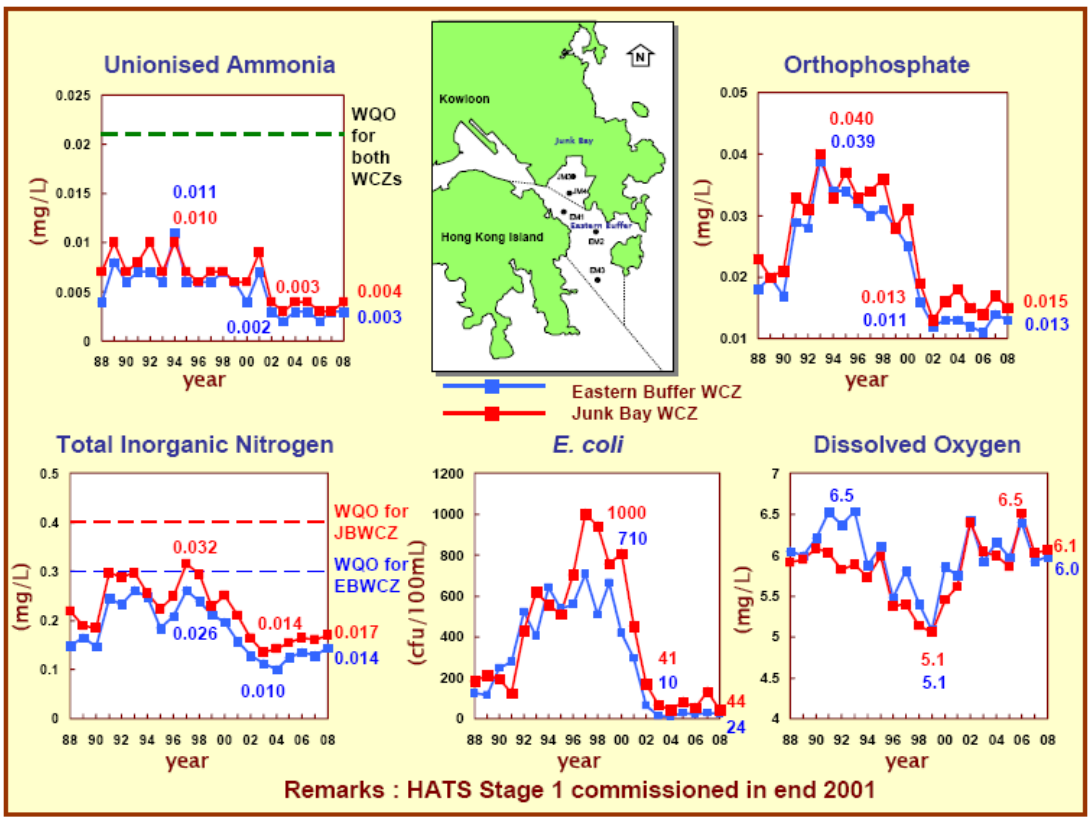
The Stonecutters Island Sewage Treatment Works

Eastern Buffer and Junk Bay Water Control Zones



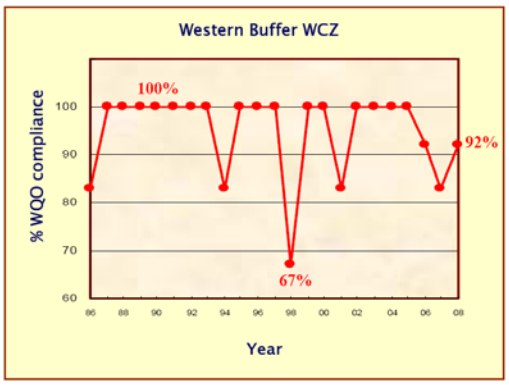


As in 2007, the Eastern Buffer and Junk Bay WCZs achieved full compliance (100%) with the WQOs in 2008. Since the imple- mentation of the HATS Stage 1, all sewage generated from Junk Bay (Tseung Kwan O) and Eastern Buffer (Chai Wan) has been diverted and treated at the Stonecutters Island Sewage Treatment Works. As a result, substantial water quality improvements (increase in DO and decreases in nutrients and *E. coli*) in the 2 WCZs have been observed. For example, the annual geometric means of *E. coli* in these waters were greatly reduced from 400-800 cfu/100mL in 2000 to below 50 cfu/100mL in 2008. These water quality improvements were sustained in 2008.



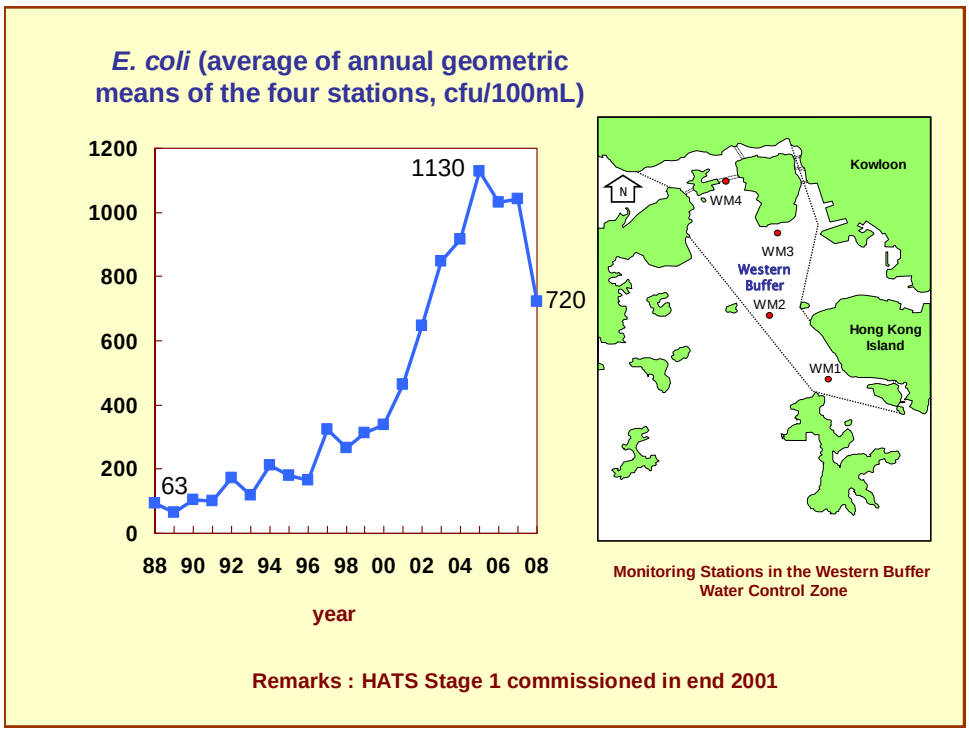
Water quality changes in the Eastern Buffer and Junk Bay WCZs (1988-2008)

Western Buffer Water Control Zone



The Western Buffer WCZ achieved 92% compliance with the WQOs in 2008, higher than that in 2007 (83%). The compliance with the DO objective has increased from 50% in 2007 to 75% in 2008 with only one station (WM4) failing to meet the DO objective this year. Although the *E. coli* levels in this WCZ were high due to the discharge of the treated but un-disinfected effluent from the Stonecutters Island Sewage Treatment Works (SCISTW), its level had decline 36% from 1130 cfu/100mL in 2005 to 720 cfu/100mL in 2008. This problem should be further alleviated at the end of 2009 when the disinfection facilities at the SCISTW under HATS Stage 2A are installed and in operation.

Sampling at station WM4 under the Tsing Ma Bridge

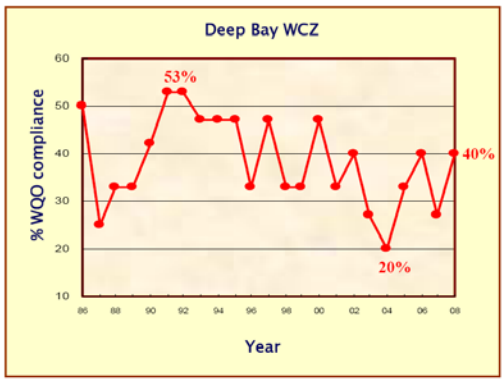


E. coli in the Western Buffer WCZ (1988-2008)

Western Waters

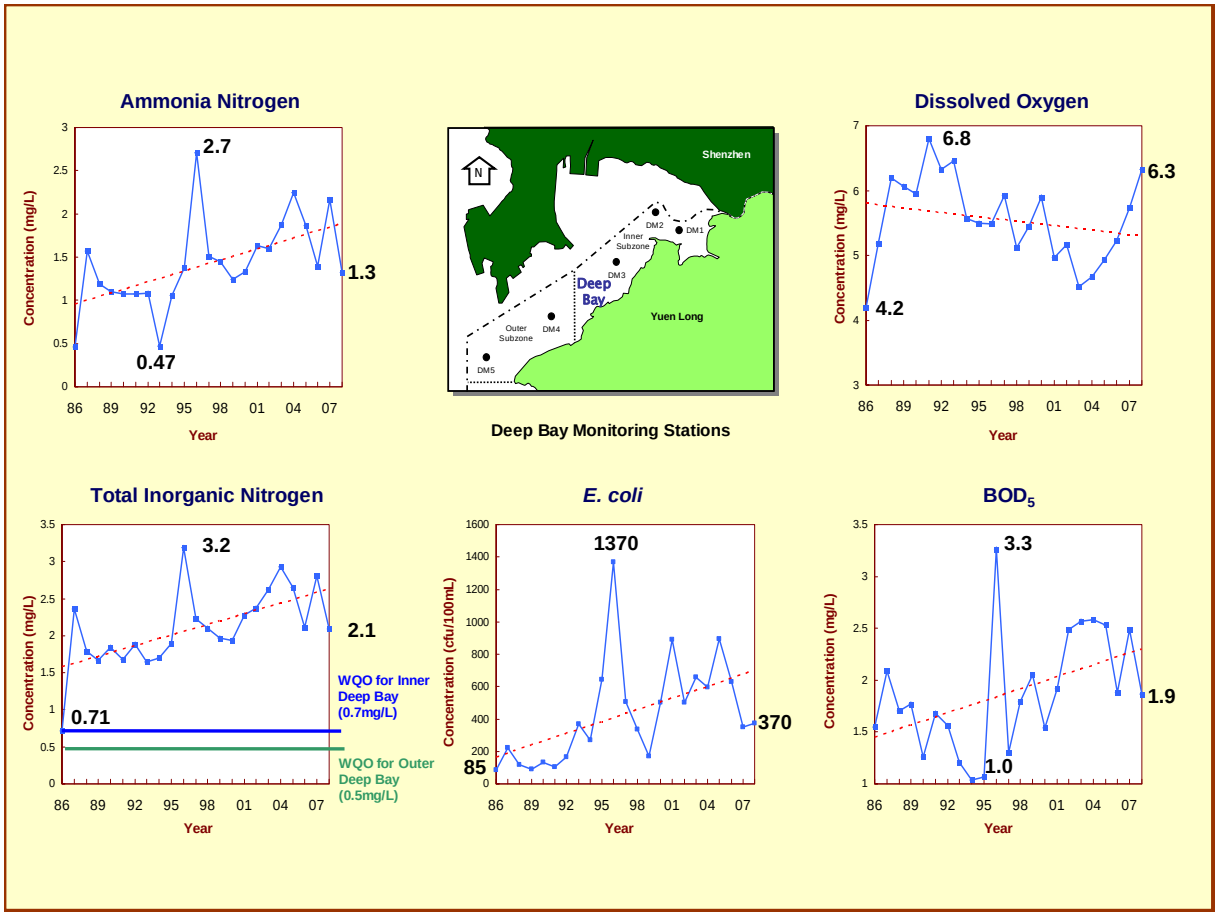
The Deep Bay and North Western WCZs are located in the western waters. Deep Bay is shallow. Its depth varies from 2m to 8m and its sediment laden water body was impacted by pollution from both Hong Kong and Shenzhen. The Deep Bay WCZ includes the ecologically sensitive Mai Po and Inner Deep Bay Ramsar 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



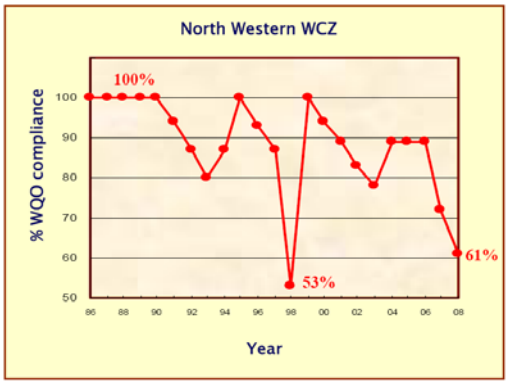
Deep Bay has the poorest water quality in the territory with high concentrations of organic and inorganic pollutants and low levels of DO. In 2008, the WQO compliance in the Deep Bay WCZ (40%) was higher compared with that in 2007 (26%) but similar to that in 2006 (40%). Pollution problems were more acute in the inner bay which received discharges from Shenzhen River, Kam Tin River, Yuen Long Creek and Tin Shui Wai Nullah. While three of the monitoring stations in the outer bay met the WQOs for DO and NH_3, none of the stations in the Deep Bay WCZ met the TIN objective. In 2008, the nitrogen levels (0.8 – 3.7 mg/L) in the bay were about 2 - 5 times higher than the TIN objective (0.5 – 0.7 mg/L).

Western Corridor in Deep Bay

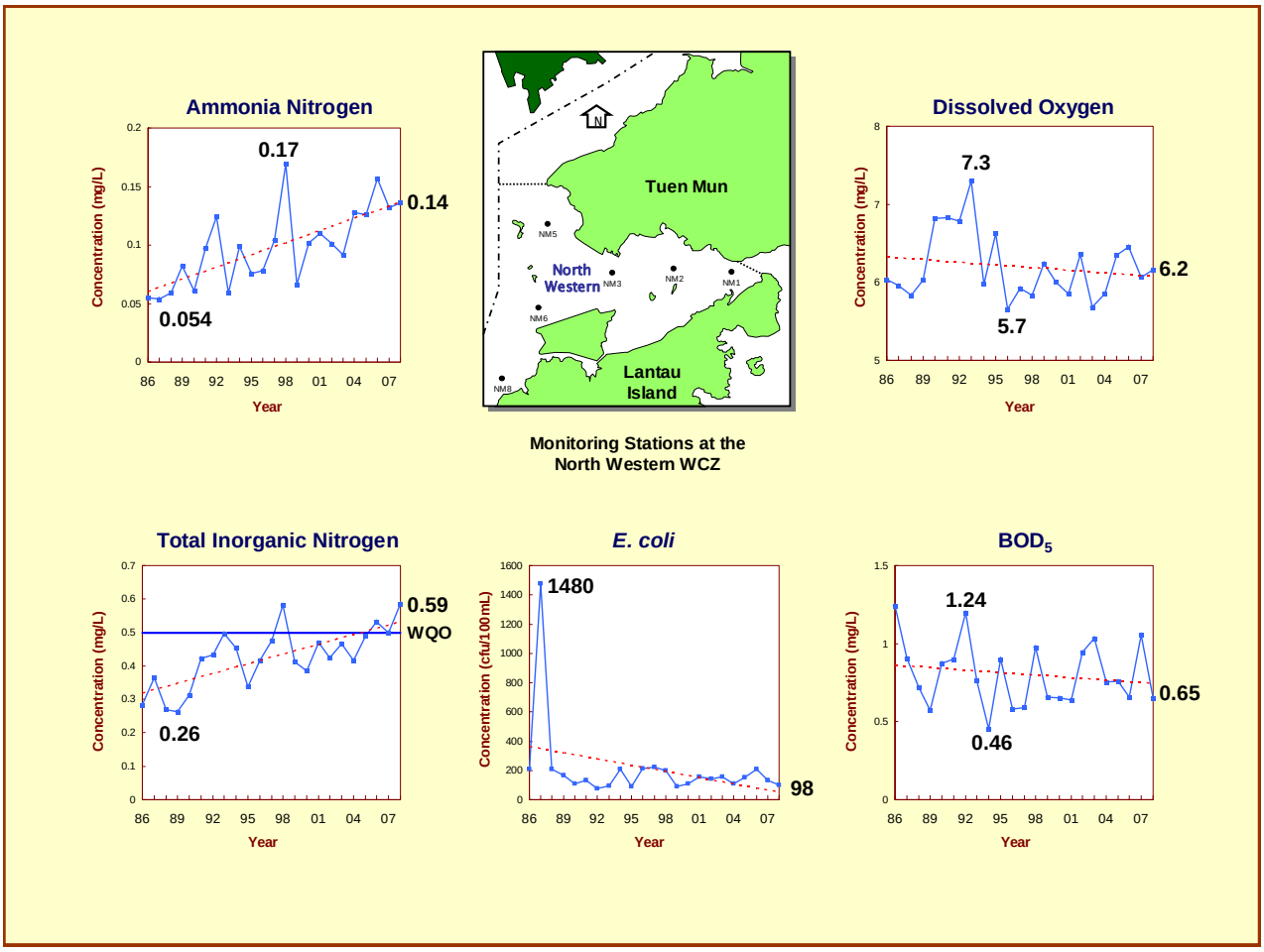


Water quality changes in the Deep Bay WCZ (1986-2008)

North Western Water Control Zone



The North Western WCZ in 2008 attained an overall WQO compliance rate of 61% and was low compared with that in 2007 (72%). As in recent years, the levels of orthophosphate phosphorus (PO_4-P) and total phosphorus (TP) in the WCZ were largely stable. Similar to some stations in the Southern, Deep Bay and Victoria Harbour WCZs, the inorganic nitrogen levels in the western part of the WCZ showed statistically significant increasing trends and increased by 127% from 1989 to 2008. The increase might be due to the influence of Pearl River as well as local discharges related to the heavy storms in June and July of 2008 which affected both Hong Kong and Guangdong province. Nevertheless, all stations in the WCZ fully complied with the NH_3 objective.

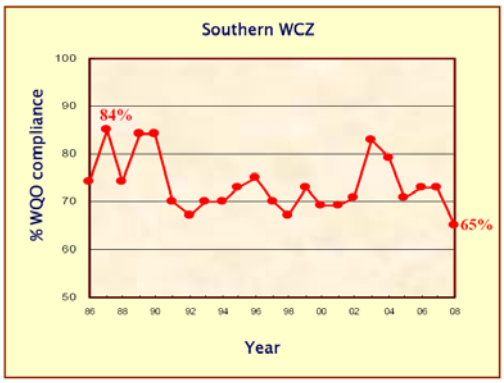


Water quality changes in the North Western WCZ (1986-2008)

Southern Waters

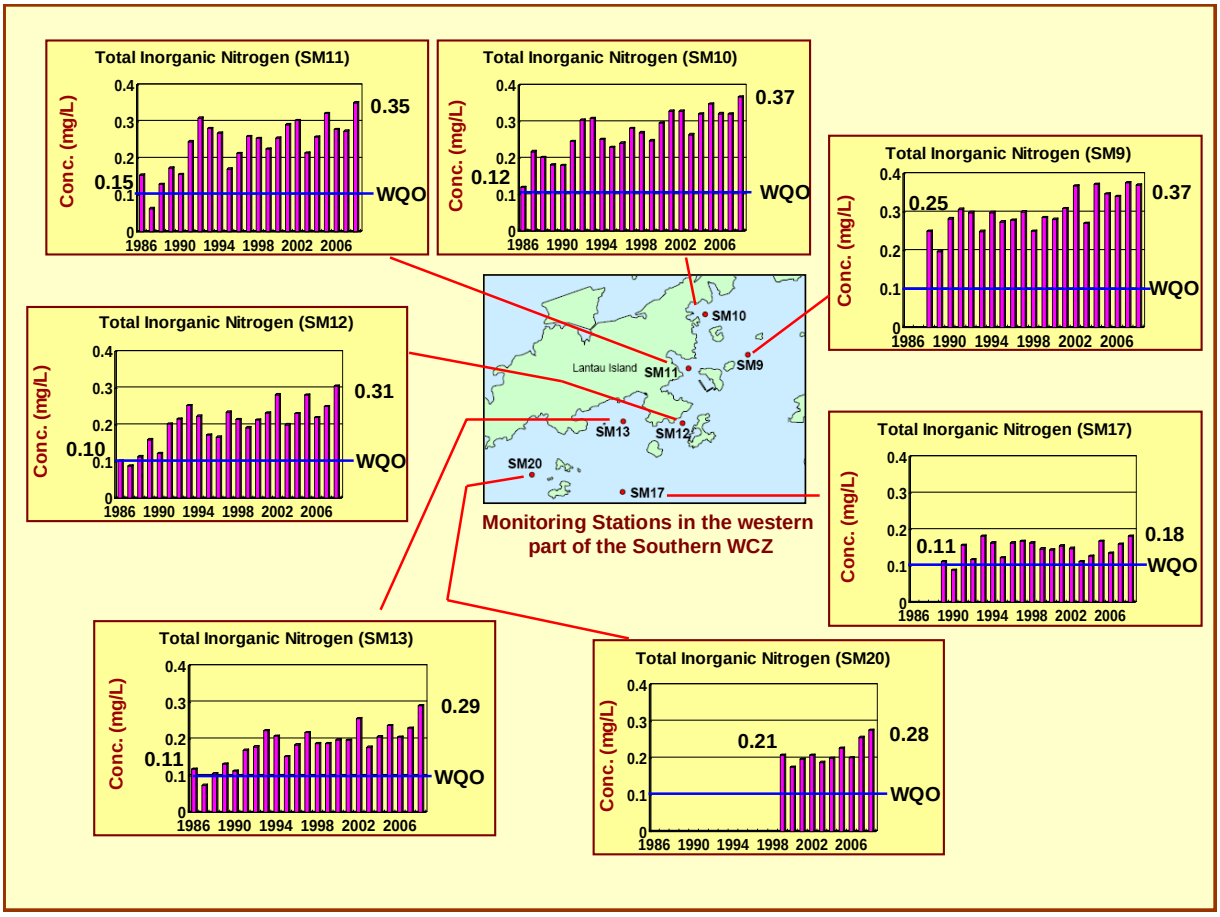
The Southern WCZ stretches from Hong Kong Island south to Lantau Island and faces the South China Sea. The western part of the WCZ is impacted seasonally by the Pearl River flow and the effect diminishes towards the eastern end.

Southern Water Control Zone



In 2008, the Southern WCZ attained an overall 65% compliance with the WQOs, lower than that in 2007 (73%). Full compliance (100%) with the WQOs for unionised ammonia (NH_3) and *E. coli* was achieved. Similar to the Northwestern waters, statistically significant increasing trends in TIN levels were observed at this WCZ. The TIN levels at the stations in the western (e.g. SM17) and northern (e.g. SM9) parts of the WCZ increased by 64% and 48% respectively from late 1980s to 2008.

First commercial-scale wind power station, *Lamma Winds*, on Lamma Island.



Levels of Total Inorganic Nitrogen (TIN) in the western part of the Southern WCZ (1986-2008)

Within the secondary contact recreation subzones, full compliance (100%) with the *E. coli* objective was attained.

Sediment Quality in Hong Kong

Collecting sediment samples

Sea bottom sediments are the ultimate sink of pollutants in the marine environment, and are also home to a wide variety of benthic organisms. The quality of marine sediments can therefore be used to reflect the health of the marine waters.

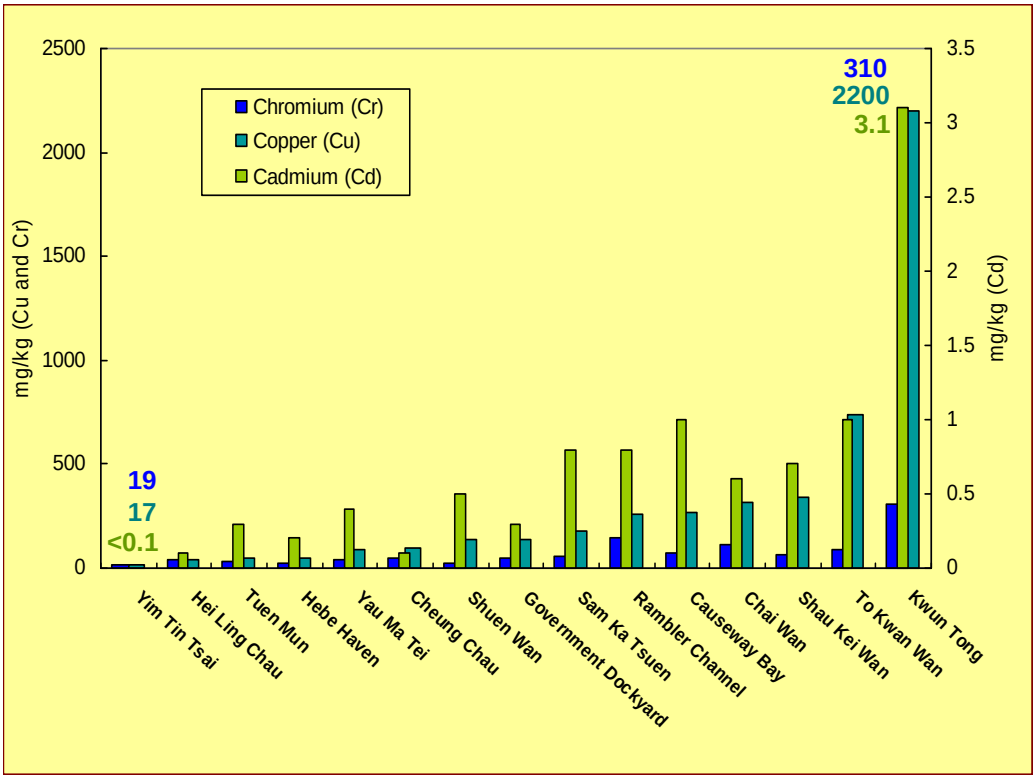
From 2004 to 2008, elevated levels of heavy metals, in particular copper and silver could often be detected in the sediments of Victoria Harbour, Junk Bay and Tsuen Wan Bay. This was attributed to previous industrial pollution sources in the 60s to 80s before pollution control

legislation was introduced. In general, organic pollutants, such as polychlorinated biphenyls (PCBs), were generally present at low concentrations in the environment except for one station in the western Victoria Harbour (VS6). The higher levels of PCB at VS6 could be related to the discharges from 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 in Hong Kong are used by small to medium vessels as a shelter against strong winds and rough sea conditions particularly during typhoon seasons. For this purpose, typhoon shelters are semi-enclosed water bodies and vulnerable to pollution from both land and sea. In 2008, the EPD monitored the water quality at 18 monitoring stations of 17 typhoon shelters (TSs), marinas and dockyard(s) around Hong Kong (there are two stations (South and West) inside the Aberdeen Typhoon Shelter). Among these typhoon shelters, Yim Tin Tsai TS, Hebe Haven TS and Hei Ling Chau TS 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 2004-2008, the Kwun Tong TS's sediment recorded high levels of heavy metals, (e.g. cadmium, chromium, copper) as well as total PCBs.

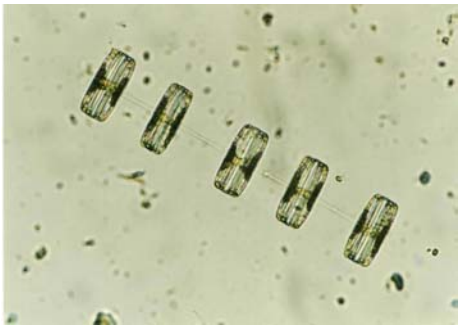
Causeway Bay Typhoon Shelter



Levels of Cadmium (Cd), Chromium (Cr) and Copper (Cu) in the sediments of typhoon shelters of Hong Kong (2004-2008)

For polyaromatic hydrocarbons (PAHs), the level in the To Kwa Wan TS was higher than the levels in other typhoon shelters. High PAHs level could be attributed to contamination from the old industrial areas in San Po Kong and perhaps the old Kai Tak Airport which ceased operation in 1997.

Phytoplankton and Red Tides in Hong Kong



The phytoplankton *Thalassiosira rotula* under the light microscope

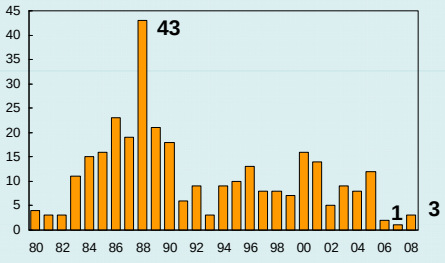
Eutrophication is a major concern in many marine coastal waters. It is a condition in a water body where high concentrations of nutrients (mainly nitrogen, phosphorus and silica) stimulate excessive algal (e.g. phytoplankton) growth. Enhanced algal growth (often called algal blooms) can reduce dissolved oxygen in the water when dead algae decompose and cause other organisms to die (e.g. fish kills). Phytoplankton is a critical component of coastal ecosystems and represents the first biological response to the nutrient

enrichment problem. Phytoplankton monitoring therefore forms an essential part of water quality management.

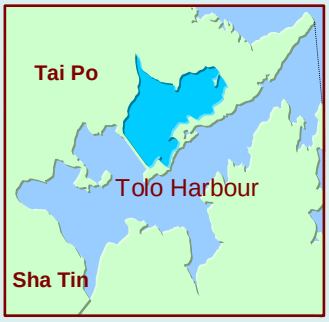
EPD conducts monitoring of phytoplankton at 25 stations covering nine WCZs in the territory. Monthly samples are analyzed and trends and changes in phytoplankton with regard to their composition and densities are examined. A total of 87 phytoplankton species was recorded in Hong Kong waters in 2008. Of these, 51 were diatoms (59%), 24 were dinoflagellates (27%) and 12 were from other minor algal groups (14%). Of the samples examined in 2008, diatoms constituted the largest component of phytoplankton in term of both species number and cell density. The most dominant diatom species was *Skeletonema costatum* which constituted 31-62% of the diatom population in the Tolo Harbour & Channel, Eastern Buffer, Port Shelter, Victoria Harbour, North Western, Western Buffer and Deep Bay WCZs. The most abundant dinoflagellate species were *Gymnodinium spp*. comprising 20-49% of the dinoflagellate populations in all the WCZs. In 2008, phytoplankton densities were generally higher at some stations in Tolo Harbour and Channel, Victoria Harbour, Southern Waters and Deep Bay than those in other WCZs.

Red Tides in Tolo Harbour

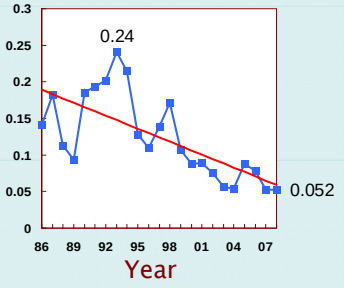
- The implementation of the Tolo Harbour Action Plan has made significant progress in reducing the nutrient levels of the harbour
- Red tides in the harbour declined from a peak of 43 in 1988 to 3 in 2008
- No fish kills were recorded in the harbour during the last ten years



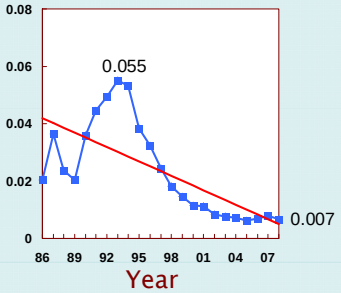
Frequency of red tides in Tolo Harbour & Channel WCZ (1980-2008)



Total Inorganic Nitrogen (mg/L)



Orthophosphate (mg/L)



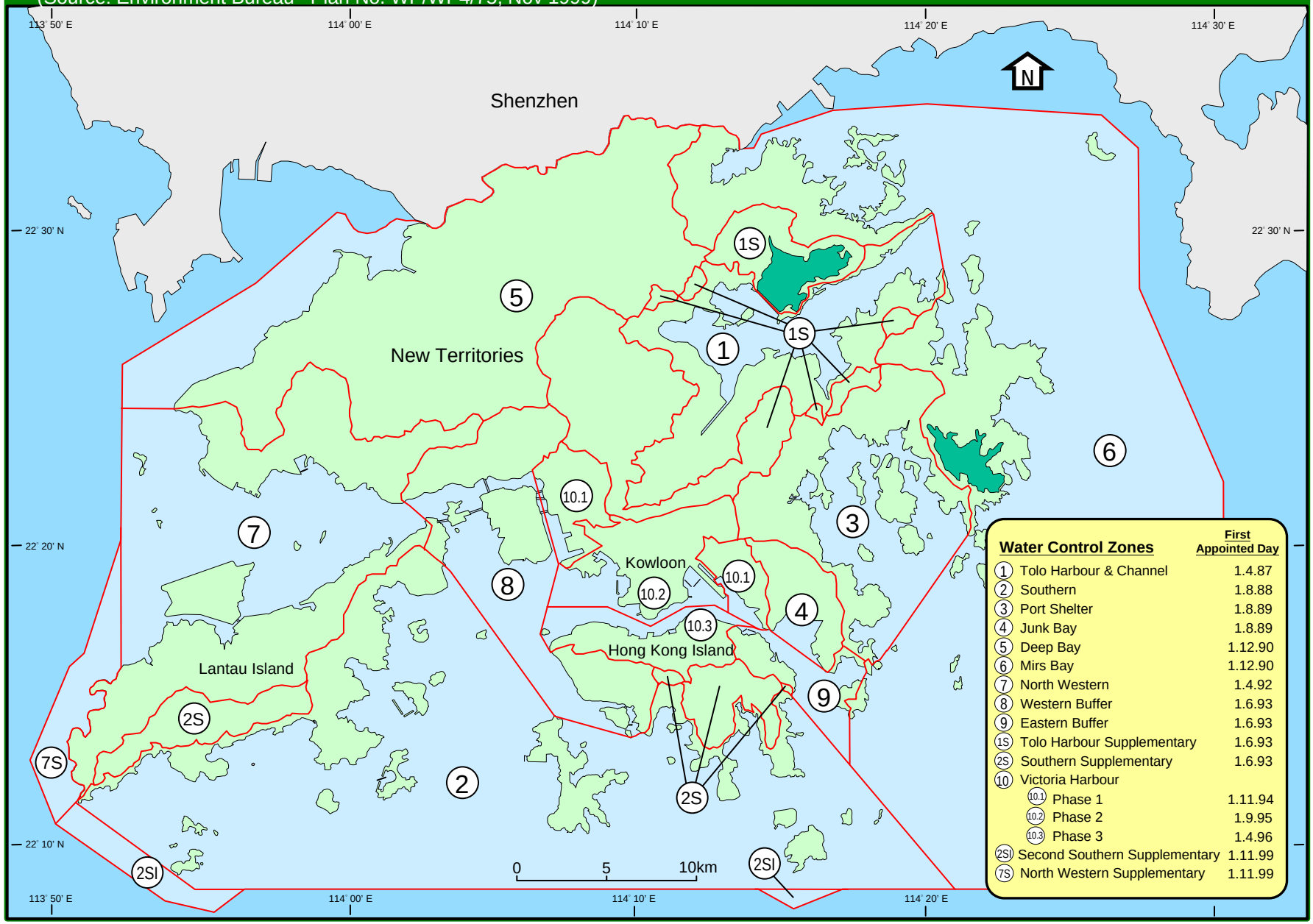
Tolo Harbour is a semi-enclosed bay. The physical and chemical conditions (e.g. hydrology, light, salinity and nutrients) are considered to be most suitable for phytoplankton growth and the formation of red tides.

Red tides and algal blooms are natural phenomena which occur seasonally in both polluted and unpolluted waters. A total of 792 red tides was recorded in Hong Kong waters between 1980 and 2008. Locally, red tides occur more frequently in the eastern (>70%) and southern (~17%) waters. The most common red tide species in Hong Kong waters was the dinoflagellate *Noctiluca scintillans*, which accounted for some 29% of the reported red tides between 1980 and 2008. In 2008, 15 red tides were recorded in Hong Kong waters. Of these, 3 occurred in Tolo Harbour, 6 in Southern waters and 3 in Port Shelter; whereas only one in Deep Bay, Mirs Bay and Western Buffer, respectively. The incidents in 2008 involved 7 red tide species, i.e. *Noctiluca scintillans*, *Prorocentrum dentatum*, *Fibrocapsa japonica*, *Mesodinium rubrum*, *Phaeocystis globosa*, *Skeletonema costatum* and *Thalassiosira tealata*.

Appendices

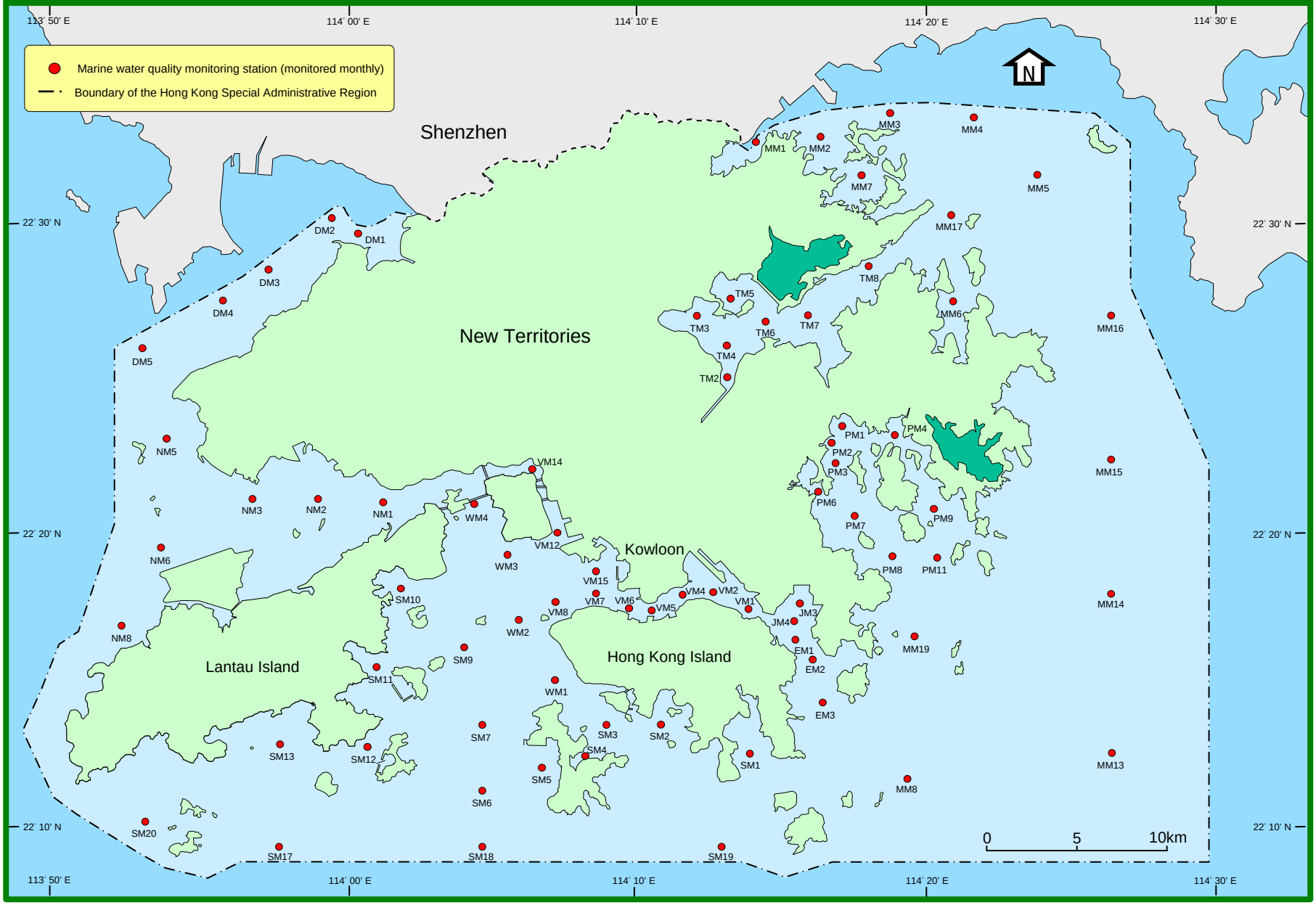
The Water Control Zones in Hong Kong

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

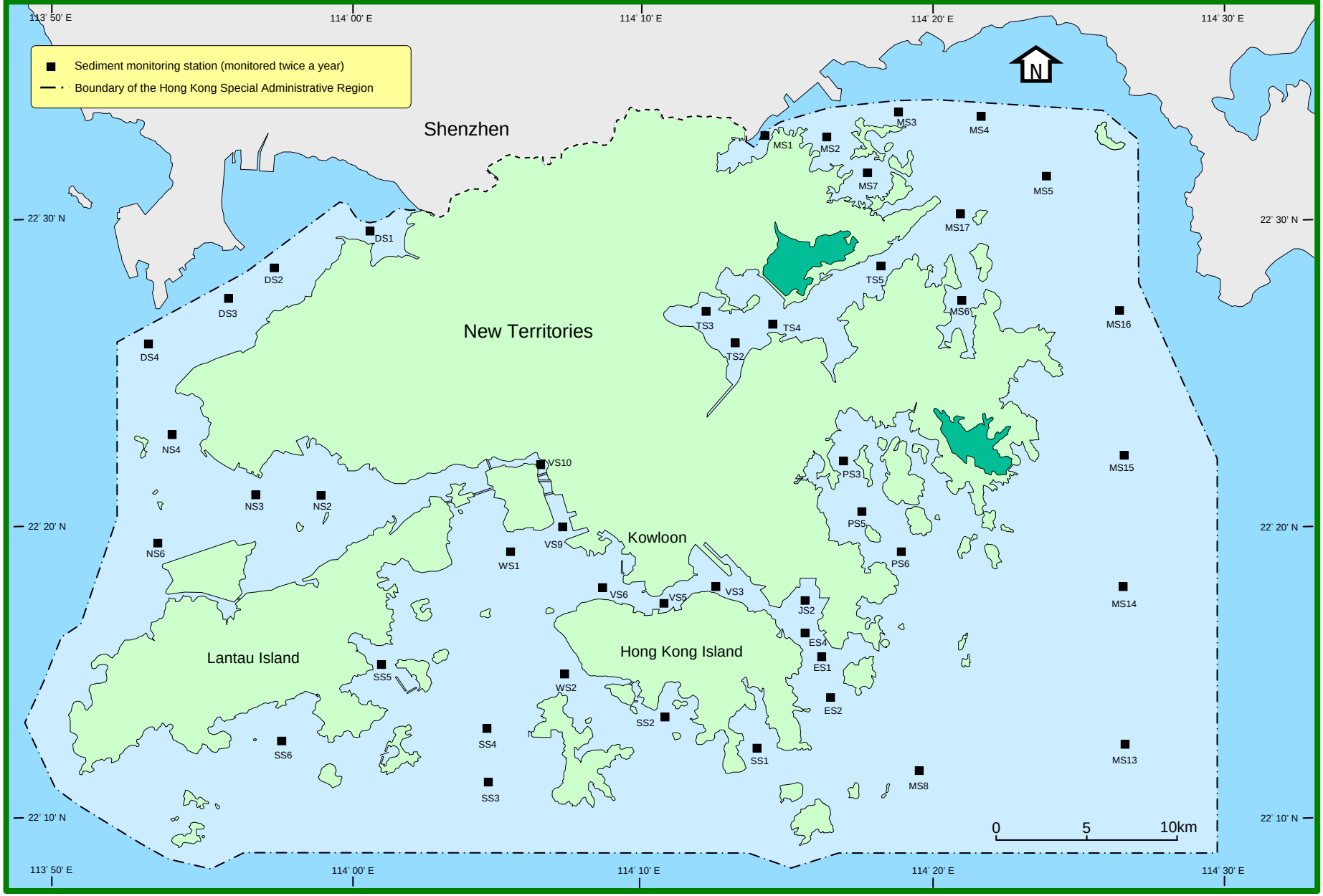


Water Control Zones	First Appointed Day
1 Tolo Harbour & Channel	1.4.87
2 Southern	1.8.88
3 Port Shelter	1.8.89
4 Junk Bay	1.8.89
5 Deep Bay	1.12.90
6 Mirs Bay	1.12.90
7 North Western	1.4.92
8 Western Buffer	1.6.93
9 Eastern Buffer	1.6.93
1S Tolo Harbour Supplementary	1.6.93
2S Southern Supplementary	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

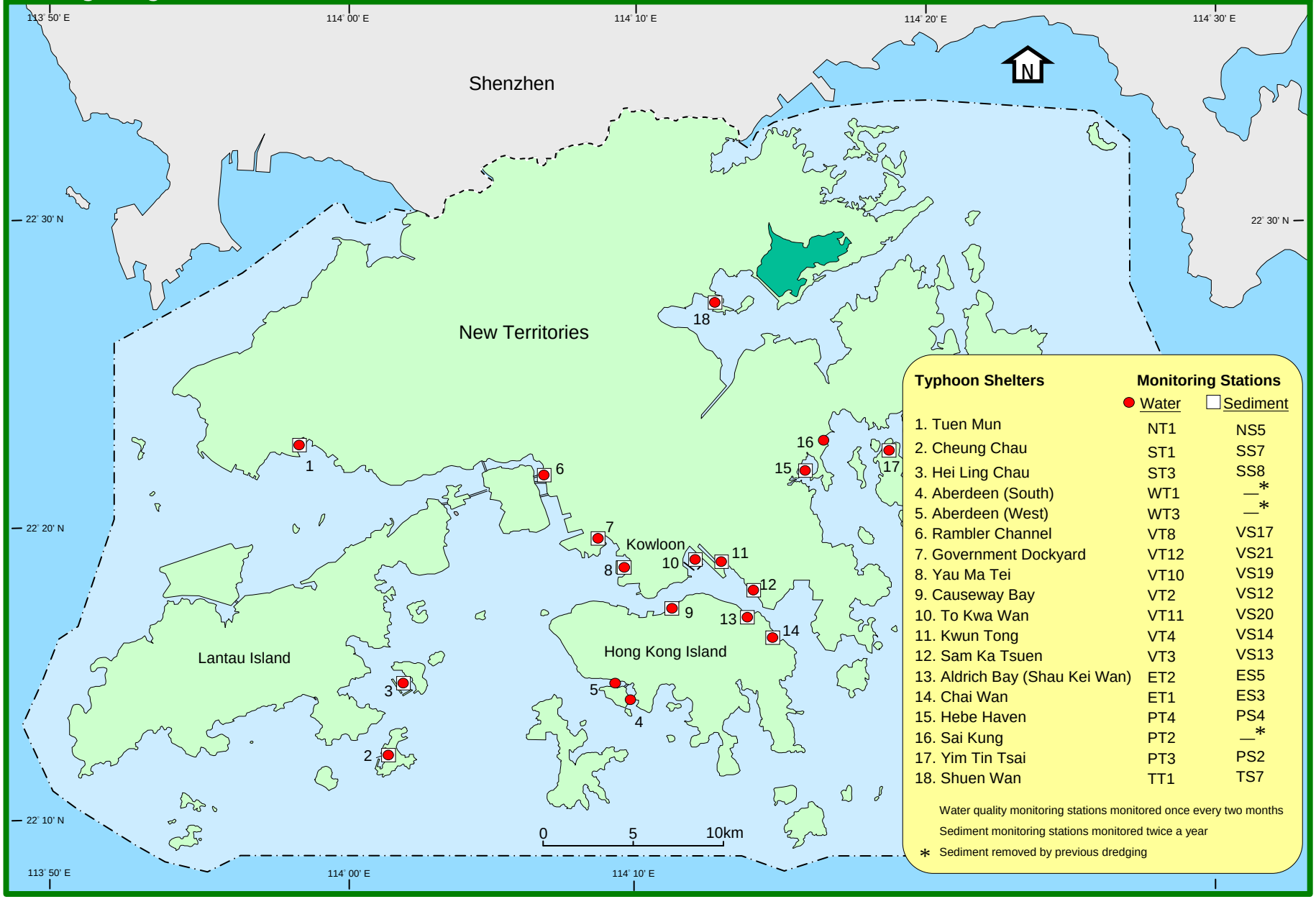
The 76 water quality monitoring stations in the open waters of Hong Kong in 2008



The 45 sediment monitoring stations in the open waters of Hong Kong in 2008



The 18 water quality monitoring stations and 15 sediment monitoring stations in the typhoon shelters of Hong Kong in 2008



Typhoon Shelters	Monitoring Stations	
	Water	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

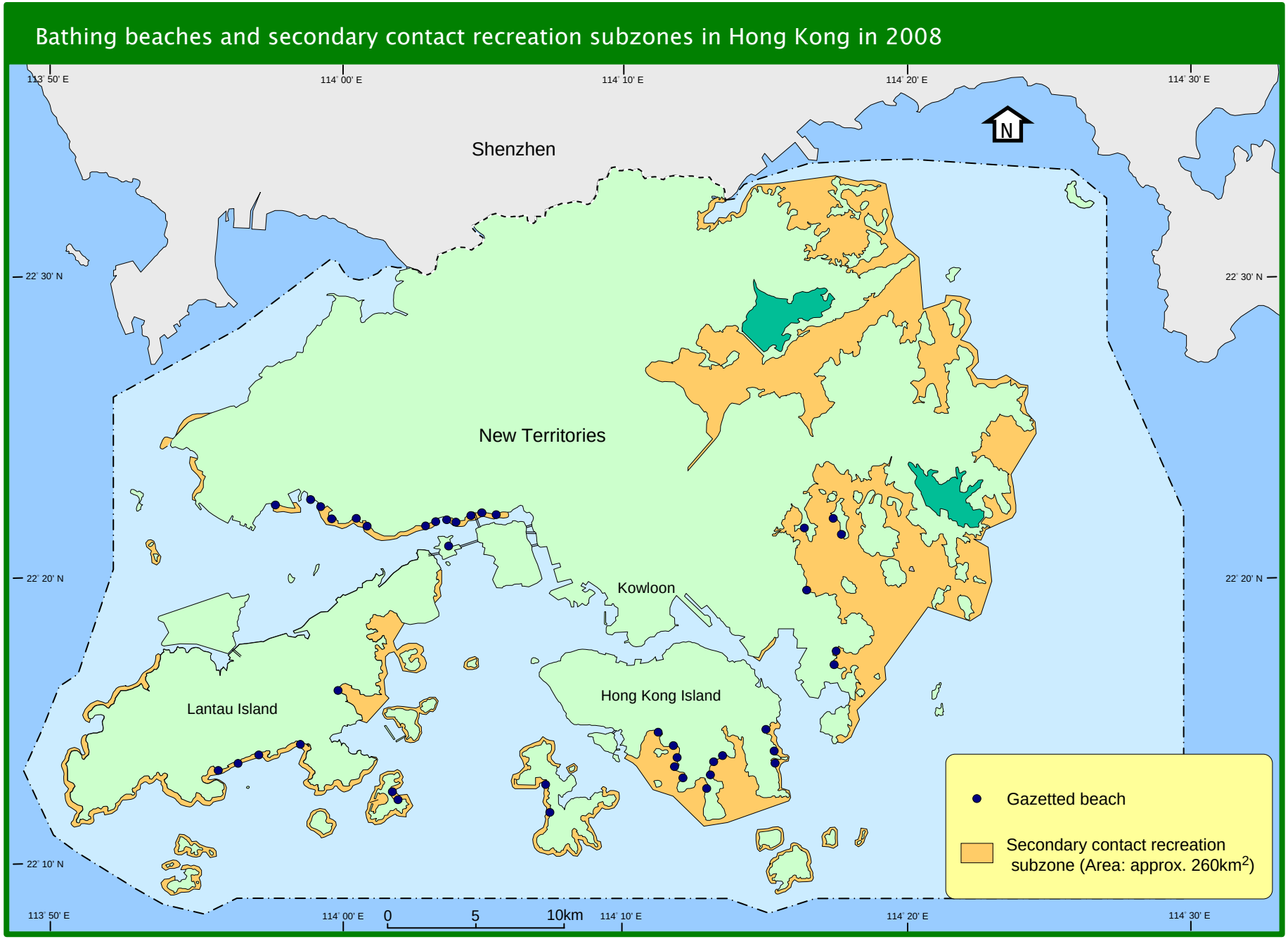
* Sediment removed by previous dredging

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

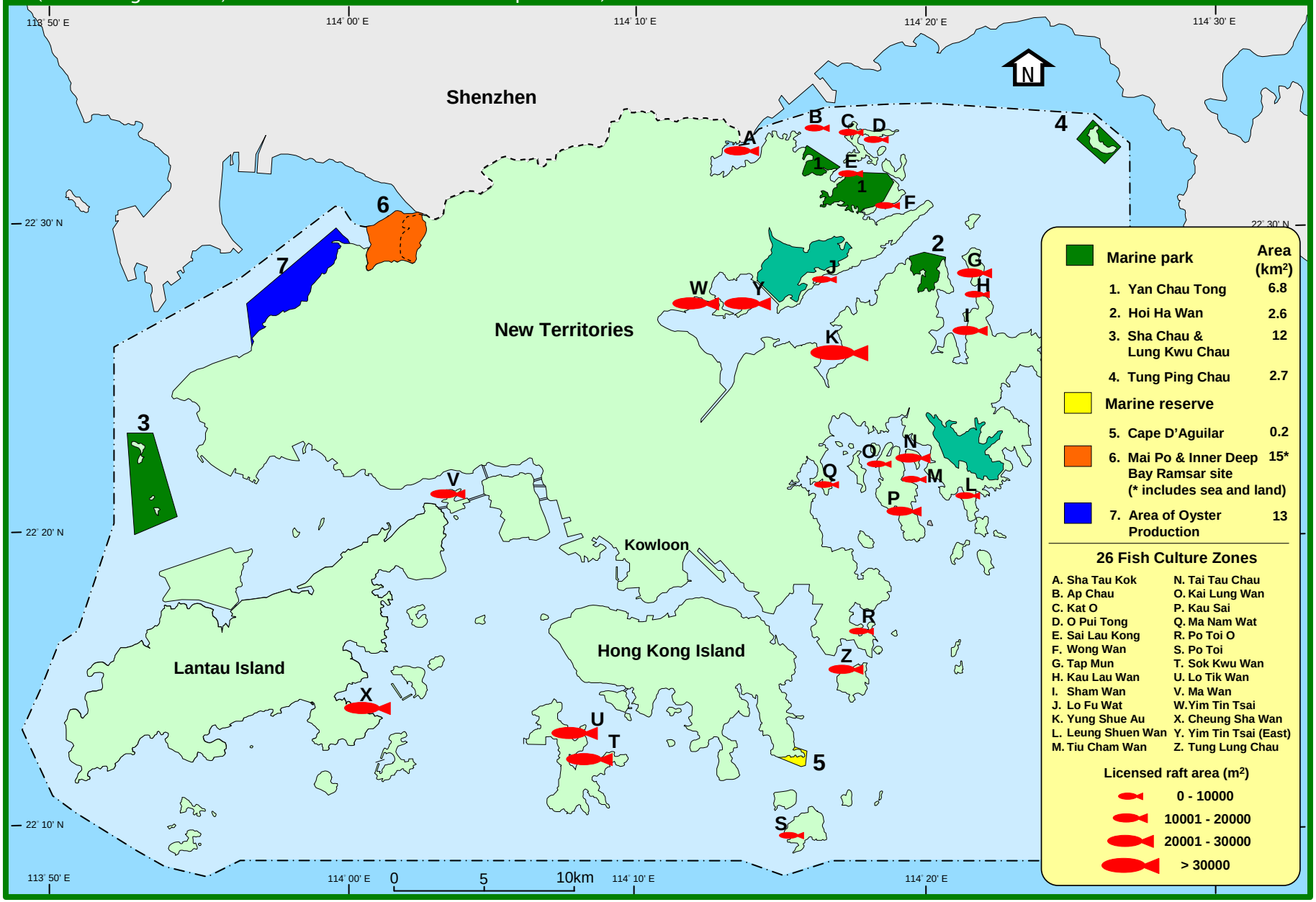
Note : 1. All locations are based on WGS84 datum

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


Bathing beaches and secondary contact recreation subzones in Hong Kong in 2008
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
N
Shenzhen
22° 30' N
New Territories
22° 20' N
Kowloon
Lantau Island
Hong Kong Island
22° 10' N
0
5
10km
Gazetted beach
Secondary contact recreation subzone (Area: approx. 260km2)

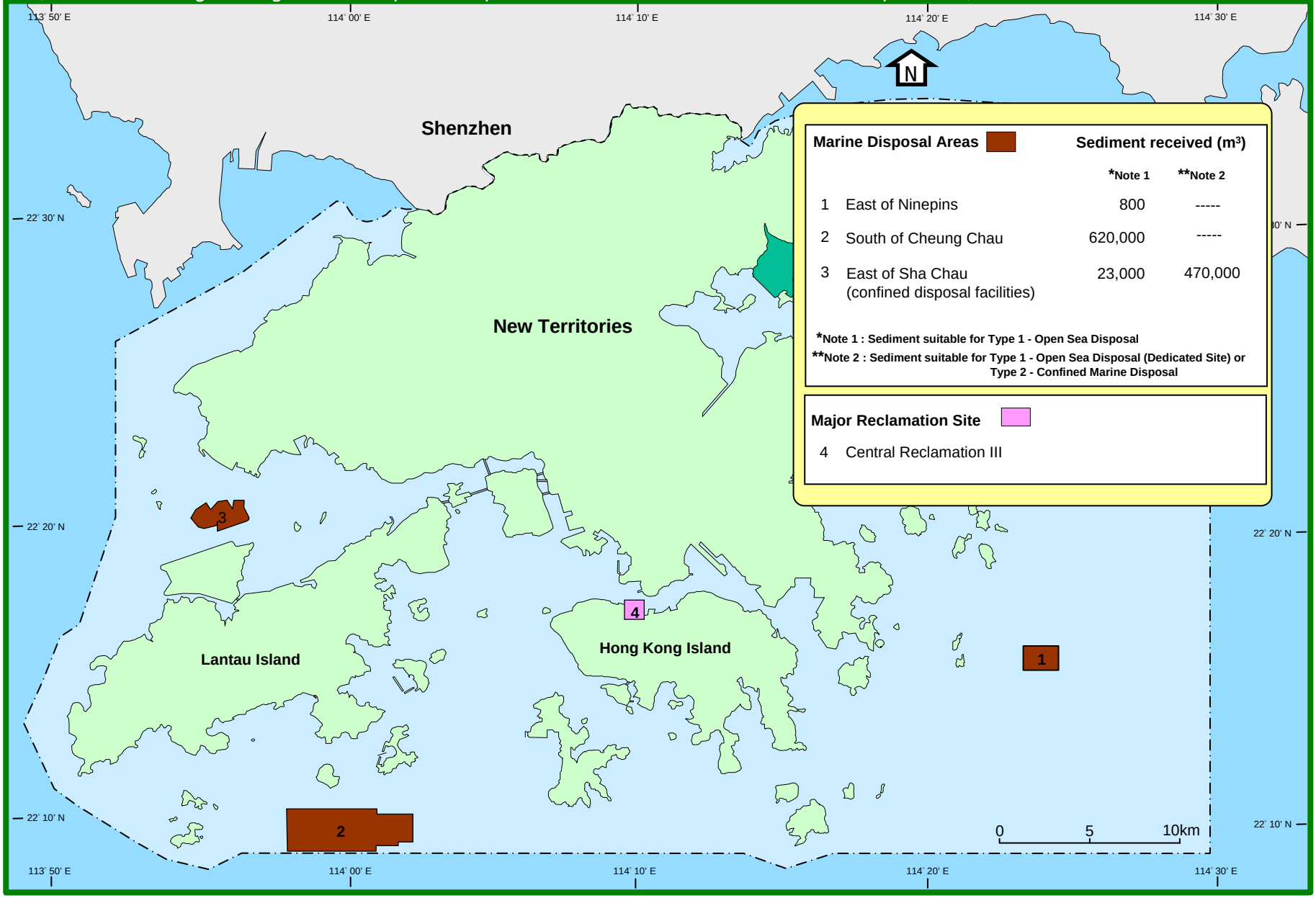
Fish and shellfish culture zones and marine conservation sites in Hong Kong in 2008

(source: Agriculture, Fisheries and Conservation Department)



Marine disposal areas and major reclamation sites in Hong Kong in 2008

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



Marine Disposal Areas		Sediment received (m^3)	
		*Note 1	**Note 2
1	East of Ninepins	800	-----
2	South of Cheung Chau	620,000	-----
3	East of Sha Chau (confined disposal facilities)	23,000	470,000

*Note 1 : Sediment suitable for Type 1 - Open Sea Disposal

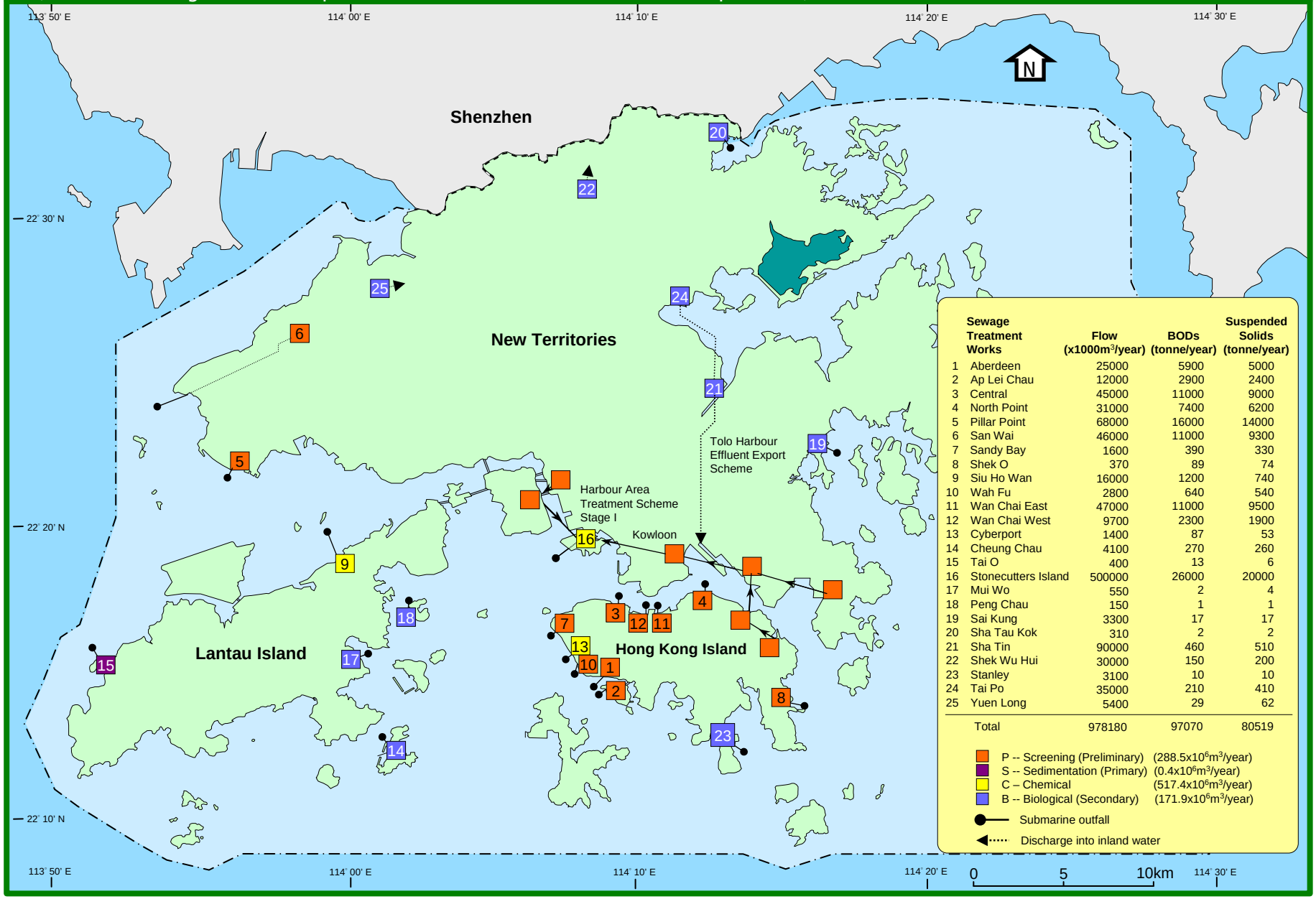
**Note 2 : Sediment suitable for Type 1 - Open Sea Disposal (Dedicated Site) or Type 2 - Confined Marine Disposal

Major Reclamation Site

4 Central Reclamation III

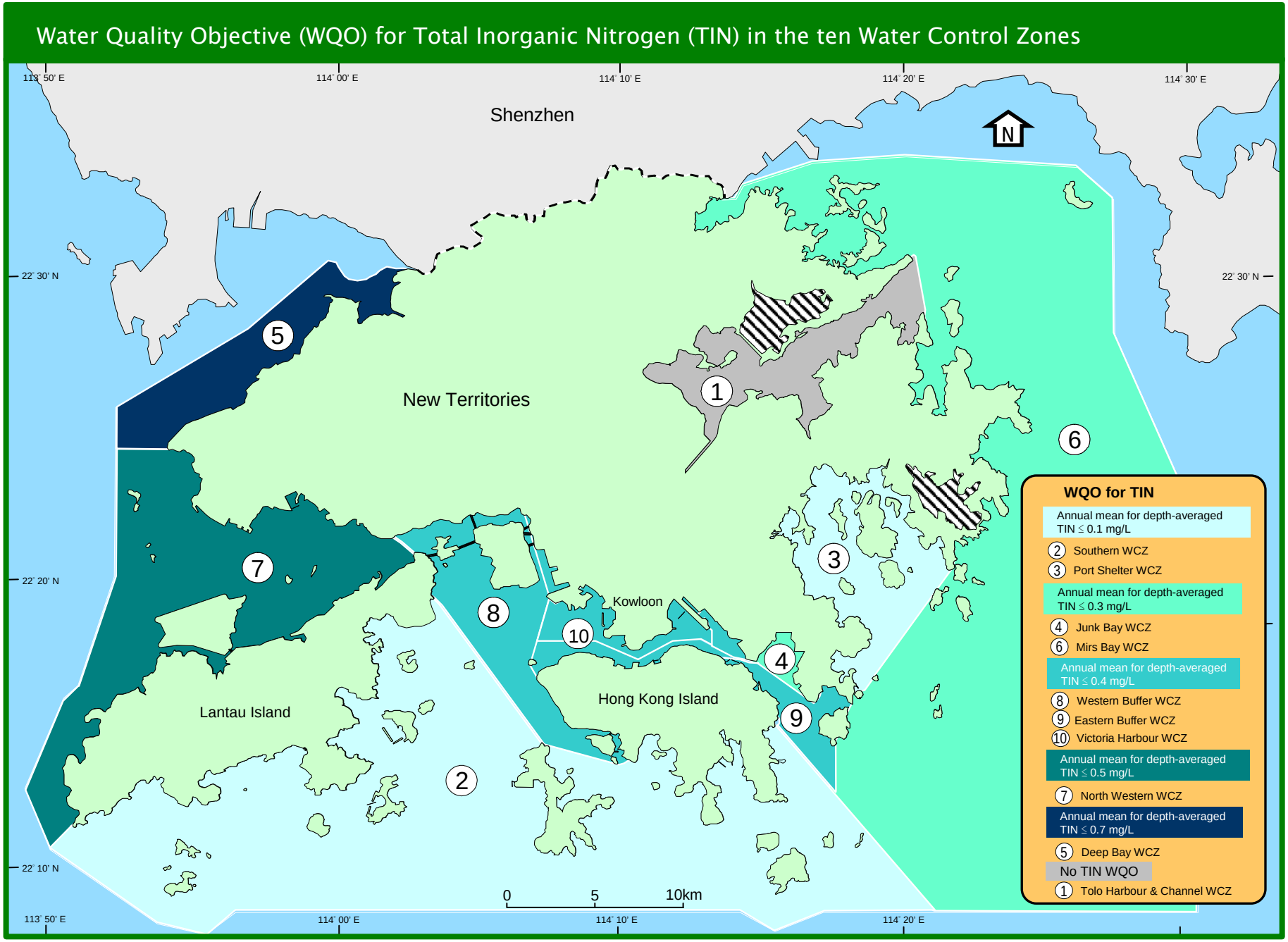
Major public sewage treatment works, outfalls, and pollution load in Hong Kong in 2008

(sources: Drainage Services Department and Environmental Protection Department)



	Sewage Treatment Works	Flow (x1000m³/year)	BODs (tonne/year)	Suspended Solids (tonne/year)
1	Aberdeen	25000	5900	5000
2	Ap Lei Chau	12000	2900	2400
3	Central	45000	11000	9000
4	North Point	31000	7400	6200
5	Pillar Point	68000	16000	14000
6	San Wai	46000	11000	9300
7	Sandy Bay	1600	390	330
8	Shek O	370	89	74
9	Siu Ho Wan	16000	1200	740
10	Wah Fu	2800	640	540
11	Wan Chai East	47000	11000	9500
12	Wan Chai West	9700	2300	1900
13	Cyberport	1400	87	53
14	Cheung Chau	4100	270	260
15	Tai O	400	13	6
16	Stonecutters Island	500000	26000	20000
17	Mui Wo	550	2	4
18	Peng Chau	150	1	1
19	Sai Kung	3300	17	17
20	Sha Tau Kok	310	2	2
21	Sha Tin	90000	460	510
22	Shek Wu Hui	30000	150	200
23	Stanley	3100	10	10
24	Tai Po	35000	210	410
25	Yuen Long	5400	29	62
	Total	978180	97070	80519

P -- Screening (Preliminary) (288.5x10⁶m³/year)
S -- Sedimentation (Primary) (0.4x10⁶m³/year)
C – Chemical (517.4x10⁶m³/year)
B -- Biological (Secondary) (171.9x10⁶m³/year)
Submarine outfall
Discharge into inland water


Water Quality Objective (WQO) for Total Inorganic Nitrogen (TIN) in the ten Water Control Zones
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
Shenzhen
New Territories
Kowloon
Hong Kong Island
Lantau Island
1
2
3
4
5
6
7
8
9
10
0
5
10km
WQO for TIN
Annual mean for depth-averaged TIN ≤ 0.1 mg/L
2 Southern WCZ
3 Port Shelter WCZ
Annual mean for depth-averaged TIN ≤ 0.3 mg/L
4 Junk Bay WCZ
6 Mirs Bay WCZ
Annual mean for depth-averaged TIN ≤ 0.4 mg/L
8 Western Buffer WCZ
9 Eastern Buffer WCZ
10 Victoria Harbour WCZ
Annual mean for depth-averaged TIN ≤ 0.5 mg/L
7 North Western WCZ
Annual mean for depth-averaged TIN ≤ 0.7 mg/L
5 Deep Bay WCZ
No TIN WQO
1 Tolo Harbour & Channel WCZ

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 methods GL-IN-14 and GL-IN-15 respectively based on ASTM D3590-89 B (FIA) and 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 methods GL-IN-14 and GL-IN-16 respectively based on ASTM D515-88 B (FIA) and 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) are 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 seabed
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.1012-1016; ii) K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383
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; ii) B.S.W. Ho and T.Y. Tam (1997), Enumeration of E. coli in environmental waters and wastewater using a chromogenic medium. Wat. Sci. Tech.Vol.35, No.11-12, pp.409-413; method adopted in 1997.
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 - 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. ii) Utermohl, H. 1958. Zur Vervollkommung der Quantitativen Phytoplankton-Methodik. Mitt. Inter. Verein. Lim. Vol. 9, pp. 1-38.
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-47 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 methods GL-IN-14 and GL-IN-15 respectively based on ASTM D3590-89 B (FIA) and APHA 20ed 4500-N A&D (FIA)	GL
	Total Phosphorus	mg/kg	0.2	In-house methods GL-IN-14 and GL-IN-16 respectively based on ASTM D515-88 B (FIA) and 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 methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Arsenic (As)	mg/kg	0.1	In-house methods GL-TE-64 and GL-TE-66 based on USEPA method 6020 (ICP-MS)	GL
	Barium (Ba)	mg/kg	0.2	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Boron (B)	mg/kg	5	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	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 methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Copper (Cu)	mg/kg	0.2	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Iron (Fe)	mg/kg	5	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Lead (Pb)	mg/kg	0.2	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Manganese (Mn)	mg/kg	1	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Mercury (Hg)	mg/kg	0.05	In-house methods GL-TE-64 and GL-TE-66 based on USEPA method 6020 (ICP-MS)	GL
	Nickel (Ni)	mg/kg	0.2	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 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 methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 6020 (ICP-MS)	GL
	Zinc (Zn)	mg/kg	0.2	In-house methods GL-TE-60 and GL-TE-64 respectively based on USEPA methods 6010B (ICP-AES) and 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 (0.023sq.m) grab / Van Veen (0.1sq.m) grab / Smith-McIntyre (0.1sq.m) 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 Government Laboratory's in-house method GL-TE-51.
6. MMT/EPD - Marine Monitoring Team, Water Policy and Science Group, Environmental Protection Department.
7. GL - 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 2008

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)		23.4 (15.2 - 30.2)	23.2 (14.9 - 29.5)	23.1 (14.5 - 29.8)	22.6 (14.0 - 27.9)	22.8 (14.4 - 28.6)	22.6 (14.3 - 27.9)	22.5 (14.0 - 27.9)
Salinity		31.4 (29.5 - 32.5)	31.7 (30.2 - 32.7)	31.8 (30.3 - 32.8)	32.2 (31.0 - 33.1)	32.0 (30.7 - 33.0)	32.2 (31.1 - 33.1)	32.3 (31.2 - 33.4)
Dissolved Oxygen (mg/L)		8.0 (5.8 - 12.9)	7.7 (5.0 - 12.1)	7.6 (4.8 - 12.1)	7.0 (5.0 - 10.1)	6.9 (4.3 - 10.2)	7.0 (5.4 - 9.8)	7.0 (5.3 - 9.9)
	Bottom	6.8 (2.6 - 11.3)	6.8 (1.7 - 11.5)	6.7 (1.6 - 11.6)	6.0 (2.6 - 10.0)	5.9 (2.6 - 10.0)	6.1 (2.7 - 9.6)	6.1 (3.3 - 9.5)
Dissolved Oxygen (% Saturation)		112 (87 - 156)	107 (75 - 146)	105 (72 - 144)	96 (73 - 124)	95 (64 - 121)	96 (80 - 122)	97 (79 - 123)
	Bottom	94 (37 - 135)	94 (25 - 137)	92 (23 - 138)	81 (39 - 118)	80 (36 - 119)	83 (40 - 118)	83 (46 - 117)
pH		8.3 (7.8 - 8.6)	8.3 (7.8 - 8.5)	8.3 (7.8 - 8.5)	8.2 (7.8 - 8.4)	8.3 (7.8 - 8.5)	8.2 (7.8 - 8.4)	8.2 (7.8 - 8.4)
Secchi Disc Depth (m)		2.2 (1.3 - 3.1)	2.5 (1.8 - 3.5)	2.8 (1.8 - 4.5)	3.4 (1.2 - 5.5)	3.1 (1.5 - 5.0)	3.3 (1.8 - 6.9)	3.9 (1.5 - 7.5)
Turbidity (NTU)		7.5 (2.2 - 13.4)	6.2 (1.3 - 9.1)	5.4 (0.9 - 8.5)	5.6 (0.8 - 8.7)	6.9 (2.0 - 8.9)	6.2 (1.0 - 10.1)	6.2 (1.4 - 9.4)
Suspended Solids (mg/L)		5.1 (2.2 - 10.6)	2.7 (1.9 - 5.7)	1.8 (0.8 - 3.1)	2.1 (0.7 - 5.4)	3.6 (1.5 - 5.7)	2.4 (0.9 - 4.0)	2.9 (0.9 - 5.6)
5-day Biochemical Oxygen Demand (mg/L)		1.7 (0.9 - 3.1)	1.2 (0.6 - 2.0)	1.3 (0.7 - 2.2)	0.8 (0.4 - 1.3)	0.8 (0.4 - 1.6)	0.8 (0.3 - 1.4)	0.7 (0.2 - 1.3)
Ammonia Nitrogen (mg/L)		0.05 (0.01 - 0.13)	0.03 (0.01 - 0.11)	0.02 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.04)
Unionised Ammonia (mg/L)		0.004 (<0.001 - 0.008)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.001 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.004 (0.002 - 0.009)	0.003 (0.002 - 0.008)	0.003 (0.002 - 0.005)	0.004 (0.002 - 0.009)	0.007 (0.002 - 0.044)	0.006 (0.002 - 0.029)	0.005 (0.002 - 0.017)
Nitrate Nitrogen (mg/L)		0.039 (0.002 - 0.153)	0.020 (0.002 - 0.065)	0.011 (0.002 - 0.051)	0.024 (0.002 - 0.123)	0.028 (0.002 - 0.123)	0.024 (0.002 - 0.137)	0.023 (0.002 - 0.143)
Total Inorganic Nitrogen (mg/L)		0.09 (0.02 - 0.24)	0.05 (0.01 - 0.18)	0.04 (0.01 - 0.08)	0.06 (0.01 - 0.15)	0.06 (0.01 - 0.15)	0.06 (0.01 - 0.17)	0.05 (0.01 - 0.17)
Total Kjeldahl Nitrogen (mg/L)		0.30 (0.21 - 0.37)	0.25 (0.18 - 0.32)	0.22 (0.15 - 0.30)	0.19 (0.13 - 0.26)	0.20 (0.15 - 0.24)	0.19 (0.15 - 0.23)	0.18 (0.14 - 0.24)
Total Nitrogen (mg/L)		0.34 (0.21 - 0.48)	0.27 (0.21 - 0.39)	0.24 (0.15 - 0.31)	0.22 (0.13 - 0.30)	0.24 (0.20 - 0.31)	0.22 (0.15 - 0.32)	0.21 (0.16 - 0.32)
Orthophosphate Phosphorus (mg/L)		0.008 (0.003 - 0.016)	0.006 (0.003 - 0.013)	0.006 (0.002 - 0.012)	0.007 (0.005 - 0.012)	0.007 (0.005 - 0.013)	0.007 (0.005 - 0.011)	0.007 (0.002 - 0.013)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.05)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		0.5 (0.1 - 1.3)	0.4 (0.1 - 1.3)	0.4 (0.1 - 1.3)	0.6 (0.2 - 1.1)	0.6 (0.2 - 1.4)	0.6 (0.3 - 1.0)	0.5 (0.1 - 1.0)
Chlorophyll-a (µg/L)		10.5 (1.2 - 23.7)	5.8 (0.9 - 17.0)	6.1 (1.5 - 11.0)	2.9 (0.9 - 6.8)	2.9 (1.6 - 6.2)	3.2 (1.1 - 5.8)	2.5 (1.4 - 4.3)
E.coli (count/100mL)		21 (3 - 74)	2 (1 - 12)	1 (1 - 2)	1 (1 - 5)	1 (1 - 3)	1 (1 - 3)	1 (1 - 5)
Faecal Coliforms (count/100mL)		53 (10 - 720)	3 (1 - 52)	2 (1 - 13)	2 (1 - 15)	2 (1 - 6)	2 (1 - 10)	1 (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 Mirs Bay WCZ in 2008 (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	11	11	11	11	12
Temperature (°C)		22.4 (14.1 - 26.9)	22.5 (13.8 - 26.7)	22.5 (13.3 - 26.4)	22.4 (13.7 - 26.5)	22.2 (14.3 - 26.8)	22.2 (14.3 - 27.0)	22.7 (14.0 - 29.3)
Salinity		32.7 (31.7 - 33.9)	32.4 (30.2 - 33.9)	32.4 (27.8 - 34.2)	32.6 (31.5 - 34.2)	32.6 (31.2 - 33.8)	32.3 (31.2 - 33.5)	32.1 (30.7 - 33.0)
Dissolved Oxygen (mg/L)		6.7 (4.5 - 9.6)	6.7 (4.8 - 8.9)	6.7 (5.1 - 8.6)	6.6 (5.2 - 8.8)	6.7 (4.7 - 9.9)	6.9 (5.1 - 10.5)	7.3 (4.9 - 11.2)
	Bottom	6.3 (3.9 - 9.2)	6.4 (4 - 8.8)	6.3 (4.2 - 8.8)	6.2 (4.2 - 8.7)	6.1 (3.1 - 9.4)	6.3 (4.1 - 10.5)	6.8 (2.4 - 11.1)
Dissolved Oxygen (% Saturation)		93 (65 - 122)	93 (68 - 116)	93 (75 - 112)	92 (75 - 114)	92 (69 - 125)	94 (74 - 132)	101 (73 - 132)
	Bottom	86 (55 - 117)	88 (57 - 112)	86 (59 - 110)	85 (58 - 113)	83 (45 - 121)	85 (58 - 130)	94 (34 - 131)
pH		8.3 (8.1 - 8.4)	8.3 (8.1 - 8.4)	8.3 (8.1 - 8.4)	8.2 (8.1 - 8.4)	8.3 (8.1 - 8.4)	8.2 (8.0 - 8.4)	8.2 (7.8 - 8.4)
Secchi Disc Depth (m)		3.4 (1.5 - 7.0)	3.7 (1.5 - 7.2)	3.8 (1.5 - 9.6)	3.8 (1.5 - 9.8)	4.2 (2.0 - 10.0)	3.9 (1.5 - 7.0)	3.2 (2.0 - 4.5)
Turbidity (NTU)		7.3 (2.4 - 12.7)	7.2 (2.0 - 10.6)	8.1 (2.7 - 15.4)	8.4 (3.4 - 14.1)	8.1 (1.7 - 20.3)	8.0 (1.9 - 17.1)	5.6 (1.3 - 9.1)
Suspended Solids (mg/L)		3.1 (1.1 - 4.4)	3.4 (1.2 - 6.0)	3.2 (1.0 - 9.2)	3.4 (0.5 - 6.2)	2.5 (0.6 - 5.9)	2.4 (1.0 - 4.4)	1.9 (1.4 - 2.9)
5-day Biochemical Oxygen Demand (mg/L)		0.7 (0.3 - 1.9)	0.5 (0.2 - 0.9)	0.5 (0.1 - 1.0)	0.5 (0.2 - 1.1)	0.5 (0.2 - 0.8)	0.6 (0.1 - 1.2)	0.9 (0.3 - 1.8)
Ammonia Nitrogen (mg/L)		0.02 (0.01 - 0.05)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.05)	0.02 (0.01 - 0.04)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.006)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.008 (0.002 - 0.033)	0.0102 (0.002 - 0.046)	0.010 (0.002 - 0.041)	0.010 (0.002 - 0.035)	0.007 (0.002 - 0.013)	0.006 (0.002 - 0.017)	0.003 (0.002 - 0.007)
Nitrate Nitrogen (mg/L)		0.050 (0.005 - 0.207)	0.069 (0.005 - 0.223)	0.074 (0.002 - 0.237)	0.060 (0.002 - 0.230)	0.043 (0.004 - 0.197)	0.038 (0.002 - 0.170)	0.016 (0.002 - 0.070)
Total Inorganic Nitrogen (mg/L)		0.08 (0.01 - 0.22)	0.10 (0.01 - 0.29)	0.11 (0.02 - 0.31)	0.09 (0.02 - 0.24)	0.07 (0.02 - 0.21)	0.07 (0.02 - 0.19)	0.04 (0.01 - 0.10)
Total Kjeldahl Nitrogen (mg/L)		0.15 (0.12 - 0.20)	0.16 (0.11 - 0.19)	0.14 (0.09 - 0.19)	0.15 (0.08 - 0.20)	0.14 (0.11 - 0.19)	0.15 (0.11 - 0.21)	0.20 (0.17 - 0.25)
Total Nitrogen (mg/L)		0.21 (0.13 - 0.35)	0.24 (0.11 - 0.43)	0.22 (0.09 - 0.45)	0.21 (0.09 - 0.39)	0.19 (0.12 - 0.34)	0.19 (0.15 - 0.32)	0.22 (0.18 - 0.29)
Orthophosphate Phosphorus (mg/L)		0.010 (0.006 - 0.018)	0.010 (0.006 - 0.019)	0.010 (0.007 - 0.020)	0.010 (0.006 - 0.020)	0.009 (0.006 - 0.018)	0.009 (0.005 - 0.014)	0.007 (0.003 - 0.011)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.04)	0.02 (0.02 - 0.04)	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)		0.6 (0.1 - 1.2)	0.6 (0.1 - 1.4)	0.6 (0.1 - 1.4)	0.7 (0.1 - 1.3)	0.6 (0.1 - 1.2)	0.6 (0.2 - 1.3)	0.5 (0.2 - 1.1)
Chlorophyll-a (µg/L)		2.6 (0.7 - 10.1)	2.3 (0.3 - 8.3)	1.9 (0.6 - 9.5)	1.5 (0.4 - 5.8)	1.6 (0.6 - 3.8)	1.8 (0.9 - 3.2)	4.1 (1.6 - 9.2)
E.coli (count/100mL)		1 (1 - 8)	2 (1 - 12)	1 (1 - 10)	1 (1 - 15)	1 (1 - 12)	1 (1 - 11)	1 (1 - 4)
Faecal Coliforms (count/100mL)		2 (1 - 24)	2 (1 - 39)	2 (1 - 24)	2 (1 - 51)	1 (1 - 31)	2 (1 - 31)	1 (1 - 4)

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 2008

Parameter		Inner Port Shelter PM1	Inner Port Shelter PM2	Inner Port Shelter PM3	Inner Port Shelter PM4	Hebe Haven PM6
Number of samples		12	12	12	12	12
Temperature (°C)		23.1 (14.6 - 28.3)	23.5 (14.3 - 30.1)	22.8 (14.3 - 27.6)	23.0 (14.2 - 28.1)	22.7 (14.2 - 27.7)
Salinity		32.2 (30.7 - 33.1)	31.8 (27.9 - 33.1)	32.4 (31.3 - 33.2)	32.4 (30.9 - 33.1)	32.3 (31.2 - 33.1)
Dissolved Oxygen (mg/L)		7.1 (4.7 - 11.1)	7.2 (4.6 - 11.0)	6.9 (4.4 - 10.9)	7.1 (4.8 - 10.9)	6.9 (4.1 - 10.3)
	Bottom	6.9 (4.0 - 10.8)	7.0 (2.9 - 11.5)	6.0 (2.0 - 10.9)	6.6 (3.0 - 10.8)	5.9 (1.4 - 11.1)
Dissolved Oxygen (% Saturation)		99 (72 - 132)	100 (70 - 133)	96 (66 - 136)	99 (74 - 130)	95 (62 - 127)
	Bottom	94 (60 - 133)	97 (42 - 141)	82 (29 - 134)	90 (45 - 128)	80 (19 - 136)
pH		8.3 (7.8 - 8.6)	8.3 (7.8 - 8.6)	8.3 (7.8 - 8.5)	8.2 (7.8 - 8.5)	8.2 (7.8 - 8.5)
Secchi Disc Depth (m)		2.9 (1.5 - 4.5)	2.9 (1.0 - 5.5)	3.2 (1.2 - 5.6)	2.9 (1.5 - 4.2)	2.8 (1.0 - 4.1)
Turbidity (NTU)		6.1 (0.6 - 11.1)	6.0 (0.8 - 11.0)	6.6 (1.3 - 12.5)	6.6 (0.9 - 12.1)	6.5 (1.1 - 11.8)
Suspended Solids (mg/L)		2.2 (1.2 - 4.1)	2.0 (0.9 - 4.1)	1.9 (0.9 - 2.9)	2.6 (1.2 - 6.2)	2.1 (1.0 - 3.8)
5-day Biochemical Oxygen Demand (mg/L)		1.1 (0.5 - 1.8)	1.1 (0.3 - 2.2)	1.2 (0.3 - 2.8)	1.0 (0.4 - 1.8)	0.9 (0.4 - 1.6)
Ammonia Nitrogen (mg/L)		0.02 (0.01 - 0.03)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.03)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.05)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.005)	0.001 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.005 (0.002 - 0.022)	0.007 (0.002 - 0.038)	0.007 (0.002 - 0.029)	0.007 (0.002 - 0.046)	0.006 (0.002 - 0.030)
Nitrate Nitrogen (mg/L)		0.009 (0.002 - 0.036)	0.018 (0.002 - 0.061)	0.019 (0.003 - 0.050)	0.010 (0.002 - 0.044)	0.019 (0.002 - 0.058)
Total Inorganic Nitrogen (mg/L)		0.04 (0.01 - 0.08)	0.05 (0.01 - 0.10)	0.05 (0.01 - 0.10)	0.04 (0.01 - 0.10)	0.05 (0.02 - 0.09)
Total Kjeldahl Nitrogen (mg/L)		0.19 (0.12 - 0.24)	0.18 (0.12 - 0.25)	0.17 (0.14 - 0.21)	0.18 (0.14 - 0.24)	0.19 (0.13 - 0.29)
Total Nitrogen (mg/L)		0.20 (0.13 - 0.26)	0.21 (0.13 - 0.31)	0.20 (0.15 - 0.26)	0.20 (0.15 - 0.25)	0.22 (0.14 - 0.31)
Orthophosphate Phosphorus (mg/L)		0.006 (0.005 - 0.007)	0.007 (0.004 - 0.008)	0.007 (0.005 - 0.013)	0.007 (0.005 - 0.010)	0.007 (0.005 - 0.019)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.02)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.02)	0.02 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.8 (0.3 - 2.1)	0.8 (0.1 - 2.3)	0.7 (0.2 - 2.1)	0.8 (0.4 - 1.8)	0.7 (0.2 - 2.0)
Chlorophyll-*a* (µg/L)		4.2 (1.7 - 11.9)	4.2 (1.3 - 13.7)	4.0 (1.1 - 13.7)	4.2 (1.3 - 14.7)	3.9 (1.6 - 8.5)
E.coli (count/100mL)		1 (1 - 1)	3 (1 - 66)	1 (1 - 4)	1 (1 - 2)	1 (1 - 3)
Faecal Coliforms (count/100mL)		1 (1 - 3)	19 (3 - 270)	2 (1 - 14)	2 (1 - 5)	3 (1 - 9)

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 2008 (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)		22.3 (13.9 - 27.2)	22.3 (13.9 - 27.3)	22.5 (14.0 - 27.2)	22.4 (13.9 - 27.4)
Salinity		32.7 (32.0 - 33.4)	32.8 (32.0 - 33.5)	32.6 (31.9 - 33.5)	32.9 (32.1 - 33.7)
Dissolved Oxygen (mg/L)		6.6 (4.1 - 9.9)	6.7 (4.3 - 9.4)	6.9 (4.9 - 10.2)	6.7 (4.9 - 9.5)
	Bottom	5.8 (3.1 - 9.6)	5.9 (3.4 - 9.4)	6.1 (3.0 - 9.6)	6.2 (3.9 - 9.3)
Dissolved Oxygen (% Saturation)		91 (60 - 123)	92 (63 - 117)	96 (75 - 128)	92 (73 - 119)
	Bottom	78 (44 - 116)	80 (49 - 110)	83 (42 - 119)	84 (54 - 116)
pH		8.2 (7.8 - 8.5)	8.2 (7.8 - 8.5)	8.3 (7.8 - 8.5)	8.2 (7.8 - 8.5)
Secchi Disc Depth (m)		4.1 (1.4 - 7.7)	3.9 (1.5 - 7.0)	3.7 (2.0 - 5.5)	3.4 (1.7 - 6.0)
Turbidity (NTU)		6.5 (0.7 - 11.3)	6.8 (1.0 - 13.8)	6.6 (0.6 - 14.6)	7.8 (1.3 - 19.3)
Suspended Solids (mg/L)		1.8 (0.7 - 4.0)	2.2 (1.1 - 4.3)	2.0 (0.8 - 3.6)	2.9 (1.2 - 7.1)
5-day Biochemical Oxygen Demand (mg/L)		0.7 (0.2 - 1.3)	0.6 (0.1 - 1.2)	0.9 (0.2 - 2.5)	0.5 (0.1 - 1.0)
Ammonia Nitrogen (mg/L)		0.02 (0.01 - 0.04)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.04)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.001 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.001 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)		0.007 (0.002 - 0.022)	0.008 (0.002 - 0.023)	0.007 (0.002 - 0.033)	0.008 (0.002 - 0.022)
Nitrate Nitrogen (mg/L)		0.033 (0.004 - 0.106)	0.034 (0.006 - 0.126)	0.027 (0.004 - 0.147)	0.035 (0.006 - 0.160)
Total Inorganic Nitrogen (mg/L)		0.06 (0.01 - 0.13)	0.07 (0.02 - 0.16)	0.06 (0.01 - 0.17)	0.06 (0.02 - 0.19)
Total Kjeldahl Nitrogen (mg/L)		0.17 (0.13 - 0.24)	0.15 (0.10 - 0.22)	0.16 (0.12 - 0.22)	0.15 (0.10 - 0.20)
Total Nitrogen (mg/L)		0.21 (0.16 - 0.28)	0.20 (0.13 - 0.28)	0.19 (0.13 - 0.33)	0.20 (0.11 - 0.32)
Orthophosphate Phosphorus (mg/L)		0.009 (0.006 - 0.016)	0.009 (0.007 - 0.014)	0.008 (0.006 - 0.014)	0.009 (0.007 - 0.014)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.03)	0.02 (0.02 - 0.03)	0.02 (0.02 - 0.02)	0.02 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		0.8 (0.4 - 1.8)	0.7 (0.3 - 1.5)	0.7 (0.2 - 1.1)	0.7 (0.2 - 1.1)
Chlorophyll-a (µg/L)		2.7 (0.9 - 5.7)	2.5 (0.6 - 5.0)	2.8 (1.1 - 4.9)	2.2 (1.1 - 5.0)
E.coli (count/100mL)		1 (1 - 1)	1 (1 - 1)	1 (1 - 1)	1 (1 - 1)
Faecal Coliforms (count/100mL)		1 (1 - 4)	1 (1 - 4)	1 (1 - 3)	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 Tolo Harbour WCZ in 2008

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)		23.5 (15.9 - 29.0)	23.2 (15.4 - 28.0)	23.0 (15.2 - 28.5)	23.8 (16.4 - 29.4)	22.6 (15.0 - 28.2)	22.7 (14.8 - 28.2)	22.2 (14.6 - 27.8)
Salinity		30.4 (27.8 - 31.7)	31.4 (29.5 - 32.2)	31.4 (30.0 - 32.8)	31.1 (27.5 - 32.3)	31.8 (30.0 - 32.8)	31.8 (30.3 - 32.7)	32.1 (30.4 - 33.2)
Dissolved Oxygen (mg/L)		7.8 (6.0 - 9.3)	7.2 (5.4 - 9.4)	7.0 (4.2 - 9.8)	7.1 (5.7 - 8.9)	6.4 (4.0 - 9.1)	6.7 (4.6 - 9.5)	6.3 (3.7 - 9.6)
	Bottom	7.5 (3.0 - 9.4)	5.7 (0.8 - 9.3)	5.4 (0.7 - 9.9)	7.0 (5.4 - 8.7)	5.0 (1.0 - 8.6)	5.5 (1.8 - 9.3)	5.1 (1.8 - 9.2)
Dissolved Oxygen (% Saturation)		109 (77 - 130)	100 (80 - 114)	96 (64 - 119)	99 (84 - 111)	87 (59 - 110)	92 (67 - 114)	86 (54 - 115)
	Bottom	104 (44 - 127)	78 (12 - 111)	73 (10 - 119)	98 (80 - 110)	67 (14 - 105)	74 (26 - 111)	68 (26 - 109)
pH		8.3 (8.1 - 8.6)	8.3 (8.1 - 8.5)	8.3 (8.0 - 8.5)	8.2 (7.1 - 8.7)	8.3 (8.0 - 8.5)	8.3 (8.0 - 8.5)	8.3 (8.0 - 8.4)
Secchi Disc Depth (m)		2.5 (1.7 - 3.5)	2.5 (1.7 - 4.4)	2.6 (1.5 - 3.5)	2.7 (1.6 - 4.3)	2.8 (1.9 - 3.9)	3.0 (1.9 - 4.4)	3.3 (2.2 - 5.0)
Turbidity (NTU)		7.8 (1.3 - 28.6)	6.2 (1.6 - 13.0)	6.7 (1.3 - 18.5)	6.2 (1.5 - 9.3)	5.8 (1.2 - 10.3)	5.9 (1.2 - 12.3)	6.2 (1.4 - 11.0)
Suspended Solids (mg/L)		2.4 (1.1 - 4.0)	2.1 (0.7 - 3.1)	2.1 (1.2 - 3.6)	3.5 (0.9 - 16.0)	2.0 (1.1 - 3.2)	2.2 (1.0 - 3.8)	2.1 (1.2 - 2.8)
5-day Biochemical Oxygen Demand (mg/L)		1.7 (0.6 - 3.2)	1.6 (0.5 - 3.3)	1.7 (0.3 - 3.0)	1.7 (0.6 - 3.3)	1.3 (0.7 - 2.4)	1.1 (0.1 - 2.1)	0.7 (0.1 - 1.3)
Ammonia Nitrogen (mg/L)		0.04 (0.01 - 0.10)	0.03 (0.01 - 0.08)	0.03 (0.01 - 0.07)	0.03 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.03 (0.01 - 0.07)
Unionised Ammonia (mg/L)		0.004 (<0.001 - 0.016)	0.003 (<0.001 - 0.009)	0.002 (<0.001 - 0.006)	0.003 (<0.001 - 0.011)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.007)
Nitrite Nitrogen (mg/L)		0.004 (0.002 - 0.024)	0.003 (0.002 - 0.010)	0.005 (0.002 - 0.024)	0.004 (0.002 - 0.020)	0.008 (0.002 - 0.044)	0.006 (0.002 - 0.030)	0.011 (0.002 - 0.039)
Nitrate Nitrogen (mg/L)		0.016 (0.002 - 0.065)	0.011 (0.002 - 0.072)	0.013 (0.002 - 0.048)	0.005 (0.002 - 0.014)	0.019 (0.002 - 0.061)	0.014 (0.002 - 0.061)	0.026 (0.002 - 0.101)
Total Inorganic Nitrogen (mg/L)		0.06 (0.02 - 0.190	0.05 (0.02 - 0.13)	0.05 (0.01 - 0.12)	0.04 (0.01 - 0.07)	0.06 (0.02 - 0.14)	0.05 (0.01 - 0.09)	0.07 (0.01 - 0.13)
Total Kjeldahl Nitrogen (mg/L)		0.30 (0.26 - 0.39)	0.28 (0.17 - 0.40)	0.28 (0.20 - 0.39)	0.26 (0.19 - 0.37)	0.25 (0.21 - 0.32)	0.23 (0.17 - 0.33)	0.22 (0.13 - 0.31)
Total Nitrogen (mg/L)		0.32 (0.27 - 0.43)	0.29 (0.18 - 0.41)	0.30 (0.20 - 0.42)	0.27 (0.19 - 0.39)	0.27 (0.21 - 0.39)	0.25 (0.17 - 0.38)	0.25 (0.15 - 0.35)
Orthophosphate Phosphorus (mg/L)		0.005 (0.003 - 0.013)	0.006 (0.004 - 0.013)	0.007 (0.004 - 0.023)	0.006 (0.004 - 0.009)	0.007 (0.004 - 0.016)	0.007 (0.003 - 0.015)	0.010 (0.005 - 0.018)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.04)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.04)	0.02 (0.02 - 0.04)	0.03 (0.02 - 0.06)
Silica (as SiO_2) (mg/L)		0.8 (0.1 - 1.8)	0.7 (0.1 - 1.3)	0.8 (0.1 - 1.4)	0.7 (0.2 - 1.4)	0.8 (0.2 - 1.4)	0.7 (0.2 - 1.2)	0.8 (0.3 - 1.6)
Chlorophyll-*a* (µg/L)		8.3 (2.5 - 14.5)	7.5 (1.4 - 14.7)	6.8 (1.5 - 15.7)	6.2 (1.0 - 16.0)	4.3 (1.2 - 10.9)	4.0 (1.5 - 9.0)	3.2 (1.5 - 5.7)
E.coli (count/100mL)		7 (2 - 79)	5 (1 - 58)	2 (1 - 13)	2 (1 - 7)	1 (1 - 2)	1 (1 - 5)	1 (1 - 8)
Faecal Coliforms (count/100mL)		82 (5 - 1100)	22 (1 - 220)	11 (1 - 70)	19 (1 - 200)	4 (1 - 20)	2 (1 - 36)	1 (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 for the Southern WCZ in 2008

Parameter		Hong Kong Island (South)			East Lamma Channel	
		SM1	SM2	SM19	SM3	SM4
Number of samples		12	12	12	12	12
Temperature (°C)		22.7 (13.9 - 26.8)	22.9 (14.1 - 27.2)	22.7 (14.2 - 26.7)	22.5 (14.2 - 26.8)	23.0 (14.3 - 27.2)
Salinity		31.7 (26.3 - 33.8)	31.5 (26.4 - 33.7)	32 (28.5 - 34.0)	31.9 (28.2 - 33.7)	30.8 (24.3 - 33.6)
Dissolved Oxygen (mg/L)		6.6 (4.6 - 9.1)	6.5 (4.0 - 9.7)	6.5 (4.1 - 9.3)	6.2 (3.7 - 9.4)	6.5 (4.4 - 9.7)
	Bottom	5.9 (2.8 - 9.2)	6.1 (3.2 - 9.6)	5.9 (2.9 - 9.0)	5.9 (2.8 - 9.9)	6.0 (2.3 - 9.8)
Dissolved Oxygen (% Saturation)		91 (66 - 115)	90 (59 - 120)	91 (60 - 119)	84 (53 - 116)	90 (64 - 119)
	Bottom	81 (40 - 117)	84 (46 - 122)	81 (43 - 115)	80 (41 - 121)	82 (33 - 120)
pH		8.2 (7.8 - 8.5)	8.1 (7.8 - 8.5)	8.2 (7.8 - 8.5)	8.1 (7.8 - 8.2)	8.1 (7.8 - 8.4)
Secchi Disc Depth (m)		2.6 (1.2 - 4.5)	2.6 (1.0 - 4.5)	2.4 (1.0 - 4.6)	2.3 (1.0 - 4.2)	2.1 (1.0 - 3.0)
Turbidity (NTU)		8.1 (4.2 - 11.1)	8.8 (4.8 - 16.6)	8.9 (4.9 - 13.3)	8.6 (4.5 - 17.6)	8.4 (3.9 - 18.8)
Suspended Solids (mg/L)		4.2 (1.3 - 10.0)	4.1 (1.7 - 12.7)	5.2 (1.6 - 10.6)	4.8 (2.3 - 11.0)	3.5 (1.9 - 7.7)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.3 - 1.2)	0.6 (0.3 - 1.2)	0.5 (0.1 - 1.2)	0.7 (0.3 - 1.3)	0.7 (0.4 - 1.3)
Ammonia Nitrogen (mg/L)		0.03 (0.01 - 0.06)	0.03 (0.01 - 0.06)	0.02 (0.01 - 0.06)	0.04 (0.01 - 0.07)	0.06 (0.02 - 0.11)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.006)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.003 (<0.001 - 0.006)
Nitrite Nitrogen (mg/L)		0.023 (0.002 - 0.110)	0.029 (0.002 - 0.100)	0.023 (0.002 - 0.103)	0.028 (0.002 - 0.103)	0.039 (0.003 - 0.149)
Nitrate Nitrogen (mg/L)		0.133 (0.002 - 0.670)	0.106 (0.007 - 0.317)	0.100 (0.002 - 0.321)	0.109 (0.010 - 0.300)	0.158 (0.016 - 0.431)
Total Inorganic Nitrogen (mg/L)		0.18 (0.01 - 0.84)	0.17 (0.03 - 0.38)	0.15 (0.02 - 0.46)	0.18 (0.03 - 0.42)	0.25 (0.05 - 0.66)
Total Kjeldahl Nitrogen (mg/L)		0.17 (0.12 - 0.23)	0.19 (0.13 - 0.25)	0.18 (0.10 - 0.24)	0.20 (0.15 - 0.29)	0.21 (0.16 - 0.30)
Total Nitrogen (mg/L)		0.33 (0.12 - 0.95)	0.32 (0.16 - 0.55)	0.30 (0.11 - 0.58)	0.33 (0.18 - 0.52)	0.41 (0.20 - 0.79)
Orthophosphate Phosphorus (mg/L)		0.010 (0.006 - 0.017)	0.011 (0.005 - 0.017)	0.011 (0.007 - 0.017)	0.013 (0.007 - 0.017)	0.015 (0.005 - 0.024)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.03)	0.03 (0.02 - 0.04)	0.02 (0.02 - 0.03)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		0.9 (0.3 - 2.8)	0.9 (0.2 - 2.6)	0.8 (0.3 - 2.6)	0.9 (0.2 - 2.6)	1.1 (0.2 - 3.0)
Chlorophyll-*a* (µg/L)		3.0 (0.8 - 7.9)	3.5 (0.6 - 9.4)	3.0 (0.8 - 10.4)	2.9 (0.9 - 6.5)	4.2 (0.9 - 13.1)
E.coli (count/100mL)		2 (1 - 20)	37 (6 - 170)	2 (1 - 8)	32 (6 - 420)	51 (2 - 620)
Faecal Coliforms (count/100mL)		4 (1 - 38)	79 (13 - 300)	2 (1 - 24)	66 (13 - 1000)	100 (3 - 1300)

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 2008 (continued)

		West Lamma Channel				
Parameter		SM5	SM6	SM7	SM9	SM18
Number of samples		12	12	12	12	12
Temperature (°C)		23.4 (14.2 - 28.9)	23.0 (14.1 - 27.1)	23.3 (14.2 - 27.6)	22.8 (14.2 - 27.2)	22.8 (14.0 - 26.9)
Salinity		30.3 (20.8 - 33.7)	30.8 (24.3 - 33.1)	29.7 (20.0 - 33.1)	29.8 (19.5 - 32.9)	31.5 (26.6 - 33.9)
Dissolved Oxygen (mg/L)		6.9 (5.2 - 9.8)	6.5 (4.7 - 9.7)	6.8 (3.5 - 10.9)	6.3 (4.3 - 8.8)	6.5 (4.0 - 9.2)
	Bottom	6.2 (3.2 - 9.7)	5.5 (1.1 - 9.5)	6.1 (2.2 - 10.3)	6.1 (3.7 - 8.7)	5.8 (2.5 - 9.3)
Dissolved Oxygen (% Saturation)		96 (76 - 133)	90 (66 - 118)	94 (51 - 134)	87 (60 - 107)	89 (57 - 113)
	Bottom	85 (46 - 118)	76 (16 - 116)	84 (31 - 127)	83 (53 - 106)	79 (37 - 115)
pH		8.2 (7.9 - 8.6)	8.2 (7.7 - 8.5)	8.1 (7.8 - 8.5)	8.1 (7.7 - 8.2)	8.2 (7.6 - 8.5)
Secchi Disc Depth (m)		2.0 (0.9 - 3.1)	2.0 (0.9 - 3.3)	2.1 (0.9 - 3.0)	1.9 (1.3 - 2.6)	2.2 (1.0 - 3.1)
Turbidity (NTU)		9.8 (5.8 - 19.4)	9.4 (4.3 - 19.0)	10.0 (6.0 - 18.3)	11.7 (4.7 - 33.3)	9.0 (4.6 - 14.7)
Suspended Solids (mg/L)		6.2 (1.9 - 17.0)	5.8 (2.1 - 9.9)	6.2 (2.6 - 14.7)	7.6 (2.6 - 16.7)	5.2 (1.2 - 9.8)
5-day Biochemical Oxygen Demand (mg/L)		0.9 (0.1 - 2.9)	0.7 (0.1 - 1.4)	1.1 (0.2 - 4.5)	0.7 (0.3 - 1.6)	0.7 (0.3 - 2.4)
Ammonia Nitrogen (mg/L)		0.03 (0.01 - 0.05)	0.04 (0.01 - 0.10)	0.08 (0.01 - 0.21)	0.11 (0.05 - 0.29)	0.02 (0.01 - 0.05)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.006)	0.003 (<0.001 - 0.007)	0.005 (<0.001 - 0.016)	0.006 (<0.001 - 0.020)	0.002 (<0.001 - 0.005)
Nitrite Nitrogen (mg/L)		0.039 (0.002 - 0.183)	0.038 (0.007 - 0.173)	0.050 (0.008 - 0.207)	0.048 (0.015 - 0.150)	0.028 (0.002 - 0.125)
Nitrate Nitrogen (mg/L)		0.171 (0.011 - 0.717)	0.159 (0.010 - 0.628)	0.219 (0.024 - 0.757)	0.209 (0.019 - 0.717)	0.122 (0.002 - 0.407)
Total Inorganic Nitrogen (mg/L)		0.24 (0.04 - 0.94)	0.24 (0.04 - 0.87)	0.35 (0.07 - 1.17)	0.37 (0.11 - 1.15)	0.17 (0.01 - 0.58)
Total Kjeldahl Nitrogen (mg/L)		0.20 (0.13 - 0.28)	0.22 (0.14 - 0.27)	0.28 (0.12 - 0.37)	0.31 (0.22 - 0.52)	0.18 (0.12 - 0.23)
Total Nitrogen (mg/L)		0.41 (0.17 - 1.15)	0.41 (0.18 - 1.04)	0.54 (0.17 - 1.34)	0.57 (0.28 - 1.38)	0.33 (0.14 - 0.72)
Orthophosphate Phosphorus (mg/L)		0.010 (0.004 - 0.017)	0.013 (0.008 - 0.025)	0.017 (0.007 - 0.037)	0.022 (0.012 - 0.033)	0.011 (0.006 - 0.019)
Total Phosphorus (mg/L)		0.02 (0.02 - 0.03)	0.03 (0.02 - 0.04)	0.03 (0.03 - 0.05)	0.04 (0.03 - 0.05)	0.03 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		1.1 (0.2 - 4.1)	1.1 (0.3 - 3.4)	1.4 (0.2 - 3.7)	1.3 (0.3 - 4.1)	0.9 (0.2 - 2.9)
Chlorophyll-*a* (µg/L)		5.4 (1.1 - 16.5)	4.9 (1.2 - 12.7)	7.3 (1.0 - 26.0)	3.5 (0.6 - 12.7)	3.6 (0.6 - 11.4)
E.coli (count/100mL)		2 (1 - 140)	2 (1 - 150)	15 (1 - 1000)	89 (8 - 2000)	2 (1 - 15)
Faecal Coliforms (count/100mL)		5 (1 - 300)	4 (1 - 330)	30 (1 - 2700)	190 (20 - 4700)	2 (1 - 31)

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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 2008 (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)		22.8 (13.6 - 28.2)	22.9 (13.5 - 28.6)	23.0 (13.7 - 28.9)	23.0 (13.9 - 29.0)	22.8 (14.1 - 27.6)	22.7 (14.0 - 27.0)
Salinity		29.3 (16.8 - 32.8)	29.3 (14.9 - 32.9)	29.5 (14.9 - 32.9)	29.4 (13.9 - 32.9)	31.2 (25.5 - 33.8)	30.4 (21.9 - 33.1)
Dissolved Oxygen (mg/L)		6.8 (4.1 - 10.1)	6.8 (4.3 - 9.7)	6.8 (4.5 - 9.8)	6.8 (4.7 - 9.8)	6.4 (3.5 - 10.0)	6.4 (3.9 - 9.5)
	Bottom	6.7 (3.2 - 10.1)	6.3 (2.8 - 9.3)	6.6 (3.0 - 9.7)	6.7 (3.3 - 9.6)	6.0 (2.1 - 10)	6.1 (2.0 - 9.7)
Dissolved Oxygen (% Saturation)		92 (58 - 125)	93 (61 - 122)	93 (63 - 121)	93 (66 - 122)	88 (49 - 123)	87 (53 - 117)
	Bottom	91 (46 - 124)	86 (40 - 114)	91 (43 - 119)	92 (48 - 118)	82 (30 - 122)	83 (29 - 119)
pH		8.1 (7.7 - 8.3)	8.1 (7.7 - 8.3)	8.1 (7.7 - 8.3)	8.2 (7.7 - 8.4)	8.1 (7.7 - 8.3)	8.1 (7.7 - 8.3)
Secchi Disc Depth (m)		1.9 (1.1 - 2.6)	2.1 (1.0 - 3.4)	1.8 (1.0 - 3.2)	1.9 (1.0 - 2.4)	2.1 (1.2 - 2.8)	1.9 (1.1 - 2.5)
Turbidity (NTU)		10.6 (5.5 - 15.8)	12.0 (4.5 - 20.1)	13.5 (8.8 - 21.9)	11.7 (7.9 - 19.5)	11.1 (5.8 - 26.8)	14.2 (8.3 - 35.6)
Suspended Solids (mg/L)		7.3 (2.1 - 19.0)	8.3 (2.2 - 18.7)	11.6 (2.8 - 21.0)	8.6 (3.0 - 16.7)	5.6 (2.7 - 12.3)	12.4 (3.5 - 36.3)
5-day Biochemical Oxygen Demand (mg/L)		0.8 (0.3 - 1.9)	0.8 (0.3 - 1.9)	0.7 (0.2 - 1.8)	0.7 (0.2 - 1.5)	0.6 (0.1 - 1.5)	0.7 (0.2 - 1.3)
Ammonia Nitrogen (mg/L)		0.11 (0.03 - 0.30)	0.10 (0.03 - 0.26)	0.07 (0.02 - 0.21)	0.06 (0.01 - 0.21)	0.03 (0.01 - 0.10)	0.05 (0.01 - 0.12)
Unionised Ammonia (mg/L)		0.005 (<0.001 - 0.022)	0.006 (<0.001 - 0.022)	0.004 (<0.001 - 0.018)	0.004 (<0.001 - 0.016)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.007)
Nitrite Nitrogen (mg/L)		0.049 (0.013 - 0.170)	0.047 (0.014 - 0.170)	0.041 (0.006 - 0.160)	0.038 (0.005 - 0.150)	0.022 (0.002 - 0.046)	0.034 (0.005 - 0.071)
Nitrate Nitrogen (mg/L)		0.213 (0.020 - 0.800)	0.200 (0.019 - 0.790)	0.194 (0.019 - 0.940)	0.193 (0.019 - 0.977)	0.126 (0.009 - 0.537)	0.196 (0.019 - 0.853)
Total Inorganic Nitrogen (mg/L)		0.37 (0.11 - 1.27)	0.35 (0.09 - 1.22)	0.31 (0.07 - 1.31)	0.29 (0.06 - 1.33)	0.18 (0.04 - 0.65)	0.28 (0.06 - 1.03)
Total Kjeldahl Nitrogen (mg/L)		0.32 (0.24 - 0.53)	0.31 (0.20 - 0.51)	0.27 (0.15 - 0.46)	0.26 (0.14 - 0.42)	0.20 (0.15 - 0.27)	0.24 (0.16 - 0.35)
Total Nitrogen (mg/L)		0.58 (0.27 - 1.50)	0.56 (0.24 - 1.47)	0.51 (0.19 - 1.56)	0.49 (0.17 - 1.53)	0.35 (0.17 - 0.80)	0.47 (0.19 - 1.27)
Orthophosphate Phosphorus (mg/L)		0.021 (0.008 - 0.038)	0.022 (0.006 - 0.036)	0.016 (0.004 - 0.028)	0.014 (0.005 - 0.028)	0.012 (0.005 - 0.021)	0.013 (0.005 - 0.026)
Total Phosphorus (mg/L)		0.04 (0.03 - 0.05)	0.04 (0.02 - 0.06)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.05)	0.03 (0.02 - 0.03)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)		1.3 (0.2 - 4.1)	1.3 (0.1 - 4.0)	1.3 (0.1 - 4.9)	1.3 (0.1 - 5.2)	1.0 (0.2 - 2.9)	1.3 (0.1 - 4.4)
Chlorophyll-*a* (µg/L)		5.3 (0.9 - 16.0)	5.1 (0.8 - 14.9)	3.5 (1.2 - 10.4)	3.2 (0.9 - 8.3)	2.3 (0.6 - 7.0)	3.5 (0.6 - 11.9)
E.coli (count/100mL)		15 (1 - 1000)	6 (1 - 460)	21 (2 - 200)	5 (1 - 81)	2 (1 - 23)	2 (1 - 75)
Faecal Coliforms (count/100mL)		38 (3 - 2100)	13 (1 - 890)	43 (3 - 480)	9 (1 - 300)	3 (1 - 70)	4 (1 - 240)

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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 2008

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)		23.1 (16.1 - 27.2)	23.4 (16.2 - 27.3)	23.4 (16.2 - 27.1)	23.5 (16.3 - 27.2)	23.5 (16.3 - 27.2)
Salinity		32.0 (29.3 - 33.5)	31.4 (26.3 - 33.2)	31.3 (26.2 - 33.2)	30.9 (25.7 - 32.7)	30.9 (27.1 - 32.7)
Dissolved Oxygen (mg/L)		5.5 (3.1 - 7.1)	5.4 (3.2 - 7.1)	5.3 (3.0 - 7.0)	5.0 (3.0 - 6.2)	5.1 (2.8 - 7.1)
	Bottom	5.4 (2.7 - 7.2)	5.3 (3.0 - 7.0)	4.9 (2.4 - 7.0)	5.0 (3.0 - 6.8)	4.8 (2.5 - 6.6)
Dissolved Oxygen (% Saturation)		77 (45 - 92)	76 (46 - 97)	73 (45 - 94)	70 (45 - 89)	72 (42 - 103)
	Bottom	75 (39 - 90)	75 (43 - 90)	69 (35 - 87)	69 (45 - 85)	67 (36 - 82)
pH		8.1 (7.9 - 8.3)	8.1 (7.9 - 8.3)	8.0 (7.9 - 8.3)	8.0 (7.9 - 8.3)	8.0 (7.8 - 8.3)
Secchi Disc Depth (m)		2.6 (1.8 - 3.2)	2.6 (1.8 - 3.2)	2.5 (1.5 - 3.1)	2.3 (1.8 - 3.3)	2.4 (1.3 - 3.1)
Turbidity (NTU)		8.9 (2.9 - 18.6)	7.4 (2.5 - 11.3)	7.9 (2.6 - 11.9)	7.9 (3.1 - 12.0)	8.1 (3.5 - 11.2)
Suspended Solids (mg/L)		6.2 (1.7 - 13.7)	3.9 (1.9 - 7.5)	5.1 (2.9 - 8.6)	5.0 (2.8 - 8.7)	5.3 (2.7 - 7.3)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.3 - 0.8)	0.7 (0.3 - 1.1)	0.8 (0.3 - 1.4)	1.2 (0.3 - 3.5)	0.8 (0.3 - 1.3)
Ammonia Nitrogen (mg/L)		0.08 (0.03 - 0.13)	0.12 (0.03 - 0.18)	0.13 (0.03 - 0.22)	0.17 (0.05 - 0.27)	0.17 (0.07 - 0.29)
Unionised Ammonia (mg/L)		0.004 (<0.001 - 0.006)	0.006 (<0.001 - 0.012)	0.006 (<0.001 - 0.011)	0.007 (0.001 - 0.010)	0.007 (0.002 - 0.011)
Nitrite Nitrogen (mg/L)		0.024 (0.006 - 0.098)	0.032 (0.009 - 0.140)	0.035 (0.008 - 0.152)	0.039 (0.020 - 0.146)	0.038 (0.019 - 0.133)
Nitrate Nitrogen (mg/L)		0.111 (0.037 - 0.247)	0.146 (0.056 - 0.433)	0.156 (0.047 - 0.450)	0.176 (0.098 - 0.447)	0.168 (0.099 - 0.363)
Total Inorganic Nitrogen (mg/L)		0.22 (0.11 - 0.42)	0.30 (0.14 - 0.71)	0.32 (0.15 - 0.73)	0.39 (0.22 - 0.71)	0.38 (0.21 - 0.62)
Total Kjeldahl Nitrogen (mg/L)		0.24 (0.17 - 0.31)	0.30 (0.18 - 0.39)	0.33 (0.17 - 0.46)	0.40 (0.23 - 0.59)	0.37 (0.28 - 0.46)
Total Nitrogen (mg/L)		0.38 (0.22 - 0.56)	0.48 (0.28 - 0.93)	0.52 (0.26 - 0.96)	0.62 (0.40 - 0.93)	0.58 (0.46 - 0.81)
Orthophosphate Phosphorus (mg/L)		0.020 (0.009 - 0.032)	0.026 (0.008 - 0.040)	0.028 (0.008 - 0.041)	0.032 (0.009 - 0.057)	0.032 (0.007 - 0.048)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.04)	0.04 (0.02 - 0.06)	0.04 (0.02 - 0.06)	0.05 (0.04 - 0.09)	0.05 (0.03 - 0.07)
Silica (as SiO_2) (mg/L)		0.9 (0.4 - 2.1)	1.0 (0.2 - 2.4)	1.0 (0.2 - 2.4)	1.1 (0.1 - 2.7)	1.1 (0.1 - 2.6)
Chlorophyll-*a* (µg/L)		2.7 (0.4 - 11.3)	3.7 (0.4 - 18.3)	3.5 (0.2 - 18.3)	3.9 (0.3 - 19.3)	3.8 (0.5 - 24.0)
E.coli (count/100mL)		330 (76 - 3800)	1100 (76 - 14000)	2900 (370 - 12000)	4200 (840 - 23000)	4500 (990 - 12000)
Faecal Coliforms (count/100mL)		750 (110 - 11000)	2500 (95 - 26000)	6300 (920 - 26000)	10000 (1400 - 81000)	11000 (1900 - 37000)

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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 2008 (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)		22.7 (14.8 - 27.8)	22.6 (14.7 - 27.6)	23.6 (16.5 - 27.2)	22.7 (14.9 - 27.7)	23.0 (14.8 - 28.5)
Salinity		31.0 (26.8 - 33.2)	31.1 (27.1 - 33.2)	30.6 (24.0 - 32.8)	30.8 (26.8 - 32.9)	29.6 (22.5 - 32.7)
Dissolved Oxygen (mg/L)		5.4 (3.0 - 7.8)	5.8 (3.9 - 7.7)	5.2 (2.9 - 6.3)	5.4 (3.2 - 8.0)	5.6 (3.9 - 7.9)
	Bottom	5.3 (2.7 - 7.8)	5.7 (3.5 - 8.1)	4.9 (2.3 - 6.2)	5.4 (2.8 - 8.0)	5.6 (3.4 - 8.0)
Dissolved Oxygen (% Saturation)		74 (45 - 95)	80 (58 - 94)	73 (44 - 91)	75 (48 - 97)	76 (57 - 96)
	Bottom	72 (40 - 95)	78 (52 - 98)	68 (32 - 83)	74 (43 - 98)	77 (50 - 97)
pH		8.0 (7.7 - 8.2)	8.1 (7.9 - 8.2)	8.0 (7.8 - 8.3)	8.0 (7.8 - 8.2)	8.0 (7.8 - 8.2)
Secchi Disc Depth (m)		2.4 (1.5 - 3.0)	2.3 (1.0 - 3.6)	2.3 (1.6 - 3.2)	2.0 (1.0 - 2.7)	2.0 (1.0 - 2.9)
Turbidity (NTU)		8.4 (4.3 - 11.8)	8.9 (3.9 - 12.8)	9.0 (5.0 - 11.9)	11.9 (7.3 - 17.1)	9.6 (4.6 - 14.3)
Suspended Solids (mg/L)		4.6 (2.1 - 6.8)	5.0 (2.7 - 8.6)	6.1 (2.8 - 9.2)	10.2 (6.2 - 16.5)	5.7 (3.0 - 8.2)
5-day Biochemical Oxygen Demand (mg/L)		0.8 (0.2 - 1.5)	0.7 (0.1 - 1.5)	0.8 (0.3 - 1.3)	0.6 (0.1 - 1.4)	0.6 (0.1 - 1.5)
Ammonia Nitrogen (mg/L)		0.19 (0.12 - 0.28)	0.15 (0.04 - 0.25)	0.19 (0.12 - 0.31)	0.16 (0.10 - 0.23)	0.14 (0.06 - 0.22)
Unionised Ammonia (mg/L)		0.008 (0.002 - 0.015)	0.007 (0.001 - 0.013)	0.008 (0.003 - 0.014)	0.007 (0.003 - 0.009)	0.006 (0.002 - 0.009)
Nitrite Nitrogen (mg/L)		0.040 (0.009 - 0.060)	0.041 (0.008 - 0.094)	0.043 (0.021 - 0.177)	0.046 (0.015 - 0.096)	0.064 (0.016 - 0.187)
Nitrate Nitrogen (mg/L)		0.173 (0.049 - 0.310)	0.166 (0.047 - 0.287)	0.182 (0.084 - 0.540)	0.190 (0.070 - 0.317)	0.257 (0.098 - 0.600)
Total Inorganic Nitrogen (mg/L)		0.40 (0.21 - 0.57)	0.35 (0.22 - 0.51)	0.42 (0.25 - 0.87)	0.40 (0.27 - 0.53)	0.46 (0.30 - 0.80)
Total Kjeldahl Nitrogen (mg/L)		0.41 (0.28 - 0.54)	0.32 (0.21 - 0.43)	0.39 (0.30 - 0.49)	0.35 (0.28 - 0.45)	0.31 (0.22 - 0.38)
Total Nitrogen (mg/L)		0.63 (0.34 - 0.81)	0.53 (0.34 - 0.69)	0.62 (0.46 - 1.09)	0.58 (0.45 - 0.72)	0.63 (0.48 - 0.97)
Orthophosphate Phosphorus (mg/L)		0.036 (0.020 - 0.053)	0.028 (0.013 - 0.040)	0.033 (0.010 - 0.049)	0.032 (0.025 - 0.043)	0.031 (0.024 - 0.042)
Total Phosphorus (mg/L)		0.05 (0.03 - 0.07)	0.04 (0.03 - 0.06)	0.05 (0.03 - 0.07)	0.05 (0.04 - 0.07)	0.04 (0.04 - 0.05)
Silica (as SiO_2) (mg/L)		1.2 (0.4 - 2.3)	1.2 (0.4 - 2.2)	1.1 (0.1 - 2.8)	1.3 (0.5 - 2.4)	1.6 (0.7 - 2.9)
Chlorophyll-*a* (µg/L)		1.8 (0.6 - 3.2)	1.8 (1.0 - 2.9)	4.2 (0.4 - 20.7)	1.5 (0.7 - 2.3)	2.0 (0.7 - 3.3)
E.coli (count/100mL)		5100 (290 - 41000)	4300 (410 - 21000)	2300 (440 - 9000)	2800 (760 - 7200)	580 (96 - 2500)
Faecal Coliforms (count/100mL)		13000 (1100 - 140000)	10000 (1100 - 76000)	6100 (800 - 23000)	7500 (2400 - 15000)	1500 (220 - 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.

Summary of water quality statistics for the Eastern Buffer WCZ in 2008

Parameter	Chai Wan	Tathong Channel	
	EM1	EM2	EM3
Number of samples	12	12	12
Temperature (°C)	23.1 (16.0 - 27.0)	23.1 (15.9 - 27.0)	23.1 (15.8 - 26.9)
Salinity	32.5 (31.0 - 33.6)	32.6 (30.8 - 33.6)	32.6 (31.7 - 33.8)
Dissolved Oxygen (mg/L)	5.8 (3.4 - 7.2)	5.9 (3.9 - 7.1)	6.2 (4.6 - 7.3)
Bottom	5.8 (3.6 - 7.2)	5.9 (3.7 - 7.3)	5.9 (4.0 - 7.4)
Dissolved Oxygen (% Saturation)	81 (49 - 96)	83 (56 - 95)	88 (69 - 97)
Bottom	81 (52 - 93)	82 (53 - 96)	82 (55 - 97)
pH	8.1 (8.0 - 8.3)	8.2 (8.0 - 8.3)	8.2 (8.1 - 8.4)
Secchi Disc Depth (m)	2.4 (1.8 - 3.0)	2.5 (1.7 - 3.0)	2.5 (1.5 - 3.1)
Turbidity (NTU)	8.6 (3.2 - 16.5)	8.4 (3.4 - 14.5)	9.2 (3.1 - 17.3)
Suspended Solids (mg/L)	4.4 (1.7 - 13.2)	4.2 (2.1 - 8.3)	4.6 (1.4 - 9.8)
5-day Biochemical Oxygen Demand (mg/L)	0.7 (0.4 - 1.6)	0.7 (0.2 - 1.6)	0.7 (0.1 - 1.6)
Ammonia Nitrogen (mg/L)	0.06 (0.02 - 0.13)	0.05 (0.02 - 0.09)	0.03 (0.01 - 0.06)
Unionised Ammonia (mg/L)	0.003 (<0.001 - 0.005)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)
Nitrite Nitrogen (mg/L)	0.023 (0.004 - 0.093)	0.021 (0.003 - 0.088)	0.016 (0.002 - 0.064)
Nitrate Nitrogen (mg/L)	0.091 (0.028 - 0.213)	0.080 (0.017 - 0.196)	0.065 (0.008 - 0.160)
Total Inorganic Nitrogen (mg/L)	0.17 (0.09 - 0.36)	0.15 (0.05 - 0.34)	0.11 (0.02 - 0.22)
Total Kjeldahl Nitrogen (mg/L)	0.19 (0.13 - 0.25)	0.17 (0.11 - 0.22)	0.17 (0.11 - 0.21)
Total Nitrogen (mg/L)	0.30 (0.16 - 0.55)	0.27 (0.14 - 0.49)	0.25 (0.12 - 0.37)
Orthophosphate Phosphorus (mg/L)	0.016 (0.010 - 0.021)	0.013 (0.009 - 0.019)	0.010 (0.008 - 0.015)
Total Phosphorus (mg/L)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.04)	0.02 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)	0.8 (0.5 - 1.5)	0.8 (0.4 - 1.4)	0.7 (0.3 - 1.4)
Chlorophyll-a (µg/L)	2.7 (0.5 - 9.7)	2.4 (0.4 - 10.2)	2.5 (0.4 - 9.3)
E.coli (count/100mL)	110 (4 - 1500)	31 (1 - 220)	4 (1 - 17)
Faecal Coliforms (count/100mL)	260 (8 - 2600)	80 (2 - 610)	10 (2 - 56)

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 2008

Parameter		Hong Kong Island (West) WM1	Hong Kong Island (West) WM2	Tsing Yi (South) WM3	Tsing Yi (West) WM4
Number of samples		12	12	12	12
Temperature (°C)		22.3 (14.7 - 27.1)	22.6 (14.7 - 27.6)	22.6 (14.7 - 27.5)	22.6 (14.8 - 27.3)
Salinity		32.0 (29.9 - 33.6)	30.9 (26.4 - 33.2)	31.3 (27.7 - 33.2)	31.2 (29.3 - 33.0)
Dissolved Oxygen (mg/L)		6.1 (2.7 - 9.1)	6.0 (3.4 - 8.3)	5.8 (3.4 - 8.2)	5.7 (3.4 - 8.2)
	Bottom	5.9 (2.1 - 9.3)	5.8 (3.3 - 8.5)	5.7 (2.7 - 8.4)	5.6 (2.7 - 8.3)
Dissolved Oxygen (% Saturation)		83 (41 - 111)	82 (52 - 101)	80 (51 - 99)	79 (51 - 100)
	Bottom	81 (30 - 113)	80 (48 - 103)	78 (40 - 103)	77 (40 - 101)
pH		8.1 (7.9 - 8.3)	8.1 (7.8 - 8.2)	8.1 (7.9 - 8.2)	8.1 (7.8 - 8.2)
Secchi Disc Depth (m)		2.5 (1.0 - 3.5)	2.5 (1.0 - 4.0)	2.1 (1.0 - 3.0)	2.3 (1.0 - 3.0)
Turbidity (NTU)		9.5 (5.6 - 15.4)	8.6 (3.6 - 14.1)	9.4 (5.6 - 14.0)	10.7 (5.3 - 18.3)
Suspended Solids (mg/L)		5.5 (1.7 - 13.1)	4.8 (2.8 - 7.6)	5.7 (3.0 - 8.7)	6.4 (3.0 - 12.1)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.3 - 1.3)	0.7 (0.3 - 1.3)	0.7 (0.4 - 1.2)	0.6 (0.2 - 1.0)
Ammonia Nitrogen (mg/L)		0.04 (0.01 - 0.08)	0.11 (0.05 - 0.17)	0.11 (0.06 - 0.18)	0.10 (0.04 - 0.19)
Unionised Ammonia (mg/L)		0.002 (<0.001 - 0.004)	0.005 (0.002 - 0.008)	0.005 (0.002 - 0.010)	0.004 (0.002 - 0.008)
Nitrite Nitrogen (mg/L)		0.027 (0.003 - 0.057)	0.045 (0.008 - 0.114)	0.038 (0.010 - 0.078)	0.045 (0.014 - 0.090)
Nitrate Nitrogen (mg/L)		0.113 (0.015 - 0.217)	0.177 (0.047 - 0.343)	0.153 (0.046 - 0.270)	0.177 (0.054 - 0.277)
Total Inorganic Nitrogen (mg/L)		0.18 (0.06 - 0.29)	0.33 (0.20 - 0.48)	0.31 (0.16 - 0.45)	0.32 (0.17 - 0.47)
Total Kjeldahl Nitrogen (mg/L)		0.20 (0.15 - 0.25)	0.27 (0.23 - 0.31)	0.29 (0.24 - 0.35)	0.26 (0.21 - 0.35)
Total Nitrogen (mg/L)		0.34 (0.21 - 0.46)	0.49 (0.36 - 0.66)	0.48 (0.34 - 0.66)	0.49 (0.37 - 0.62)
Orthophosphate Phosphorus (mg/L)		0.015 (0.009 - 0.027)	0.023 (0.012 - 0.033)	0.023 (0.015 - 0.037)	0.024 (0.019 - 0.035)
Total Phosphorus (mg/L)		0.03 (0.02 - 0.04)	0.04 (0.03 - 0.05)	0.04 (0.03 - 0.06)	0.04 (0.03 - 0.05)
Silica (as SiO_2) (mg/L)		1.0 (0.1 - 2.0)	1.2 (0.4 - 2.4)	1.2 (0.3 - 2.1)	1.2 (0.5 - 2.2)
Chlorophyll-*a* (µg/L)		2.2 (0.9 - 4.7)	1.8 (1.0 - 2.9)	1.8 (1.0 - 2.9)	1.6 (0.9 - 3.5)
E.coli (count/100mL)		110 (31 - 700)	1300 (120 - 11000)	2700 (250 - 6900)	710 (77 - 3700)
Faecal Coliforms (count/100mL)		240 (50 - 1200)	2700 (350 - 42000)	6000 (590 - 22000)	1600 (200 - 6900)

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 2008

Parameter	Junk Bay JM3	Junk Bay JM4
Number of samples	12	12
Temperature (°C)	23.5 (16.2 - 27.2)	23.3 (15.9 - 27.0)
Salinity	32.2 (30.7 - 33.5)	32.4 (31.5 - 33.6)
Dissolved Oxygen (mg/L)	6.2 (4.8 - 7.5)	5.9 (3.9 - 7.3)
Bottom	5.8 (3.4 - 7.1)	5.8 (3.6 - 7.3)
Dissolved Oxygen (% Saturation)	87 (72 - 112)	83 (57 - 95)
Bottom	81 (50 - 92)	81 (52 - 95)
pH	8.1 (8.0 - 8.4)	8.2 (8.0 - 8.4)
Secchi Disc Depth (m)	2.4 (1.7 - 3.0)	2.5 (2.0 - 3.2)
Turbidity (NTU)	9.7 (3.4 - 22.7)	9.5 (3.4 - 23.6)
Suspended Solids (mg/L)	4.0 (1.9 - 6.7)	4.6 (2.0 - 12.8)
5-day Biochemical Oxygen Demand (mg/L)	0.9 (0.3 - 2.2)	0.8 (0.3 - 1.6)
Ammonia Nitrogen (mg/L)	0.07 (0.03 - 0.12)	0.06 (0.02 - 0.11)
Unionised Ammonia (mg/L)	0.004 (<0.001 - 0.008)	0.003 (<0.001 - 0.007)
Nitrite Nitrogen (mg/L)	0.024 (0.004 - 0.071)	0.020 (0.003 - 0.061)
Nitrate Nitrogen (mg/L)	0.090 (0.030 - 0.177)	0.082 (0.023 - 0.153)
Total Inorganic Nitrogen (mg/L)	0.18 (0.09 - 0.27)	0.16 (0.05 - 0.22)
Total Kjeldahl Nitrogen (mg/L)	0.22 (0.13 - 0.31)	0.18 (0.10 - 0.27)
Total Nitrogen (mg/L)	0.33 (0.17 - 0.46)	0.28 (0.13 - 0.38)
Orthophosphate Phosphorus (mg/L)	0.015 (0.007 - 0.024)	0.015 (0.008 - 0.022)
Total Phosphorus (mg/L)	0.03 (0.02 - 0.04)	0.03 (0.02 - 0.04)
Silica (as SiO_2) (mg/L)	0.8 (0.5 - 1.6)	0.8 (0.4 - 1.4)
Chlorophyll-*a* (µg/L)	4.5 (0.6 - 22.4)	3.2 (0.3 - 13.3)
E.coli (count/100mL)	39 (2 - 220)	49 (2 - 270)
Faecal Coliforms (count/100mL)	140 (13 - 620)	130 (8 - 970)

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 2008

Parameter		Inner Deep Bay			Outer Deep Bay	
		DM1	DM2	DM3	DM4	DM5
Number of samples		12	12	12	12	12
Temperature (°C)		24.6 (16.7 - 31.5)	24.5 (16.7 - 31.0)	24.4 (16.0 - 30.1)	24.1 (15.9 - 29.5)	23.9 (15.8 - 28.9)
Salinity		17.0 (4.4 - 24.4)	18.1 (3.6 - 26.0)	21.2 (6.6 - 29.4)	22.5 (11.4 - 30.0)	25.6 (14.5 - 31.8)
Dissolved Oxygen (mg/L)		5.2 (1.6 - 9.4)	6.7 (2.5 - 16.1)	7.2 (3.6 - 14.2)	6.3 (3.3 - 9.4)	6.2 (4.1 - 8.1)
	Bottom	N.M.	N.M.	N.M.	6.1 (3.1 - 10.9)	6.0 (3.5 - 8.0)
Dissolved Oxygen (% Saturation)		69 (23 - 128)	88 (37 - 201)	97 (53 - 183)	85 (48 - 124)	85 (60 - 108)
	Bottom	N.M.	N.M.	N.M.	82 (46 - 142)	82 (50 - 105)
pH		7.4 (6.2 - 8.3)	7.6 (6.6 - 8.4)	7.8 (6.7 - 8.6)	7.8 (6.8 - 8.3)	7.8 (7.0 - 8.5)
Secchi Disc Depth (m)		0.5 (0.1 - 1.0)	0.5 (0.1 - 1.1)	0.7 (0.1 - 1.3)	0.8 (0.1 - 1.4)	1.1 (0.5 - 1.8)
Turbidity (NTU)		36.8 (18.2 - 68.1)	26.0 (15.9 - 41.0)	16.0 (12.2 - 21.4)	16.9 (11.3 - 24.3)	13.4 (11.0 - 15.8)
Suspended Solids (mg/L)		41.5 (14.0 - 110.0)	22.9 (11.0 - 51.0)	11.2 (4.9 - 20.0)	11.6 (5.0 - 20.5)	7.0 (3.8 - 14.6)
5-day Biochemical Oxygen Demand (mg/L)		3.5 (1.1 - 7.1)	2.9 (1.0 - 8.2)	1.4 (0.5 - 4.0)	0.9 (0.5 - 2.2)	0.7 (0.2 - 2.2)
Ammonia Nitrogen (mg/L)		2.88 (1.20 - 6.30)	2.47 (1.90 - 3.60)	0.55 (0.05 - 1.40)	0.46 (0.16 - 1.51)	0.24 (0.10 - 0.48)
Unionised Ammonia (mg/L)		0.045 (0.003 - 0.156)	0.082 (0.010 - 0.357)	0.014 (0.004 - 0.025)	0.014 (0.002 - 0.038)	0.007 (0.001 - 0.013)
Nitrite Nitrogen (mg/L)		0.284 (0.190 - 0.420)	0.291 (0.220 - 0.480)	0.178 (0.110 - 0.270)	0.156 (0.069 - 0.285)	0.104 (0.052 - 0.197)
Nitrate Nitrogen (mg/L)		0.528 (0.200 - 1.000)	0.520 (0.310 - 1.100)	0.673 (0.250 - 1.100)	0.633 (0.205 - 1.050)	0.493 (0.123 - 1.000)
Total Inorganic Nitrogen (mg/L)		3.70 (2.23 - 6.74)	3.28 (2.48 - 4.25)	1.40 (0.82 - 2.56)	1.25 (0.47 - 2.85)	0.83 (0.30 - 1.65)
Total Kjeldahl Nitrogen (mg/L)		3.76 (2.40 - 8.20)	3.34 (2.60 - 4.70)	0.92 (0.47 - 1.80)	0.72 (0.43 - 1.85)	0.44 (0.30 - 0.64)
Total Nitrogen (mg/L)		4.57 (3.43 - 8.64)	4.15 (3.18 - 5.31)	1.77 (1.09 - 2.86)	1.51 (0.70 - 3.19)	1.04 (0.48 - 1.82)
Orthophosphate Phosphorus (mg/L)		0.278 (0.150 - 0.410)	0.240 (0.140 - 0.320)	0.081 (0.018 - 0.150)	0.058 (0.022 - 0.128)	0.035 (0.014 - 0.052)
Total Phosphorus (mg/L)		0.41 (0.24 - 0.66)	0.36 (0.26 - 0.51)	0.13 (0.09 - 0.21)	0.09 (0.07 - 0.16)	0.06 (0.04 - 0.09)
Silica (as SiO_2) (mg/L)		4.5 (1.1 - 6.6)	4.0 (0.1 - 7.1)	3.1 (0.1 - 6.2)	3.1 (0.7 - 6.6)	2.5 (0.7 - 5.6)
Chlorophyll-*a* (µg/L)		28.5 (0.6 - 130.0)	41.5 (1.0 - 170.0)	14.0 (1.3 - 77.0)	7.0 (0.7 - 40.0)	5.2 (0.5 - 35.7)
E.coli (count/100mL)		1400 (400 - 19000)	680 (91 - 6900)	85 (9 - 570)	330 (64 - 1200)	270 (66 - 780)
Faecal Coliforms (count/100mL)		2700 (670 - 28000)	1200 (160 - 11000)	170 (39 - 890)	620 (96 - 2100)	620 (170 - 1400)

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 2008

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 (14.9 - 27.4)	23.3 (15.1 - 27.8)	23.3 (15.2 - 27.9)	23.4 (15.4 - 28.2)	23.3 (15.1 - 28.4)	23.2 (14.9 - 27.9)
Salinity		29.8 (21.3 - 32.9)	28.1 (11.3 - 32.9)	28.7 (21.1 - 32.7)	27.3 (15.7 - 32.0)	26.7 (9.3 - 32.4)	27.6 (7.4 - 32.4)
Dissolved Oxygen (mg/L)		6.0 (3.6 - 8.7)	6.0 (3.7 - 8.7)	6.0 (3.8 - 8.5)	5.9 (3.7 - 8.3)	6.5 (4.4 - 8.2)	6.6 (4.2 - 9.0)
	Bottom	5.7 (2.7 - 8.8)	5.8 (3.4 - 8.6)	5.8 (3.1 - 8.6)	5.6 (3.1 - 8.5)	6.3 (3.3 - 8.5)	6.3 (3.1 - 9.0)
Dissolved Oxygen (% Saturation)		82 (51 - 111)	82 (54 - 110)	82 (56 - 108)	81 (54 - 106)	88 (66 - 104)	90 (62 - 114)
	Bottom	79 (39 - 111)	80 (49 - 109)	79 (45 - 109)	77 (45 - 108)	85 (48 - 109)	86 (45 - 115)
pH		8.0 (7.8 - 8.2)	8.0 (7.9 - 8.2)	8.1 (7.9 - 8.2)	8.0 (7.8 - 8.2)	8.1 (7.9 - 8.3)	8.1 (7.9 - 8.3)
Secchi Disc Depth (m)		2.1 (1.2 - 3.0)	2.0 (1.1 - 2.7)	2.0 (1.5 - 2.5)	1.8 (1.0 - 2.6)	1.8 (1.1 - 3.0)	1.8 (0.8 - 2.6)
Turbidity (NTU)		10.4 (4.1 - 18.8)	10.0 (3.9 - 16.7)	11.2 (4.6 - 16.2)	14.3 (5.8 - 33.3)	13.3 (3.3 - 29.9)	14.9 (5.0 - 27.8)
Suspended Solids (mg/L)		7.3 (2.1 - 12.2)	6.6 (2.6 - 14.8)	8.0 (5.8 - 14.3)	10.8 (4.1 - 21.0)	10.3 (2.8 - 36.3)	10.8 (4.1 - 28.3)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.1 - 0.9)	0.6 (0.1 - 0.9)	0.6 (0.2 - 0.9)	0.7 (0.2 - 1.3)	0.7 (0.2 - 1.9)	0.7 (0.3 - 2.2)
Ammonia Nitrogen (mg/L)		0.13 (0.05 - 0.23)	0.15 (0.05 - 0.27)	0.14 (0.03 - 0.26)	0.20 (0.12 - 0.34)	0.13 (0.03 - 0.37)	0.07 (0.01 - 0.15)
Unionised Ammonia (mg/L)		0.005 (0.003 - 0.008)	0.006 (0.003 - 0.012)	0.006 (0.001 - 0.009)	0.008 (0.005 - 0.014)	0.006 (0.001 - 0.011)	0.004 (<0.001 - 0.012)
Nitrite Nitrogen (mg/L)		0.062 (0.020 - 0.257)	0.082 (0.020 - 0.363)	0.077 (0.021 - 0.277)	0.100 (0.025 - 0.313)	0.096 (0.020 - 0.353)	0.080 (0.019 - 0.377)
Nitrate Nitrogen (mg/L)		0.268 (0.036 - 0.927)	0.370 (0.042 - 1.500)	0.320 (0.064 - 0.830)	0.429 (0.111 - 1.433)	0.436 (0.079 - 1.500)	0.378 (0.084 - 1.567)
Total Inorganic Nitrogen (mg/L)		0.46 (0.13 - 1.30)	0.60 (0.16 - 2.06)	0.54 (0.14 - 1.22)	0.73 (0.30 - 1.94)	0.66 (0.15 - 2.03)	0.53 (0.13 - 2.09)
Total Kjeldahl Nitrogen (mg/L)		0.28 (0.18 - 0.37)	0.31 (0.18 - 0.46)	0.30 (0.19 - 0.40)	0.39 (0.26 - 0.50)	0.32 (0.15 - 0.64)	0.25 (0.12 - 0.47)
Total Nitrogen (mg/L)		0.61 (0.24 - 1.56)	0.76 (0.25 - 2.33)	0.70 (0.30 - 1.41)	0.92 (0.42 - 2.23)	0.85 (0.32 - 2.30)	0.70 (0.26 - 2.41)
Orthophosphate Phosphorus (mg/L)		0.024 (0.015 - 0.032)	0.028 (0.016 - 0.045)	0.027 (0.013 - 0.035)	0.033 (0.022 - 0.049)	0.024 (0.012 - 0.041)	0.018 (0.009 - 0.040)
Total Phosphorus (mg/L)		0.04 (0.03 - 0.05)	0.05 (0.03 - 0.06)	0.05 (0.03 - 0.05)	0.06 (0.04 - 0.09)	0.05 (0.03 - 0.08)	0.04 (0.02 - 0.07)
Silica (as SiO_2) (mg/L)		1.4 (0.4 - 3.7)	1.7 (0.4 - 5.8)	1.5 (0.4 - 3.6)	2.0 (0.8 - 5.5)	2.1 (0.5 - 5.9)	1.9 (0.4 - 6.2)
Chlorophyll-*a* (µg/L)		1.5 (0.8 - 3.0)	1.5 (0.6 - 3.1)	1.9 (0.8 - 5.9)	2.1 (0.7 - 5.5)	2.6 (1.0 - 6.7)	2.5 (1.0 - 4.2)
E.coli (count/100mL)		660 (84 - 2700)	390 (99 - 4600)	250 (98 - 780)	440 (96 - 1900)	12 (2 - 160)	3 (1 - 77)
Faecal Coliforms (count/100mL)		1400 (230 - 5900)	940 (160 - 10000)	550 (140 - 2600)	1000 (130 - 5800)	34 (6 - 280)	6 (1 - 120)

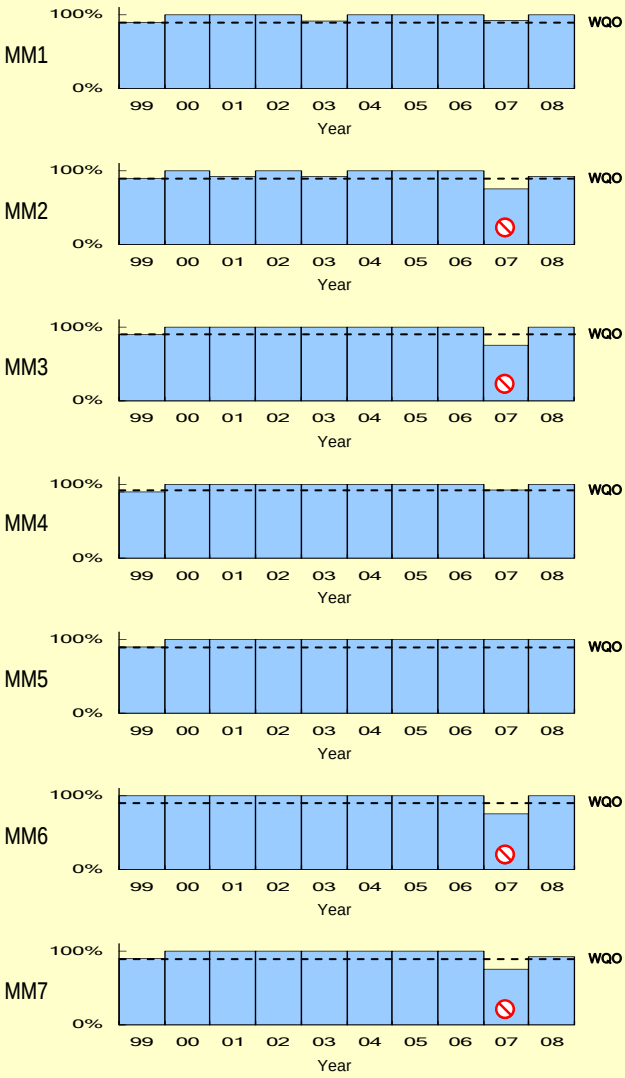
Note : 1. Unless otherwise specified, data presented are depth-averaged (A) values calculated by taking the means of three depths: Surface (S), Mid-depth (M), Bottom (B).

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

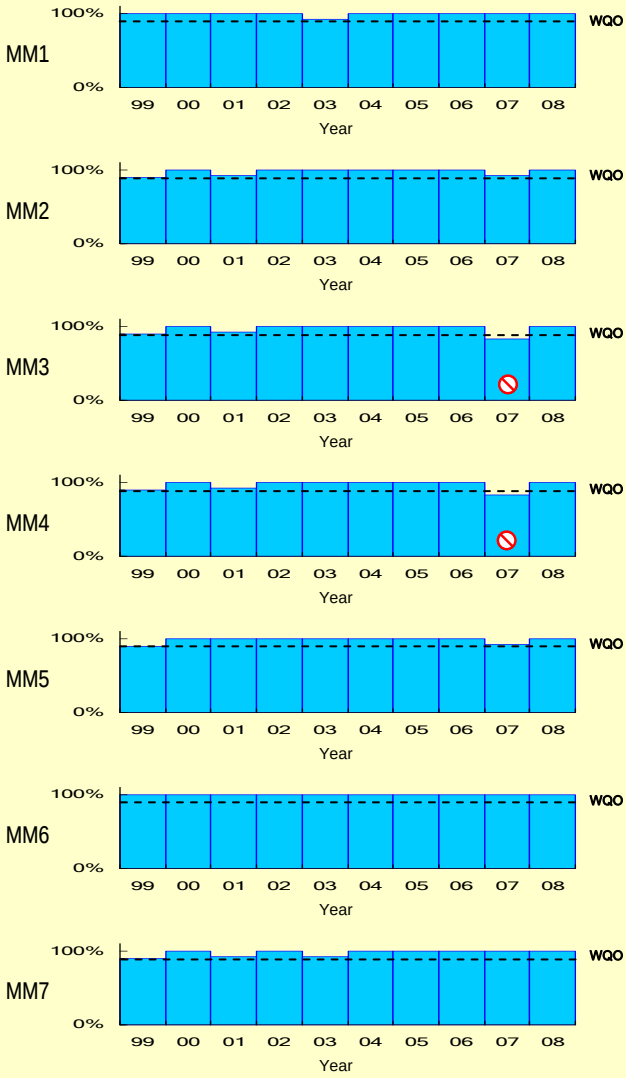
3. Data in brackets indicate the ranges.

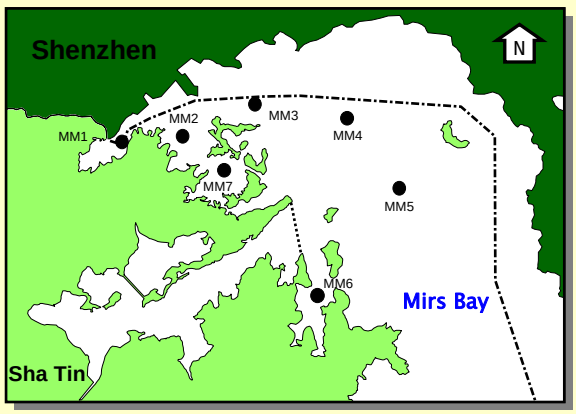
Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



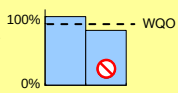


Dissolved Oxygen (DO)

1. Bottom

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

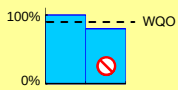
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

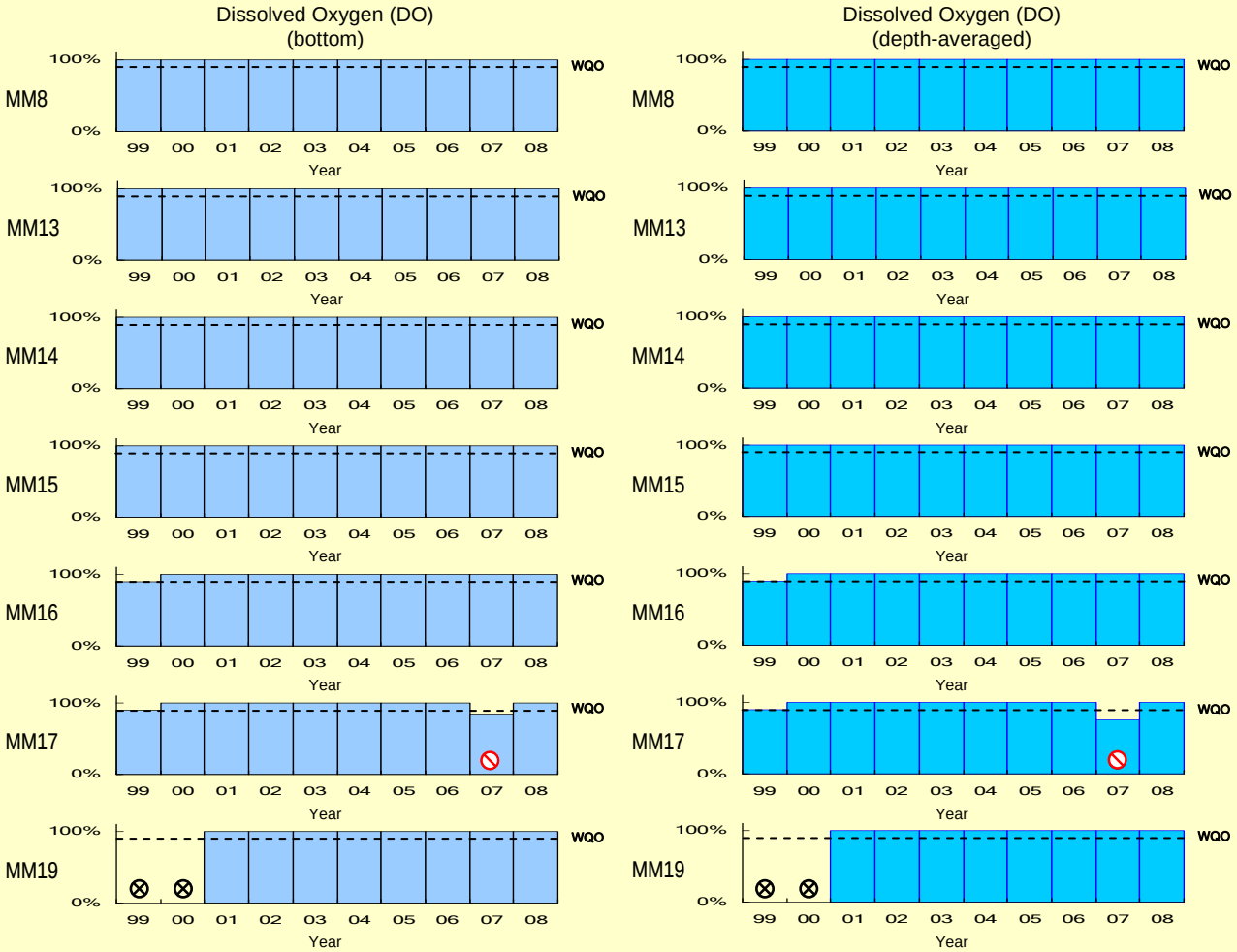
WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

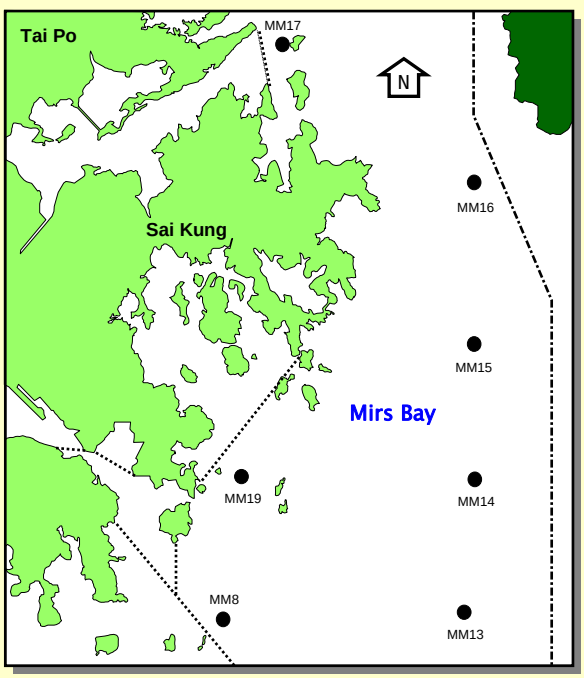
% sample with depth-averaged DO ≥ 4 mg/L



Non-compliance

Levels of compliance with key Water Quality Objectives in the 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

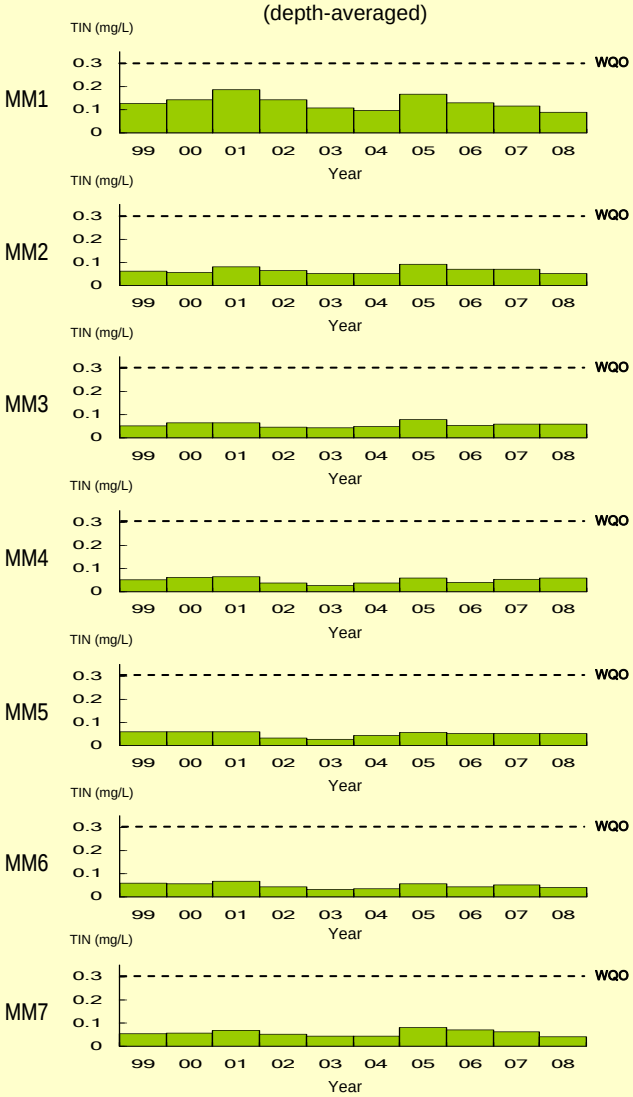
% sample with depth-averaged DO ≥ 4 mg/L

Non-compliance

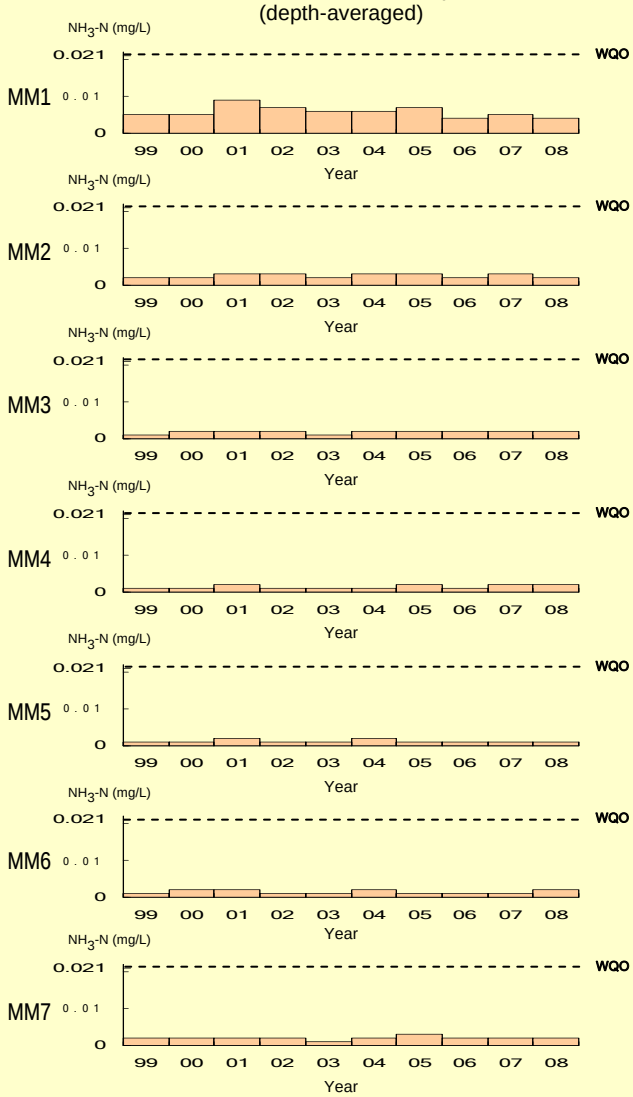
No data ; monitoring has not started

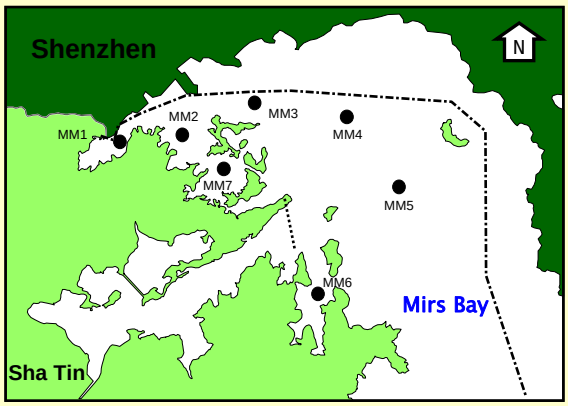
Levels of compliance with key Water Quality Objectives in the Mirs Bay WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



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

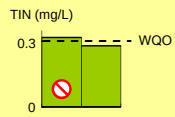




Total Inorganic Nitrogen (TIN)

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

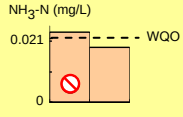
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

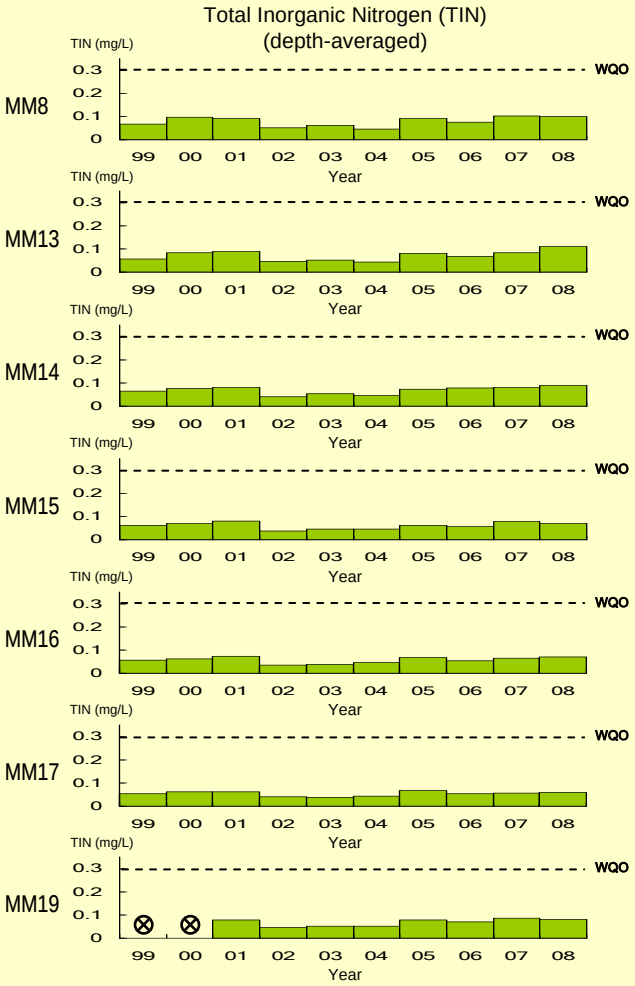
WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

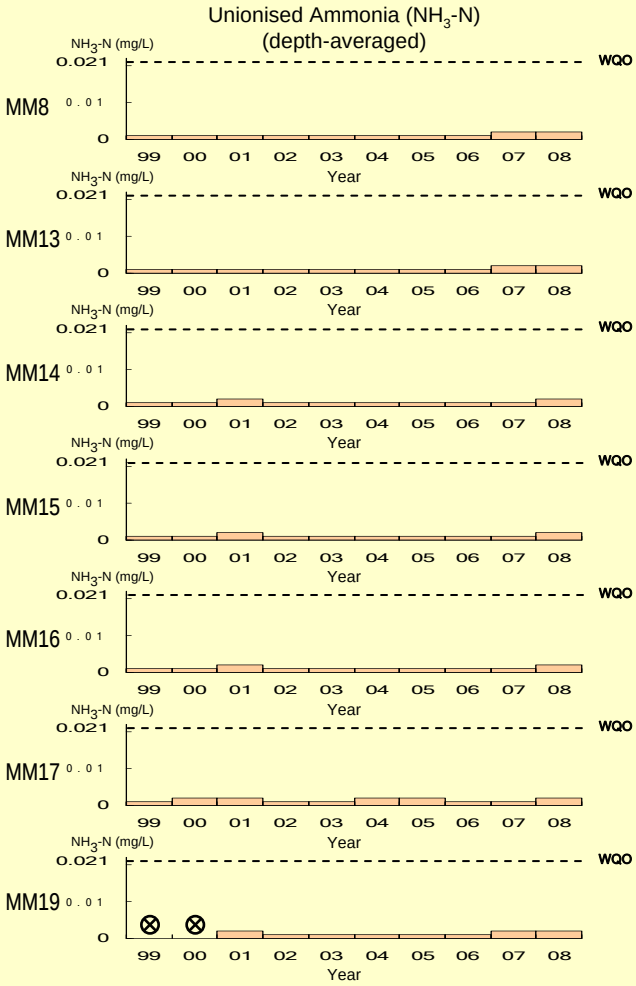
annual mean for depth-averaged NH_3-N

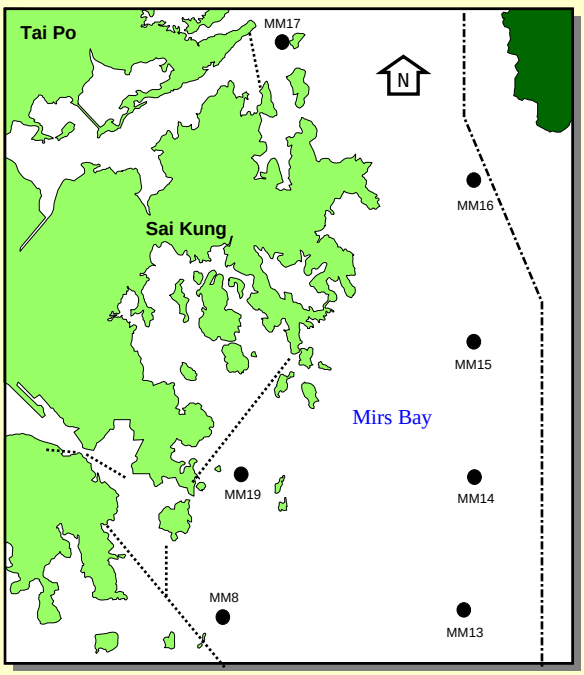


Non-compliance

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



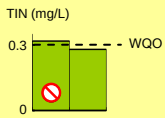




Total Inorganic Nitrogen (TIN)

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

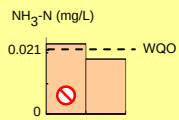
annual mean for depth-averaged TIN



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

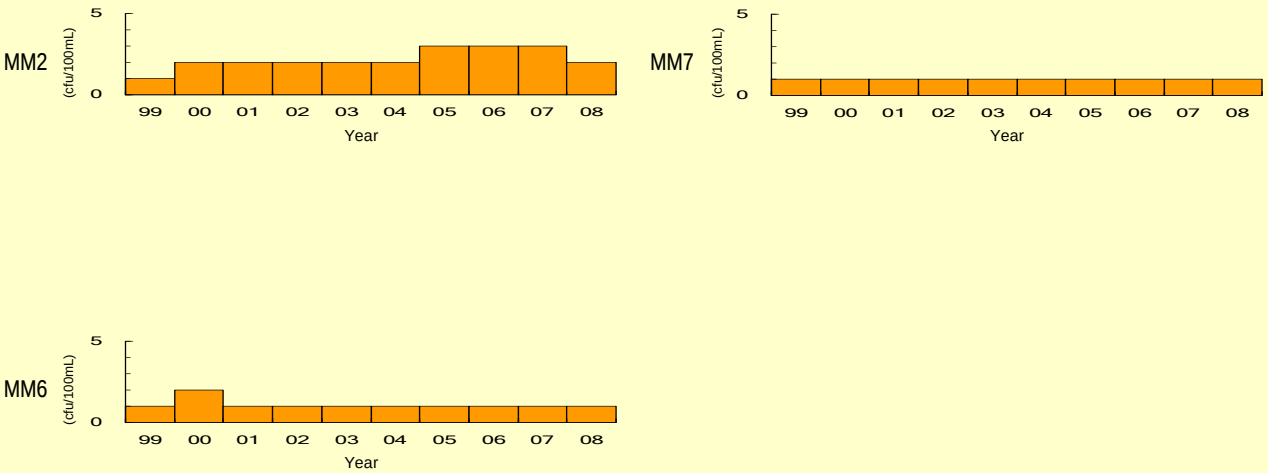


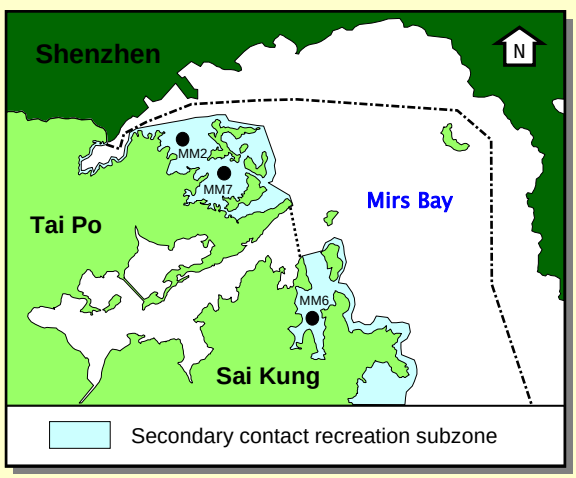
Non-compliance

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)





E. coli

WQO for secondary contact recreation subzones :
annual geometric mean for depth averaged
E. coli ≤ 610 cfu/100mL

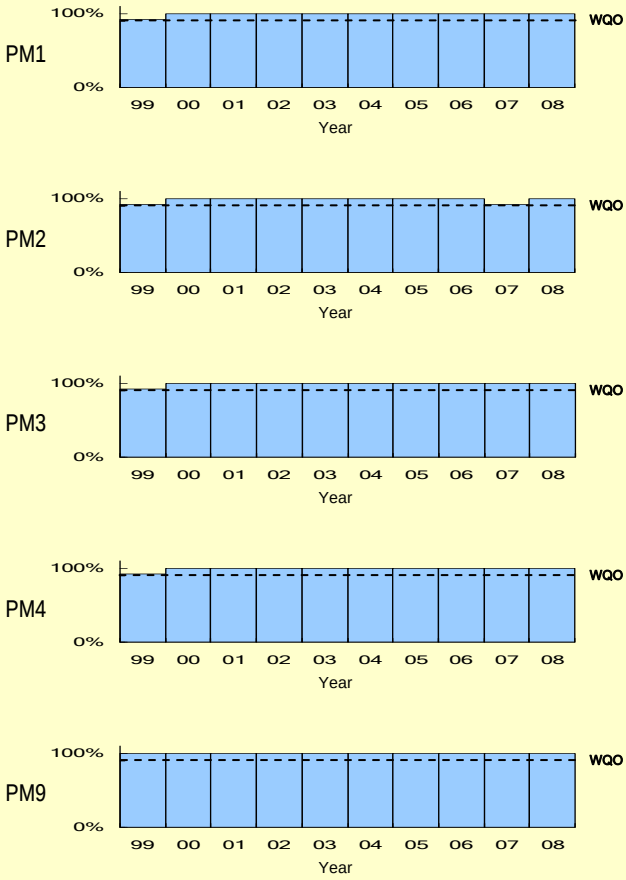
annual geometric mean for depth averaged *E. coli* (cfu/100mL)

610 WQO
0

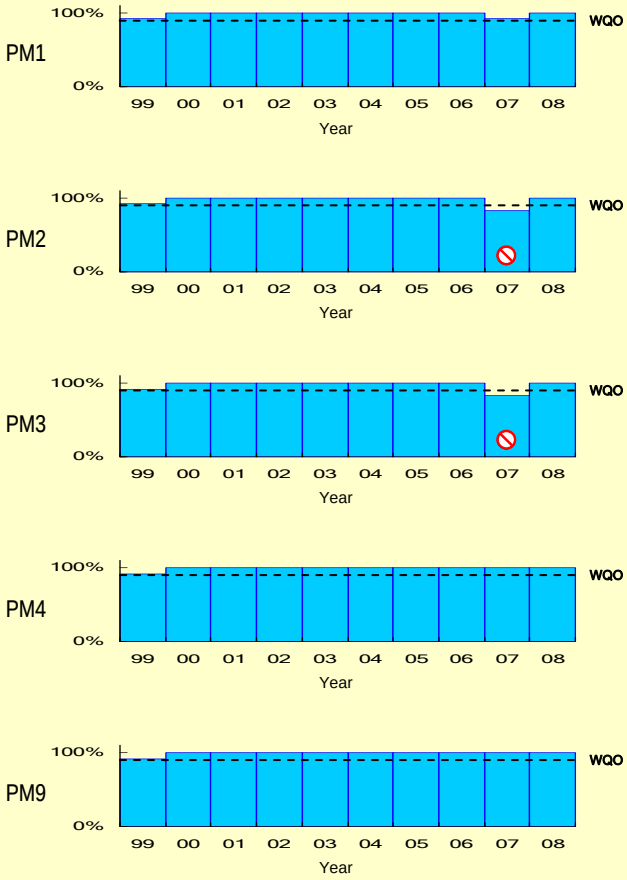
Non-compliance

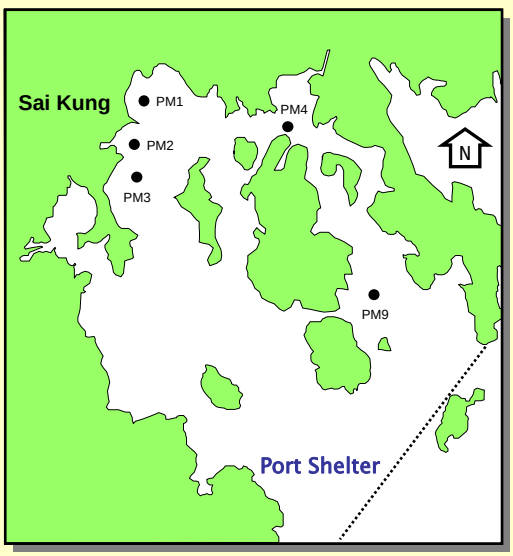
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



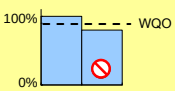


Dissolved Oxygen (DO)

1. Bottom

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

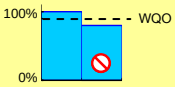
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

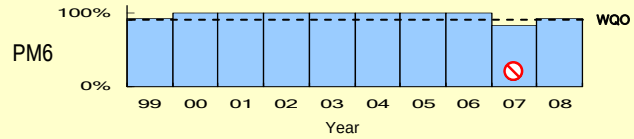
% sample with depth-averaged DO ≥ 4 mg/L

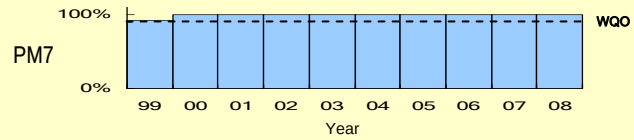


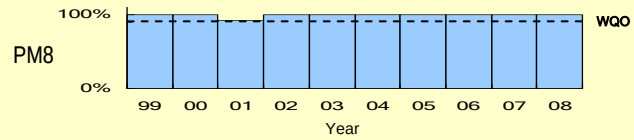
Non-compliance

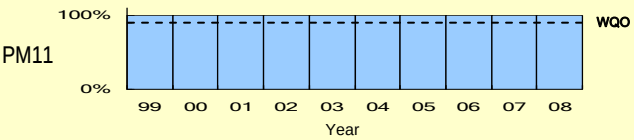
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

Dissolved Oxygen (DO) (bottom)

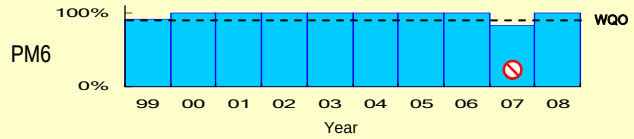


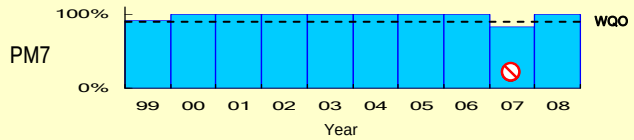


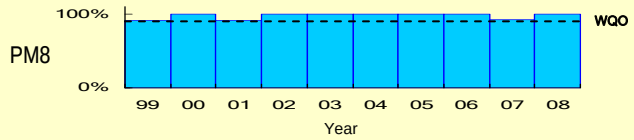


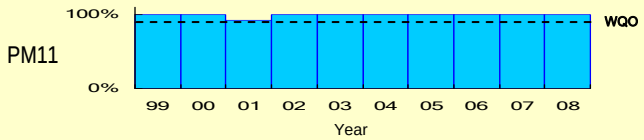


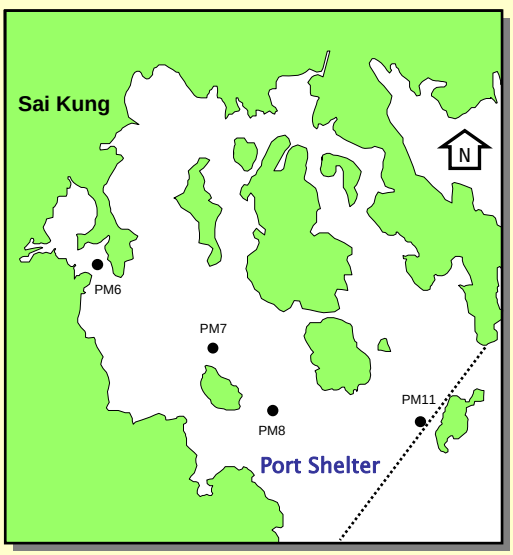
Dissolved Oxygen (DO) (depth-averaged)









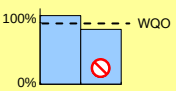


Dissolved Oxygen (DO)

1. Bottom

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

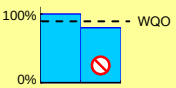
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

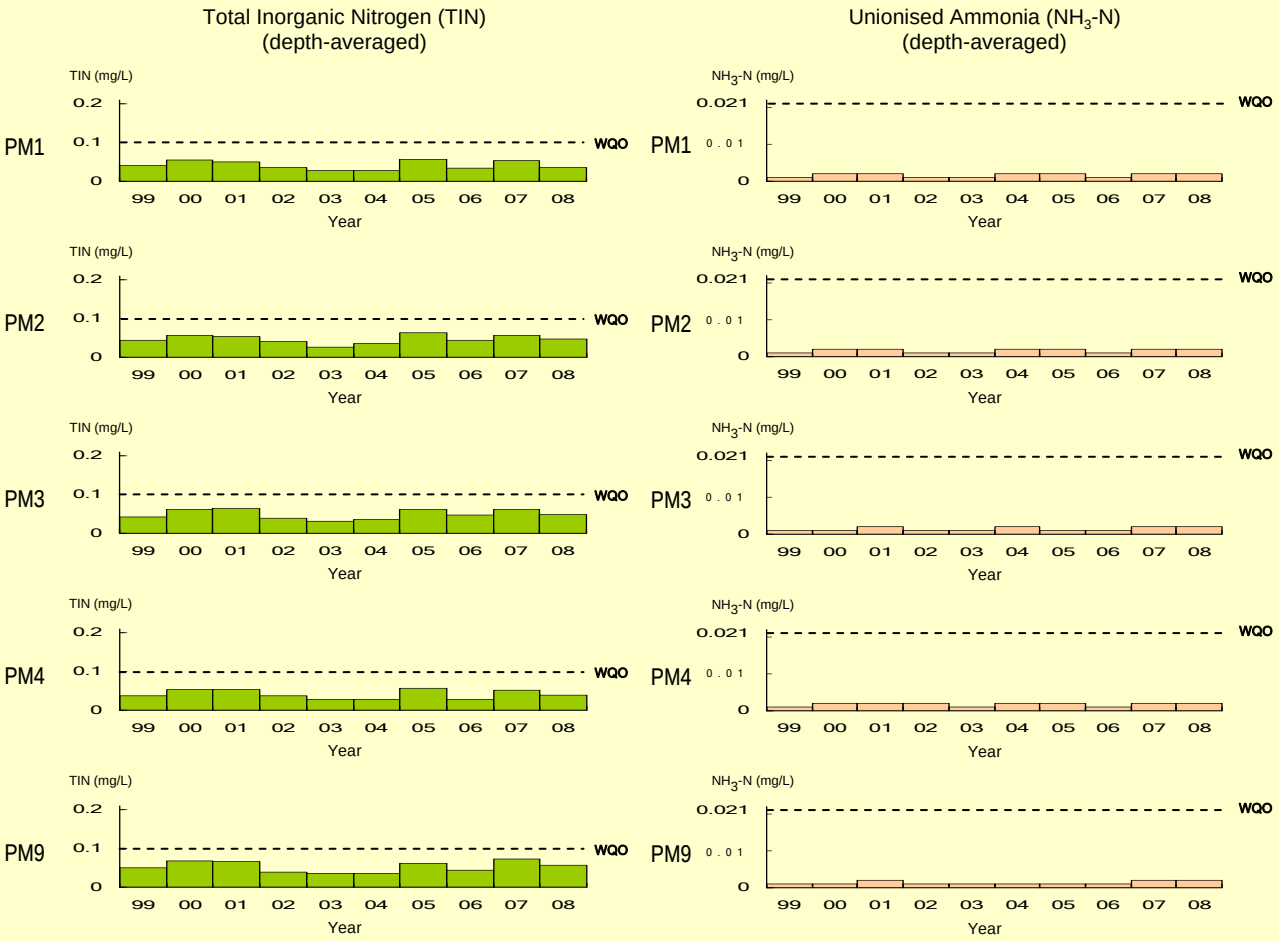
WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

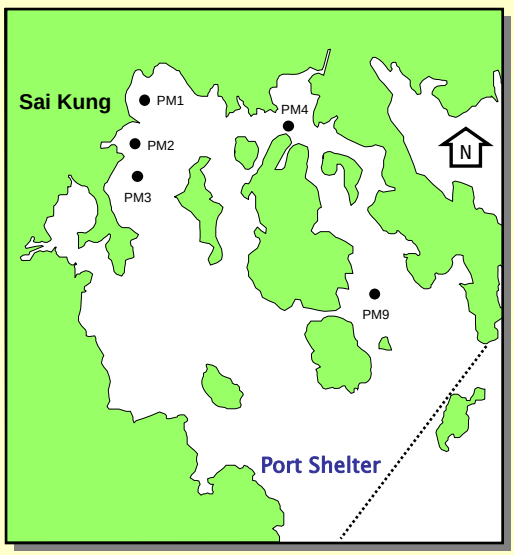
% sample with depth-averaged DO ≥ 4 mg/L



Non-compliance

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





Total Inorganic Nitrogen (TIN)

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

annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

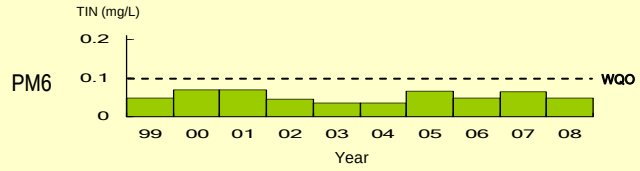
WQO : annual mean for depth-averaged NH_3-N ≤ 0.021 mg/L

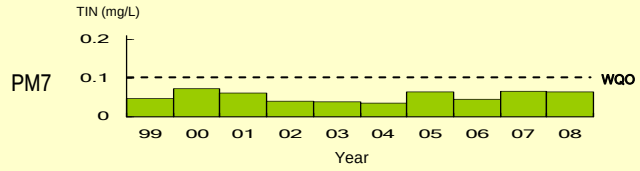
annual mean for depth-averaged NH_3-N

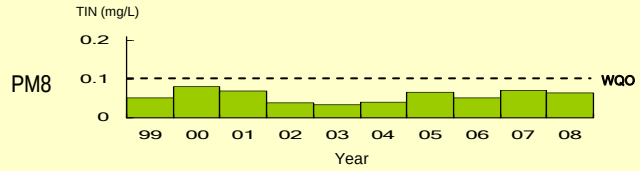
Non-compliance

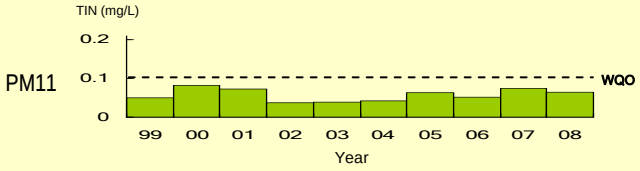
Levels of compliance with key Water Quality Objectives in the Port Shelter WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)

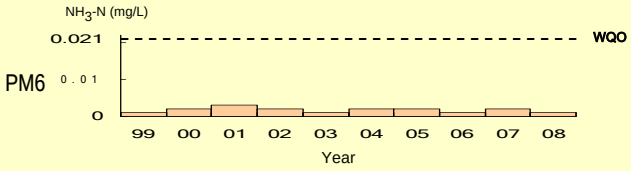


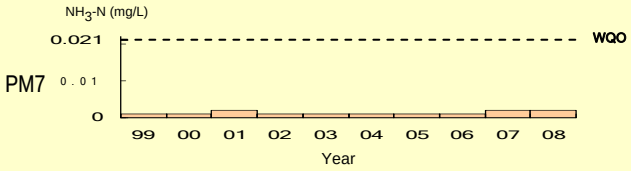


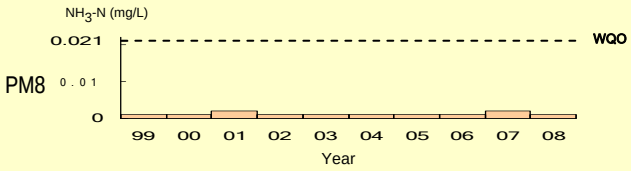


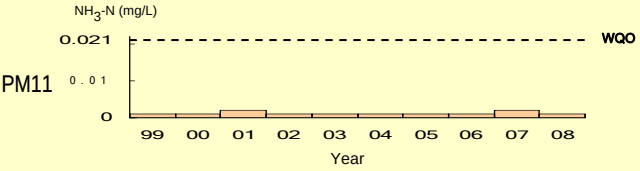


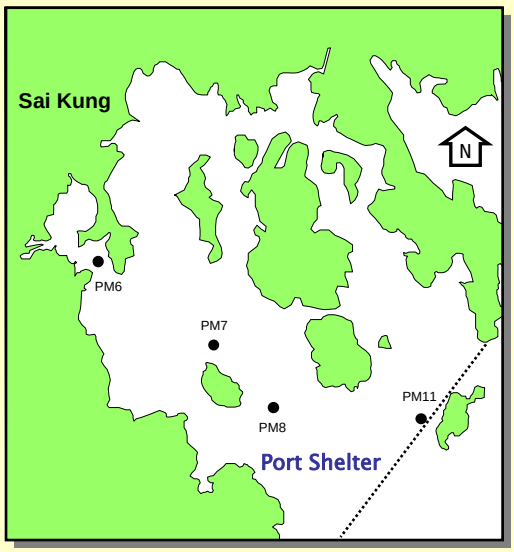
Unionised Ammonia (NH_3-N) (depth-averaged)







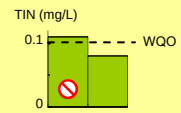




Total Inorganic Nitrogen (TIN)

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

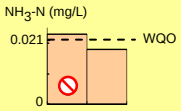
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

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

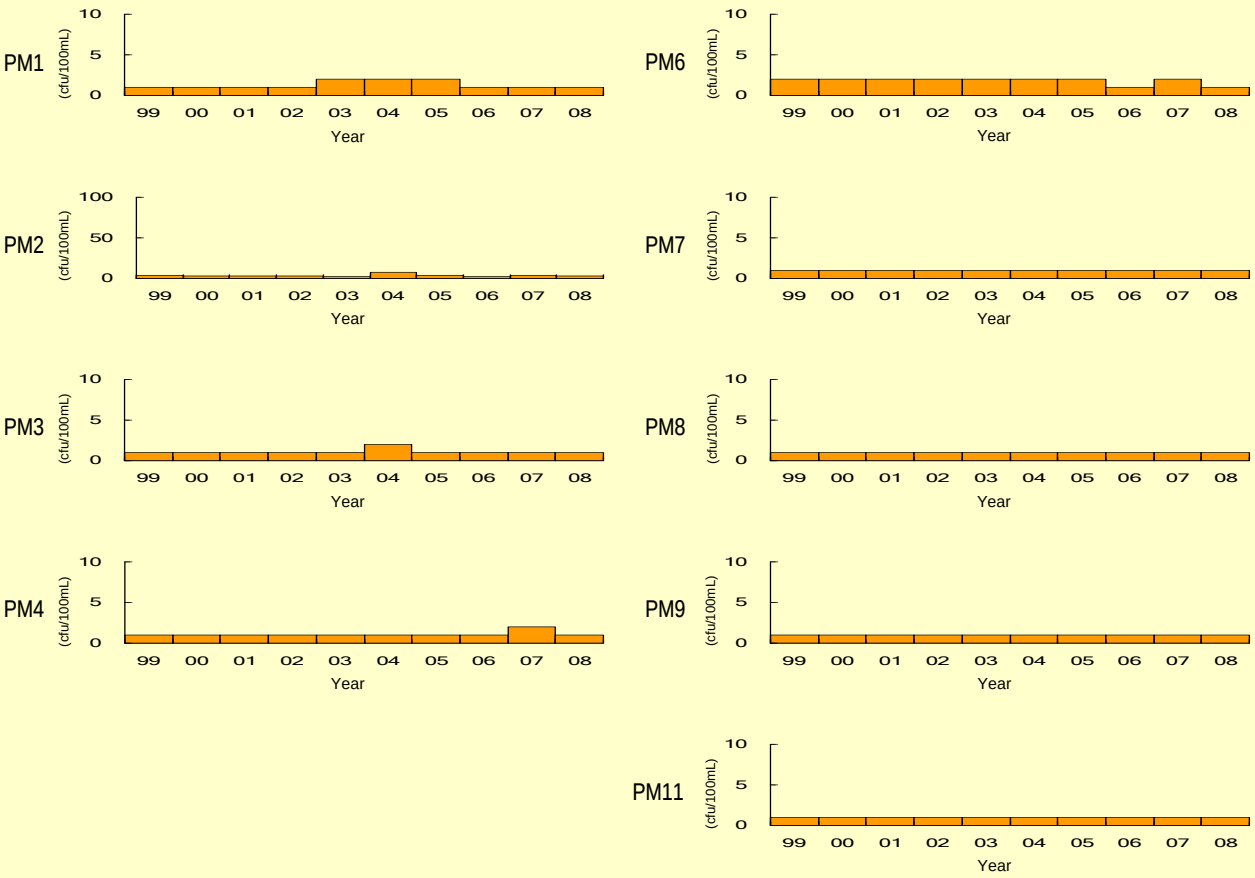
annual mean for depth-averaged NH_3-N

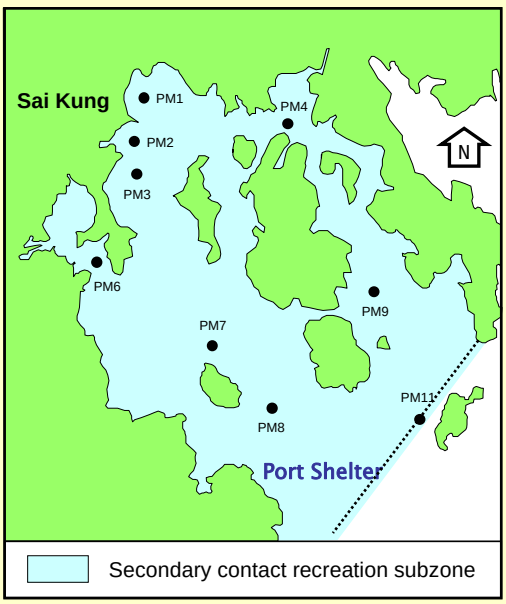


Non-compliance

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

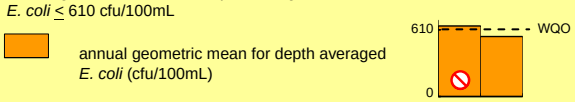
E. coli
(annual geometric mean)





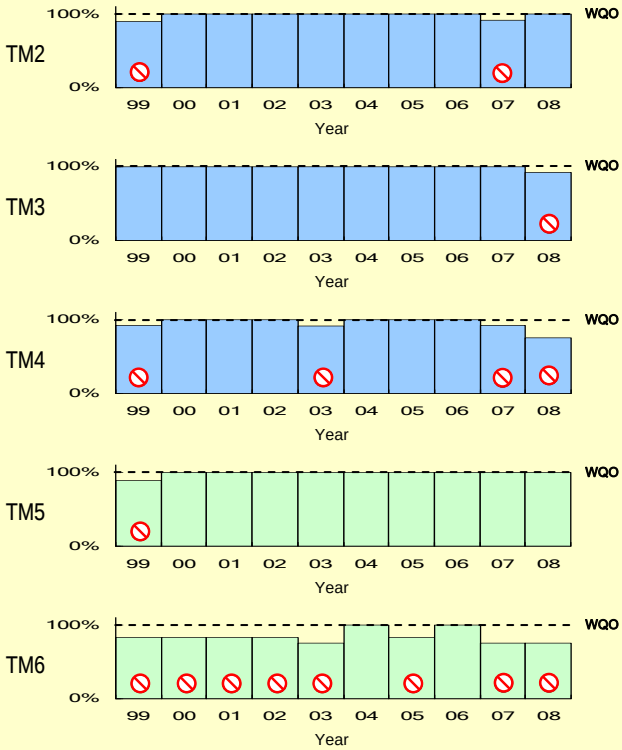
E. coli

WQO for secondary contact recreation subzones :
annual geometric mean for depth averaged
E. coli < 610 cfu/100mL

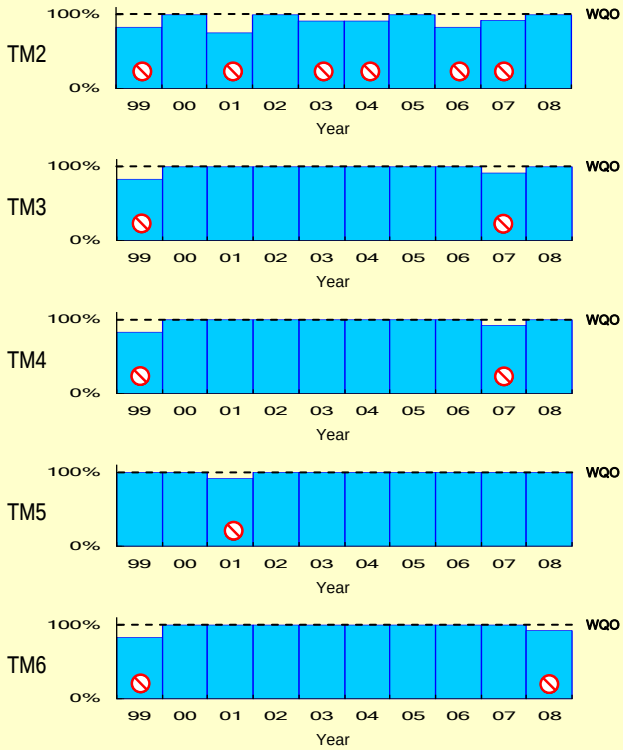


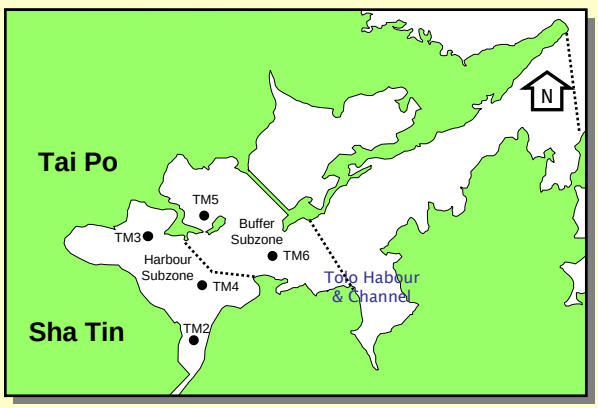
Levels of compliance with key Water Quality Objectives in the Tolo Harbour and Channel WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(water column average)





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

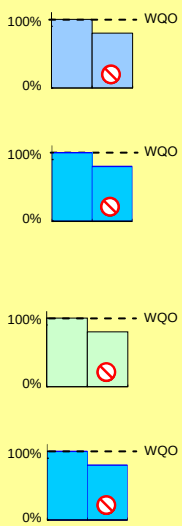
% sample with bottom DO ≥ 3 mg/L

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

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

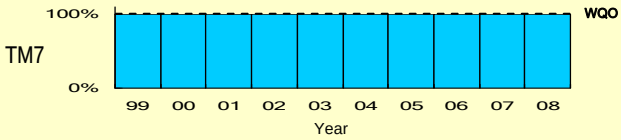
% sample with water column average DO ≥ 4 mg/L

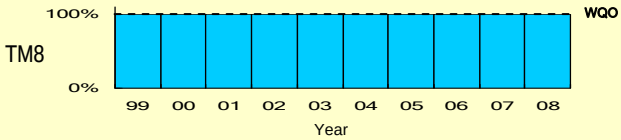
Non-compliance



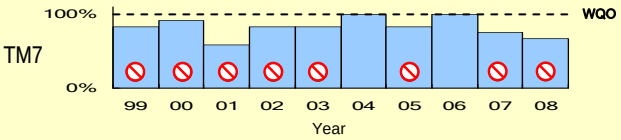
Levels of compliance with key Water Quality Objectives in the Tolo Harbour and Channel WCZ (continued)

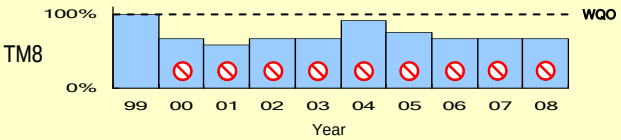
Dissolved Oxygen (DO)
(surface)



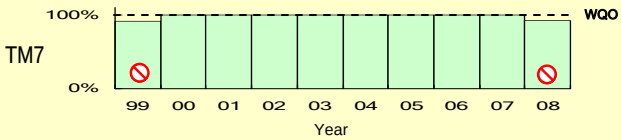


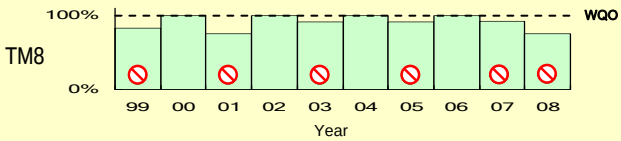
Dissolved Oxygen (DO)
(bottom)

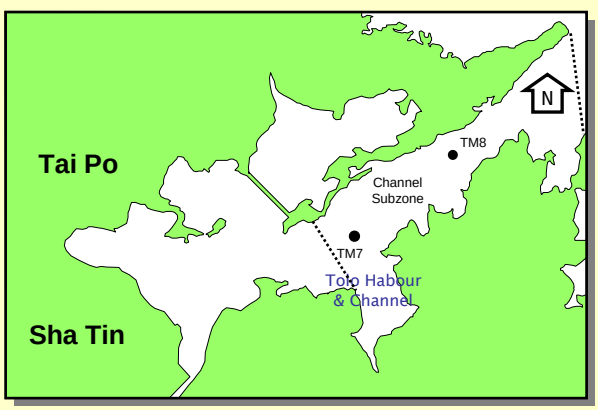




Dissolved Oxygen (DO)
(middle)







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

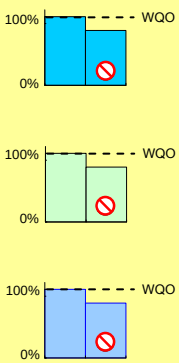
% sample with middle DO ≥ 4 mg/L

3. Bottom

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

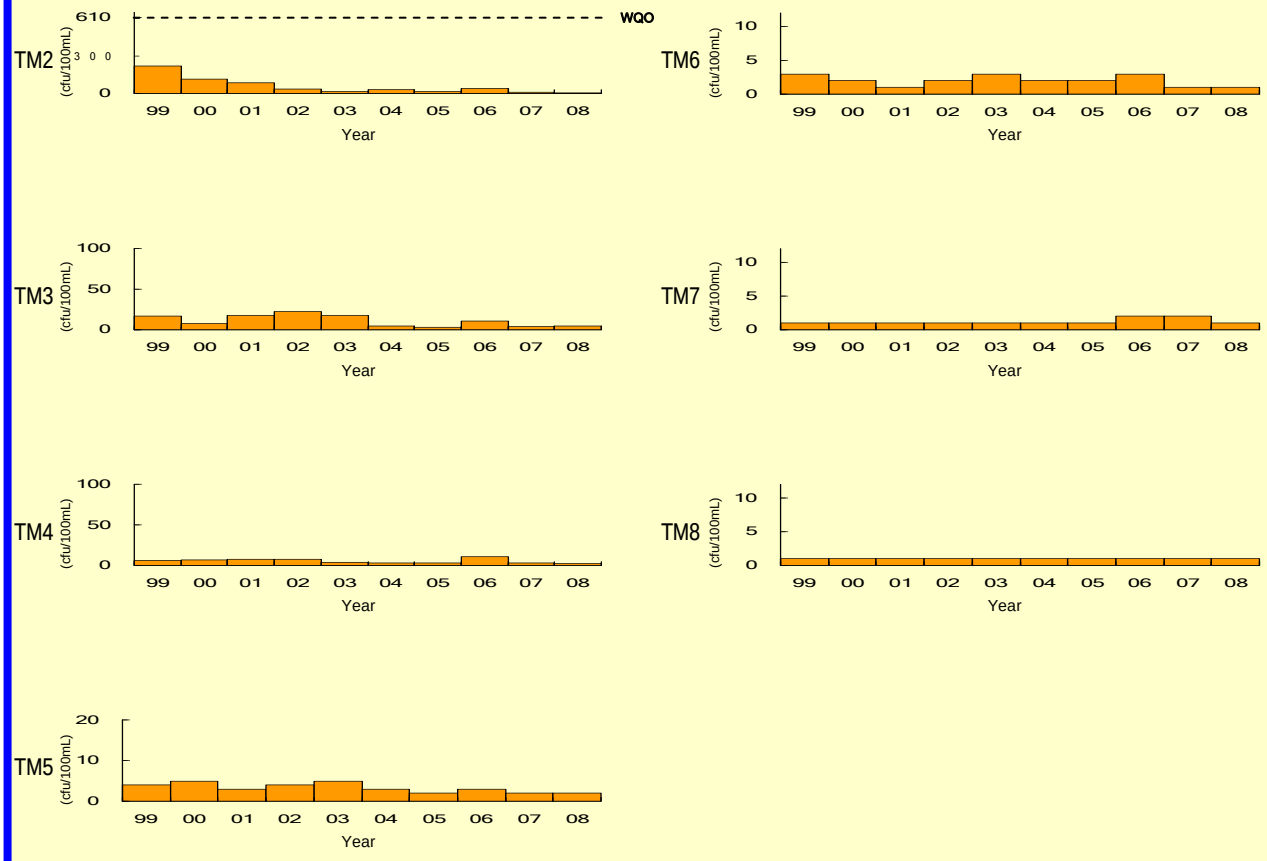
% sample with bottom DO ≥ 4 mg/L

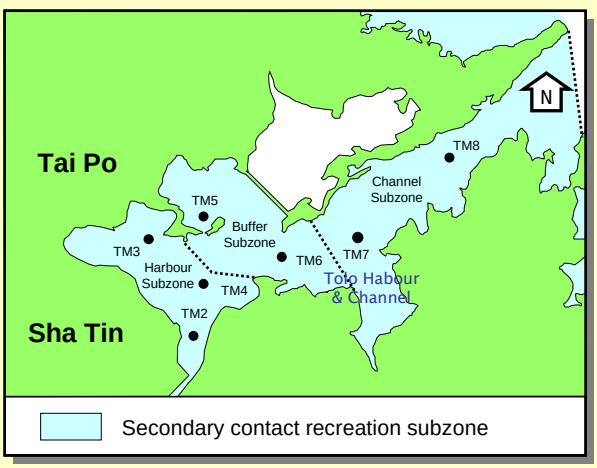
Non-compliance



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

E. coli
(annual geometric mean)



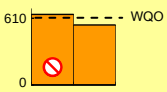


E. coli

WQO for secondary contact recreation subzones :
annual geometric mean for depth averaged
E. coli ≤ 610 cfu/100mL

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

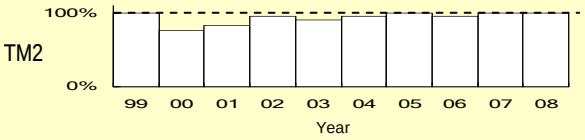
Non-compliance

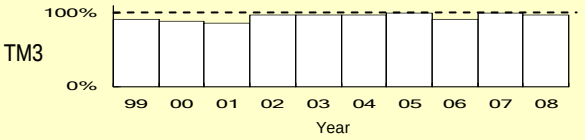


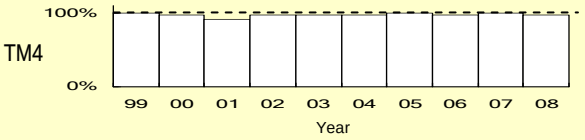
Levels of chlorophyll-*a* in the Tolo Harbour and Channel WCZ

Chlorophyll-*a*

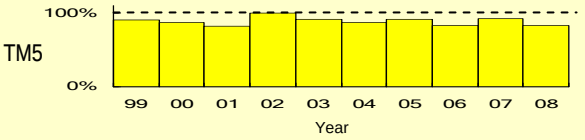
1. Harbour Subzone

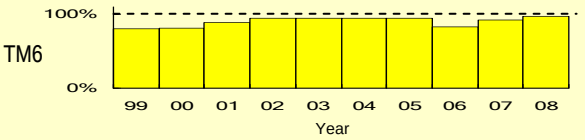




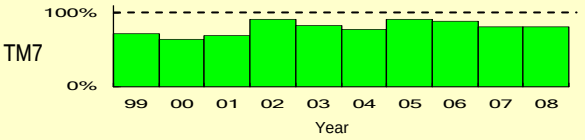


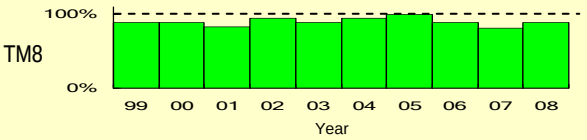
2. Buffer Subzone

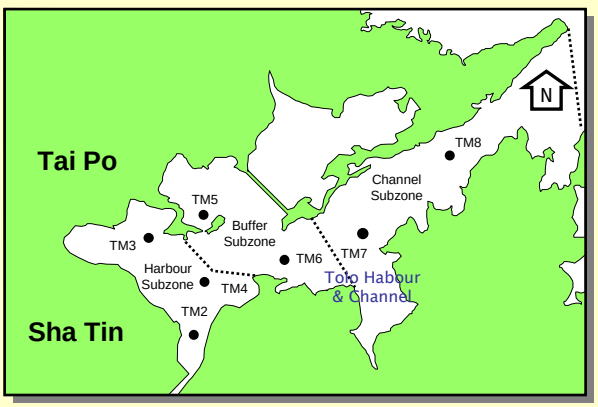




3. Channel Subzone







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

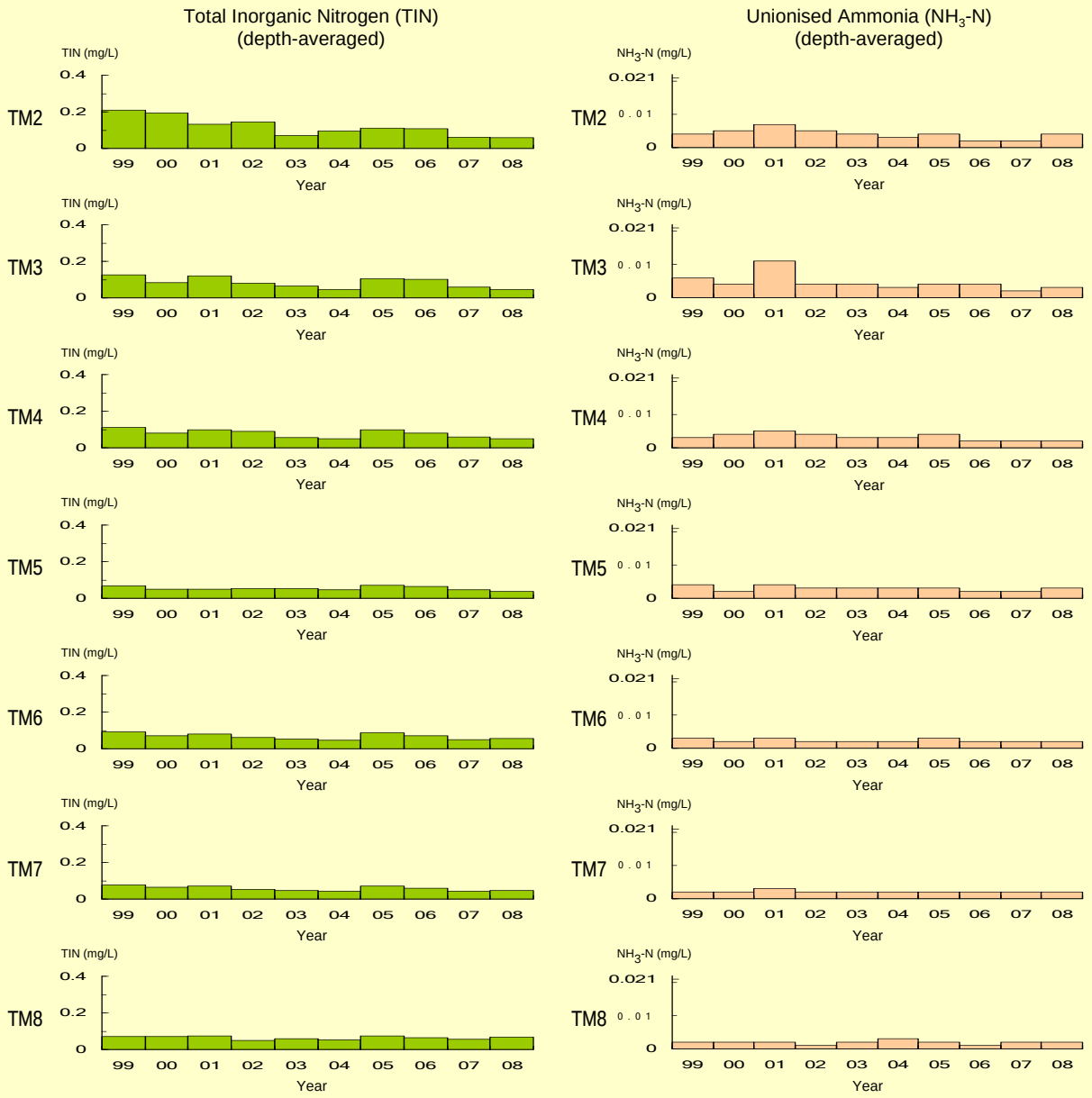
WQO : Chlorophyll-*a* ≤ 10 μg/L

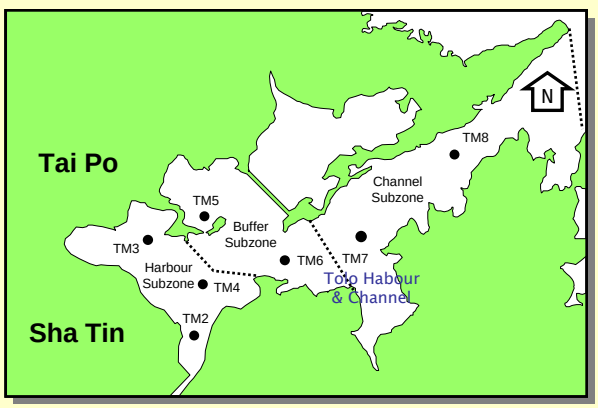
3. Channel Subzone

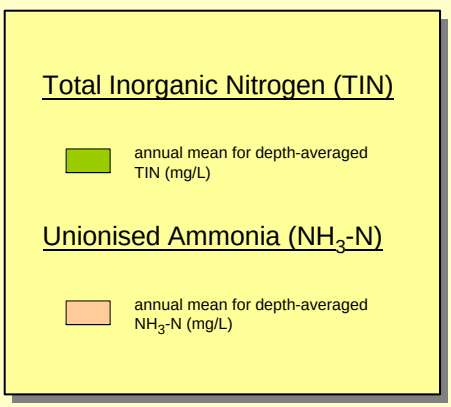
% sample (S, M, B) with Chlorophyll-*a* ≤ 6 μg/L

WQO : Chlorophyll-*a* ≤ 6 μg/L

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

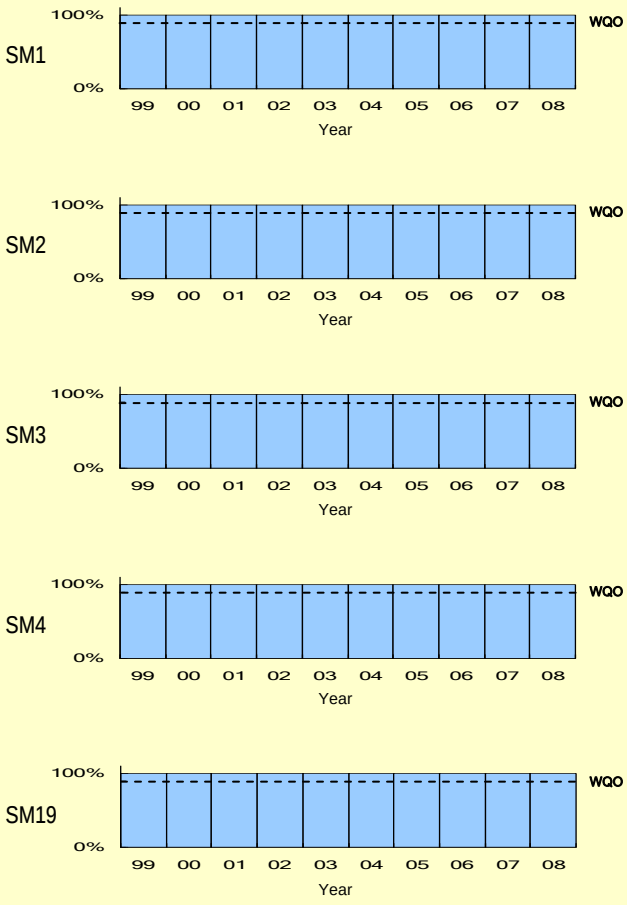




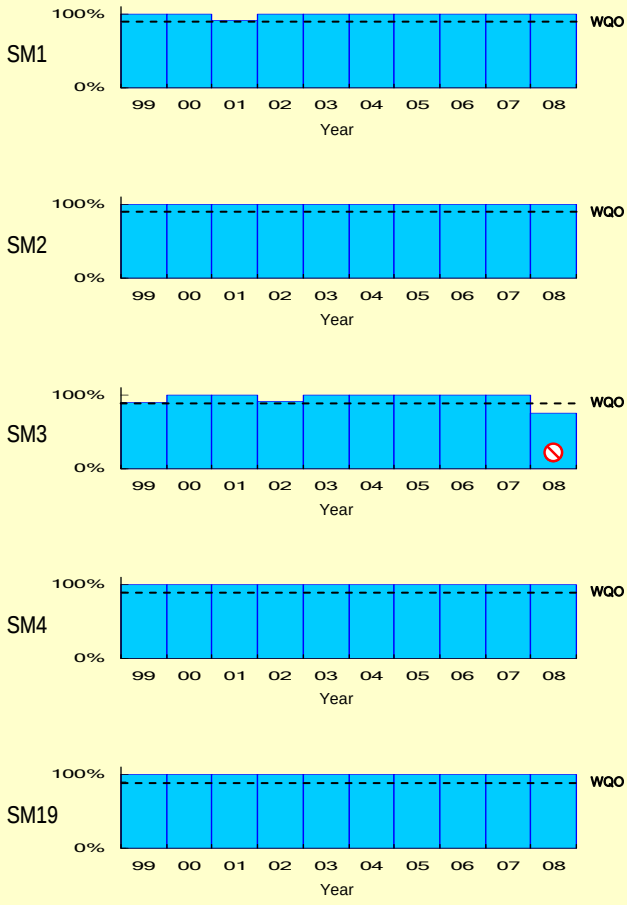


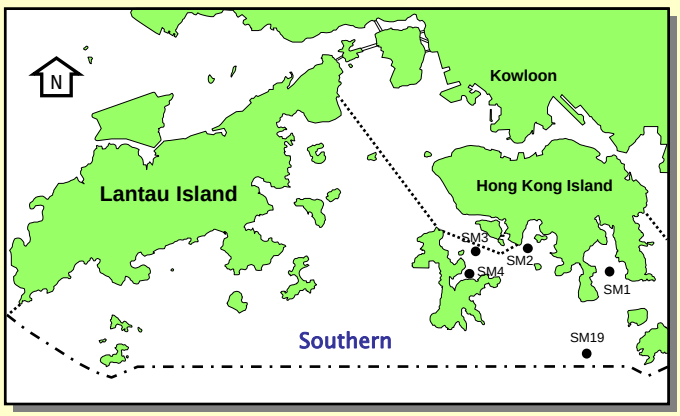
Levels of compliance with key Water Quality Objectives in the Southern WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



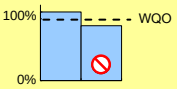


Dissolved Oxygen (DO)

1. Bottom

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

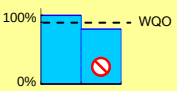
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

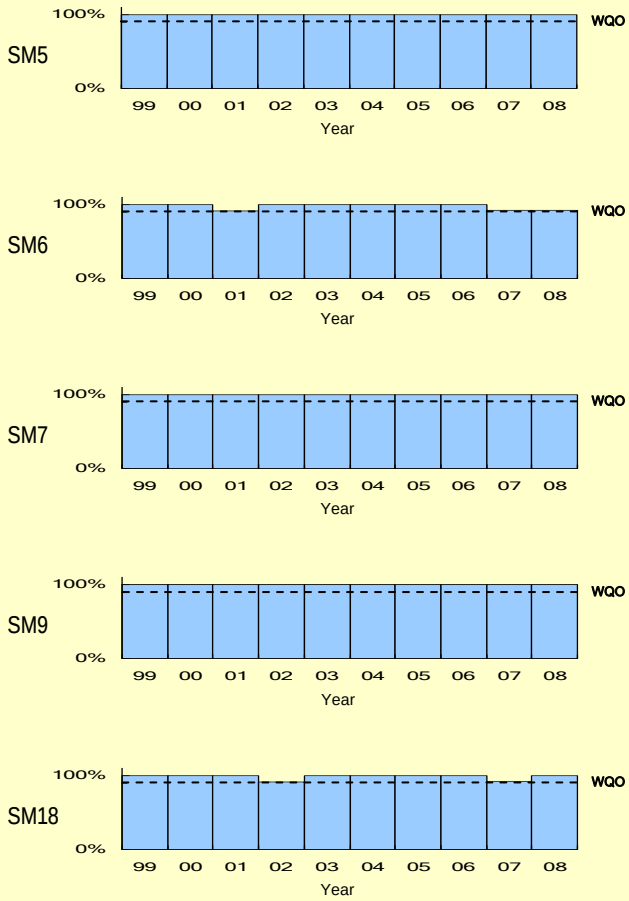
% sample with depth-averaged DO ≥ 4 mg/L



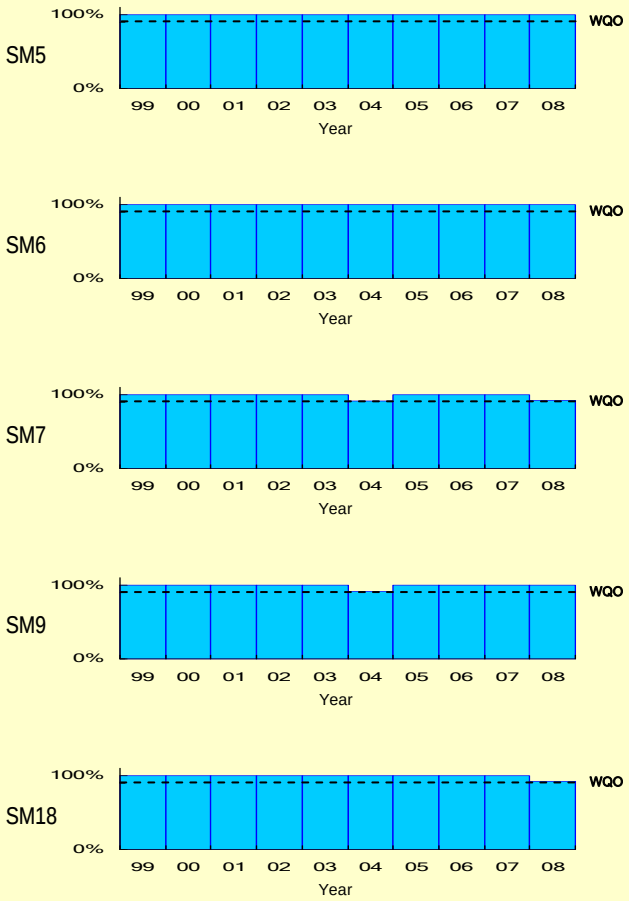
Non-compliance

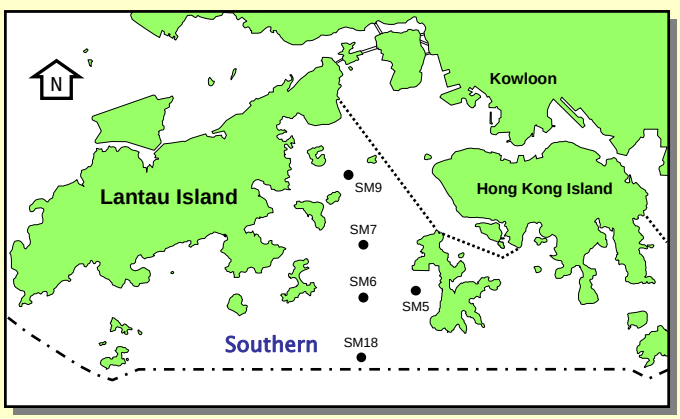
Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Dissolved Oxygen (DO) (bottom)



Dissolved Oxygen (DO) (depth-averaged)



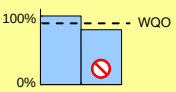


Dissolved Oxygen (DO)

1. Bottom

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

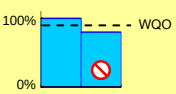
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

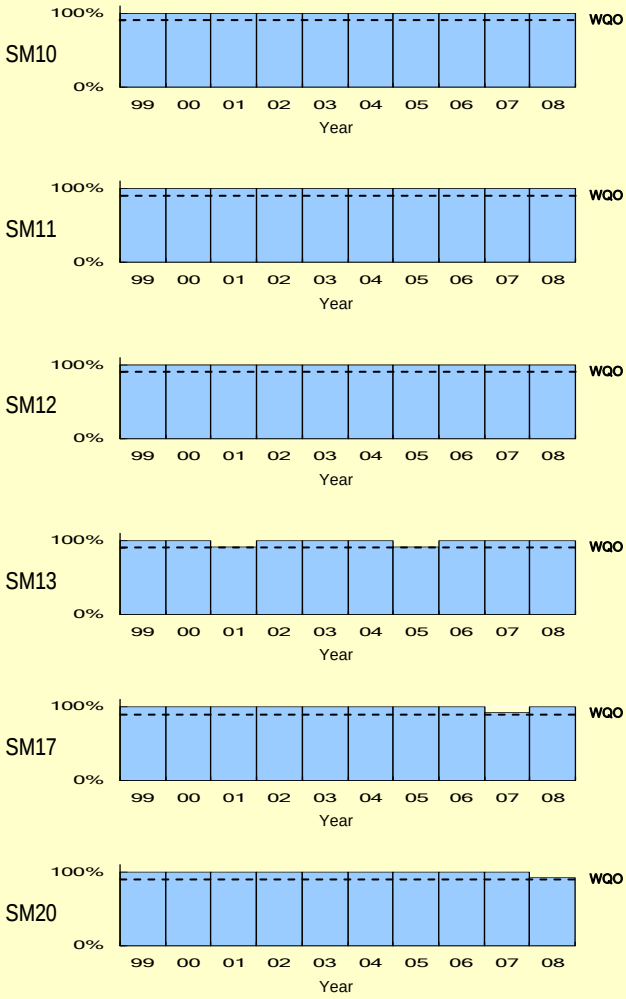
% sample with depth-averaged DO ≥ 4 mg/L



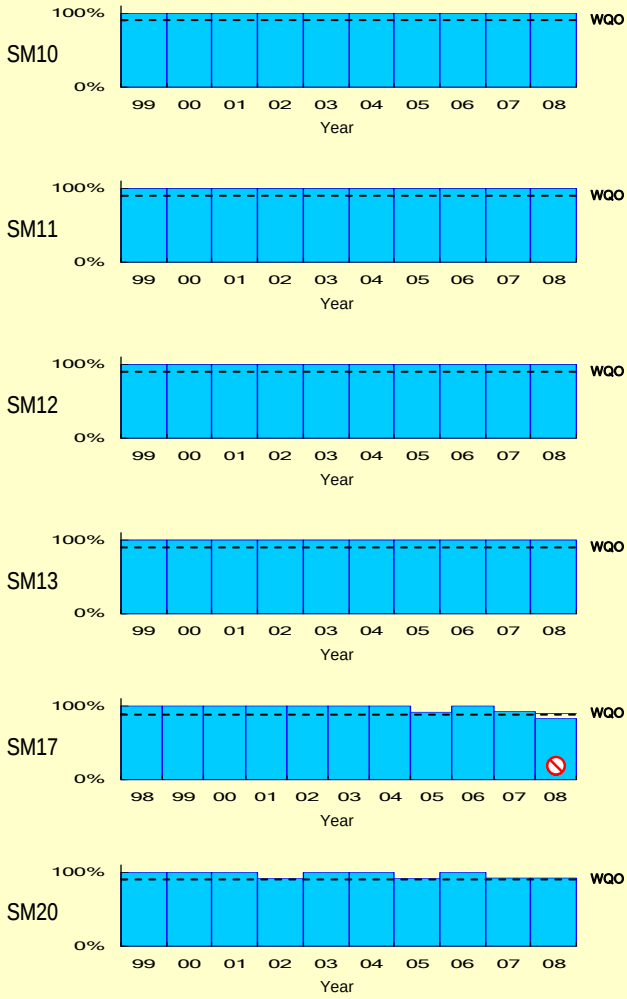
Non-compliance

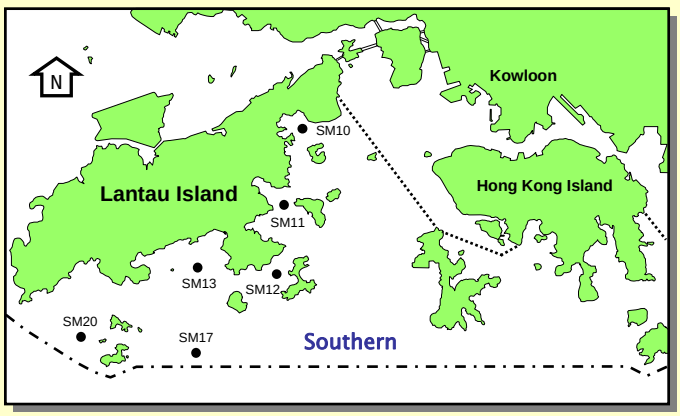
Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

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

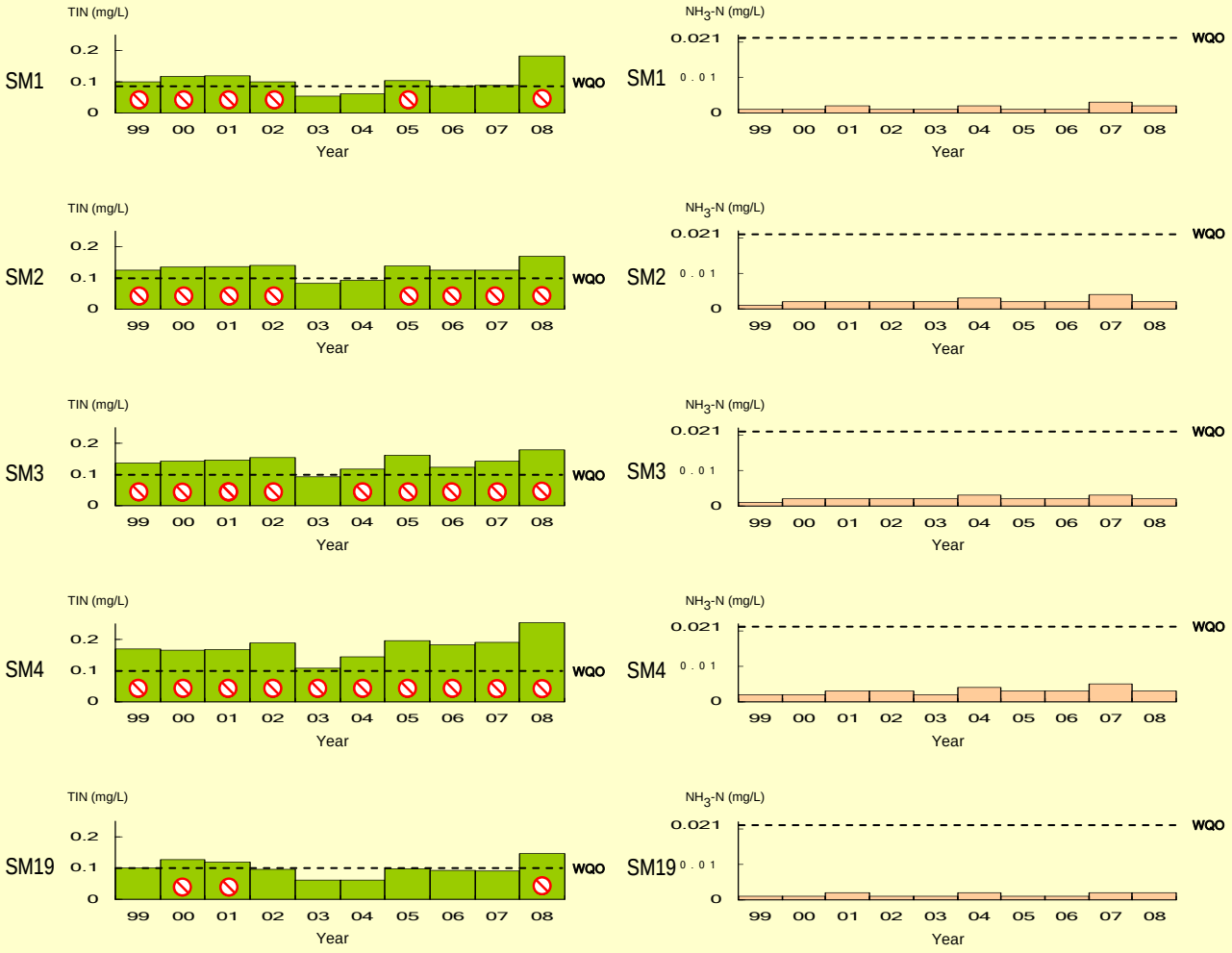
% sample with depth-averaged DO ≥ 4 mg/L

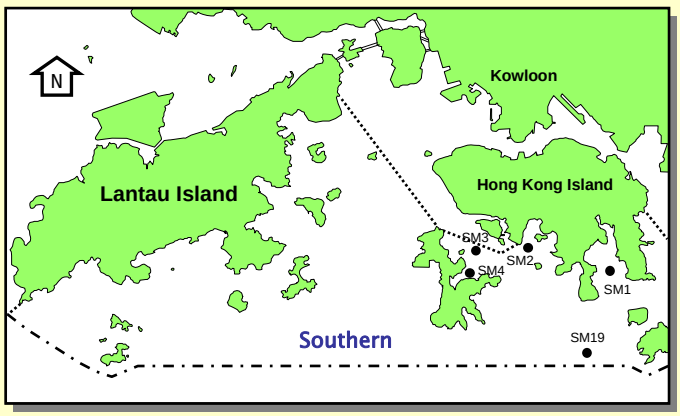
Non-compliance

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)

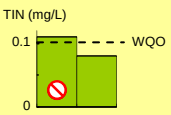




Total Inorganic Nitrogen (TIN)

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

annual mean for depth-averaged TIN

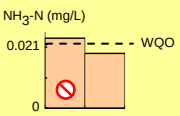


Unionised Ammonia (NH_3-N)

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

annual mean for depth-averaged NH_3-N

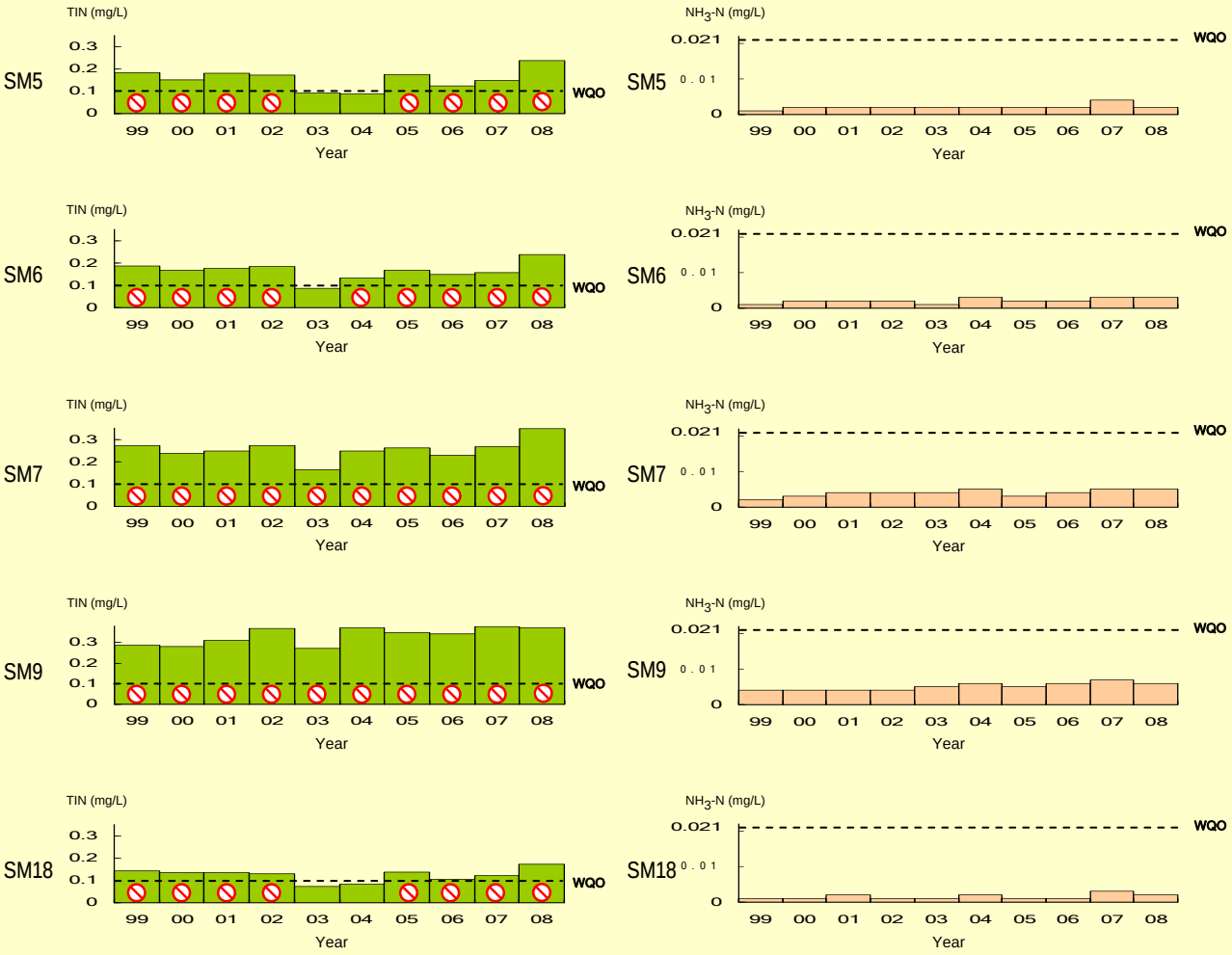
Non-compliance

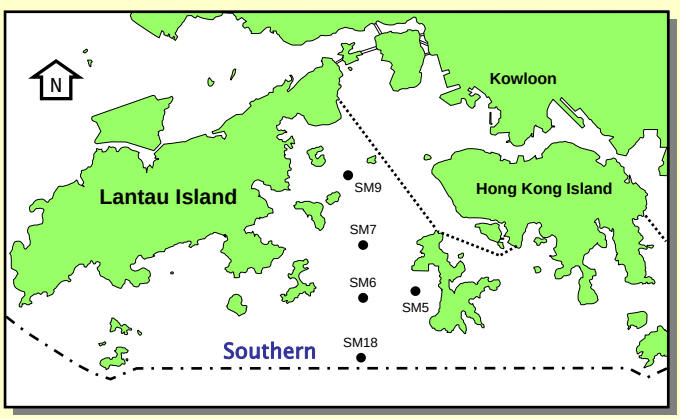


Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

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

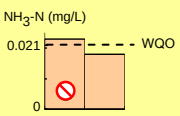
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

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

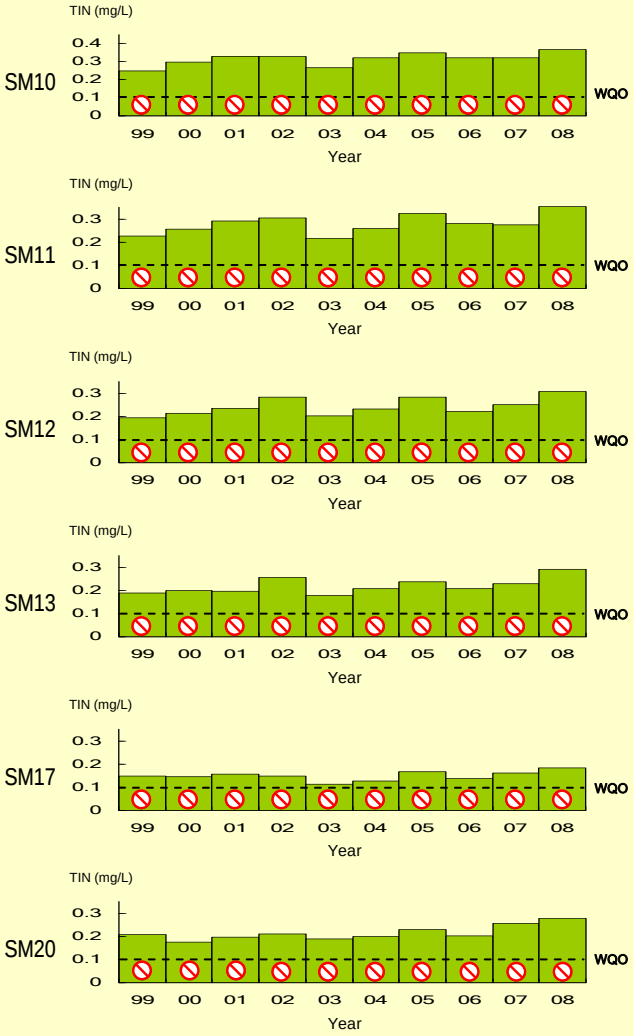
annual mean for depth-averaged NH_3-N

Non-compliance

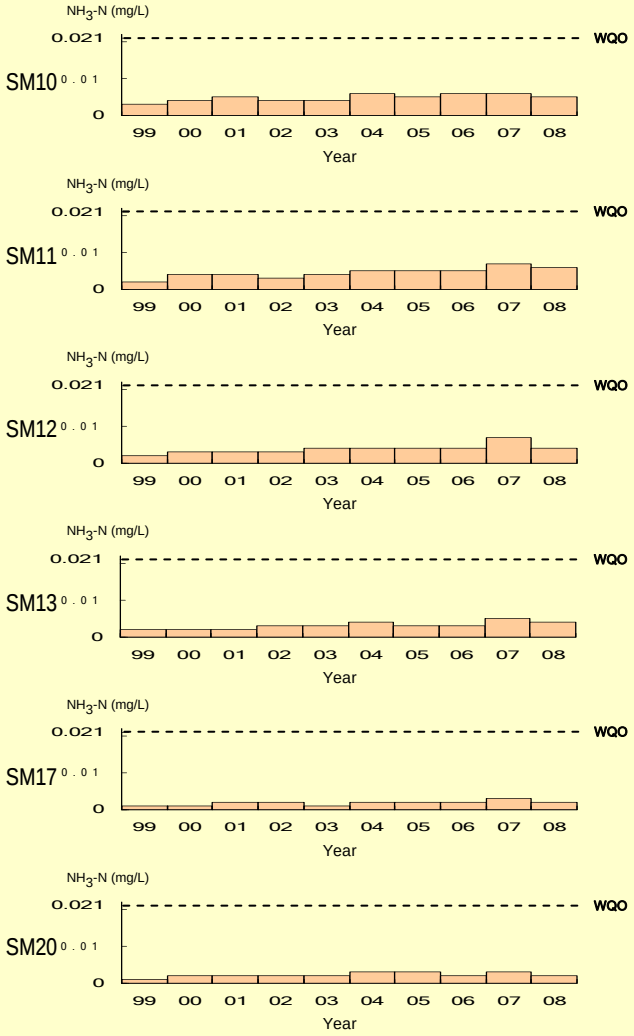


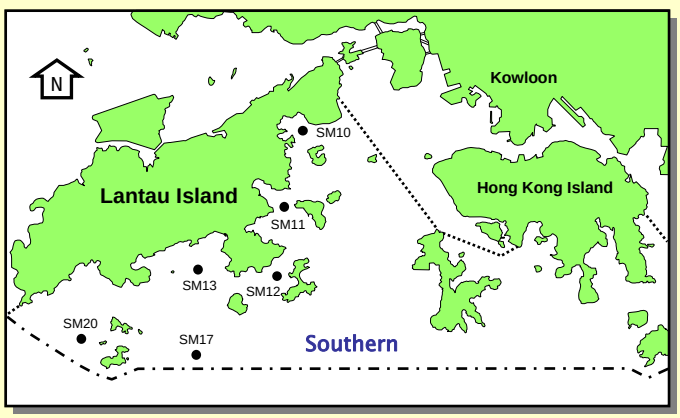
Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



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

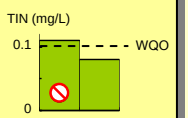




Total Inorganic Nitrogen (TIN)

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

annual mean for depth-averaged TIN

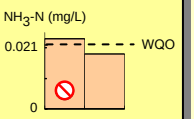


Unionised Ammonia (NH_3-N)

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

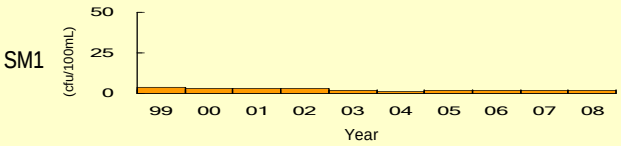
annual mean for depth-averaged NH_3-N

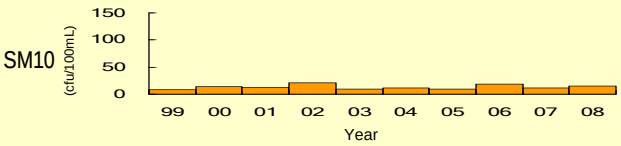
Non-compliance

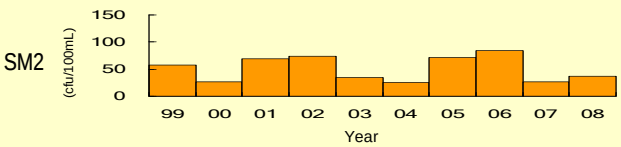


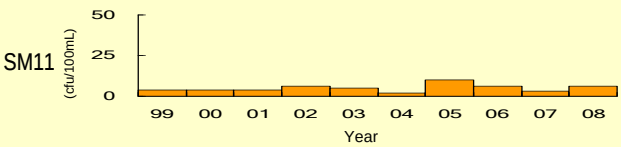
Levels of compliance with key Water Quality Objectives in the Southern WCZ (continued)

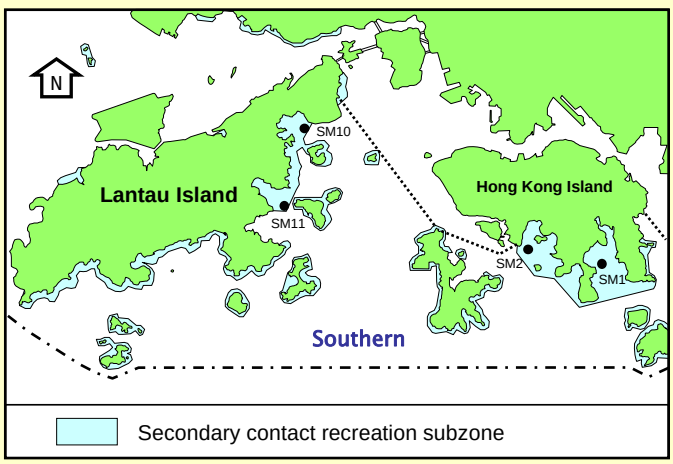
E. coli
(annual geometric mean)





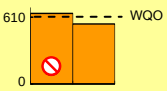






E. coli

WQO for secondary contact recreation subzones :
annual geometric mean for depth averaged
E. coli ≤ 610 cfu/100mL

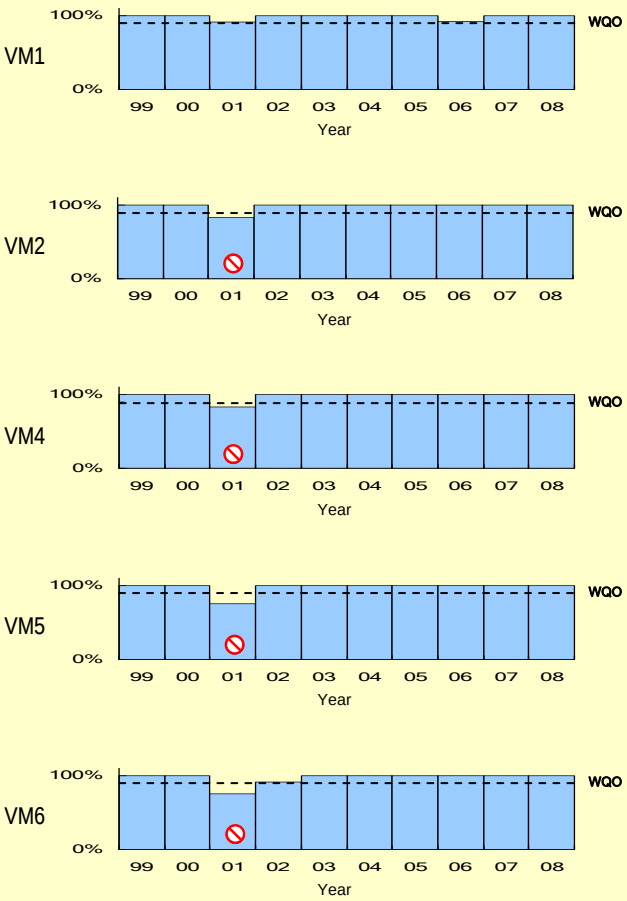


annual geometric mean for depth averaged
E. coli (cfu/100mL)

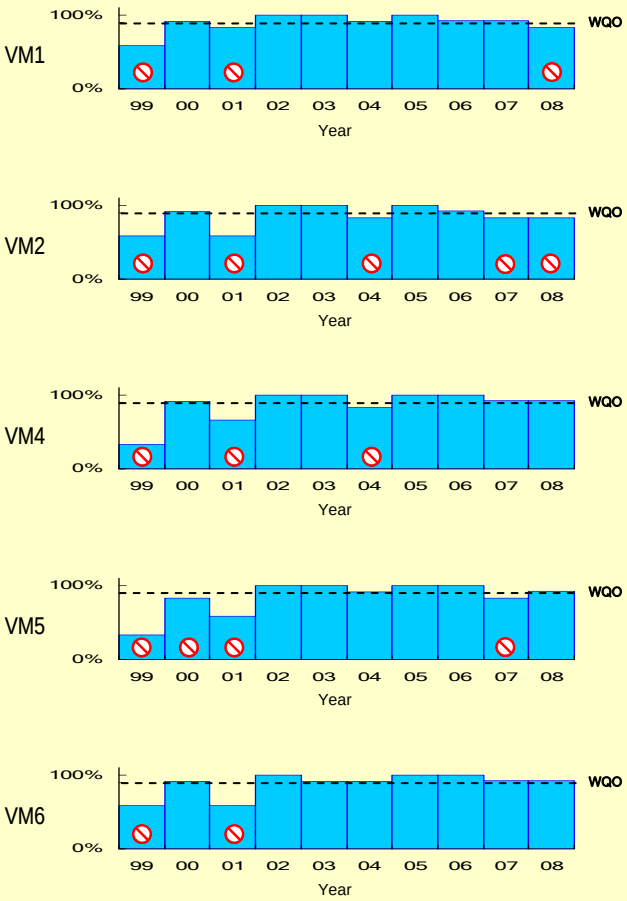
Non-compliance

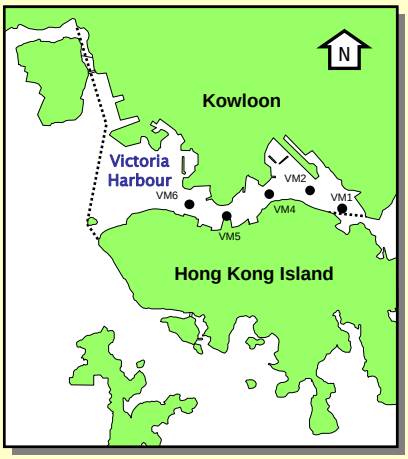
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ

Dissolved Oxygen (DO) (bottom)



Dissolved Oxygen (DO) (depth-averaged)





Dissolved Oxygen (DO)

1. Bottom

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

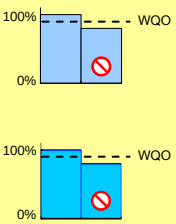
% sample with bottom DO ≥ 2 mg/L

2. Depth-averaged

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

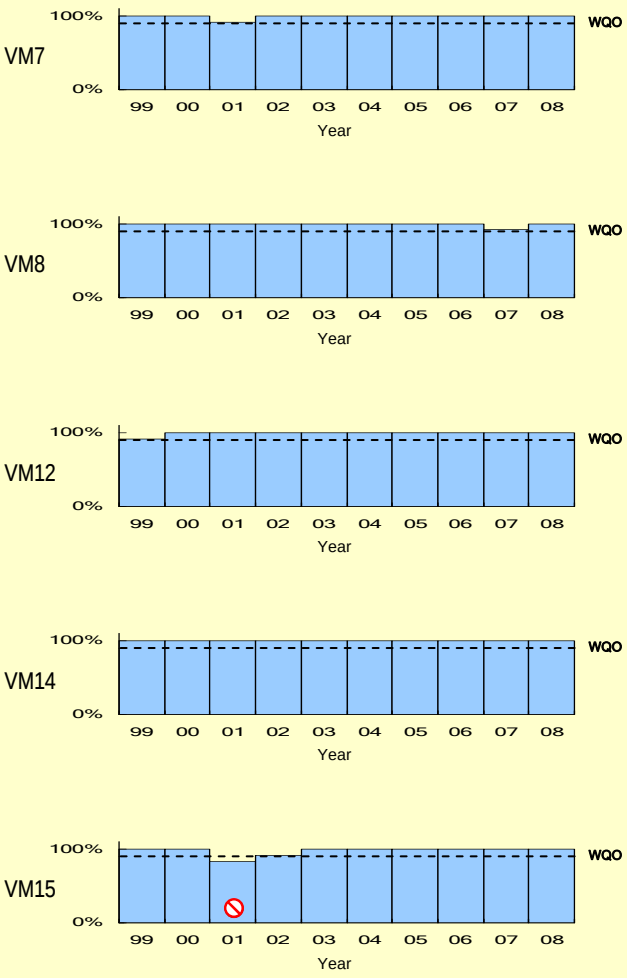
% sample with depth-averaged DO ≥ 4 mg/L

Non-compliance

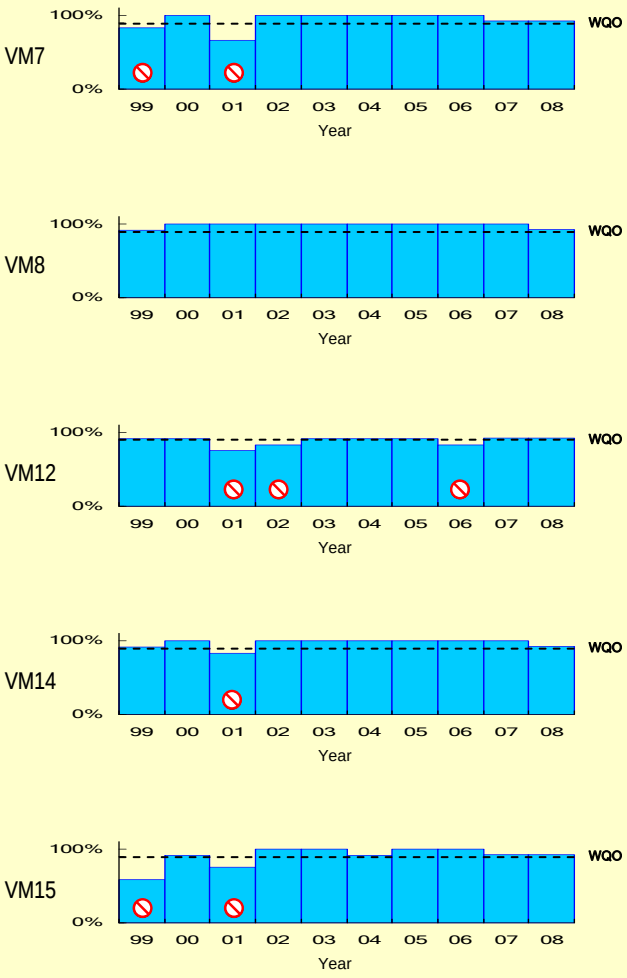


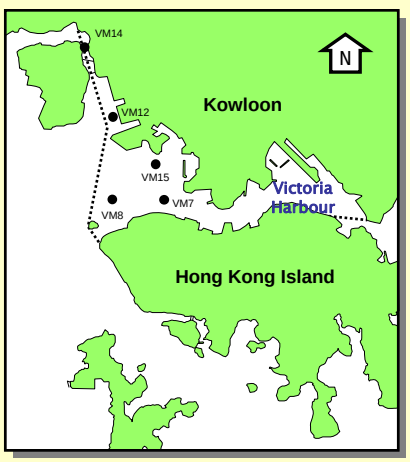
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

Dissolved Oxygen (DO) (bottom)



Dissolved Oxygen (DO) (depth-averaged)



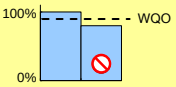


Dissolved Oxygen (DO)

1. Bottom

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

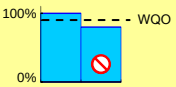
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

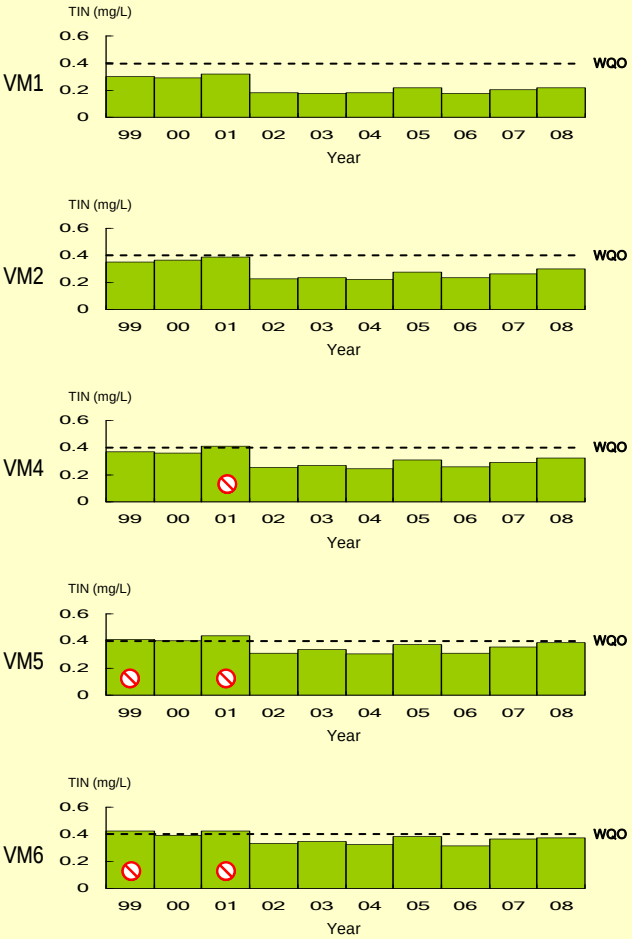
% sample with depth-averaged DO ≥ 4 mg/L



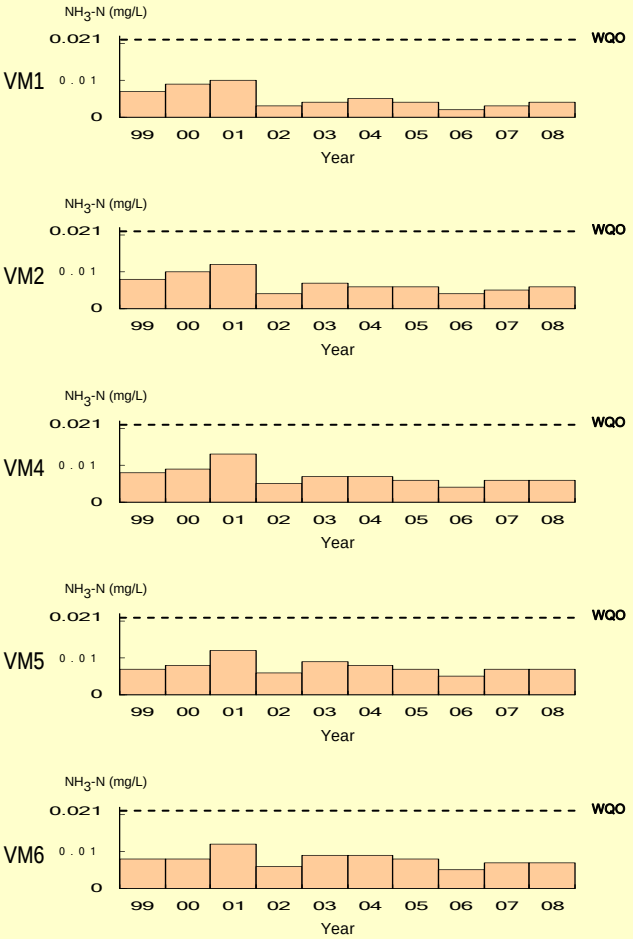
Non-compliance

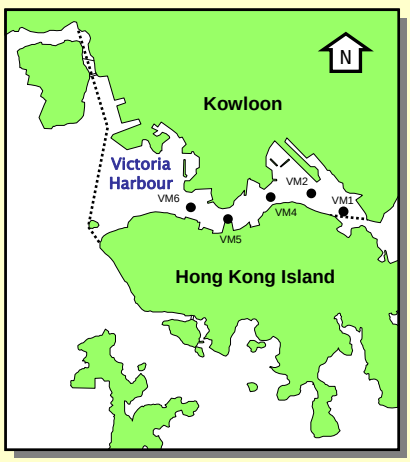
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)



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

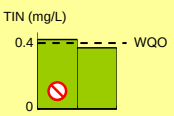




Total Inorganic Nitrogen (TIN)

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

annual mean for depth-averaged TIN

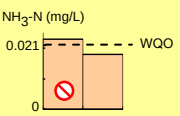


Unionised Ammonia (NH_3-N)

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

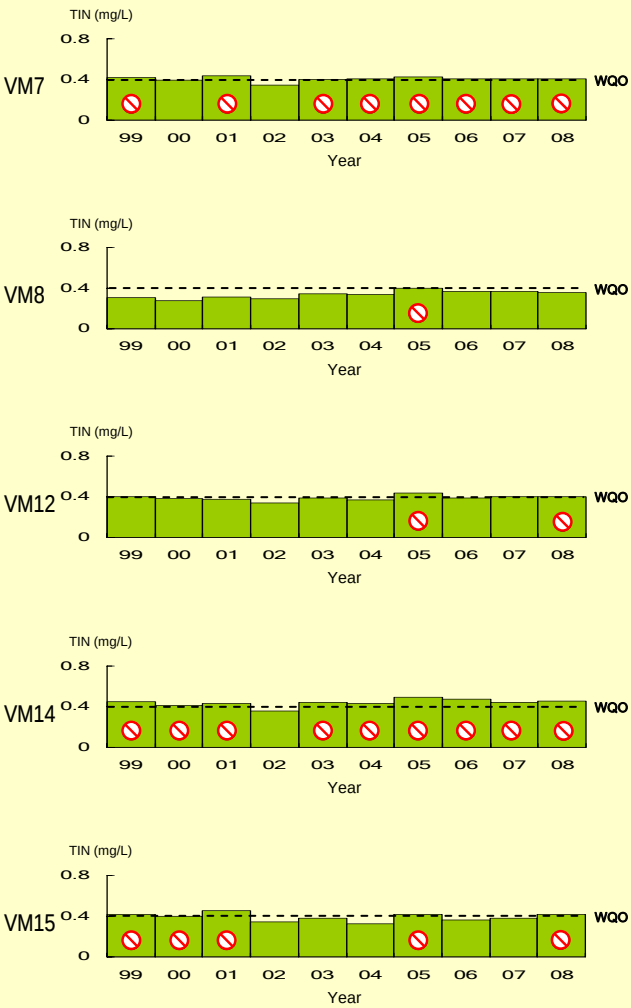
annual mean for depth-averaged NH_3-N

Non-compliance

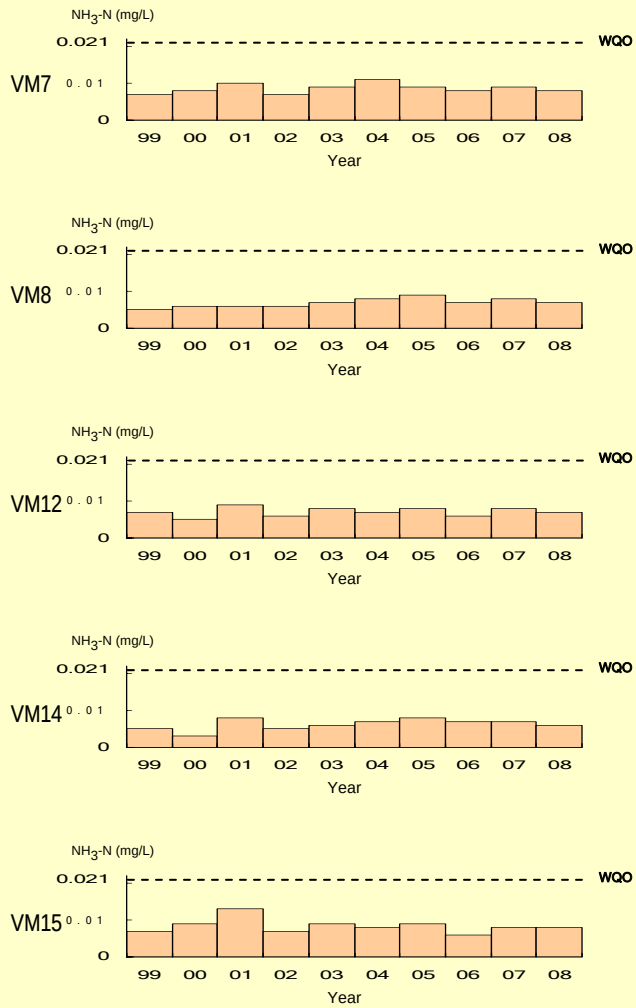


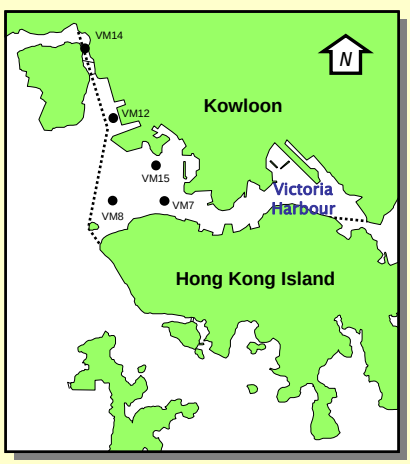
Levels of compliance with key Water Quality Objectives in the Victoria Harbour WCZ (continued)

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

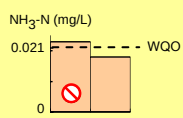
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

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

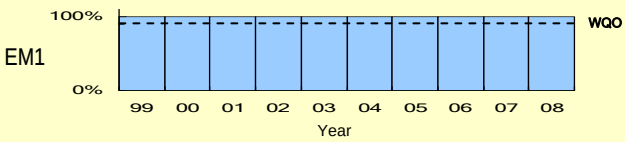
annual mean for depth-averaged NH_3-N

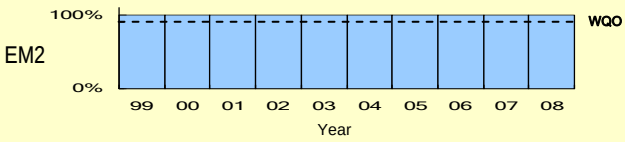
Non-compliance

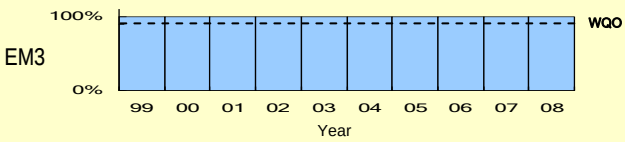


Levels of compliance with key Water Quality Objectives in the Eastern Buffer WCZ

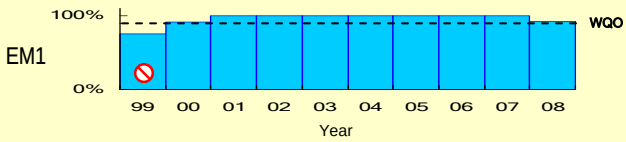
Dissolved Oxygen (DO)
(bottom)

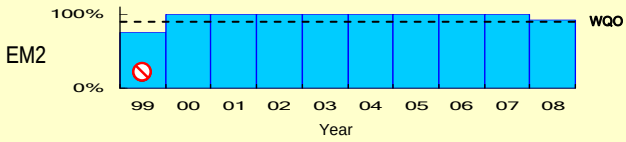


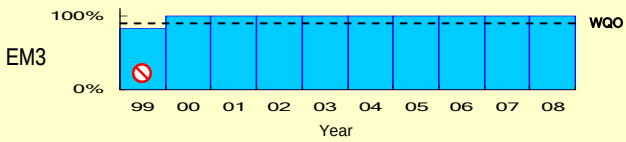


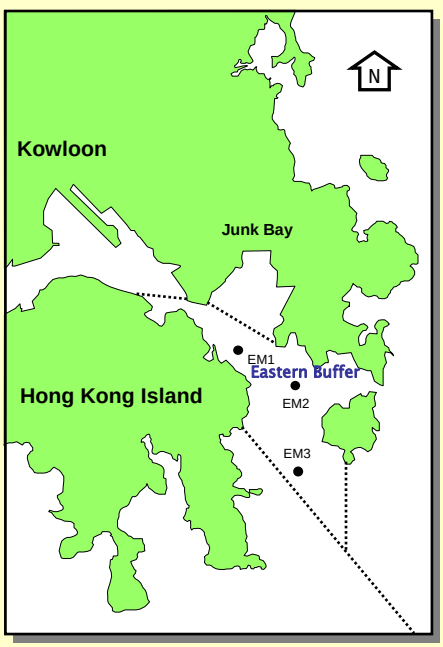


Dissolved Oxygen (DO)
(depth-averaged)







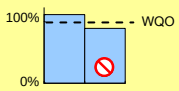


Dissolved Oxygen (DO)

1. Bottom

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

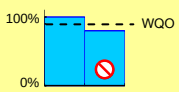
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

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

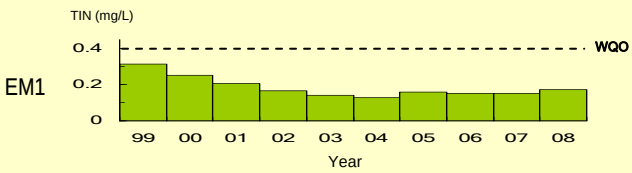


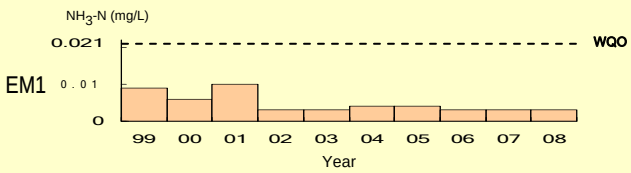
Non-compliance

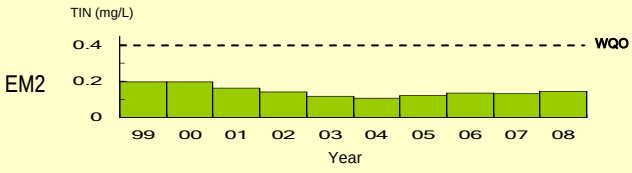
Levels of compliance with key Water Quality Objectives in the Eastern Buffer WCZ (continued)

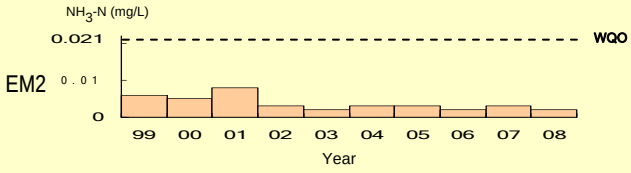
Total Inorganic Nitrogen (TIN) (depth-averaged)

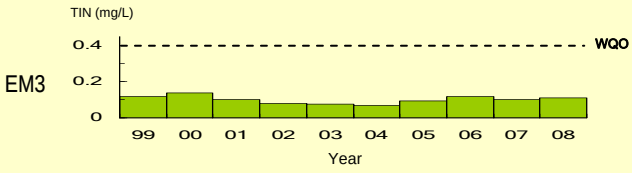
Unionised Ammonia (NH_3-N) (depth-averaged)

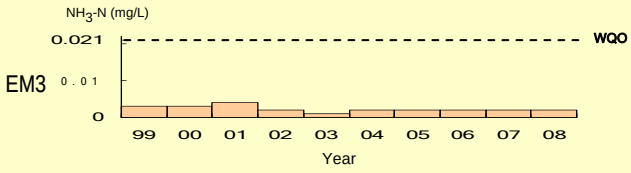


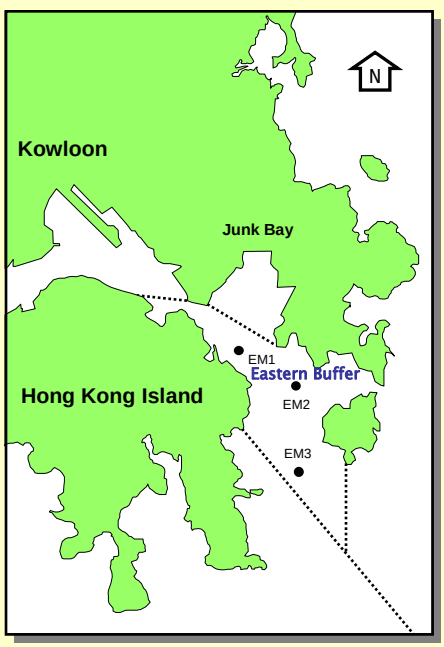












Total Inorganic Nitrogen (TIN)

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

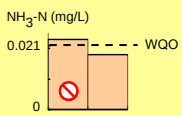
annual mean for depth-averaged TIN

Unionised Ammonia (NH_3-N)

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

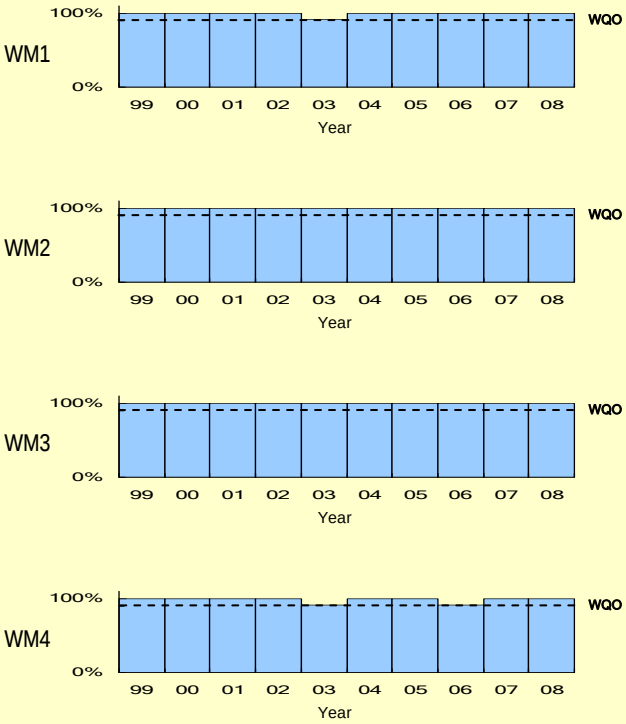
annual mean for depth-averaged NH_3-N

Non-compliance

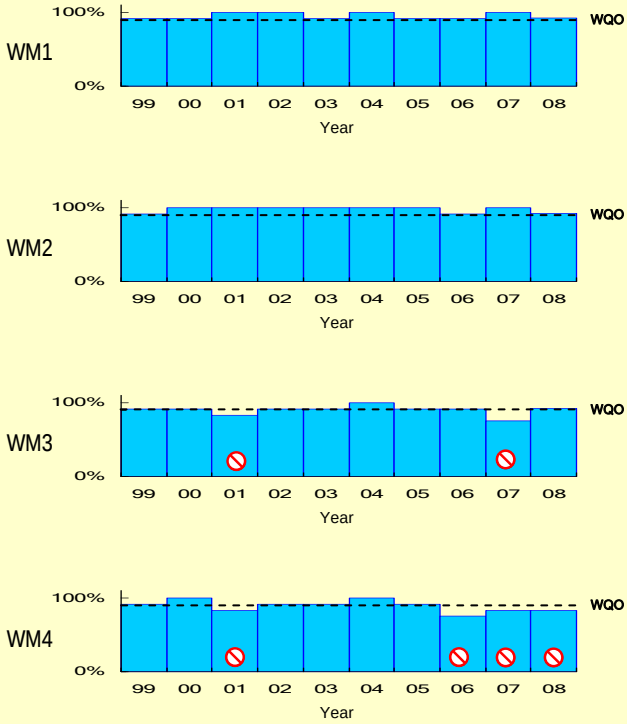


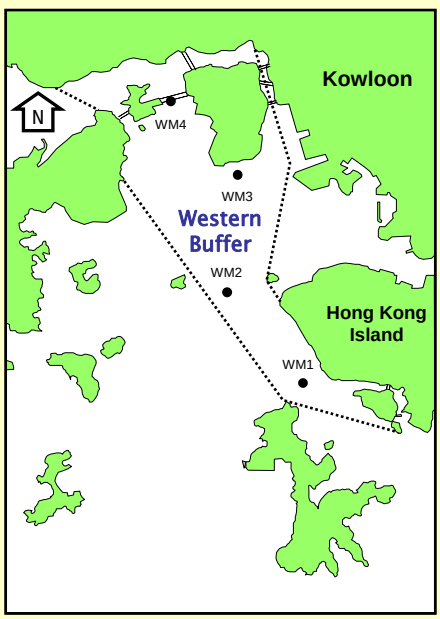
Levels of compliance with key Water Quality Objectives in the Western Buffer WCZ

Dissolved Oxygen (DO)
(bottom)



Dissolved Oxygen (DO)
(depth-averaged)



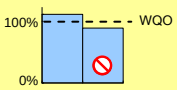


Dissolved Oxygen (DO)

1. Bottom

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

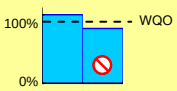
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

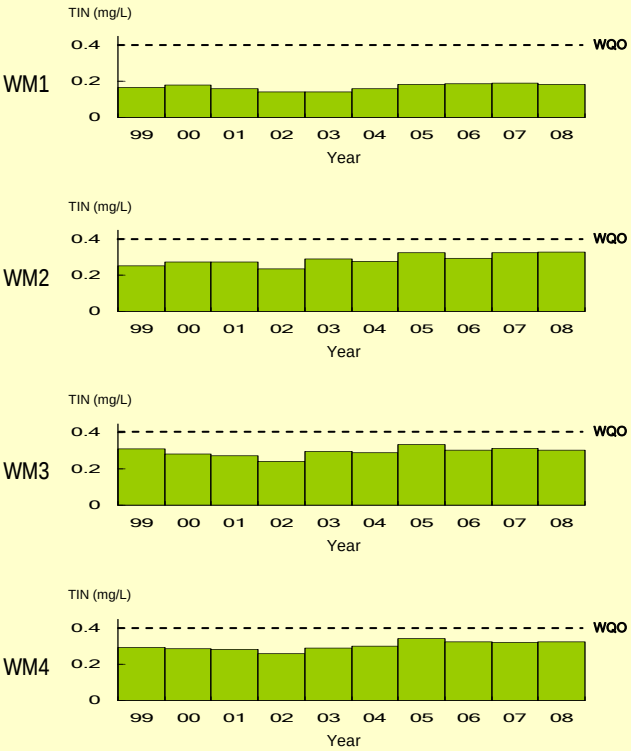
% sample with depth-averaged DO ≥ 4 mg/L



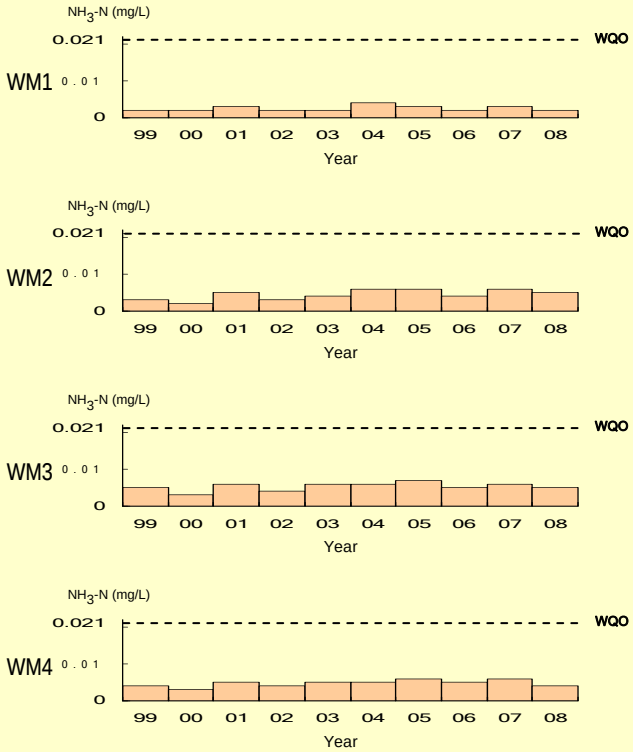
Non-compliance

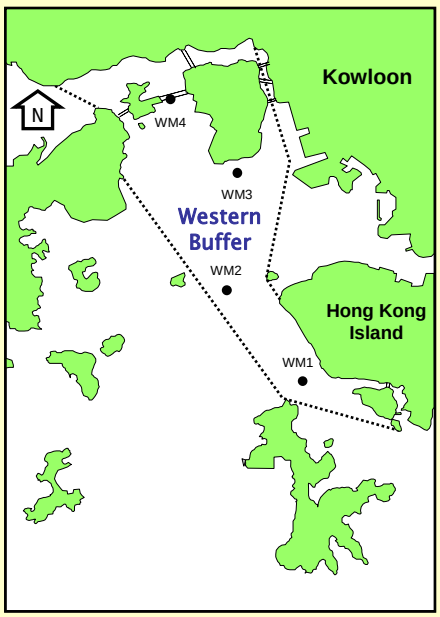
Levels of compliance with key Water Quality Objectives in the Western Buffer WCZ (continued)

Total Inorganic Nitrogen (TIN)
(depth-averaged)



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

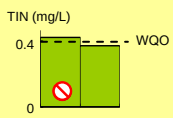




Total Inorganic Nitrogen (TIN)

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

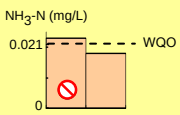
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

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

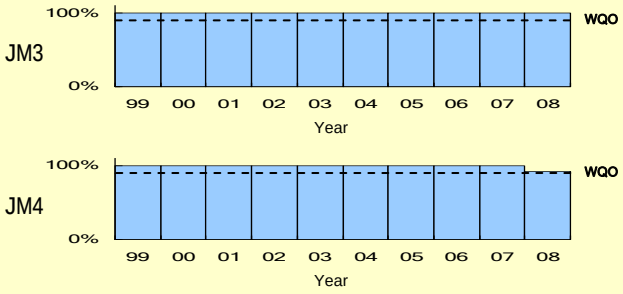
annual mean for depth-averaged NH_3-N



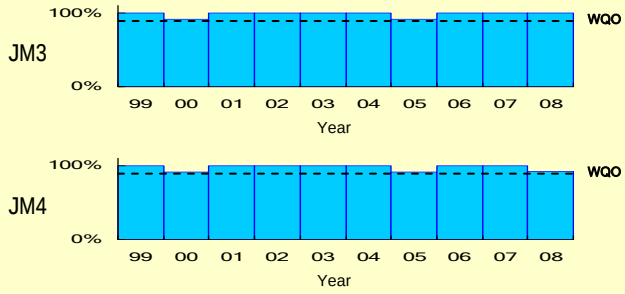
Non-compliance

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

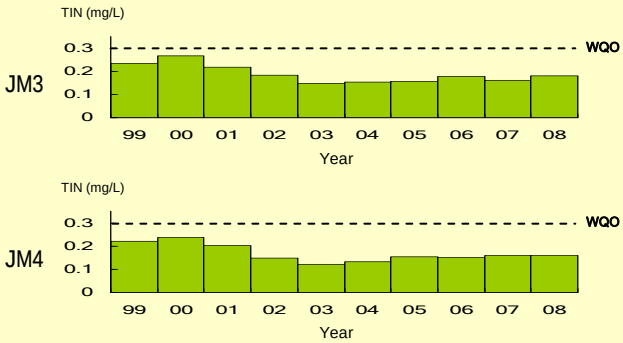
Dissolved Oxygen (DO)
(bottom)



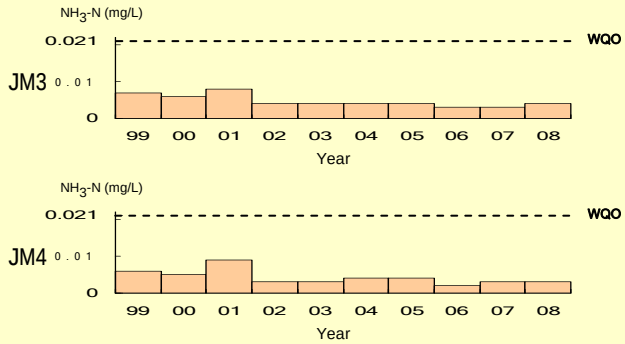
Dissolved Oxygen (DO)
(depth-averaged)

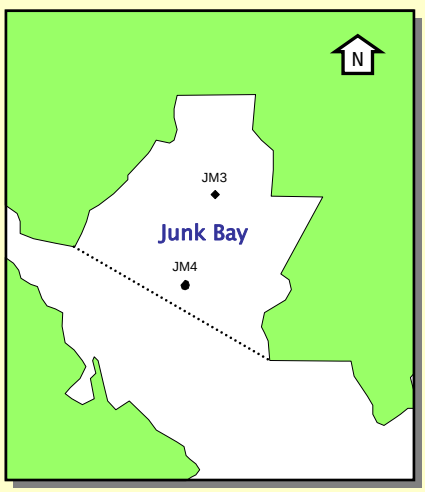


Total Inorganic Nitrogen (TIN)
(depth-averaged)



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



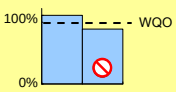


Dissolved Oxygen (DO)

1. Bottom

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

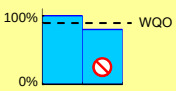
% sample with bottom DO ≥ 2 mg/L



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)

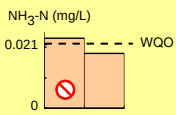
WQO : annual mean for depth-averaged TIN ≤ 0.3 mg/L

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

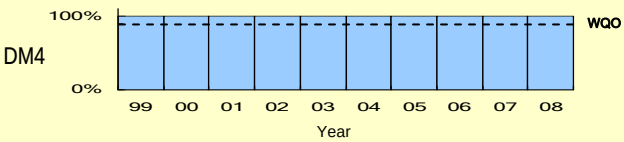
Levels of compliance with key Water Quality Objectives in the Deep Bay WCZ

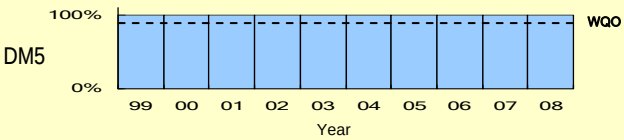
Dissolved Oxygen (DO) (bottom)

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

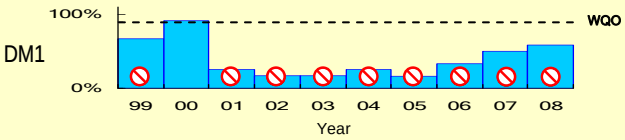
DM2 DO (bottom) not measured, water depth ≤ 3m

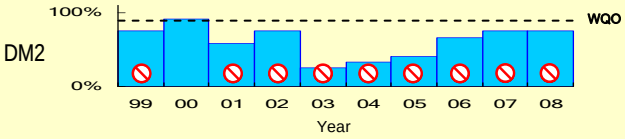
DM3 DO (bottom) not measured, water depth ≤ 3m

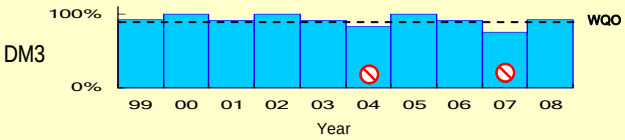


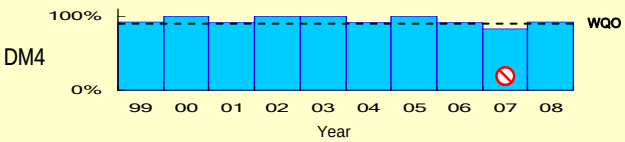


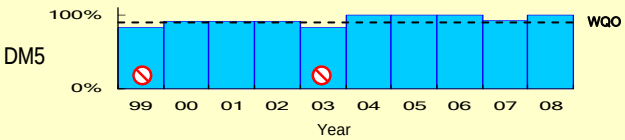
Dissolved Oxygen (DO) (depth-averaged)

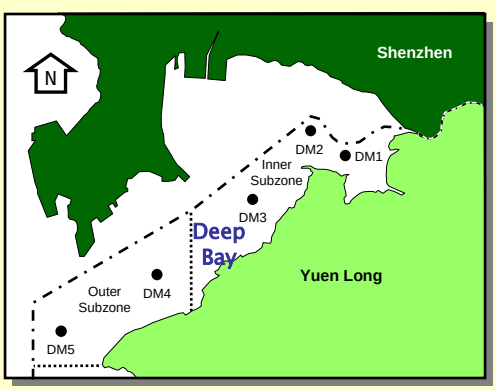










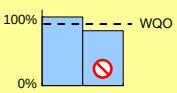


Dissolved Oxygen (DO)

1. Bottom

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

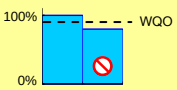
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

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

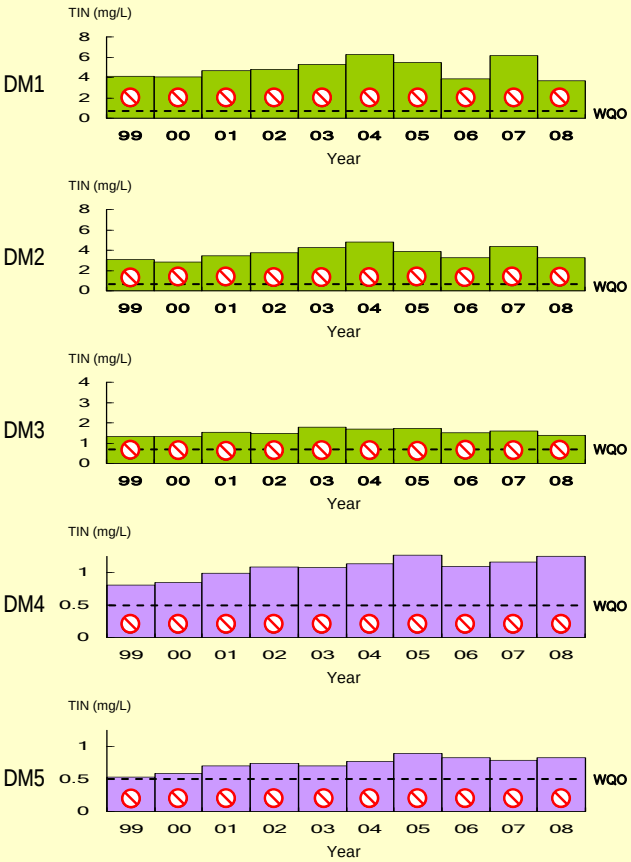
% sample with depth-averaged DO ≥ 4 mg/L



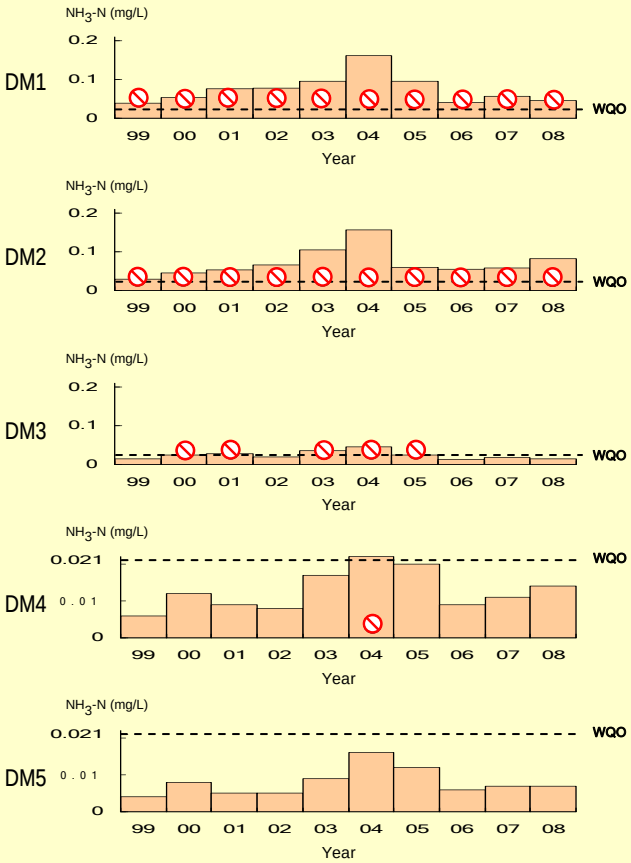
Non-compliance

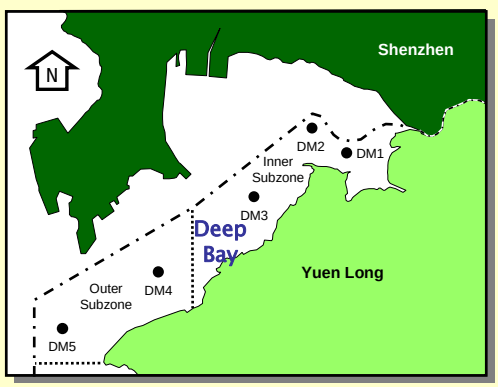
Levels of compliance with key Water Quality Objectives in the Deep Bay WCZ (continued)

Total Inorganic Nitrogen (TIN) (depth-averaged)



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



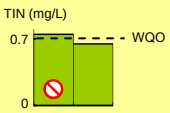


Total Inorganic Nitrogen (TIN)

Inner Subzone (DM1 - DM3)

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

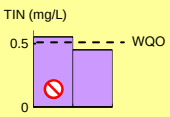
annual mean for depth-averaged TIN



Outer Subzone (DM4 - DM5)

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

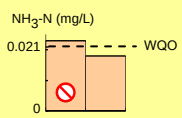
annual mean for depth-averaged TIN



Unionised Ammonia (NH_3-N)

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

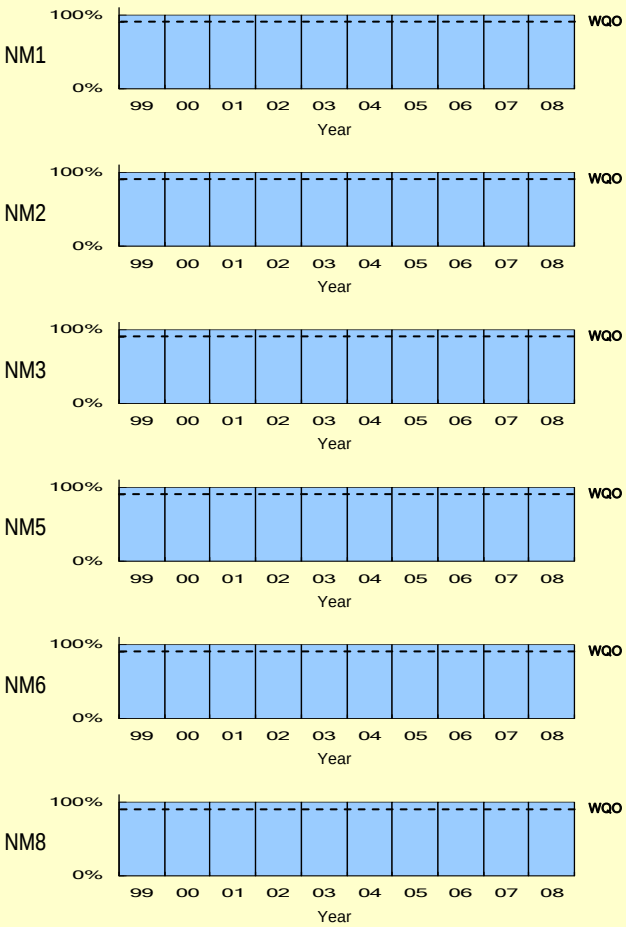
annual mean for depth-averaged NH_3-N



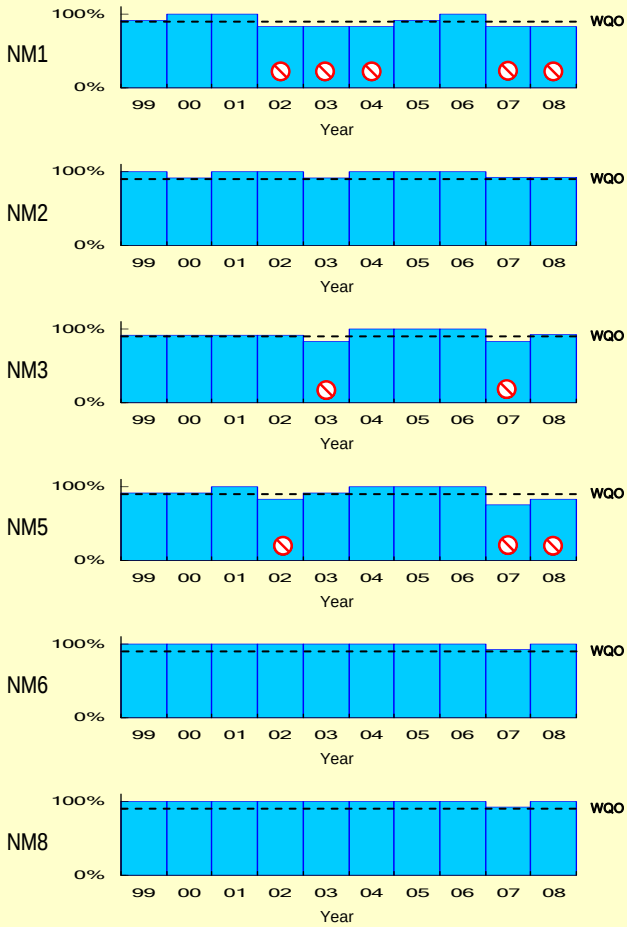
Non-compliance

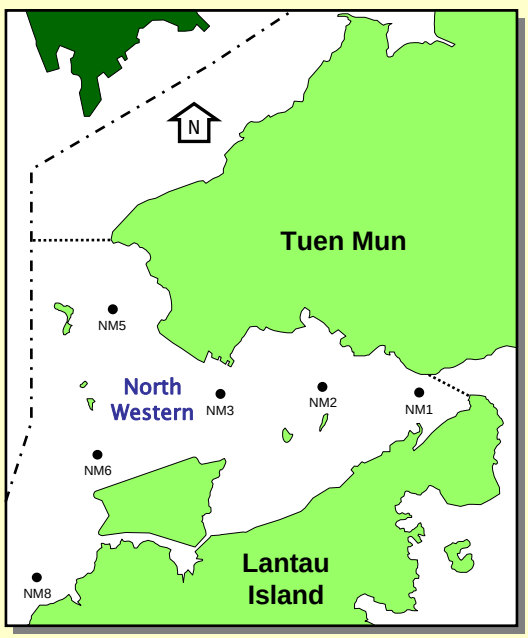
Levels of compliance with key Water Quality Objectives in the North Western WCZ

Dissolved Oxygen (DO) (bottom)



Dissolved Oxygen (DO) (depth-averaged)



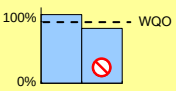


Dissolved Oxygen (DO)

1. Bottom

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

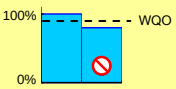
% sample with bottom DO ≥ 2 mg/L



2. Depth-averaged

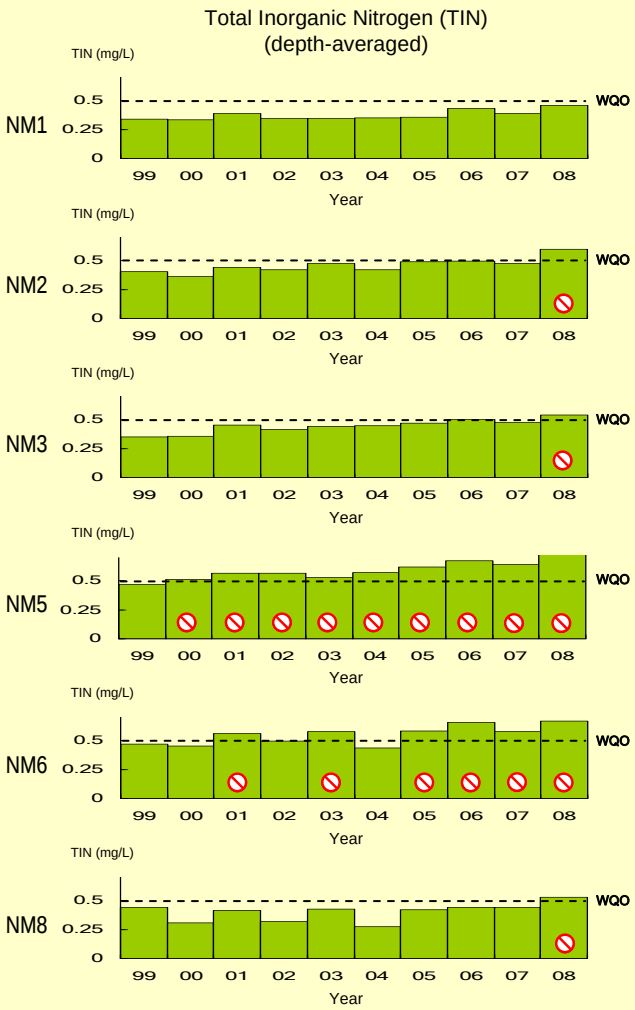
WQO : 90% sample with depth-averaged DO ≥ 4 mg/L

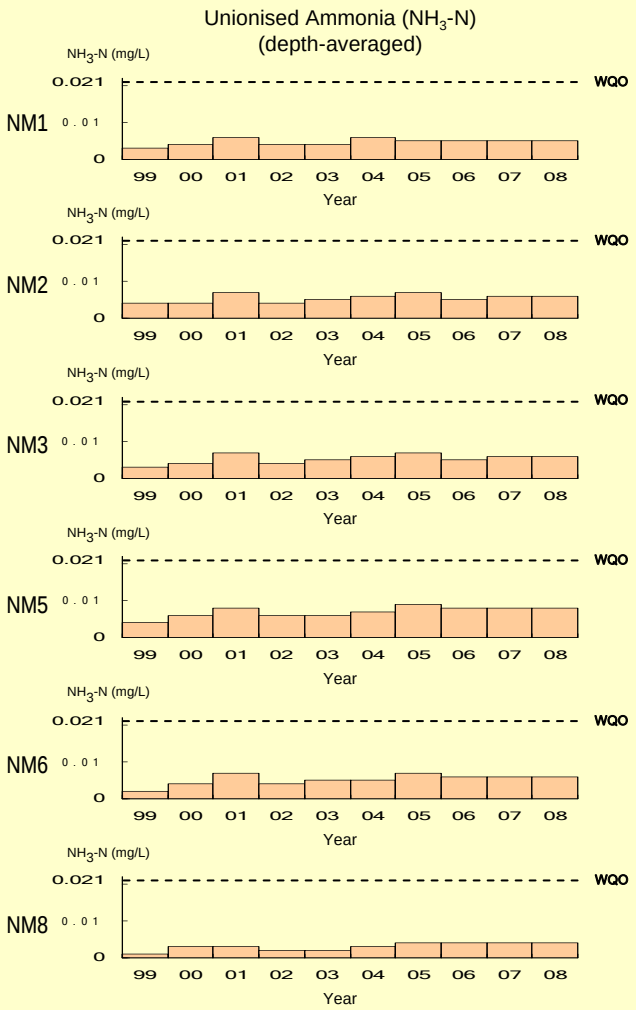
% sample with depth-averaged DO ≥ 4 mg/L

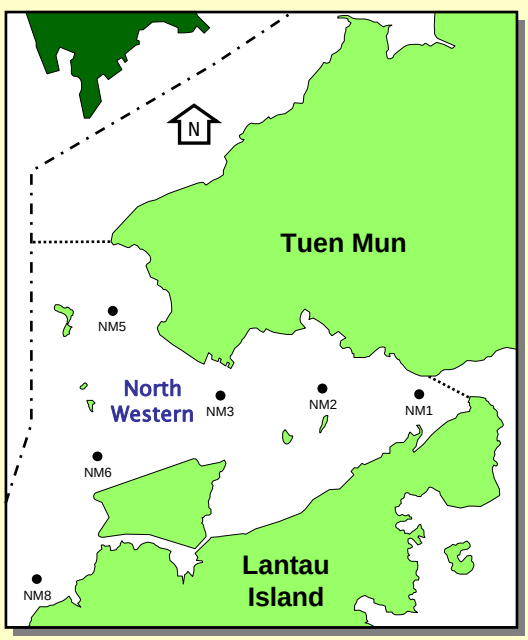


Non-compliance

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







Total Inorganic Nitrogen (TIN)

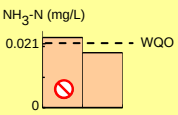
WQO : annual mean for depth-averaged TIN $\leq$ 0.5 mg/L

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

Results of the Seasonal Kendall Test for water quality trends in the Mirs Bay WCZ, 1991 - 2008

Monitoring Station		MM1	MM2	MM3	MM4	MM5	MM6	MM7
Monitoring Period		1991 I 2008	1991 I 2008	1991 I 2008	1991 I 2008	1991 I 2008	1991 I 2008	1991 I 2008
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 - 2008 (continued)

Monitoring Station		MM8	MM13	MM14	MM15	MM16	MM17
Monitoring Period		1991 I 2008	1991 I 2008	1994 I 2008	1994 I 2008	1994 I 2008	1986 I 2008
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 eight 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 - 2008

Monitoring Station		PM1	PM2	PM3	PM4	PM6	PM7	PM8	PM9	PM11
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008
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 - 2008

Monitoring Station		TM2	TM3	TM4	TM5	TM6	TM7	TM8
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008
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 - 2008

Monitoring Station		SM1	SM2	SM3	SM4	SM5	SM6	SM7	SM9
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1988 I 2008
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 - 2008 (continued)

Monitoring Station		SM10	SM11	SM12	SM13	SM17	SM18	SM19	SM20
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1989 I 2008	1989 I 2008	1989 I 2008	1999 I 2008
Parameter	Water Depth								
Temperature (℃)	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. ↗ significant increase
5. ↘ significant decrease

Results of the Seasonal Kendall Test for water quality trends in the Victoria Harbour WCZ, 1986 - 2008

Monitoring Station		VM1	VM2	VM4	VM5	VM6
Monitoring Period		1988 I 2008	1988 I 2008	1988 I 2008	1986 I 2008	1988 I 2008
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 - 2008 (continued)

Monitoring Station		VM7	VM8	VM12	VM14	VM15
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1993 I 2008
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 - 2008

Monitoring Station		EM1	EM2	EM3
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008
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 - 2008

Monitoring Station		WM1	WM2	WM3	WM4
Monitoring Period		1988 I 2008	1988 I 2008	1986 I 2008	1986 I 2008
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 - 2008

Monitoring Station		JM3	JM4
Monitoring Period		1986 I 2008	1986 I 2008
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 - 2008

Monitoring Station		DM1	DM2	DM3	DM4	DM5
Monitoring Period		1986 I 2008	1986 I 2008	1986 I 2008	1986 I 2008	1991 I 2008
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 - 2008

Monitoring Station		NM1	NM2	NM3	NM5	NM6	NM8
Monitoring Period		1988 I 2008	1986 I 2008	1986 I 2008	1988 I 2008	1991 I 2008	1999 I 2008
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

Summary statistics for bottom sediment quality in the Tolo Harbour and Channel and Southern WCZs, 2004 - 2008

	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)	73 (58 - 88)	77 (43 - 90)	72 (56 - 80)	88 (80 - 93)	71 (59 - 88)	83 (62 - 97)	76 (66 - 92)	75 (49 - 91)
Electrochemical Potential (mV)	-329 (-376) - (-285)	-325 (-360) - (-281)	-339 (-390) - (-258)	-343 (-380) - (-307)	-163 (-263) - (-91)	-186 (-279) - (-128)	-182 (-265) - (-116)	-170 (-246) - (-95)
Total Solids (%w/w)	35 (32 - 38)	33 (25 - 43)	37 (28 - 54)	32 (28 - 35)	57 (47 - 63)	48 (43 - 60)	50 (41 - 54)	47 (42 - 52)
Total Volatile Soilds (%w/w)	9.6 (8.3 - 11.0)	9.6 (7.2 - 12.0)	9.2 (5.0 - 12.0)	10.4 (8.4 - 12.0)	6.4 (5.0 - 9.6)	7.8 (5.4 - 14.0)	7.0 (5.8 - 8.7)	7.8 (5.8 - 16.0)
Chemical Oxygen Demand (mg/kg)	24000 (21000 - 27000)	23000 (19000 - 25000)	21000 (16000 - 23000)	21000 (18000 - 24000)	11000 (9100 - 12000)	13000 (10000 - 14000)	16000 (15000 - 19000)	16000 (14000 - 23000)
Total Carbon (%w/w)	0.9 (0.7 - 1.0)	0.7 (0.6 - 0.8)	0.9 (0.8 - 1.2)	0.9 (0.8 - 0.9)	0.9 (0.7 - 1.0)	0.7 (0.6 - 0.9)	0.8 (0.6 - 1.0)	0.8 (0.5 - 1.3)
Ammonical Nitrogen (mg/kg)	6.3 (0.1 - 11.0)	3.4 (<0.1 - 7.2)	8.9 (3.2 - 15.0)	11.4 (6.0 - 21.0)	5.1 (2.3 - 9.7)	8.3 (2.6 - 37.0)	5.5 (1.7 - 11.0)	2.9 (1.0 - 6.5)
Total Kjeldahl Nitrogen (mg/kg)	560 (420 - 700)	510 (350 - 630)	620 (400 - 810)	730 (590 - 870)	370 (210 - 490)	440 (290 - 510)	410 (330 - 470)	430 (260 - 710)
Total Phosphorus (mg/kg)	170 (140 - 220)	150 (140 - 170)	170 (130 - 200)	200 (160 - 230)	200 (110 - 240)	210 (160 - 230)	210 (180 - 230)	210 (150 - 290)
Total Sulphide (mg/kg)	120 (8 - 250)	110 (10 - 240)	130 (11 - 330)	130 (21 - 430)	19 (7 - 48)	39 (1 - 100)	26 (4 - 72)	22 (2 - 53)
Total Cyanide (mg/kg)	0.2 (<0.1 - 0.2)	0.2 (<0.1 - 0.3)	0.2 (<0.1 - 0.2)	0.2 (<0.1 - 0.2)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	8.2 (5.9 - 10.0)	8.7 (5.9 - 11.0)	7.8 (5.9 - 9.2)	6.0 (5.4 - 6.8)	6.6 (6.2 - 7.3)	8.3 (7.8 - 9.3)	7.0 (5.8 - 7.9)	7.3 (6.1 - 8.3)
Cadmium (mg/kg)	0.6 (0.2 - 0.8)	0.6 (0.4 - 0.7)	0.5 (0.3 - 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)	23 (14 - 27)	25 (19 - 33)	34 (30 - 36)	25 (22 - 36)	34 (31 - 38)	32 (28 - 37)	36 (29 - 47)
Copper (mg/kg)	38 (15 - 50)	39 (25 - 59)	26 (19 - 39)	22 (19 - 25)	11 (7 - 18)	21 (18 - 25)	18 (15 - 21)	28 (18 - 38)
Lead (mg/kg)	83 (66 - 96)	92 (75 - 100)	68 (52 - 82)	51 (44 - 58)	28 (22 - 35)	36 (30 - 41)	35 (28 - 38)	38 (31 - 49)
Mercury (mg/kg)	0.09 (0.05 - 0.13)	0.07 (<0.05 - 0.11)	0.06 (<0.05 - 0.10)	0.06 (<0.05 - 0.09)	0.06 (<0.05 - 0.07)	0.09 (0.07 - 0.13)	0.09 (0.07 - 0.15)	0.12 (0.08 - 0.20)
Nickel (mg/kg)	17 (12 - 22)	15 (8 - 20)	17 (13 - 24)	26 (22 - 31)	18 (15 - 23)	23 (20 - 26)	23 (19 - 25)	22 (19 - 26)
Silver (mg/kg)	0.5 (0.2 - 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)	230 (130 - 320)	270 (170 - 380)	160 (130 - 220)	130 (120 - 150)	76 (65 - 110)	100 (92 - 120)	93 (82 - 100)	110 (78 - 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)	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)	92 (90 - 110)	91 (90 - 94)	93 (90 - 110)	93 (90 - 110)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	41 (24 - 56)	41 (24 - 85)	44 (27 - 87)	44 (16 - 72)	55 (26 - 190)	67 (34 - 130)	60 (39 - 120)	91 (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, Fluorene, 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, 2004 - 2008

	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)	93 (79 - 99)	62 (44 - 87)	86 (74 - 96)	69 (46 - 92)	75 (47 - 90)	80 (44 - 95)	62 (37 - 88)
Electrochemical Potential (mV)	-207 (-299) - (-92)	-161 (-270) - (-62)	-218 (-323) - (-115)	-245 (-366) - (-143)	-169 (-267) - (-34)	-201 (-350) - (-88)	-201 (-334) - (-136)
Total Solids (%w/w)	39 (35 - 41)	63 (55 - 66)	44 (40 - 50)	49 (37 - 59)	48 (42 - 53)	48 (42 - 54)	57 (47 - 67)
Total Volatile Soilds (%w/w)	8.1 (6.8 - 9.9)	4.0 (3.2 - 4.6)	7.1 (5.6 - 9.5)	6.6 (4.3 - 8.8)	6.4 (5.0 - 8.3)	7.1 (5.8 - 9.8)	5.8 (4.0 - 8.1)
Chemical Oxygen Demand (mg/kg)	15000 (14000 - 17000)	9500 (7800 - 12000)	17000 (13000 - 19000)	22000 (17000 - 29000)	18000 (15000 - 22000)	16000 (13000 - 18000)	15000 (10000 - 18000)
Total Carbon (%w/w)	0.6 (0.5 - 0.6)	0.5 (0.4 - 0.6)	0.6 (0.6 - 0.8)	0.7 (0.4 - 1.2)	0.6 (0.5 - 0.7)	0.5 (0.5 - 0.7)	0.6 (0.4 - 0.8)
Ammonical Nitrogen (mg/kg)	7.0 (0.2 - 15.0)	4.0 (0.3 - 10.0)	4.7 (0.2 - 8.6)	119.9 (14.0 - 600.0)	10.1 (<0.1 - 53.0)	1.8 (<0.1 - 7.9)	4.2 (0.1 - 15.0)
Total Kjeldahl Nitrogen (mg/kg)	500 (300 - 870)	270 (190 - 360)	460 (410 - 520)	530 (230 - 1700)	430 (160 - 700)	300 (160 - 430)	240 (100 - 410)
Total Phosphorus (mg/kg)	200 (130 - 340)	180 (130 - 200)	190 (170 - 210)	260 (110 - 530)	270 (140 - 410)	190 (120 - 270)	150 (70 - 240)
Total Sulphide (mg/kg)	58 (2 - 150)	9 (<1 - 46)	65 (4 - 200)	280 (1 - 960)	110 (29 - 570)	35 (0.2 - 120)	5 (1 - 15)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.3 (<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)	7.8 (6.6 - 9.0)	5.5 (4.4 - 6.1)	7.4 (6.7 - 8.9)	9.9 (7.1 - 13.0)	12.1 (9.9 - 14.0)	12.9 (7.7 - 15.0)	12.0 (8.8 - 16.0)
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 - 0.6)	0.2 (<0.1 - 0.4)	0.1 (<0.1 - 0.2)
Chromium (mg/kg)	43 (41 - 45)	22 (19 - 25)	49 (40 - 65)	42 (28 - 66)	42 (22 - 54)	44 (24 - 53)	32 (16 - 49)
Copper (mg/kg)	38 (33 - 42)	10 (8 - 13)	110 (73 - 150)	73 (21 - 210)	63 (26 - 100)	56 (12 - 77)	22 (9 - 64)
Lead (mg/kg)	52 (42 - 57)	25 (21 - 31)	58 (44 - 110)	56 (40 - 84)	52 (30 - 60)	50 (32 - 69)	39 (27 - 58)
Mercury (mg/kg)	0.16 (0.14 - 0.20)	0.08 (<0.05 - 0.18)	0.27 (0.22 - 0.41)	0.16 (<0.05 - 0.40)	0.16 (0.06 - 0.26)	0.13 (<0.05 - 0.16)	0.07 (<0.05 - 0.14)
Nickel (mg/kg)	28 (24 - 32)	14 (12 - 17)	25 (20 - 31)	38 (20 - 140)	27 (14 - 37)	29 (16 - 35)	20 (15 - 31)
Silver (mg/kg)	0.5 (0.5 - 0.6)	<0.2 (<0.2 - <0.2)	2.2 (1.6 - 3.0)	0.9 (0.3 - 2.9)	0.7 (0.2 - 1.4)	0.5 (<0.2 - 0.8)	0.3 (<0.2 - 0.5)
Zinc (mg/kg)	150 (140 - 160)	63 (52 - 74)	160 (130 - 200)	230 (110 - 560)	190 (91 - 270)	150 (81 - 210)	91 (63 - 140)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 20)	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)	97 (90 - 110)	140 (90 - 470)	92 (90 - 96)	92 (90 - 98)	91 (90 - 95)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	68 (47 - 83)	22 (19 - 25)	250 (90 - 420)	210 (26 - 880)	110 (54 - 150)	98 (29 - 280)	45 (16 - 82)

Note:
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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, Fluorene, 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, 2004 - 2008

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)	90 (84 - 96)	53 (8 - 92)	81 (74 - 91)	87 (77 - 95)	83 (21 - 99)	92 (85 - 99)	88 (77 - 98)	88 (82 - 96)
Electrochemical Potential (mV)	-257 (-308) - (-188)	-159 (-240) - (-102)	-186 (-252) - (-73)	-305 (-372) - (-218)	-341 (-368) - (-298)	-352 (-382) - (-323)	-232 (-295) - (-152)	-245 (-327) - (-190)
Total Solids (%w/w)	36 (33 - 41)	54 (38 - 63)	50 (46 - 53)	40 (36 - 44)	32 (31 - 35)	30 (27 - 33)	35 (33 - 41)	42 (31 - 54)
Total Volatile Soilds (%w/w)	11.9 (8.5 - 14.0)	7.8 (4.7 - 10.0)	8.6 (7.2 - 11.0)	7.8 (6.4 - 11.0)	9.6 (8.0 - 15.0)	10.5 (8.9 - 15.0)	9.5 (7.6 - 15.0)	8.9 (5.1 - 12.0)
Chemical Oxygen Demand (mg/kg)	19000 (14000 - 22000)	13000 (10000 - 15000)	14000 (11000 - 19000)	19000 (14000 - 23000)	17000 (14000 - 20000)	18000 (16000 - 20000)	17000 (15000 - 20000)	17000 (11000 - 19000)
Total Carbon (%w/w)	1.1 (1.0 - 1.3)	1.9 (0.9 - 3.0)	1.3 (1.2 - 1.4)	0.7 (0.6 - 0.8)	0.6 (0.6 - 0.7)	0.7 (0.6 - 0.9)	0.8 (0.7 - 1.0)	0.8 (0.5 - 1.1)
Ammonical Nitrogen (mg/kg)	7.1 (3.7 - 14.0)	6.3 (1.3 - 12.0)	5.9 (2.4 - 9.1)	9.3 (0.2 - 23.0)	11.8 (5.0 - 18.0)	8.8 (4.8 - 13.0)	4.2 (0.2 - 10.0)	3.5 (<0.1 - 8.0)
Total Kjeldahl Nitrogen (mg/kg)	550 (280 - 700)	370 (210 - 570)	410 (210 - 560)	460 (290 - 600)	610 (520 - 670)	640 (340 - 780)	660 (590 - 770)	480 (290 - 700)
Total Phosphorus (mg/kg)	160 (87 - 210)	150 (83 - 200)	170 (89 - 220)	160 (95 - 250)	180 (170 - 190)	180 (140 - 200)	210 (180 - 250)	160 (110 - 220)
Total Sulphide (mg/kg)	53 (4 - 270)	7 (1 - 15)	16 (1 - 36)	87 (11 - 170)	99 (8 - 270)	39 (3 - 89)	46 (2 - 180)	14 (2 - 55)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.1)	<0.1 (<0.1 - <0.1)	0.1 (<0.1 - 0.1)	0.2 (<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)	5.6 (4.7 - 6.5)	3.5 (0.2 - 5.2)	5.7 (5.1 - 6.6)	8.6 (7.2 - 9.3)	6.8 (5.9 - 7.9)	6.3 (5.8 - 7.6)	6.3 (4.4 - 7.3)	6.3 (5.8 - 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 - 0.4)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.1)
Chromium (mg/kg)	27 (20 - 34)	21 (13 - 31)	26 (23 - 29)	31 (26 - 35)	36 (33 - 39)	34 (31 - 39)	35 (25 - 41)	31 (23 - 33)
Copper (mg/kg)	22 (18 - 29)	10 (6 - 16)	12 (10 - 14)	36 (29 - 42)	21 (14 - 23)	20 (16 - 22)	17 (12 - 20)	13 (11 - 15)
Lead (mg/kg)	37 (30 - 43)	25 (15 - 38)	32 (27 - 35)	51 (43 - 56)	47 (40 - 51)	43 (38 - 51)	45 (28 - 53)	37 (33 - 40)
Mercury (mg/kg)	0.09 (0.07 - 0.11)	0.05 (<0.05 - 0.05)	0.05 (<0.05 - 0.05)	0.08 (0.07 - 0.10)	0.06 (<0.05 - 0.07)	0.07 (0.06 - 0.09)	0.06 (<0.05 - 0.06)	0.06 (<0.05 - 0.13)
Nickel (mg/kg)	18 (15 - 23)	16 (9 - 24)	20 (16 - 24)	20 (16 - 24)	25 (21 - 27)	24 (22 - 27)	27 (18 - 31)	22 (16 - 25)
Silver (mg/kg)	0.2 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	0.2 (<0.2 - 0.2)	1.2 (0.9 - 1.4)	0.3 (<0.2 - 0.5)	0.2 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	<0.2 (<0.2 - <0.2)
Zinc (mg/kg)	100 (73 - 130)	66 (29 - 93)	78 (67 - 90)	120 (99 - 140)	110 (92 - 120)	100 (82 - 120)	110 (77 - 120)	93 (73 - 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)	91 (90 - 97)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	49 (24 - 77)	25 (17 - 34)	27 (20 - 40)	36 (28 - 58)	33 (24 - 42)	46 (28 - 71)	37 (29 - 54)	30 (20 - 67)

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, Fluorene, 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, 2004 - 2008

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 (83 - 97)	87 (78 - 95)	92 (81 - 98)	95 (90 - 97)	92 (83 - 99)	91 (77 - 96)	89 (82 - 97)	82 (71 - 96)
Electrochemical Potential (mV)	-205 (-274) - (-109)	-203 (-255) - (-95)	-240 (-308) - (-145)	-185 (-249) - (-139)	-165 (-208) - (-104)	-171 (-250) - (-113)	-153 (-260) - (-78)	-155 (-267) - (-39)
Total Solids (%w/w)	37 (33 - 40)	42 (36 - 47)	34 (31 - 39)	47 (45 - 49)	49 (42 - 54)	51 (46 - 56)	51 (43 - 57)	56 (54 - 58)
Total Volatile Soilds (%w/w)	8.9 (6.3 - 13.0)	8.2 (6.6 - 12.0)	11.0 (9.0 - 16.0)	6.9 (5.8 - 8.9)	6.5 (5.5 - 8.4)	6.3 (4.9 - 8.7)	6.4 (5.5 - 8.8)	6.1 (5.4 - 8.0)
Chemical Oxygen Demand (mg/kg)	16000 (14000 - 18000)	15000 (13000 - 17000)	19000 (16000 - 21000)	12000 (10000 - 18000)	11000 (8100 - 18000)	12000 (8700 - 18000)	11000 (8100 - 21000)	13000 (8700 - 27000)
Total Carbon (%w/w)	0.7 (0.6 - 0.8)	0.7 (0.6 - 0.8)	0.9 (0.7 - 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)	6.1 (0.1 - 15.0)	8.7 (0.1 - 23.0)	6.3 (0.4 - 11.0)	1.7 (0.3 - 4.8)	4.1 (0.7 - 21.0)	2.4 (0.1 - 9.1)	2.5 (0.2 - 5.2)	3.0 (0.9 - 7.8)
Total Kjeldahl Nitrogen (mg/kg)	560 (430 - 670)	550 (360 - 670)	710 (580 - 800)	430 (270 - 520)	390 (200 - 540)	400 (200 - 520)	430 (310 - 540)	400 (300 - 490)
Total Phosphorus (mg/kg)	190 (140 - 210)	200 (140 - 240)	220 (180 - 240)	210 (150 - 240)	200 (98 - 260)	210 (130 - 260)	230 (180 - 260)	220 (170 - 260)
Total Sulphide (mg/kg)	19 (1 - 67)	15 (1 - 40)	36 (2 - 98)	19 (1 - 60)	13 (1 - 70)	7 (1 - 18)	10 (1 - 27)	9 (1 - 35)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.3)	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 - 0.2)	0.1 (<0.1 - 0.1)
Arsenic (mg/kg)	6.3 (5.5 - 7.0)	6.3 (5.4 - 7.0)	5.8 (5.4 - 6.2)	6.5 (5.4 - 7.7)	7.7 (5.7 - 15.0)	7.1 (5.7 - 8.3)	6.2 (5.2 - 6.8)	6.2 (4.9 - 7.0)
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 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)	<0.1 (<0.1 - <0.1)
Chromium (mg/kg)	37 (34 - 39)	32 (28 - 35)	33 (30 - 39)	32 (25 - 37)	34 (27 - 60)	31 (28 - 34)	29 (24 - 35)	27 (21 - 33)
Copper (mg/kg)	16 (15 - 17)	14 (12 - 15)	18 (17 - 20)	13 (8 - 16)	13 (10 - 22)	11 (9 - 13)	11 (8 - 13)	9 (7 - 12)
Lead (mg/kg)	42 (38 - 45)	42 (37 - 47)	45 (41 - 49)	34 (29 - 42)	34 (27 - 53)	33 (29 - 36)	31 (27 - 39)	30 (27 - 35)
Mercury (mg/kg)	0.06 (<0.05 - 0.07)	0.05 (<0.05 - 0.06)	0.07 (0.05 - 0.08)	0.05 (<0.05 - 0.06)	0.06 (<0.05 - 0.08)	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)	25 (22 - 27)	24 (18 - 29)	27 (20 - 45)	24 (19 - 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)	0.2 (<0.2 - 0.2)
Zinc (mg/kg)	100 (90 - 110)	94 (87 - 100)	110 (99 - 150)	88 (64 - 100)	93 (79 - 160)	85 (74 - 92)	81 (64 - 95)	75 (65 - 84)
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)	91 (90 - 97)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	36 (28 - 57)	32 (19 - 63)	51 (35 - 74)	39 (17 - 120)	30 (21 - 51)	24 (18 - 32)	27 (19 - 51)	30 (18 - 91)

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, Fluorene, 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, 2004 - 2008

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)	56 (35 - 63)	64 (34 - 87)	37 (12 - 61)	46 (14 - 81)	61 (37 - 91)	80 (66 - 93)
Electrochemical Potential (mV)	-185 (-338) - (-129)	-178 (-340) - (-86)	-209 (-338) - (-161)	-181 (-320) - (-58)	-207 (-289) - (-114)	-177 (-233) - (-93)
Total Solids (%w/w)	57 (49 - 64)	58 (49 - 70)	62 (56 - 68)	63 (51 - 76)	52 (45 - 65)	46 (43 - 49)
Total Volatile Soilds (%w/w)	6.2 (5.4 - 7.5)	5.7 (3.1 - 7.5)	5.1 (4.6 - 5.9)	4.6 (2.2 - 7.6)	6.3 (4.4 - 7.7)	6.9 (5.6 - 8.4)
Chemical Oxygen Demand (mg/kg)	14000 (11000 - 17000)	15000 (9700 - 23000)	16000 (12000 - 19000)	12000 (7500 - 16000)	18000 (13000 - 20000)	15000 (11000 - 21000)
Total Carbon (%w/w)	0.9 (0.6 - 1.2)	0.7 (0.5 - 1.0)	0.8 (0.6 - 0.9)	0.5 (0.4 - 0.8)	0.9 (0.7 - 1.1)	0.6 (0.5 - 0.7)
Ammonical Nitrogen (mg/kg)	3.2 (0.1 - 9.3)	5.3 (<0.1 - 21.0)	12.8 (0.2 - 28.0)	2.5 (<0.1 - 10.0)	8.8 (4.8 - 18.0)	4.7 (0.1 - 30.0)
Total Kjeldahl Nitrogen (mg/kg)	310 (120 - 520)	320 (170 - 440)	270 (110 - 350)	260 (130 - 400)	380 (270 - 480)	390 (260 - 540)
Total Phosphorus (mg/kg)	180 (84 - 290)	190 (120 - 250)	160 (77 - 230)	150 (110 - 230)	180 (130 - 260)	180 (140 - 200)
Total Sulphide (mg/kg)	10 (1 - 37)	16 (2 - 65)	29 (3 - 77)	12 (1 - 47)	74 (9 - 200)	51 (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)	8.7 (7.2 - 14.0)	11.1 (8.3 - 14.0)	10.0 (8.8 - 11.0)	10.3 (7.2 - 16.0)	7.3 (3.8 - 9.4)	8.7 (6.9 - 10.0)
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)	30 (24 - 43)	30 (20 - 42)	28 (22 - 36)	26 (18 - 37)	33 (17 - 41)	36 (32 - 40)
Copper (mg/kg)	33 (26 - 42)	26 (18 - 48)	27 (12 - 42)	17 (10 - 27)	47 (13 - 68)	26 (22 - 29)
Lead (mg/kg)	36 (31 - 50)	37 (27 - 45)	36 (31 - 46)	30 (20 - 46)	39 (24 - 53)	38 (32 - 43)
Mercury (mg/kg)	0.09 (0.08 - 0.13)	0.11 (0.06 - 0.16)	0.09 (0.06 - 0.20)	0.07 (<0.05 - 0.10)	0.13 (0.06 - 0.160)	0.09 (<0.05 - 0.14)
Nickel (mg/kg)	19 (15 - 27)	19 (11 - 24)	18 (13 - 22)	18 (11 - 24)	19 (9 - 24)	24 (21 - 26)
Silver (mg/kg)	0.4 (0.3 - 0.6)	0.2 (<0.2 - 0.4)	0.3 (<0.2 - 0.3)	0.2 (<0.2 - 0.2)	1.0 (0.2 - 1.7)	0.4 (0.3 - 0.5)
Zinc (mg/kg)	98 (77 - 130)	92 (62 - 120)	100 (93 - 110)	73 (47 - 100)	110 (53 - 130)	110 (95 - 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 - 94)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	58 (26 - 120)	59 (24 - 110)	61 (24 - 120)	28 (17 - 49)	160 (68 - 420)	59 (35 - 120)

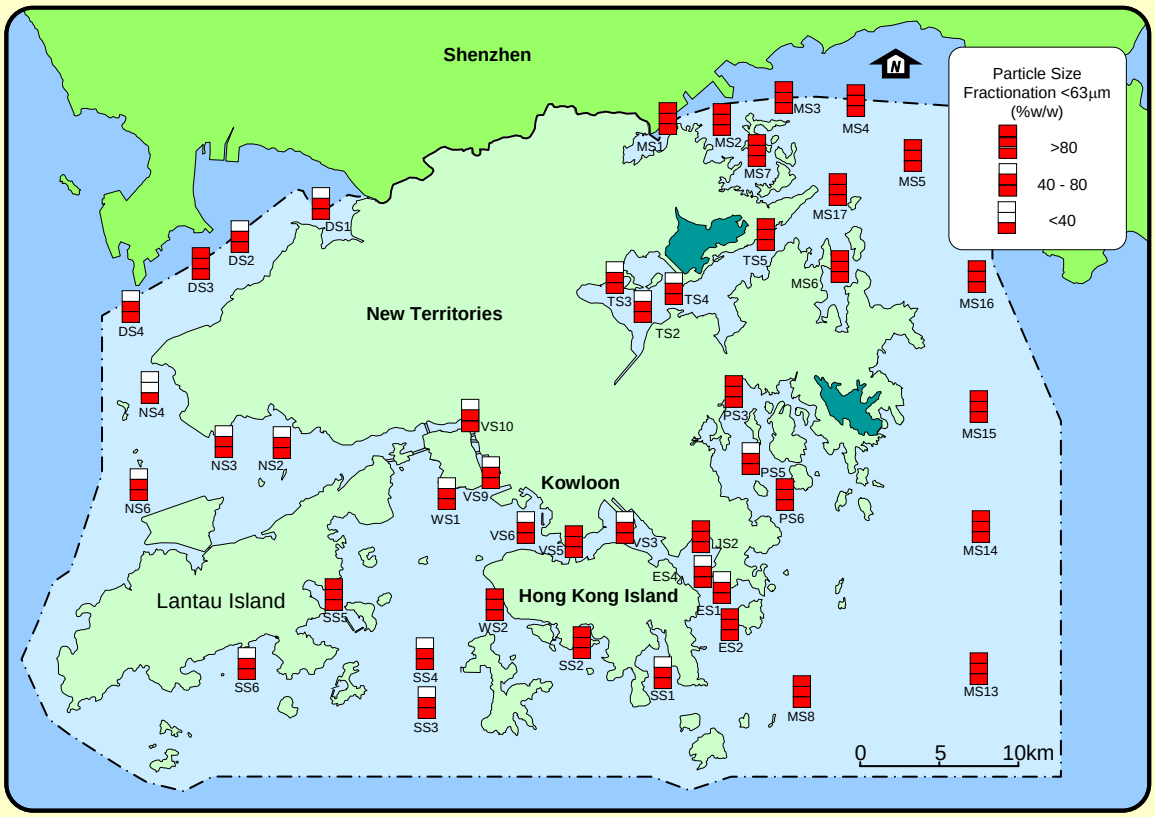
Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration 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, Fluorene, 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, 2004 - 2008

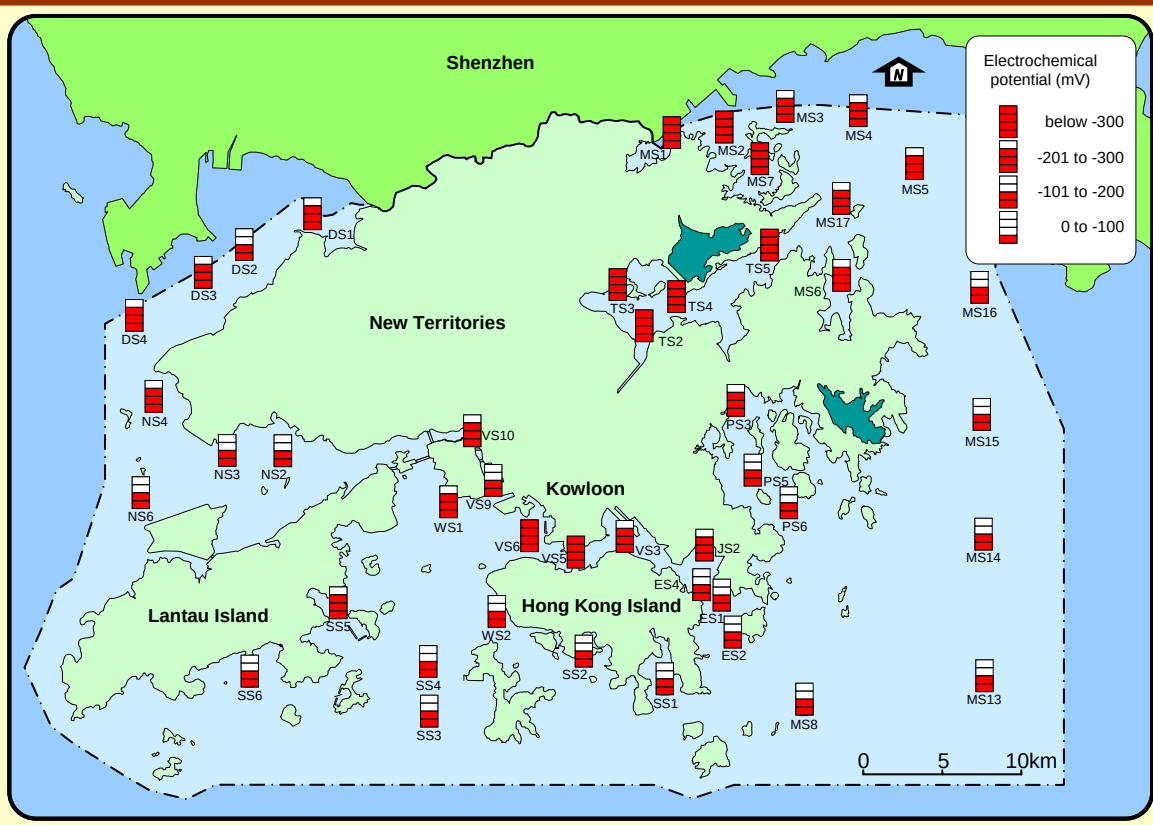
	Eastern Buffer			Victoria Harbour			Rambler Channel	
	Chai Wan	Tathong Channel		(East)	(Central)	(West)		
Parameter	ES1	ES2	ES4	VS3	VS5	VS6	VS9	VS10
Number of samples	10	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	43 (21 - 94)	80 (55 - 98)	50 (24 - 87)	64 (10 - 91)	83 (51 - 95)	50 (25 - 77)	79 (64 - 88)	76 (18 - 97)
Electrochemical Potential (mV)	-177 (-272) - (-65)	-168 (-286) - (-120)	-199 (-271) - (-134)	-288 (-365) - (-183)	-358 (-409) - (-244)	-304 (-381) - (-169)	-193 (-277) - (-80)	-228 (-327) - (-121)
Total Solids (%w/w)	68 (64 - 71)	53 (38 - 66)	61 (48 - 70)	43 (35 - 63)	40 (37 - 50)	54 (37 - 70)	51 (40 - 54)	45 (34 - 66)
Total Volatile Soilds (%w/w)	4.3 (3.7 - 5.2)	6.1 (4.6 - 7.9)	5.2 (3.7 - 7.3)	7.0 (4.1 - 9.6)	8.5 (6.3 - 10.0)	7.6 (5.0 - 12.0)	6.3 (5.3 - 8.4)	6.9 (4.1 - 9.0)
Chemical Oxygen Demand (mg/kg)	12000 (8700 - 27000)	14000 (11000 - 21000)	15000 (11000 - 21000)	21000 (16000 - 26000)	27000 (20000 - 32000)	24000 (18000 - 32000)	16000 (11000 - 23000)	19000 (15000 - 24000)
Total Carbon (%w/w)	1.3 (0.9 - 1.6)	0.7 (0.6 - 0.9)	0.9 (0.7 - 1.1)	0.7 (0.6 - 0.9)	0.9 (0.7 - 1.4)	1.2 (0.7 - 1.6)	0.8 (0.6 - 1.0)	0.8 (0.5 - 2.0)
Ammonical Nitrogen (mg/kg)	4.9 (2.2 - 9.3)	10.9 (0.5 - 67.0)	3.8 (0.3 - 7.0)	8.7 (<0.1 - 20.0)	25.9 (7.2 - 46.0)	10.4 (2.5 - 28.0)	9.1 (<0.1 - 49.0)	7.8 (<0.1 - 32.0)
Total Kjeldahl Nitrogen (mg/kg)	260 (190 - 320)	410 (210 - 590)	350 (200 - 470)	560 (350 - 1200)	630 (430 - 940)	400 (170 - 560)	310 (130 - 440)	420 (300 - 530)
Total Phosphorus (mg/kg)	130 (96 - 200)	180 (140 - 220)	150 (88 - 180)	200 (130 - 430)	200 (160 - 230)	200 (110 - 260)	150 (65 - 200)	180 (140 - 210)
Total Sulphide (mg/kg)	16 (1 - 43)	37 (1 - 180)	33 (5 - 140)	150 (2 - 440)	390 (8 - 1200)	150 (11 - 320)	55 (1 - 460)	150 (1 - 750)
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 - 0.3)	0.2 (<0.1 - 0.4)	0.1 (<0.1 - 0.3)	0.1 (<0.1 - 0.2)	0.2 (<0.1 - 0.3)
Arsenic (mg/kg)	4.3 (3.6 - 5.2)	6.7 (5.6 - 8.9)	4.4 (3.5 - 6.3)	7.2 (5.2 - 9.0)	7.9 (6.5 - 10.0)	9.2 (5.5 - 16.0)	5.0 (3.0 - 8.5)	8.2 (4.6 - 10.0)
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 - 0.6)	0.7 (0.4 - 0.9)	0.4 (0.2 - 0.6)	0.2 (<0.1 - 0.7)	0.5 (0.1 - 0.9)
Chromium (mg/kg)	19 (13 - 23)	30 (22 - 41)	26 (21 - 36)	44 (18 - 59)	58 (42 - 68)	37 (17 - 52)	37 (27 - 76)	73 (27 - 110)
Copper (mg/kg)	26 (18 - 36)	26 (15 - 42)	52 (39 - 75)	130 (57 - 190)	180 (120 - 220)	100 (57 - 150)	67 (8 - 230)	180 (65 - 300)
Lead (mg/kg)	25 (18 - 48)	34 (21 - 50)	29 (23 - 39)	51 (14 - 66)	68 (55 - 84)	93 (50 - 140)	35 (21 - 81)	56 (38 - 72)
Mercury (mg/kg)	0.09 (0.06 - 0.12)	0.08 (<0.05 - 0.14)	0.16 (0.10 - 0.36)	0.39 (0.21 - 0.54)	0.49 (0.35 - 0.63)	0.61 (0.26 - 1.20)	0.11 (<0.05 - 0.23)	0.22 (0.13 - 0.30)
Nickel (mg/kg)	12 (9 - 13)	20 (15 - 27)	14 (11 - 19)	21 (10 - 27)	26 (19 - 31)	18 (10 - 28)	24 (19 - 43)	32 (12 - 48)
Silver (mg/kg)	0.5 (0.4 - 0.7)	0.4 (<0.2 - 1.0)	1.2 (0.9 - 2.0)	4.2 (1.7 - 6.0)	7.1 (3.6 - 9.4)	2.9 (1.1 - 4.5)	1.1 (<0.2 - 6.3)	4.2 (1.3 - 6.8)
Zinc (mg/kg)	61 (42 - 73)	87 (56 - 120)	82 (72 - 110)	180 (93 - 250)	270 (190 - 340)	200 (140 - 250)	100 (66 - 210)	180 (90 - 250)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	19 (18 - 22)	20 (18 - 23)	31 (18 - 49)	19 (18 - 23)	19 (18 - 26)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	94 (90 - 130)	93 (90 - 110)	100 (90 - 170)	100 (90 - 140)	120 (100 - 180)	200 (110 - 410)	91 (90 - 100)	90 (90 - 95)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	100 (45 - 390)	84 (24 - 190)	310 (62 - 1700)	390 (90 - 670)	620 (350 - 990)	1500 (360 - 2900)	58 (18 - 180)	140 (52 - 210)

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, Fluorene, 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.

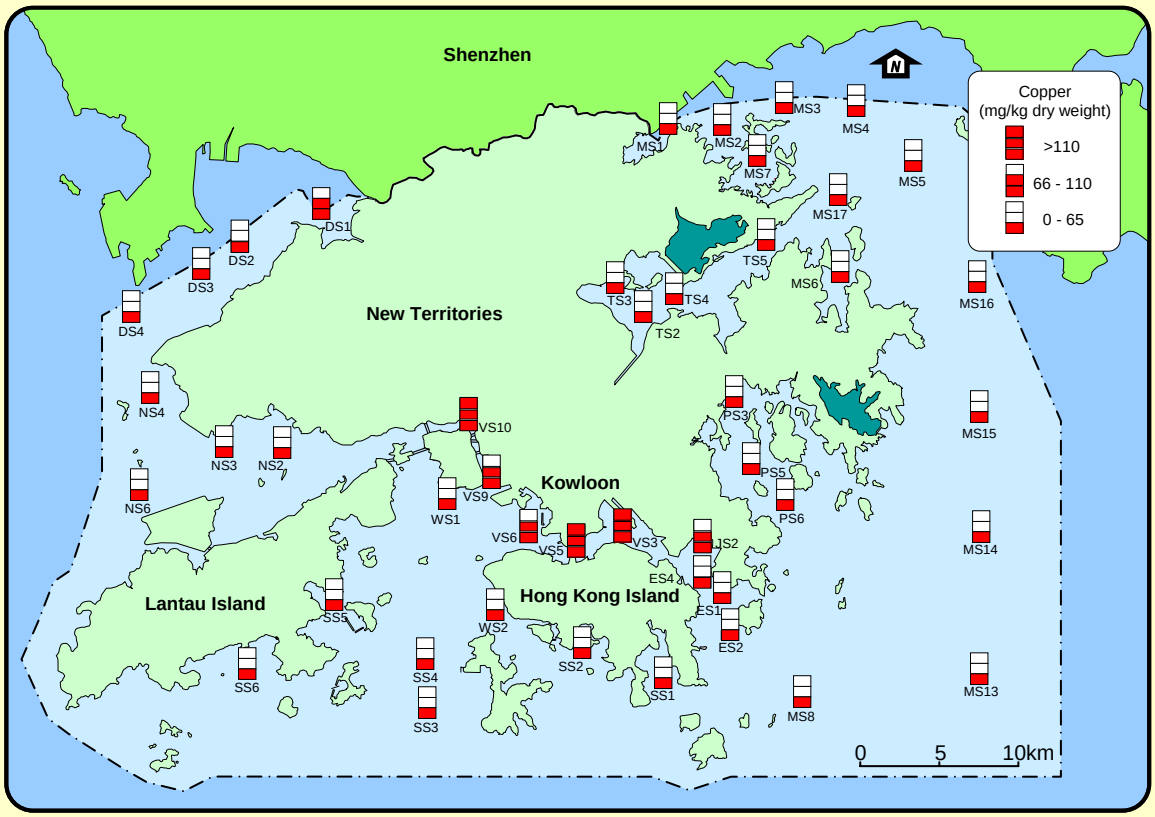
Particle Size Fractionation <63 µm in marine sediments in Hong Kong, 2004 – 2008



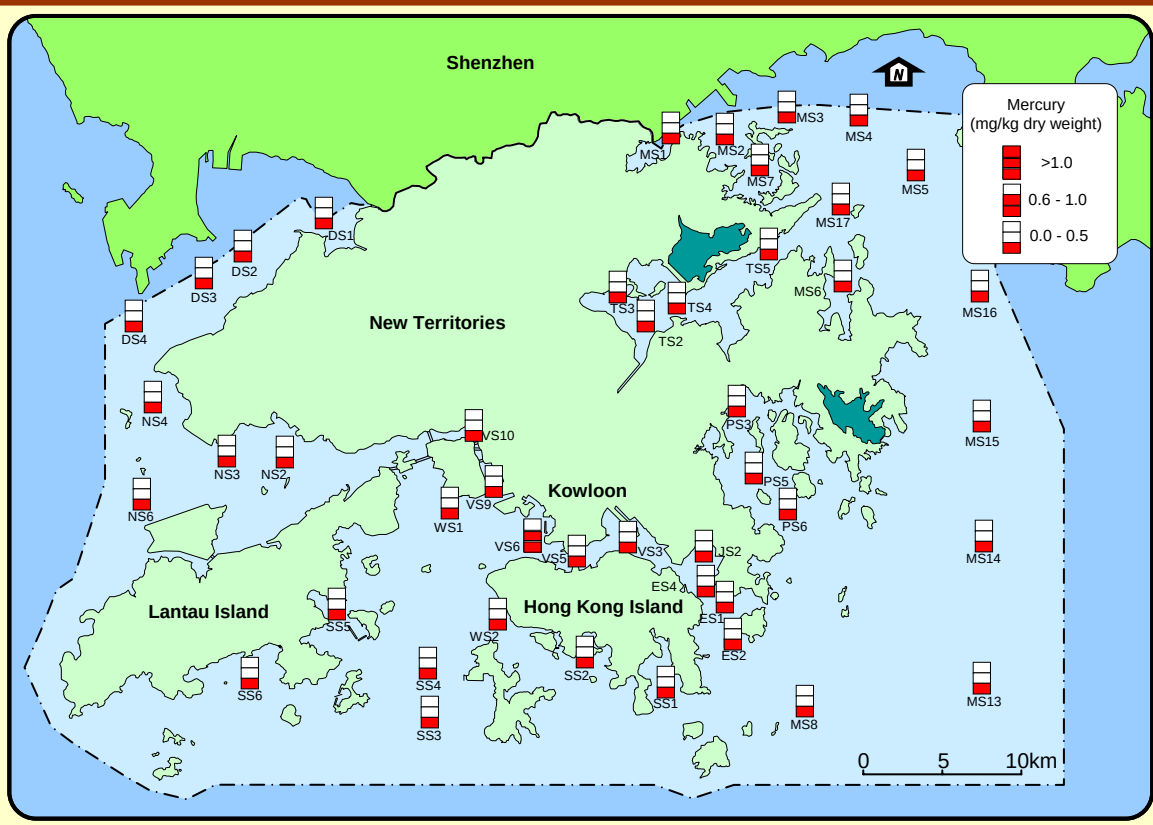
Electrochemical potential in marine sediments in Hong Kong, 2004 - 2008



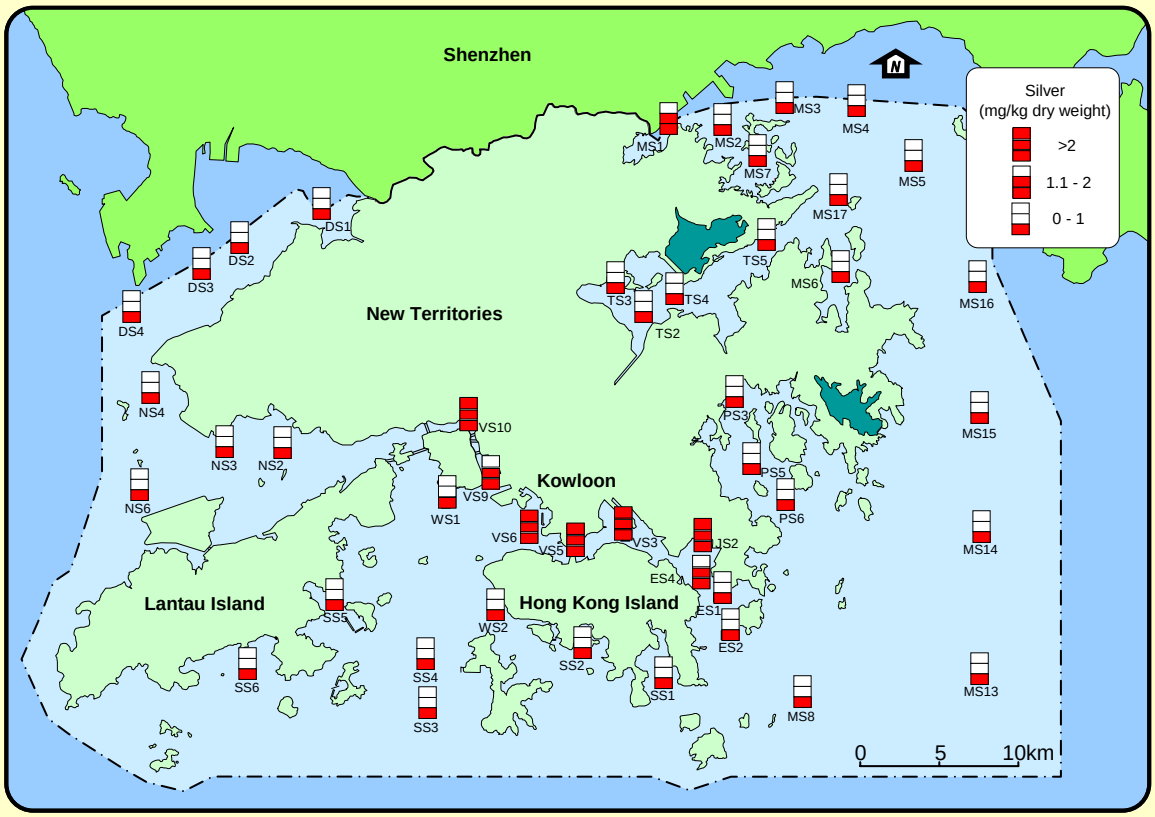
Copper in marine sediments in Hong Kong, 2004 - 2008



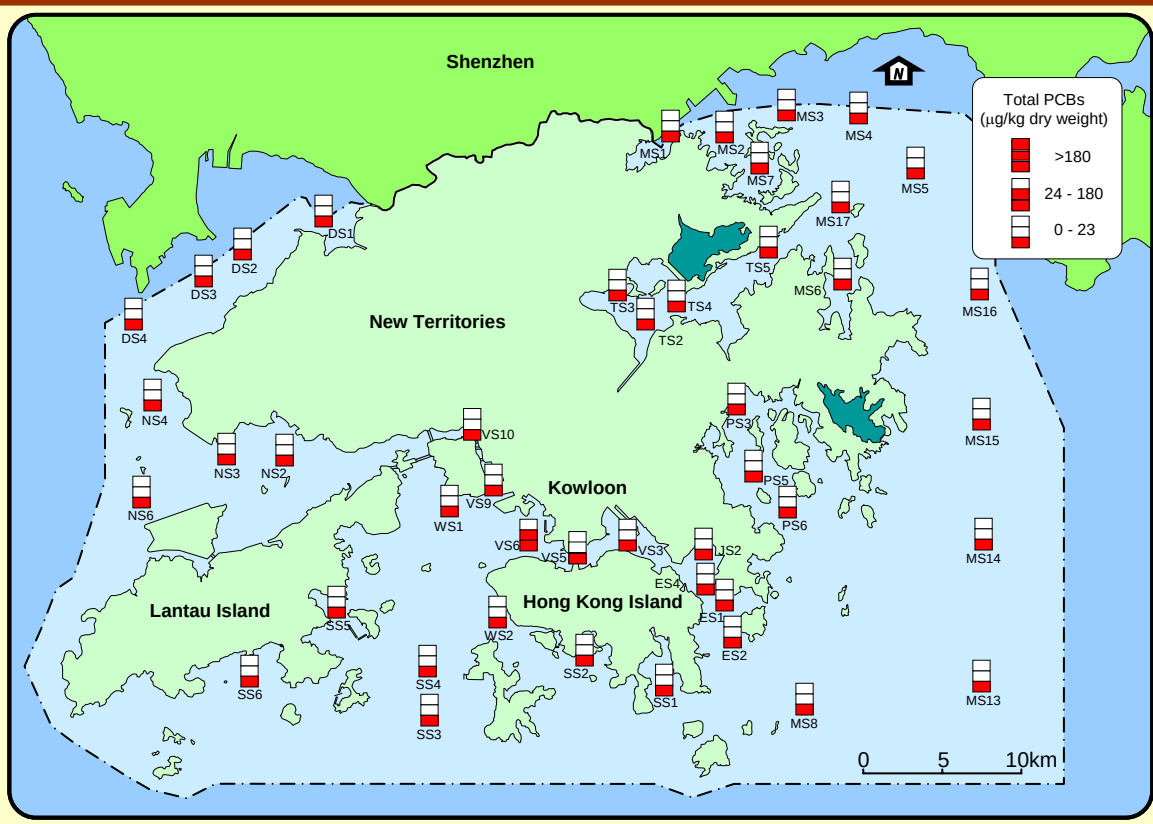
Mercury in marine sediments in Hong Kong, 2004 - 2008



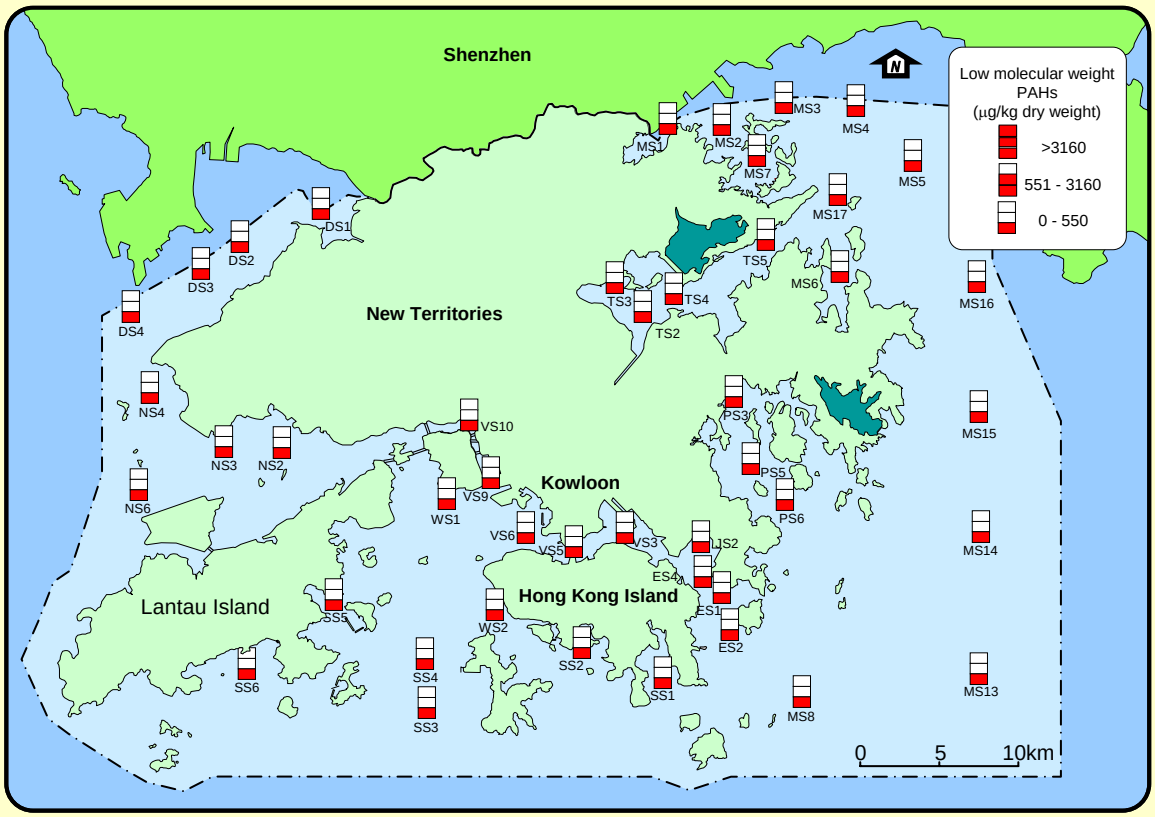
Silver in marine sediments in Hong Kong, 2004 - 2008



Total polychlorinated biphenyls (PCBs) in marine sediments in Hong Kong, 2004 - 2008

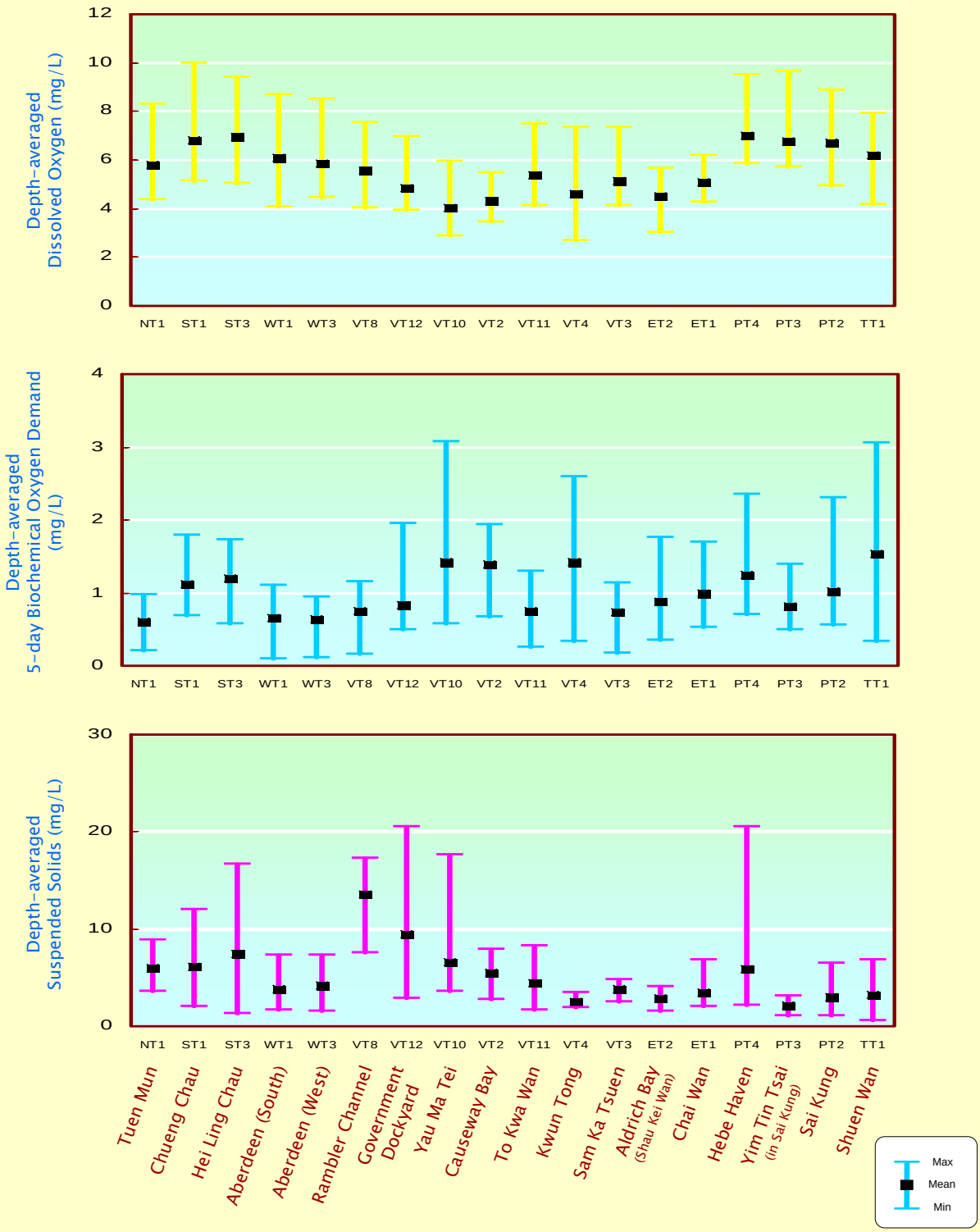


Low molecular weight polycyclic aromatic hydrocarbons (PAHs) in marine sediments in Hong Kong, 2004 - 2008

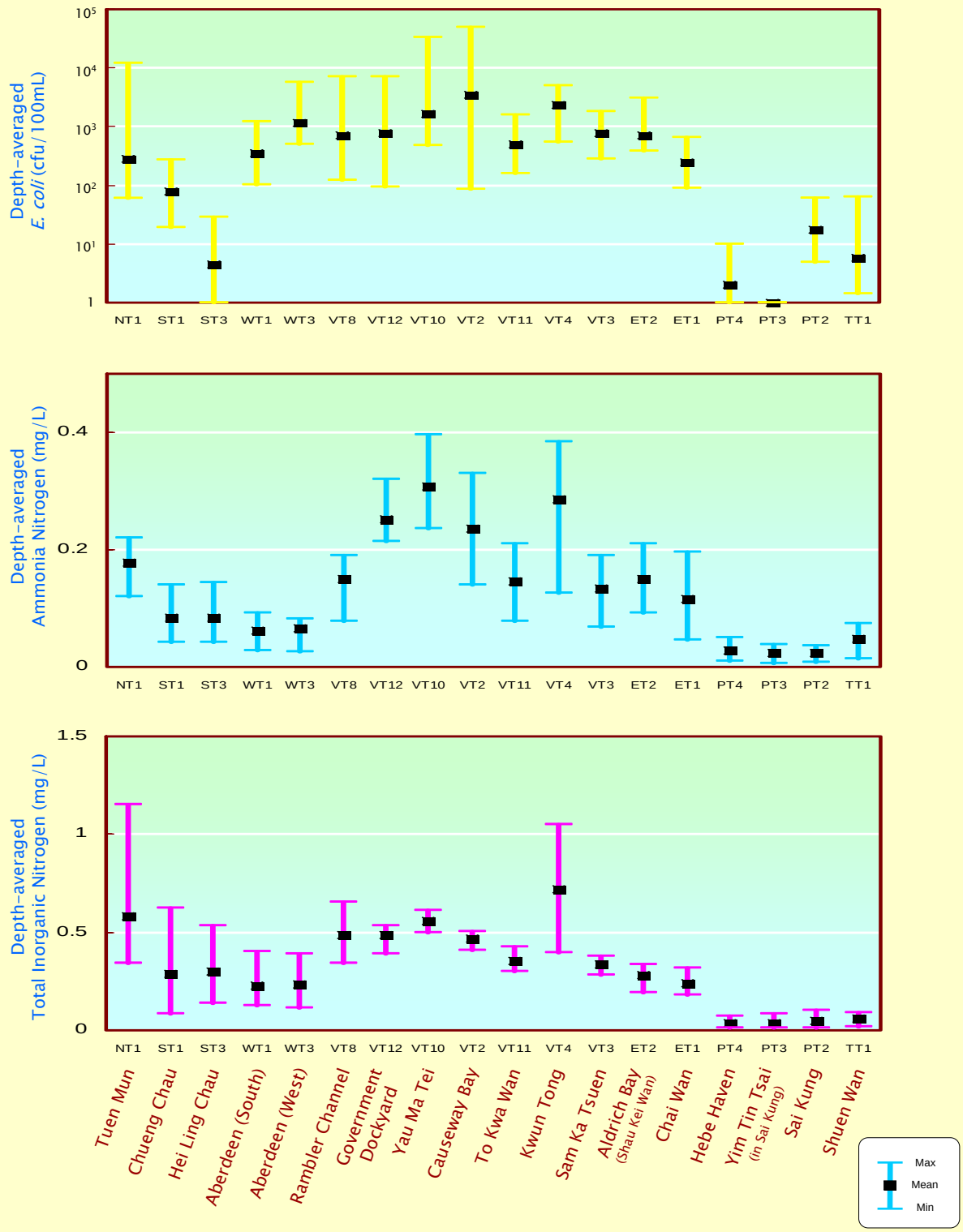


High molecular weight polycyclic aromatic hydrocarbons (PAHs) in marine sediments in Hong Kong, 2004 - 2008

Water quality of typhoon shelters in Hong Kong in 2008



Water quality of typhoon shelters in Hong Kong in 2008 (continued)



Results of the Seasonal Kendall Test for water quality trends in typhoon shelters, 1986 – 2008

Monitoring Station		NT1	ST1	WT3	WT1	VT8	VT10	VT2	VT11
Monitoring Period		1986 – 2008	1986 – 2008	1986 – 2008	1986 – 2008	1986 – 2008	1993 – 2008	1986 – 2008	1994 – 2008
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. VT12 has nine years of 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 typhoon shelters, 1986 – 2008 (continued)

Monitoring Station		VT4	VT3	ET2	ET1	PT4	PT2	PT3	TT1
Monitoring Period		1987 – 2008	1986 – 2008	1993 – 2008	1986 – 2008	1986 – 2008	1986 – 2008	1986 – 2008	1986 – 2008
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 nine 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 2008

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)		23.7 (16.6 - 28.2)	23.1 (16.2 - 28.9)	23.0 (16.0 - 28.4)	23.0 (15.3 - 28.1)	22.8 (15.3 - 28.0)	23.5 (15.5 - 27.1)
Salinity		27.1 (15.0 - 31.6)	29.4 (21.9 - 33.1)	29.8 (24.2 - 32.4)	30.5 (22.8 - 33.5)	30.9 (25.8 - 33.6)	28.9 (24.4 - 31.6)
Dissolved Oxygen (mg/L)		5.8 (4.4 - 8.3)	6.8 (5.2 - 10.0)	6.9 (5.0 - 9.4)	6.1 (4.1 - 8.7)	5.9 (4.4 - 8.5)	5.6 (4.0 - 7.5)
	Bottom	N.M.	6.8 (4.7 - 9.9)	6.6 (4.1 - 9.4)	6.0 (4.0 - 9.0)	5.8 (3.5 - 8.7)	5.5 (4.0 - 7.5)
Dissolved Oxygen (% Saturation)		80 (65 - 107)	93 (73 - 124)	96 (71 - 127)	83 (62 - 106)	81 (67 - 103)	77 (58 - 92)
	Bottom	N.M.	94 (68 - 122)	90 (58 - 121)	82 (60 - 109)	80 (50 - 105)	75 (57 - 91)
pH		8.0 (7.8 - 8.1)	8.1 (8.0 - 8.2)	8.2 (8.1 - 8.3)	8.1 (7.9 - 8.3)	8.1 (7.9 - 8.2)	8.0 (7.9 - 8.3)
Secchi Disc Depth (m)		2.1 (1.4 - 2.8)	2.2 (1.1 - 3.1)	2.0 (1.0 - 3.0)	2.8 (2.3 - 3.3)	2.4 (1.5 - 3.0)	1.7 (1.0 - 2.2)
Turbidity (NTU)		9.6 (6.2 - 13.7)	9.5 (7.2 - 15.0)	10.5 (6.2 - 17.5)	8.6 (4.3 - 16.4)	9.7 (5.4 - 21.1)	12.9 (9.6 - 18.7)
Suspended Solids (mg/L)		6.1 (3.6 - 8.9)	6.1 (2.1 - 12.0)	7.4 (1.4 - 16.7)	3.8 (1.6 - 7.3)	4.1 (1.6 - 7.3)	13.6 (7.5 - 17.3)
5-day Biochemical Oxygen Demand (mg/L)		0.6 (0.2 - 1.0)	1.1 (0.7 - 1.8)	1.2 (0.6 - 1.7)	0.7 (0.1 - 1.1)	0.6 (0.1 - 1.0)	0.7 (0.2 - 1.2)
Ammonia Nitrogen (mg/L)		0.18 (0.12 - 0.22)	0.08 (0.04 - 0.14)	0.08 (0.04 - 0.14)	0.06 (0.03 - 0.09)	0.07 (0.03 - 0.08)	0.15 (0.08 - 0.19)
Unionised Ammonia (mg/L)		0.007 (0.005 - 0.009)	0.004 (0.002 - 0.006)	0.004 (0.003 - 0.007)	0.003 (0.002 - 0.007)	0.003 (0.002 - 0.006)	0.007 (0.004 - 0.012)
Nitrite Nitrogen (mg/L)		0.055 (0.021 - 0.120)	0.024 (0.007 - 0.057)	0.028 (0.014 - 0.059)	0.028 (0.004 - 0.056)	0.030 (0.005 - 0.057)	0.046 (0.017 - 0.073)
Nitrate Nitrogen (mg/L)		0.350 (0.140 - 0.820)	0.181 (0.033 - 0.465)	0.185 (0.055 - 0.387)	0.135 (0.039 - 0.293)	0.137 (0.025 - 0.270)	0.288 (0.157 - 0.420)
Total Inorganic Nitrogen (mg/L)		0.58 (0.34 - 1.15)	0.29 (0.08 - 0.63)	0.30 (0.14 - 0.53)	0.23 (0.13 - 0.40)	0.23 (0.11 - 0.39)	0.48 (0.34 - 0.65)
Total Kjeldahl Nitrogen (mg/L)		0.36 (0.32 - 0.43)	0.29 (0.24 - 0.35)	0.30 (0.22 - 0.40)	0.21 (0.17 - 0.25)	0.23 (0.20 - 0.25)	0.34 (0.24 - 0.41)
Total Nitrogen (mg/L)		0.77 (0.51 - 1.37)	0.50 (0.28 - 0.78)	0.51 (0.30 - 0.68)	0.37 (0.25 - 0.57)	0.39 (0.26 - 0.54)	0.68 (0.45 - 0.86)
Orthophosphate Phosphorus (mg/L)		0.030 (0.023 - 0.037)	0.018 (0.006 - 0.039)	0.017 (0.006 - 0.030)	0.015 (0.009 - 0.021)	0.017 (0.012 - 0.022)	0.029 (0.022 - 0.037)
Total Phosphorus (mg/L)		0.04 (0.03 - 0.05)	0.04 (0.02 - 0.05)	0.04 (0.02 - 0.05)	0.03 (0.02 - 0.03)	0.03 (0.02 - 0.04)	0.06 (0.04 - 0.08)
Silica (as SiO_2) (mg/L)		1.9 (0.7 - 5.8)	1.0 (0.1 - 3.1)	1.0 (0.1 - 2.6)	1.1 (0.4 - 2.2)	1.1 (0.3 - 2.3)	1.6 (0.6 - 3.4)
Chlorophyll-a (µg/L)		2.5 (0.9 - 6.5)	5.3 (1.4 - 9.8)	6.8 (1.6 - 12.0)	2.2 (0.9 - 3.7)	2.3 (1.1 - 4.7)	2.9 (1.2 - 4.7)
E.coli (count/100mL)		280 (61 - 12000)	79 (19 - 270)	4 (1 - 28)	350 (100 - 1200)	1100 (510 - 5600)	730 (120 - 7200)
Faecal Coliforms (count/100mL)		1600 (250 - 72000)	260 (77 - 1100)	10 (1 - 72)	1100 (230 - 4400)	2500 (1000 - 9800)	2400 (490 - 21000)

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 2008

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 (16.0 - 27.7)	23.6 (15.7 - 27.2)	23.2 (15.6 - 26.8)	23.1 (15.4 - 26.8)	23.0 (15.7 - 27.0)	22.9 (15.3 - 26.8)
Salinity		29.9 (26.1 - 31.7)	29.9 (27.1 - 31.3)	30.0 (28.3 - 31.8)	31.2 (29.8 - 32.2)	30.9 (29.7 - 32.4)	31.4 (30.2 - 32.3)
Dissolved Oxygen (mg/L)		4.9 (3.9 - 6.9)	4.0 (2.9 - 5.9)	4.3 (3.5 - 5.5)	5.4 (4.1 - 7.5)	4.6 (2.7 - 7.3)	5.1 (4.1 - 7.3)
	Bottom	4.7 (3.7 - 6.9)	4.1 (3.4 - 6.1)	4.4 (3.6 - 5.9)	5.2 (4.1 - 7.5)	4.3 (2.5 - 7.3)	5.3 (4.2 - 7.4)
Dissolved Oxygen (% Saturation)		67 (59 - 85)	56 (43 - 72)	60 (52 - 66)	74 (61 - 91)	63 (40 - 89)	71 (60 - 89)
	Bottom	65 (55 - 85)	57 (50 - 74)	60 (53 - 70)	72 (59 - 91)	59 (37 - 88)	73 (61 - 89)
pH		7.9 (7.8 - 8.0)	7.9 (7.8 - 8.0)	7.9 (7.8 - 8.1)	8.0 (7.9 - 8.2)	7.9 (7.8 - 8.0)	8.0 (7.8 - 8.2)
Secchi Disc Depth (m)		2.0 (1.5 - 2.5)	2.0 (1.0 - 2.8)	2.1 (1.8 - 2.6)	2.3 (1.5 - 3.1)	1.5 (0.8 - 2.0)	2.4 (1.8 - 3.0)
Turbidity (NTU)		12.5 (9.3 - 16.6)	9.0 (7.2 - 10.2)	8.5 (6.1 - 11.2)	8.3 (4.7 - 10.5)	7.1 (1.9 - 12.6)	7.5 (3.4 - 12.1)
Suspended Solids (mg/L)		9.5 (2.9 - 20.5)	6.7 (3.6 - 17.7)	5.6 (2.8 - 8.0)	4.5 (1.7 - 8.3)	2.5 (1.9 - 3.5)	3.8 (2.6 - 4.8)
5-day Biochemical Oxygen Demand (mg/L)		0.8 (0.5 - 2.0)	1.4 (0.6 - 3.1)	1.4 (0.7 - 1.9)	0.8 (0.3 - 1.3)	1.4 (0.3 - 2.6)	0.7 (0.2 - 1.1)
Ammonia Nitrogen (mg/L)		0.25 (0.22 - 0.32)	0.31 (0.24 - 0.40)	0.24 (0.14 - 0.33)	0.15 (0.08 - 0.21)	0.29 (0.13 - 0.38)	0.13 (0.07 - 0.19)
Unionised Ammonia (mg/L)		0.009 (0.004 - 0.016)	0.010 (0.004 - 0.017)	0.009 (0.003 - 0.020)	0.006 (0.002 - 0.013)	0.009 (0.004 - 0.017)	0.005 (0.002 - 0.012)
Nitrite Nitrogen (mg/L)		0.034 (0.023 - 0.046)	0.038 (0.027 - 0.053)	0.033 (0.020 - 0.052)	0.029 (0.023 - 0.041)	0.097 (0.032 - 0.209)	0.027 (0.021 - 0.035)
Nitrate Nitrogen (mg/L)		0.199 (0.140 - 0.275)	0.211 (0.140 - 0.287)	0.199 (0.110 - 0.290)	0.182 (0.107 - 0.240)	0.334 (0.152 - 0.467)	0.177 (0.110 - 0.230)
Total Inorganic Nitrogen (mg/L)		0.48 (0.39- 0.54)	0.56 (0.50- 0.61)	0.47 (0.41- 0.50)	0.36 (0.30- 0.43)	0.72 (0.40 - 1.05)	0.34 (0.28 - 0.38)
Total Kjeldahl Nitrogen (mg/L)		0.48 (0.43 - 0.57)	0.56 (0.45 - 0.65)	0.51 (0.36 - 0.65)	0.35 (0.21 - 0.55)	0.58 (0.27 - 0.94)	0.32 (0.22 - 0.43)
Total Nitrogen (mg/L)		0.71 (0.60 - 0.78)	0.80 (0.74 - 0.86)	0.74 (0.68 - 0.83)	0.56 (0.46 - 0.77)	1.02 (0.54 - 1.56)	0.53 (0.45 - 0.62)
Orthophosphate Phosphorus (mg/L)		0.044 (0.035 - 0.050)	0.046 (0.034 - 0.058)	0.042 (0.027 - 0.052)	0.033 (0.021 - 0.050)	0.122 (0.048 - 0.242)	0.033 (0.023 - 0.043)
Total Phosphorus (mg/L)		0.08 (0.07 - 0.08)	0.08 (0.06 - 0.10)	0.07 (0.05 - 0.09)	0.05 (0.04 - 0.09)	0.16 (0.07 - 0.31)	0.06 (0.04 - 0.08)
Silica (as SiO_2) (mg/L)		1.4 (1.0 - 3.0)	1.5 (1.0 - 2.8)	1.4 (0.9 - 2.5)	1.1 (0.6 - 2.1)	1.3 (0.9 - 1.9)	1.1 (0.7 - 1.9)
Chlorophyll-a (µg/L)		4.0 (1.5 - 7.1)	2.5 (1.4 - 5.1)	2.0 (0.9 - 5.0)	3.5 (1.1 - 6.1)	8.4 (3.2 - 16.0)	2.7 (1.2 - 5.8)
E.coli (count/100mL)		790 (94 - 7000)	1700 (480 - 33000)	3500 (87 - 49000)	510 (160 - 1600)	2300 (550 - 5000)	780 (280 - 1800)
Faecal Coliforms (count/100mL)		2400 (580 - 14000)	5400 (1400 - 180000)	8800 (150 - 100000)	1500 (570 - 2900)	8200 (4000 - 22000)	2000 (640 - 6500)

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 2008

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)		23.5 (19.1 - 26.6)	23.7 (18.5 - 27.3)	22.9 (17.1 - 28.1)	23.2 (17.5 - 28.9)	23.4 (17.6 - 29.2)	23.3 (18.4 - 28.0)
Salinity		31.9 (31.0 - 33.2)	31.9 (30.6 - 33.1)	32.0 (31.2 - 33.0)	32.1 (31.2 - 33.1)	32.0 (30.3 - 32.9)	31.7 (31.3 - 32.1)
Dissolved Oxygen (mg/L)		4.5 (3.0 - 5.6)	5.1 (4.3 - 6.2)	7.0 (5.8 - 9.5)	6.8 (5.7 - 9.7)	6.7 (4.9 - 8.9)	6.2 (4.2 - 7.9)
	Bottom	4.3 (2.4 - 5.9)	5.2 (4.4 - 6.2)	6.7 (4.3 - 9.7)	7.1 (5.9 - 10.0)	6.9 (5.0 - 8.9)	5.4 (3.2 - 8.0)
Dissolved Oxygen (% Saturation)		64 (45 - 74)	72 (65 - 80)	97 (84 - 121)	95 (77 - 123)	95 (71 - 113)	87 (60 - 103)
	Bottom	60 (34 - 77)	73 (66 - 80)	92 (62 - 121)	99 (89 - 124)	97 (76 - 114)	74 (46 - 101)
pH		8.0 (7.9 - 8.0)	8.1 (8.0 - 8.1)	8.2 (8.1 - 8.3)	8.2 (8.2 - 8.3)	8.2 (8.1 - 8.4)	8.1 (7.3 - 8.4)
Secchi Disc Depth (m)		2.9 (2.4 - 3.5)	2.7 (2.4 - 3.3)	2.6 (1.8 - 3.6)	2.7 (2.0 - 3.2)	2.7 (1.8 - 3.8)	2.6 (1.8 - 3.4)
Turbidity (NTU)		8.2 (2.0 - 11.6)	9.0 (5.1 - 15.8)	6.5 (1.7 - 9.6)	5.9 (0.8 - 9.8)	6.8 (1.2 - 10.4)	5.6 (3.1 - 6.9)
Suspended Solids (mg/L)		2.8 (1.6 - 4.1)	3.5 (2.1 - 6.8)	5.8 (2.2 - 20.5)	2.1 (1.1 - 3.1)	3.0 (1.1 - 6.5)	3.2 (0.6 - 6.9)
5-day Biochemical Oxygen Demand (mg/L)		0.9 (0.4 - 1.8)	1.0 (0.5 - 1.7)	1.3 (0.7 - 2.4)	0.8 (0.5 - 1.4)	1.0 (0.6 - 2.3)	1.5 (0.3 - 3.1)
Ammonia Nitrogen (mg/L)		0.15 (0.09 - 0.21)	0.12 (0.05 - 0.20)	0.03 (0.01 - 0.05)	0.02 (0.01 - 0.04)	0.02 (0.01 - 0.04)	0.05 (0.01 - 0.07)
Unionised Ammonia (mg/L)		0.005 (0.003 - 0.008)	0.005 (0.003 - 0.007)	0.002 (<0.001 - 0.005)	0.002 (<0.001 - 0.004)	0.002 (<0.001 - 0.004)	0.003 (<0.001 - 0.006)
Nitrite Nitrogen (mg/L)		0.017 (0.008 - 0.035)	0.016 (0.008 - 0.031)	0.002 (0.002 - 0.004)	0.003 (0.002 - 0.010)	0.006 (0.002 - 0.016)	0.002 (0.002 - 0.002)
Nitrate Nitrogen (mg/L)		0.113 (0.062 - 0.210)	0.109 (0.060 - 0.170)	0.008 (0.002 - 0.021)	0.011 (0.002 - 0.044)	0.021 (0.002 - 0.057)	0.008 (0.002 - 0.018)
Total Inorganic Nitrogen (mg/L)		0.28 (0.19 - 0.34)	0.24 (0.18 - 0.32)	0.04 (0.01 - 0.07)	0.04 (0.01 - 0.09)	0.05 (0.02 - 0.10)	0.06 (0.02 - 0.09)
Total Kjeldahl Nitrogen (mg/L)		0.31 (0.23 - 0.41)	0.29 (0.21 - 0.36)	0.24 (0.18 - 0.34)	0.18 (0.13 - 0.26)	0.20 (0.14 - 0.28)	0.30 (0.25 - 0.41)
Total Nitrogen (mg/L)		0.44 (0.35 - 0.52)	0.41 (0.32 - 0.48)	0.25 (0.19 - 0.36)	0.20 (0.13 - 0.26)	0.23 (0.15 - 0.28)	0.31 (0.26 - 0.42)
Orthophosphate Phosphorus (mg/L)		0.034 (0.026 - 0.043)	0.025 (0.012 - 0.036)	0.007 (0.004 - 0.017)	0.007 (0.005 - 0.008)	0.007 (0.005 - 0.010)	0.007 (0.004 - 0.012)
Total Phosphorus (mg/L)		0.05 (0.03 - 0.06)	0.04 (0.03 - 0.06)	0.03 (0.02 - 0.05)	0.02 (0.02 - 0.02)	0.02 (0.02 - 0.03)	0.03 (0.02 - 0.03)
Silica (as SiO_2) (mg/L)		1.1 (0.6 - 1.9)	1.0 (0.6 - 1.6)	0.9 (0.3 - 2.6)	0.8 (0.4 - 1.9)	0.9 (0.1 - 2.3)	0.7 (0.4 - 1.1)
Chlorophyll-a (µg/L)		1.0 (0.2 - 2.3)	2.7 (0.3 - 8.5)	5.3 (1.6 - 8.2)	2.7 (1.1 - 4.1)	4.2 (1.3 - 9.8)	8.1 (1.3 - 14.3)
E.coli (count/100mL)		720 (390 - 3000)	240 (88 - 670)	2 (1 - 10)	1 (1 - 1)	17 (5 - 60)	6 (1 - 63)
Faecal Coliforms (count/100mL)		1900 (1000 - 4800)	750 (190 - 1600)	11 (4 - 88)	2 (1 - 3)	110 (27 - 290)	22 (2 - 150)

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, 2004- 2008

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)	67 (48 - 94)	77 (7 - 95)	94 (88 - 98)	68 (42 - 88)	95 (85 - 99)	78 (60 - 95)	85 (65 - 97)
Electrochemical Potential (mV)	-251 ((-353)-(-169))	-244 ((-310)-(-150))	-224 ((-278)-(-81))	-267 ((-371)-(-184))	-313 ((-361)-(-246))	-355 ((-397)-(-278))	-364 ((-407)-(-251))
Total Solids (%w/w)	47 (36 - 58)	42 (38 - 51)	37 (30 - 45)	45 (38 - 52)	38 (35 - 46)	47 (40 - 52)	37 (33 - 43)
Total Volatile Soilds (%w/w)	6.8 (5.8 - 9.2)	6.9 (5.4 - 8.8)	8.0 (6.7 - 11.0)	7.1 (5.7 - 8.1)	7.3 (6.0 - 9.6)	6.7 (5.6 - 8.6)	9.2 (8.4 - 11.0)
Chemical Oxygen Demand (mg/kg)	20000 (17000 - 25000)	18000 (15000 - 22000)	14000 (12000 - 16000)	25000 (16000 - 33000)	17000 (11000 - 20000)	19000 (14000 - 24000)	31000 (25000 - 36000)
Total Carbon (%w/w)	0.8 (0.6 - 1.0)	0.7 (0.5 - 1.1)	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 (0.8 - 1.1)
Ammonical Nitrogen (mg/kg)	6.4 (0.1 - 21.0)	10.6 (4.6 - 21.0)	6.9 (1.9 - 15.0)	8.1 (0.1 - 20.0)	5.3 (1.8 - 8.7)	24.9 (5.4 - 42.0)	34.4 (8.9 - 65.0)
Total Kjeldahl Nitrogen (mg/kg)	390 (230 - 620)	470 (330 - 550)	490 (300 - 1000)	460 (330 - 540)	360 (290 - 410)	450 (210 - 600)	680 (600 - 820)
Total Phosphorus (mg/kg)	200 (150 - 300)	250 (170 - 370)	190 (140 - 340)	200 (150 - 260)	190 (150 - 220)	200 (110 - 240)	220 (180 - 260)
Total Sulphide (mg/kg)	120 (5 - 750)	110 (14 - 250)	66 (2 - 150)	280 (23 - 750)	66 (3 - 190)	200 (18 - 530)	310 (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)	9.7 (5.8 - 28.0)	7.5 (6.2 - 8.9)	7.2 (6.8 - 8.4)	8.2 (6.8 - 9.7)	8.1 (7.0 - 9.1)	5.6 (4.5 - 7.6)	8.6 (7.5 - 9.2)
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)	0.4 (0.2 - 0.7)	1.0 (0.8 - 1.2)
Chromium (mg/kg)	34 (22 - 53)	52 (43 - 61)	42 (40 - 46)	150 (100 - 280)	49 (43 - 56)	38 (27 - 52)	69 (63 - 76)
Copper (mg/kg)	45 (13 - 72)	98 (57 - 140)	37 (33 - 43)	260 (150 - 490)	140 (24 - 170)	89 (46 - 150)	270 (240 - 310)
Lead (mg/kg)	52 (32 - 85)	48 (35 - 59)	51 (47 - 58)	84 (65 - 140)	51 (28 - 64)	55 (31 - 110)	87 (63 - 110)
Mercury (mg/kg)	0.07 (<0.05 - 0.12)	0.19 (0.12 - 0.26)	0.14 (0.12 - 0.18)	0.25 (0.17 - 0.49)	0.17 (<0.05 - 0.23)	0.24 (0.09 - 0.44)	0.80 (0.63 - 1.30)
Nickel (mg/kg)	22 (14 - 47)	21 (16 - 24)	27 (24 - 32)	58 (37 - 130)	29 (25 - 36)	24 (17 - 32)	29 (27 - 34)
Silver (mg/kg)	2.0 (<0.2 - 11.0)	0.4 (0.2 - 0.4)	0.6 (0.5 - 0.7)	5.4 (3.4 - 8.5)	1.8 (0.3 - 2.3)	1.8 (0.8 - 3.5)	7.7 (6.3 - 10.0)
Zinc (mg/kg)	160 (87 - 300)	150 (110 - 230)	140 (130 - 160)	280 (190 - 350)	220 (110 - 240)	190 (120 - 320)	350 (300 - 450)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	52 (28 - 92)	21 (18 - 24)	21 (18 - 30)	48 (33 - 82)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	95 (90 - 110)	95 (90 - 120)	91 (90 - 95)	120 (96 - 240)	93 (90 - 100)	110 (90 - 140)	130 (110 - 170)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	230 (22 - 530)	230 (62 - 980)	67 (62 - 80)	810 (360 - 1800)	160 (21 - 280)	430 (190 - 940)	750 (600 - 1000)

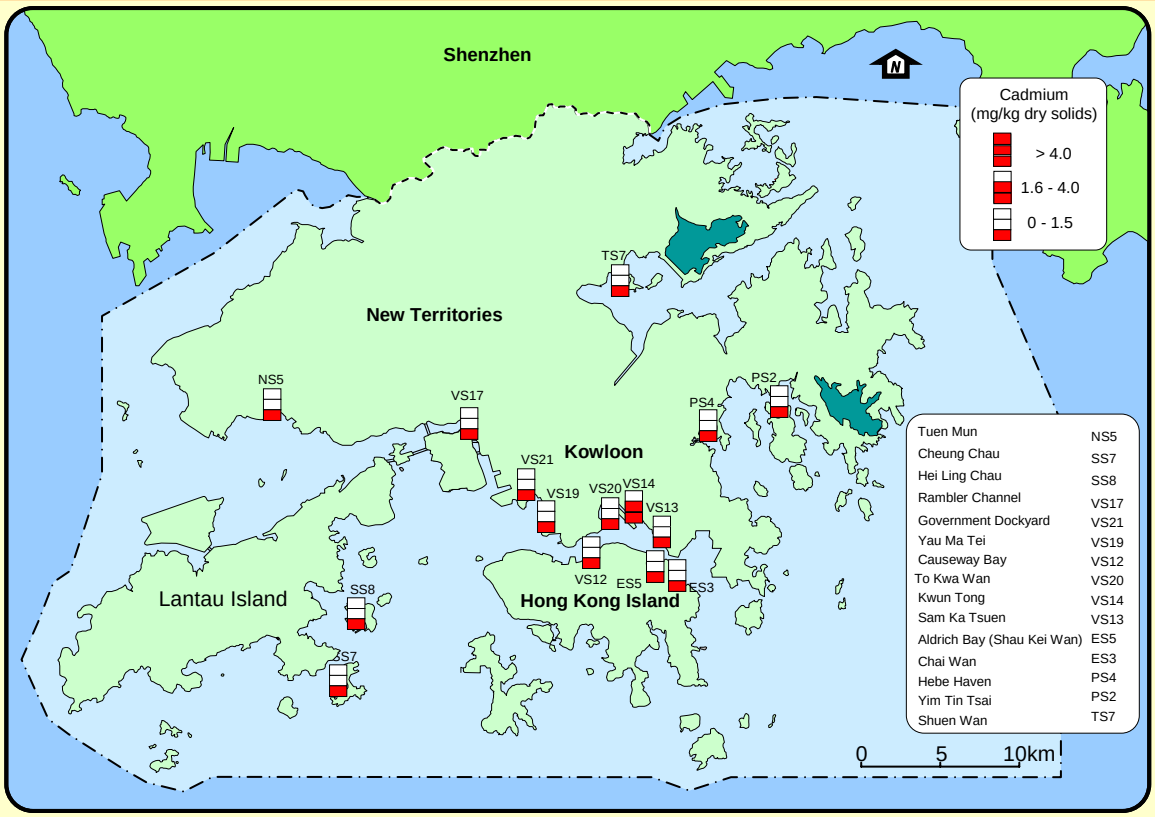
Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration 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, Fluorene, 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, 2004- 2008 (continued)

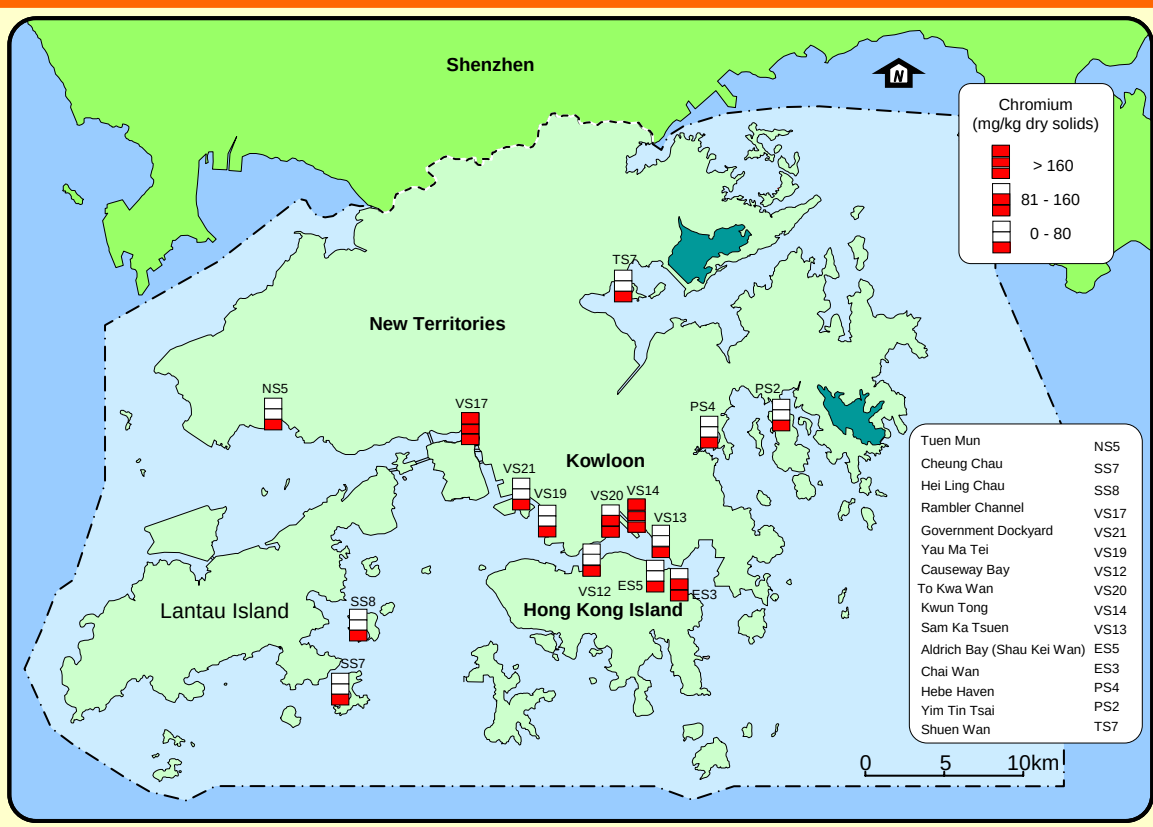
Parameter	To Kwa Wan VS20	Kwun Tong VS14	Sam Ka Tsuen VS13	Aldrich Bay (Shau Kei Wan) ES5	Chai Wan ES3	Hebe Haven PS4	Yim Tin Tsai PS2	Shuen Wan TS7
Number of samples	9	10	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	65 (45 - 87)	67 (50 - 81)	86 (76 - 90)	82 (8 - 97)	83 (25 - 96)	91 (85 - 97)	85 (64 - 93)	64 (54 - 82)
Electrochemical Potential (mV)	-339 ((-398)-(-173))	-379 ((-415)-(-305))	-238 ((-386)-(-56))	-393 ((-413)-(-345))	-336 ((-380)-(-296))	-255 ((-316)-(-207))	-224 ((-326)-(-160))	-345 ((-388)-(-289))
Total Solids (%w/w)	49 ((46 - 53))	39 ((27 - 45))	41 ((37 - 43))	32 ((27 - 35))	41 ((36 - 43))	38 ((35 - 43))	46 ((34 - 58))	36 ((29 - 50))
Total Volatile Soilds (%w/w)	7.8 (6.2 - 11.0)	9.5 (7.0 - 11.0)	9.7 (8.7 - 12.0)	10.0 (9.0 - 11.0)	8.4 (8.0 - 8.9)	9.6 (7.8 - 13.0)	10.5 (8.0 - 15.0)	8.6 (6.8 - 10.0)
Chemical Oxygen Demand (mg/kg)	36000 (29000 - 44000)	36000 (25000 - 44000)	26000 (21000 - 30000)	27000 (21000 - 33000)	27000 (22000 - 32000)	23000 (17000 - 26000)	20000 (14000 - 30000)	27000 (23000 - 30000)
Total Carbon (%w/w)	1.3 (1.0 - 2.0)	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 - 1.0)	1.7 (0.9 - 2.7)	0.8 (0.7 - 1.2)
Ammonical Nitrogen (mg/kg)	16.8 (6.7 - 34.0)	30.4 (11.0 - 54.0)	11.6 (0.5 - 28.0)	28.9 (4.2 - 45.0)	4.4 (0.3 - 9.9)	4.1 (1.5 - 7.0)	8.4 (1.7 - 22.0)	7.6 (2.5 - 12.0)
Total Kjeldahl Nitrogen (mg/kg)	520 (420 - 630)	680 (410 - 890)	570 (380 - 700)	600 (470 - 730)	510 (400 - 630)	530 (290 - 670)	480 (250 - 850)	640 (540 - 890)
Total Phosphorus (mg/kg)	210 (170 - 250)	220 (160 - 310)	240 (200 - 340)	200 (150 - 280)	240 (180 - 400)	180 (120 - 220)	140 (72 - 200)	230 (170 - 430)
Total Sulphide (mg/kg)	150 (12 - 360)	600 (25 - 1300)	210 (5 - 980)	870 (180 - 1600)	180 (18 - 680)	41 (8 - 94)	42 (1 - 110)	270 (53 - 1300)
Total Cyanide (mg/kg)	0.2 (<0.1 - 0.2)	0.3 (0.1 - 0.5)	0.3 (<0.1 - 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)	7.7 (6.0 - 8.7)	6.9 (5.5 - 8.4)	7.4 (6.4 - 8.5)	8.0 (6.1 - 10.0)	9.7 (8.5 - 12.0)	8.2 (7.3 - 9.2)	4.1 (2.6 - 5.6)	9.6 (7.9 - 12.0)
Cadmium (mg/kg)	1.0 (0.7 - 1.5)	3.1 (2.0 - 5.0)	0.8 (0.7 - 0.9)	0.7 (0.5 - 0.9)	0.6 (0.4 - 0.9)	0.2 (0.1 - 0.3)	<0.1 (<0.1 - <0.1)	0.5 (0.3 - 0.7)
Chromium (mg/kg)	92 (69 - 110)	310 (210 - 570)	55 (44 - 68)	66 (57 - 84)	110 (75 - 170)	28 (23 - 33)	19 (15 - 23)	24 (18 - 33)
Copper (mg/kg)	740 (580 - 960)	2200 (1400 - 4200)	180 (150 - 210)	340 (230 - 430)	320 (230 - 540)	51 (37 - 61)	17 (11 - 27)	140 (89 - 240)
Lead (mg/kg)	120 (87 - 220)	150 (75 - 400)	110 (85 - 120)	84 (67 - 130)	87 (63 - 120)	39 (36 - 42)	34 (25 - 39)	100 (79 - 120)
Mercury (mg/kg)	1.34 (0.85 - 2.20)	0.86 (0.58 - 1.40)	0.74 (0.51 - 1.20)	0.40 (0.27 - 0.69)	0.52 (0.38 - 0.65)	0.13 (0.11 - 0.16)	0.07 (<0.05 - 0.15)	0.17 (0.08 - 0.27)
Nickel (mg/kg)	38 (33 - 45)	91 (63 - 170)	20 (16 - 25)	29 (26 - 36)	33 (22 - 55)	9 (7 - 11)	13 (11 - 18)	13 (10 - 20)
Silver (mg/kg)	5.1 (3.5 - 5.8)	9.4 (6.3 - 13.0)	2.8 (2.2 - 3.8)	6.8 (4.2 - 9.0)	20.3 (8.9 - 32.0)	0.3 (0.3 - 0.4)	0.2 (<0.2 - 0.2)	0.5 (0.3 - 0.7)
Zinc (mg/kg)	280 (220 - 380)	470 (370 - 620)	340 (280 - 380)	400 (320 - 550)	350 (230 - 500)	160 (140 - 170)	87 (59 - 140)	350 (270 - 470)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	100 (31 - 140)	240 (150 - 470)	54 (32 - 110)	22 (18 - 29)	49 (29 - 71)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	18000 (1800 - 42000)	130 (110 - 200)	120 (93 - 180)	100 (90 - 130)	120 (100 - 170)	90 (90 - 90)	90 (90 - 90)	91 (90 - 96)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	150000 (21000 - 290000)	1200 (750 - 1900)	630 (410 - 1500)	760 (370 - 1500)	530 (270 - 920)	68 (37 - 100)	38 (21 - 52)	120 (64 - 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, Fluorene, 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.

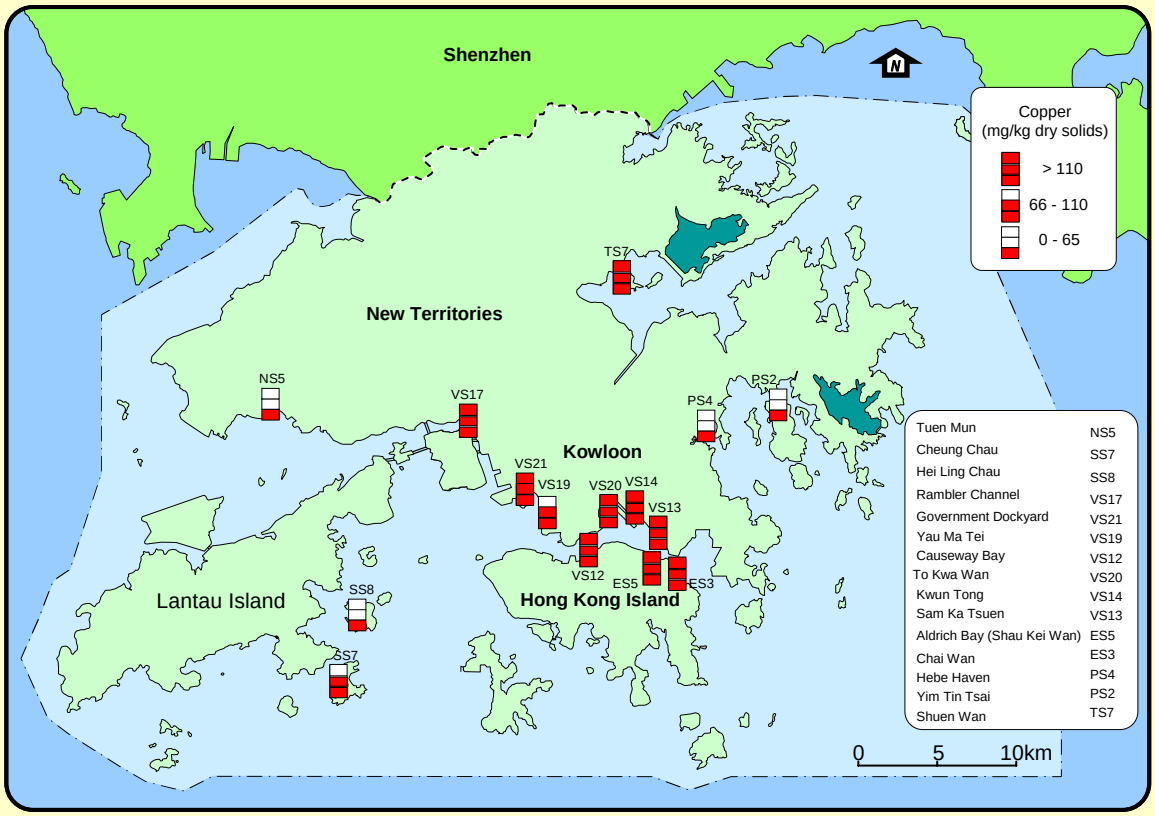
Cadmium in typhoon shelter sediments in Hong Kong, 2004 – 2008



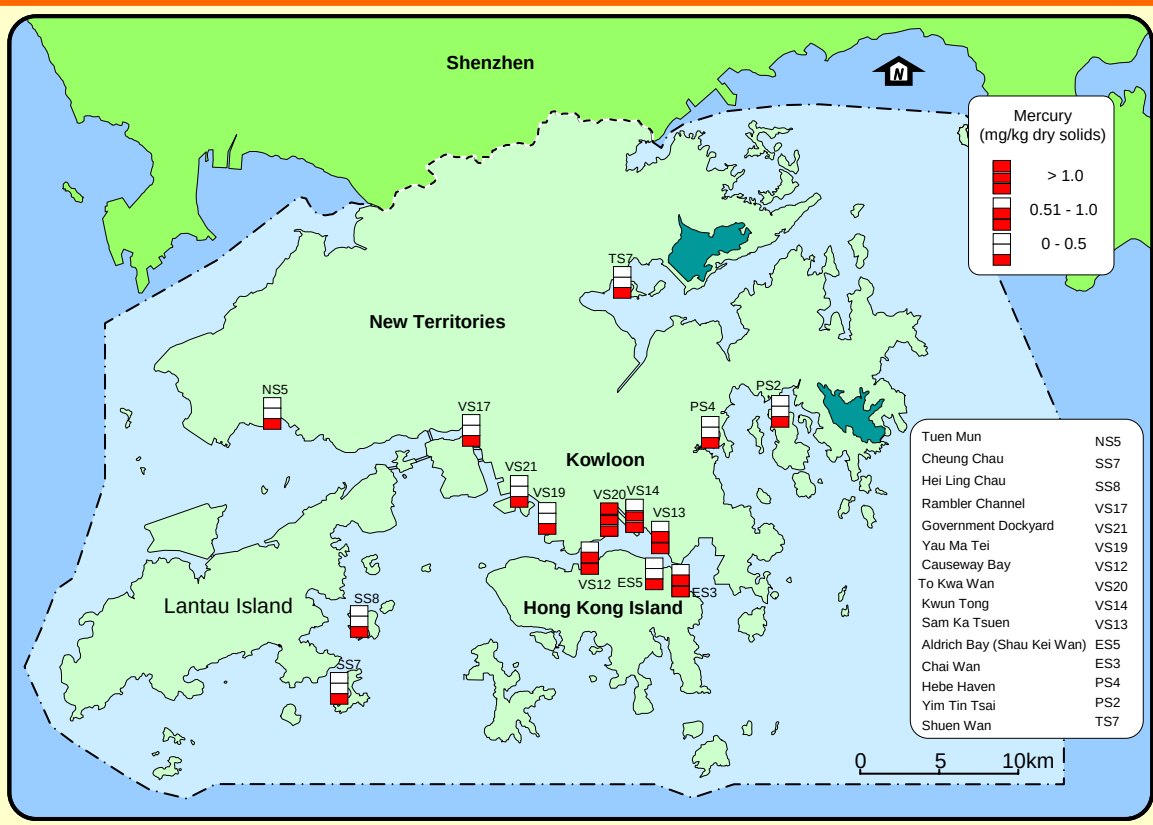
Chromium in typhoon shelter sediments in Hong Kong, 2004 – 2008



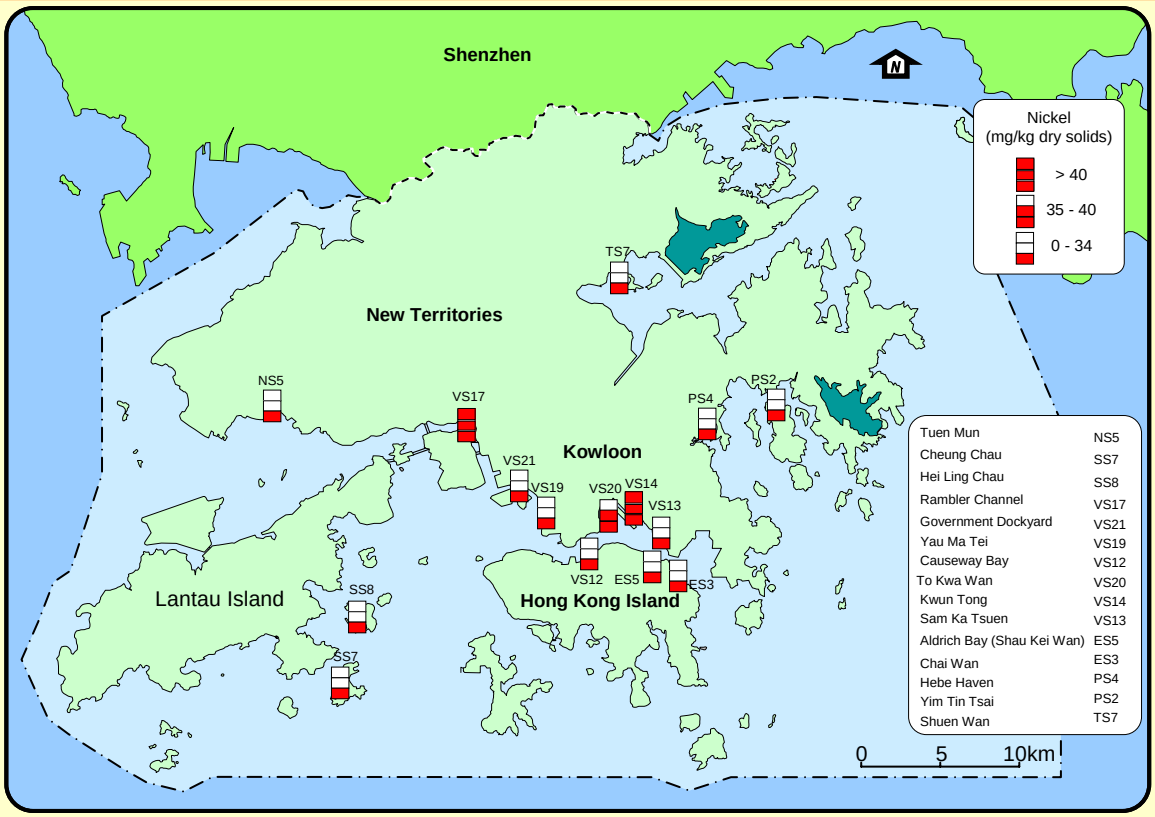
Copper in typhoon shelter sediments in Hong Kong, 2004 – 2008



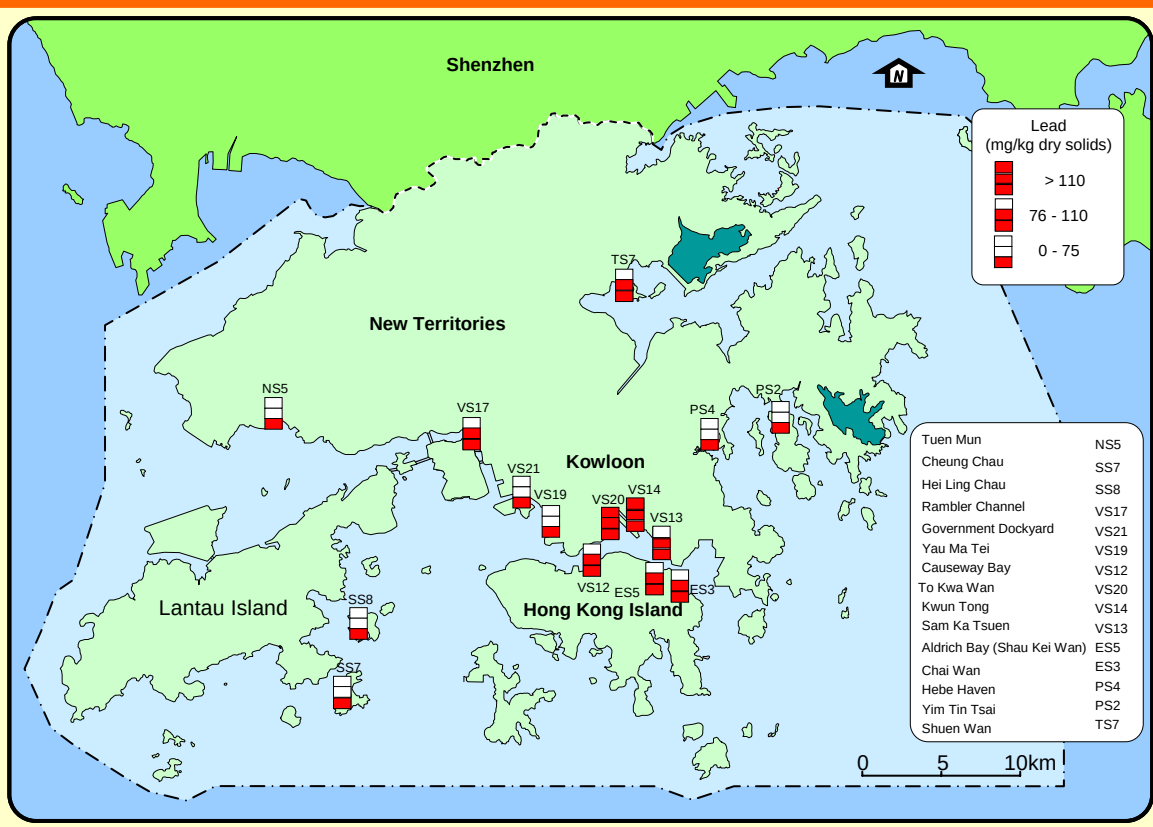
Mercury in typhoon shelter sediments in Hong Kong, 2004 – 2008



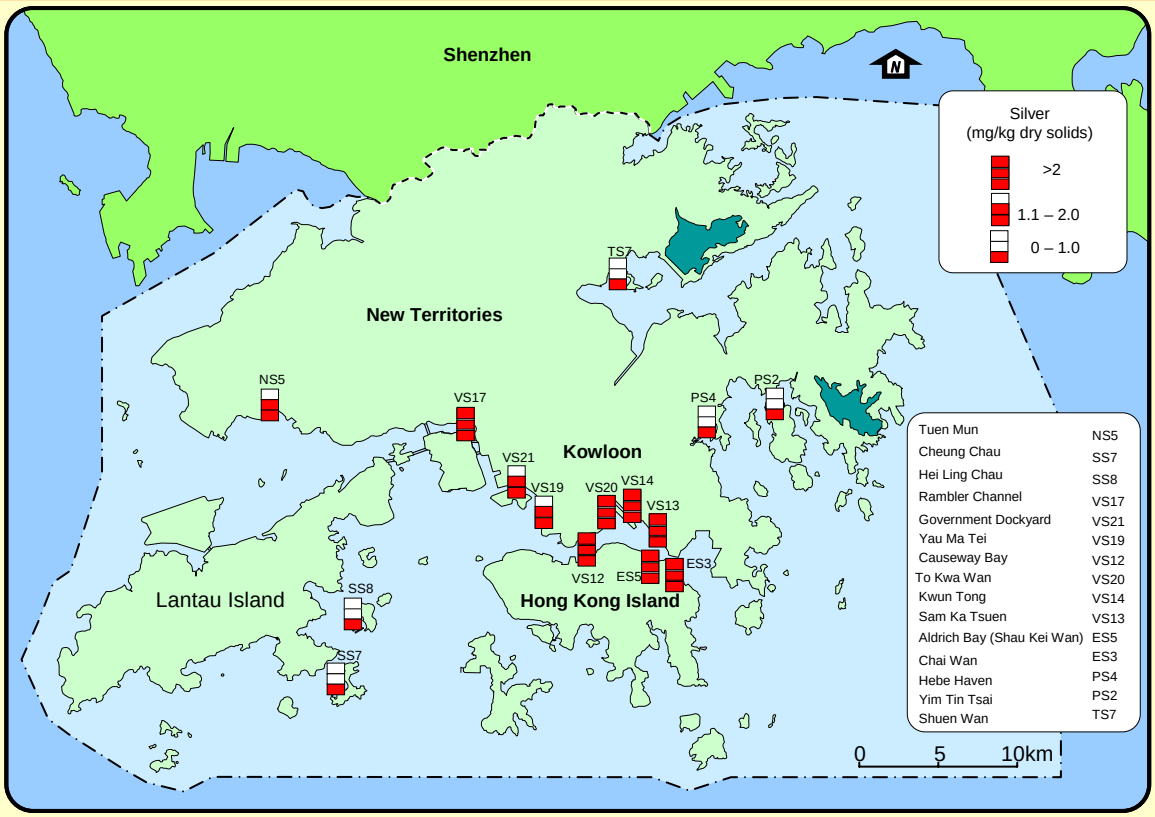
Nickel in typhoon shelter sediments in Hong Kong, 2004 – 2008



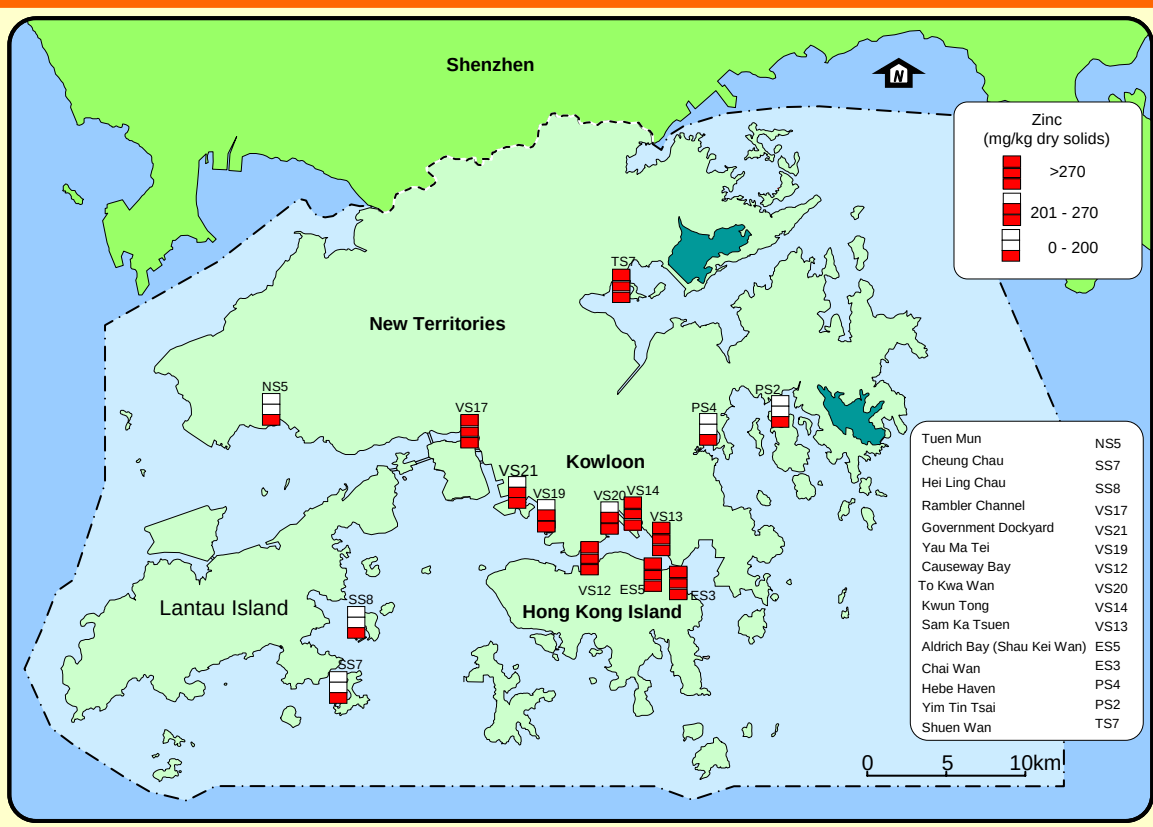
Lead in typhoon shelter sediments in Hong Kong, 2004 – 2008



Silver in typhoon shelter sediments in Hong Kong, 2004 – 2008

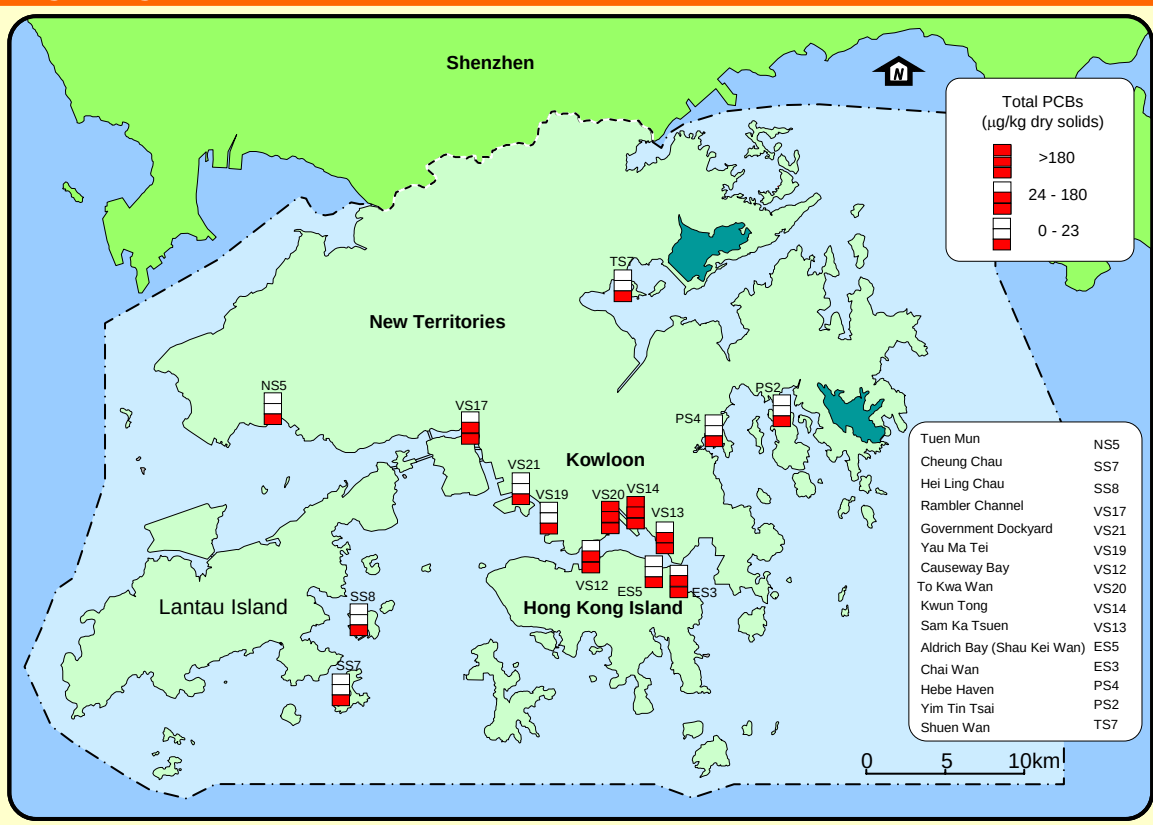


Zinc in typhoon shelter sediments in Hong Kong, 2004 – 2008

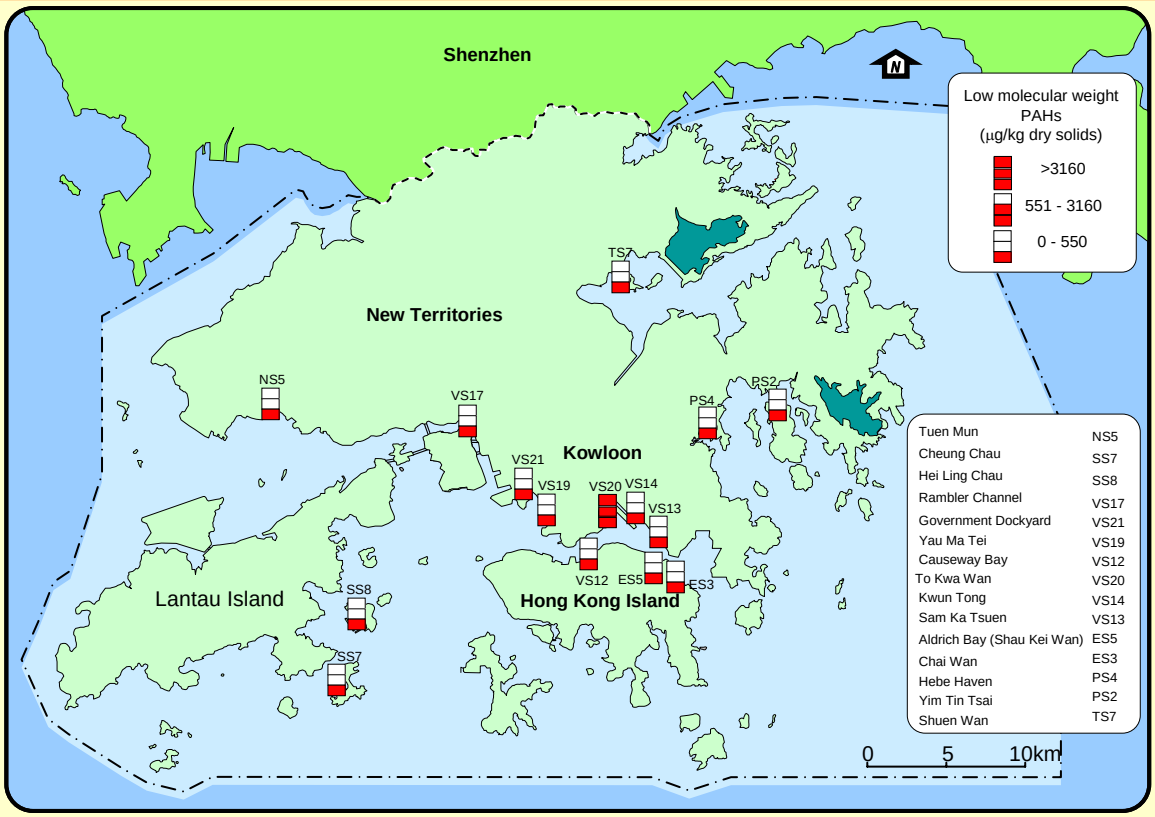


Arsenic in typhoon shelter sediments in Hong Kong, 2004 – 2008

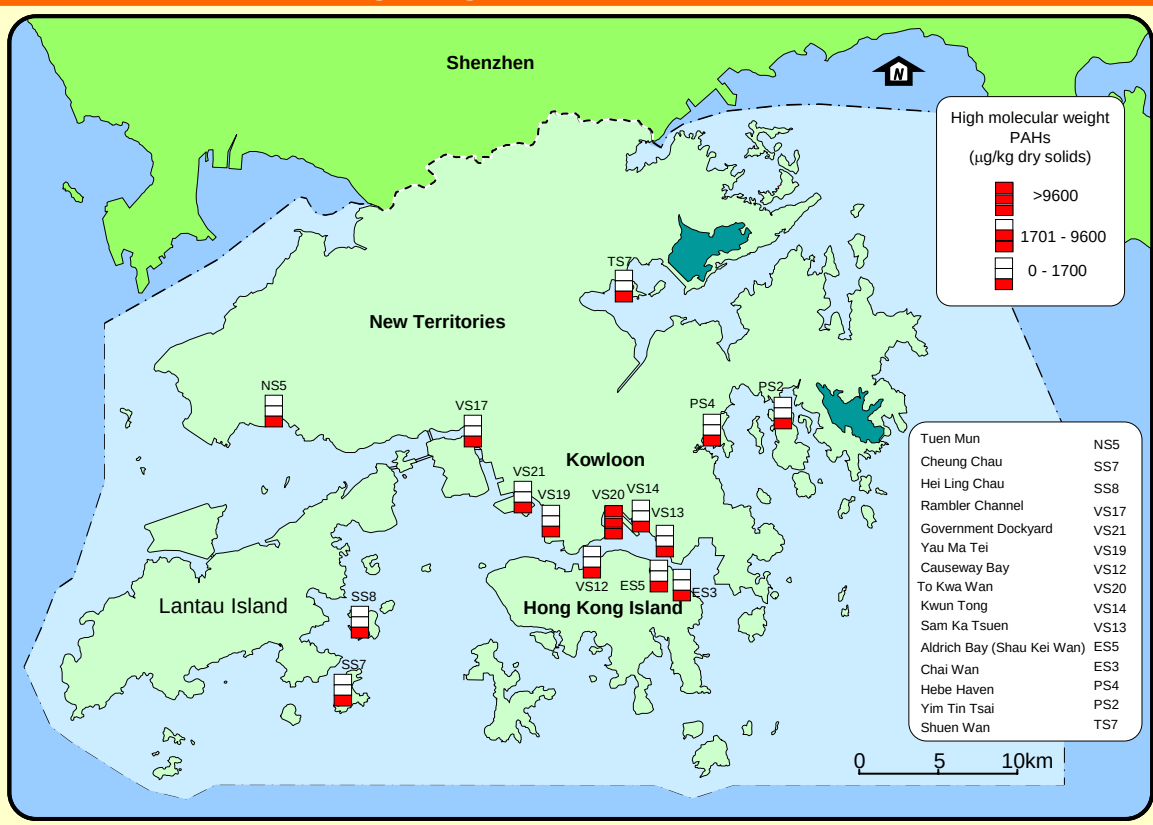
Total polychlorinated biphenyls (PCBs) in typhoon shelter sediments in Hong Kong, 2004 – 2008



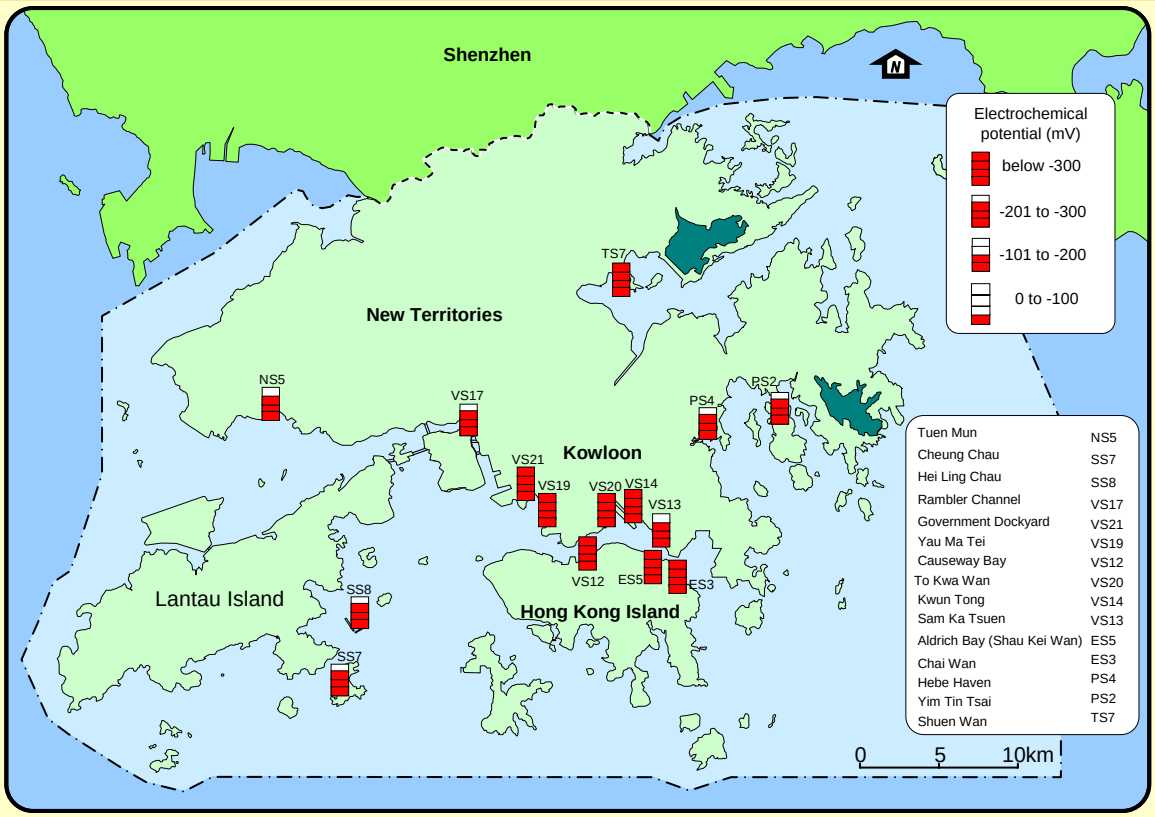
Low molecular weight polycyclic aromatic hydrocarbons (PAHs) in typhoon shelter sediments in Hong Kong, 2004 – 2008



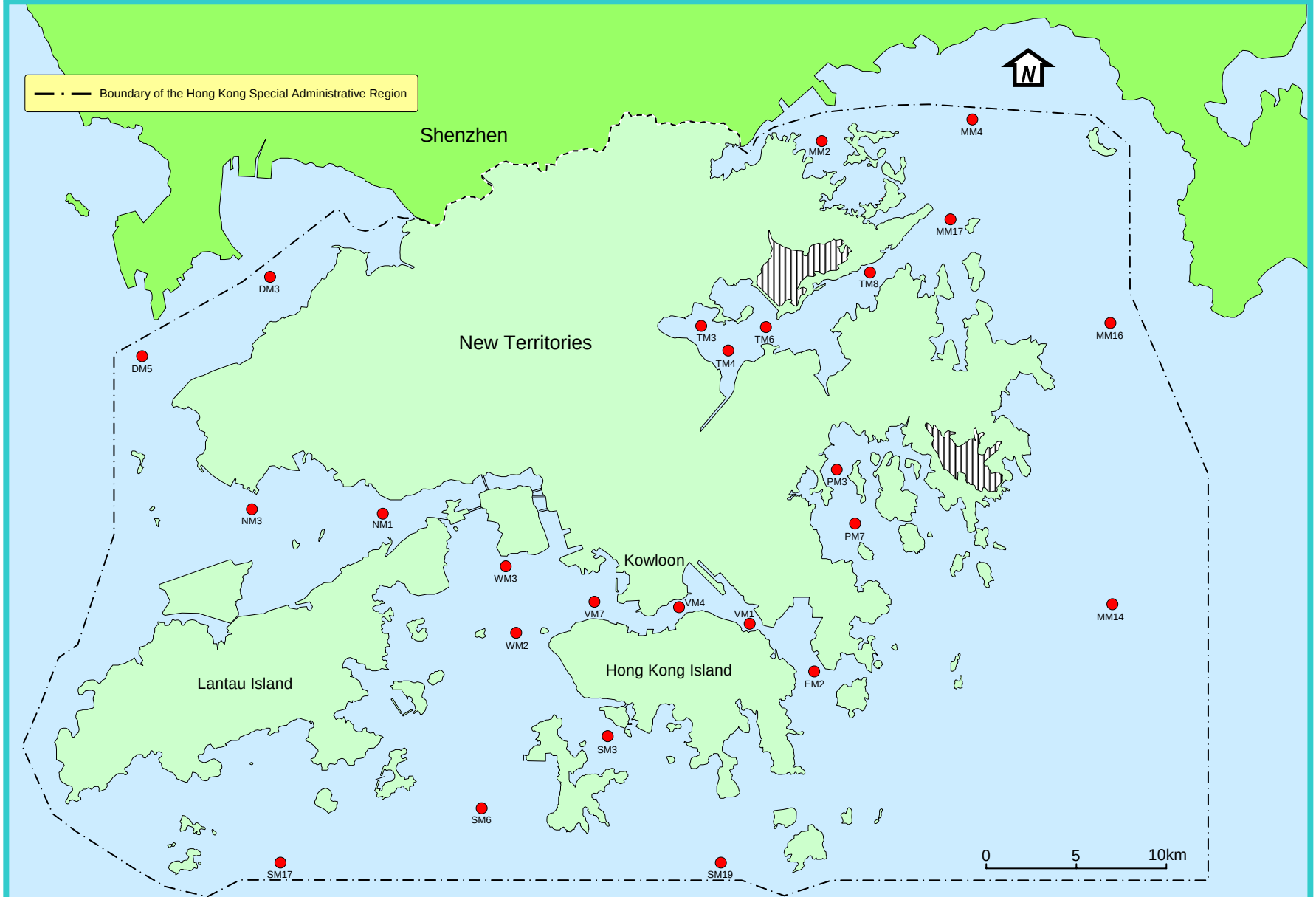
High molecular weight polycyclic aromatic hydrocarbons (PAHs) in typhoon shelter sediments in Hong Kong, 2004 – 2008



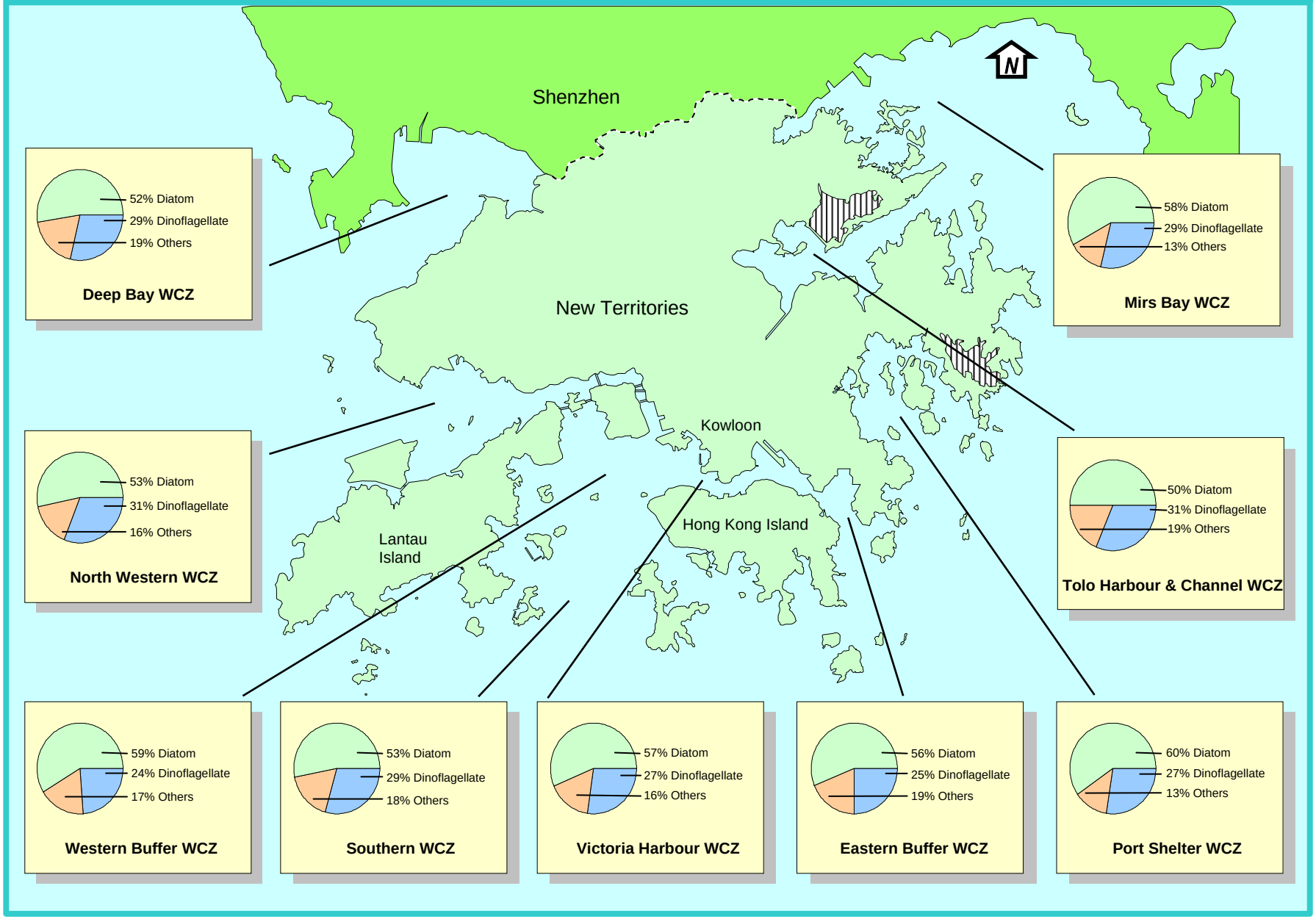
Electrochemical potential in typhoon shelter sediments in Hong Kong, 2004– 2008



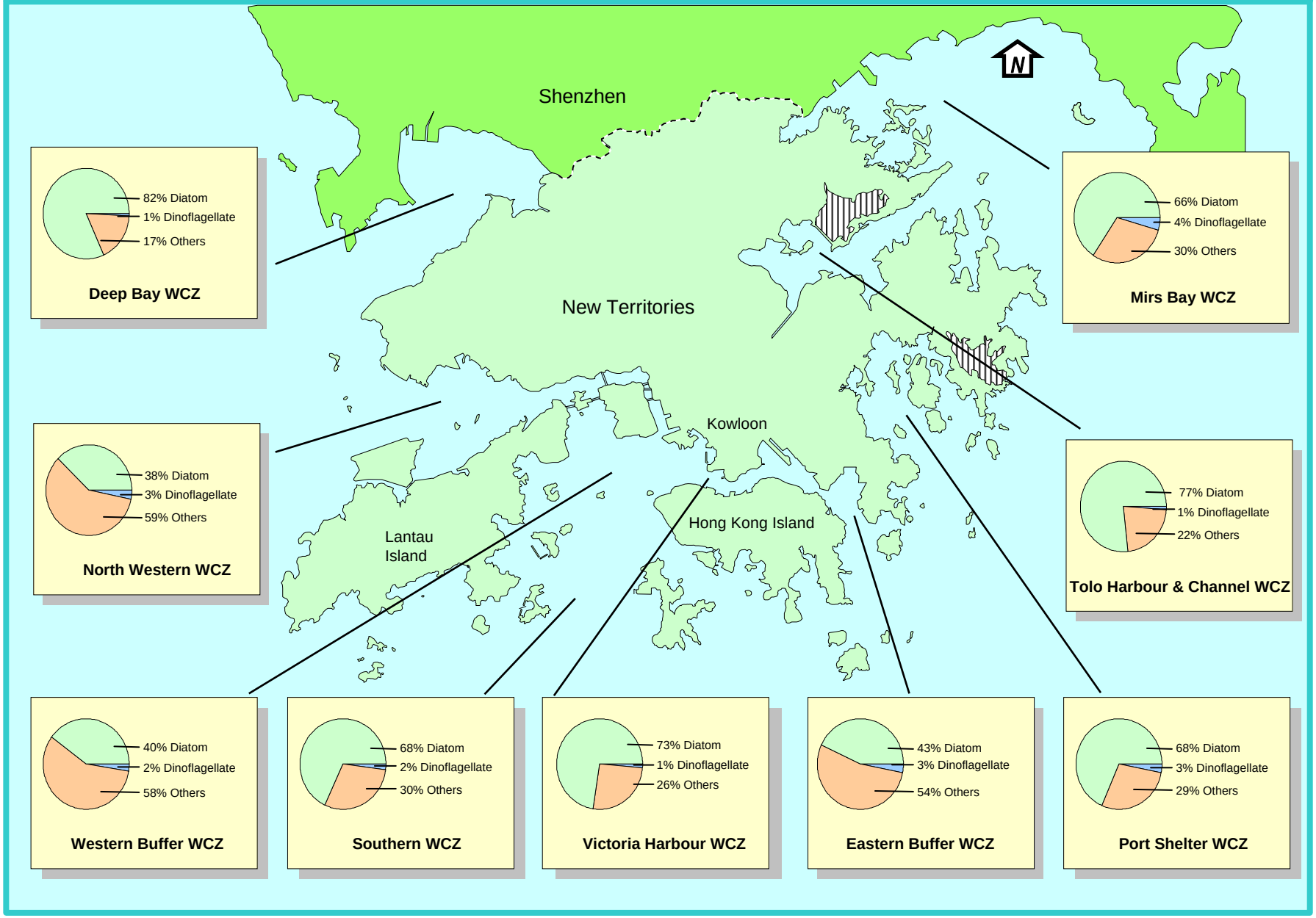
Phytoplankton monitoring stations in Hong Kong waters in 2008



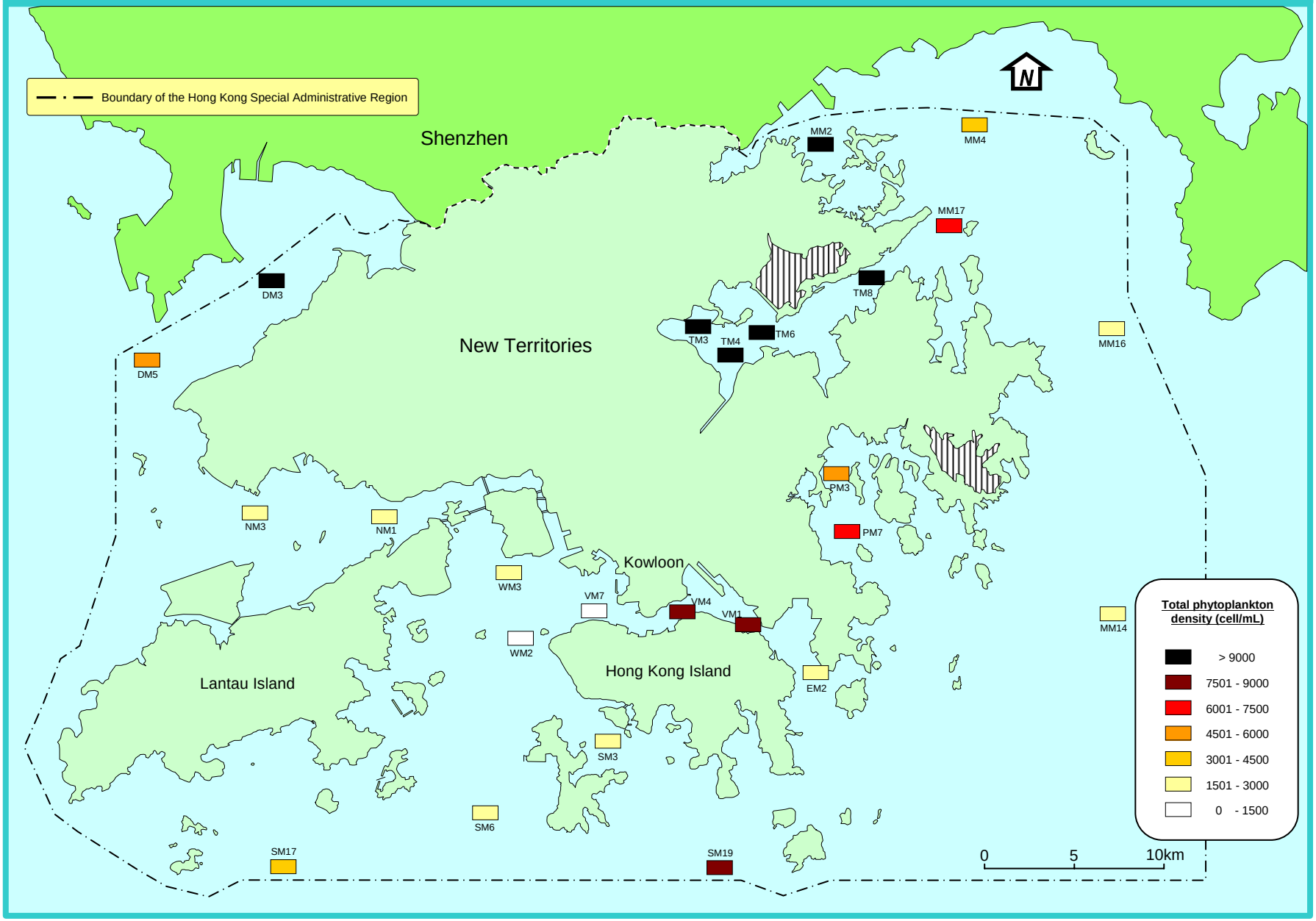
Percentage contribution of phytoplankton groups to the total number of species in the nine Water Control Zones (2008)



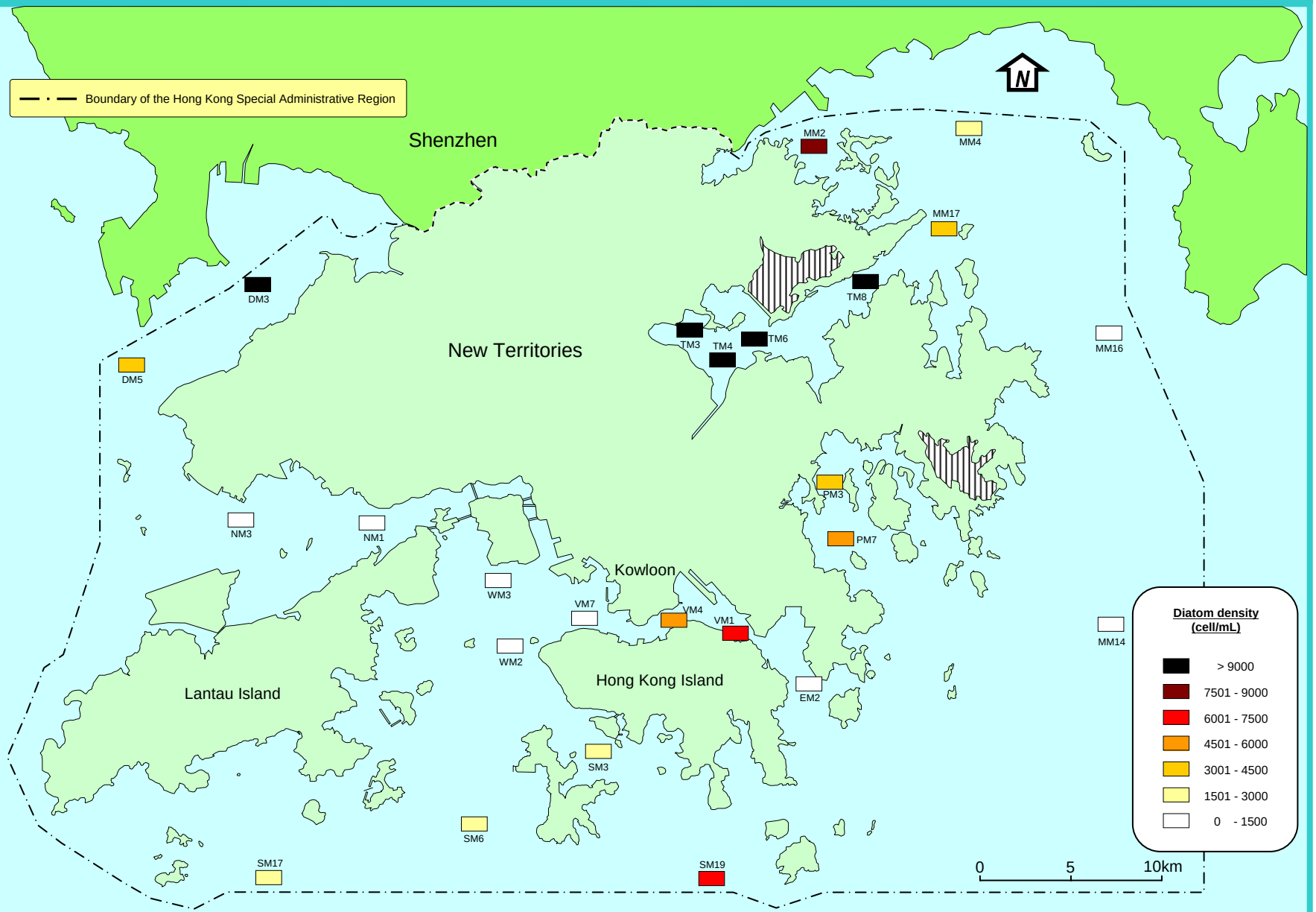
Percentage contribution of phytoplankton groups to the total density in the nine Water Control Zones (2008)



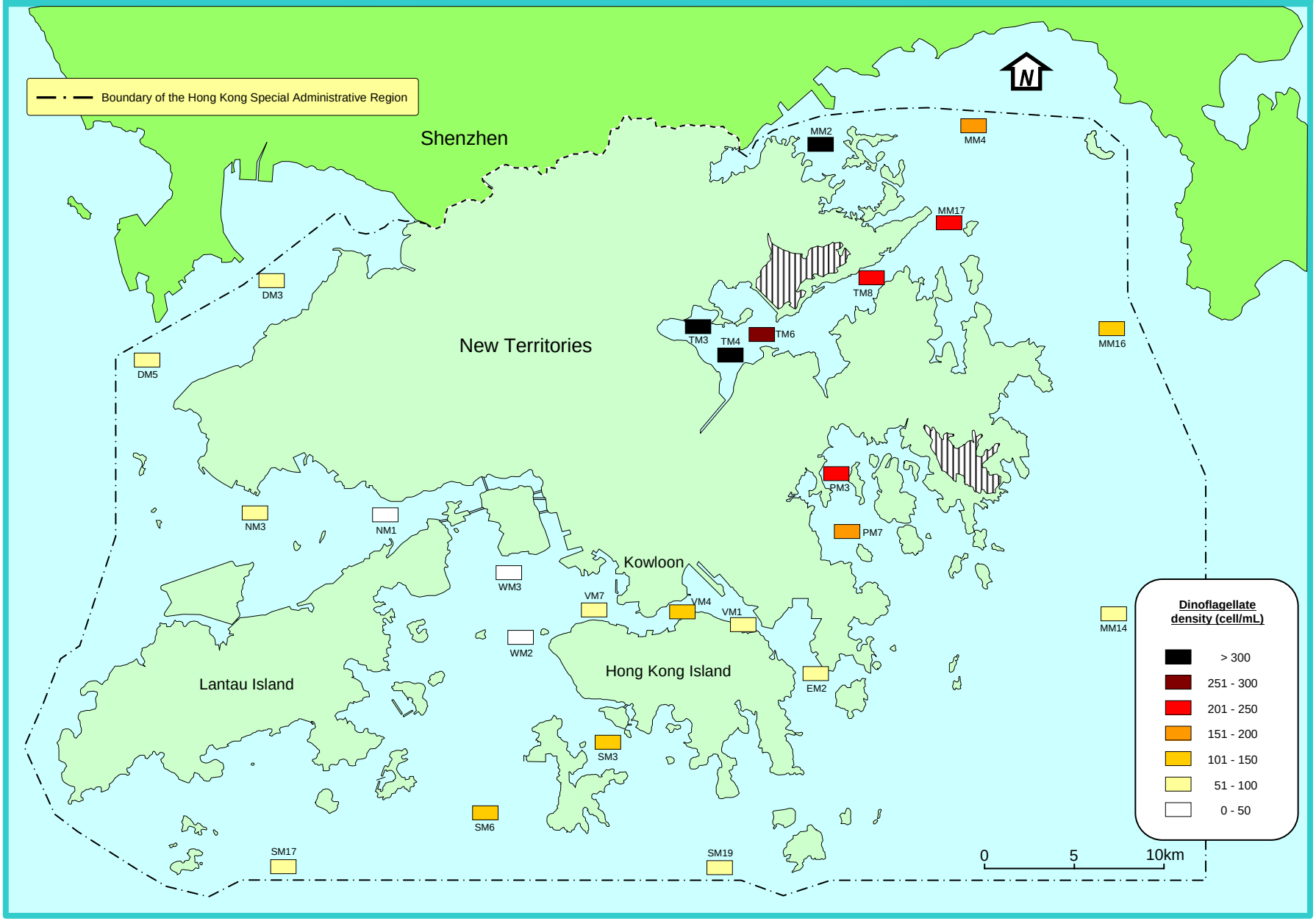
Annual mean densities (cell/mL) of total phytoplankton at 25 monitoring stations in Hong Kong waters in 2008



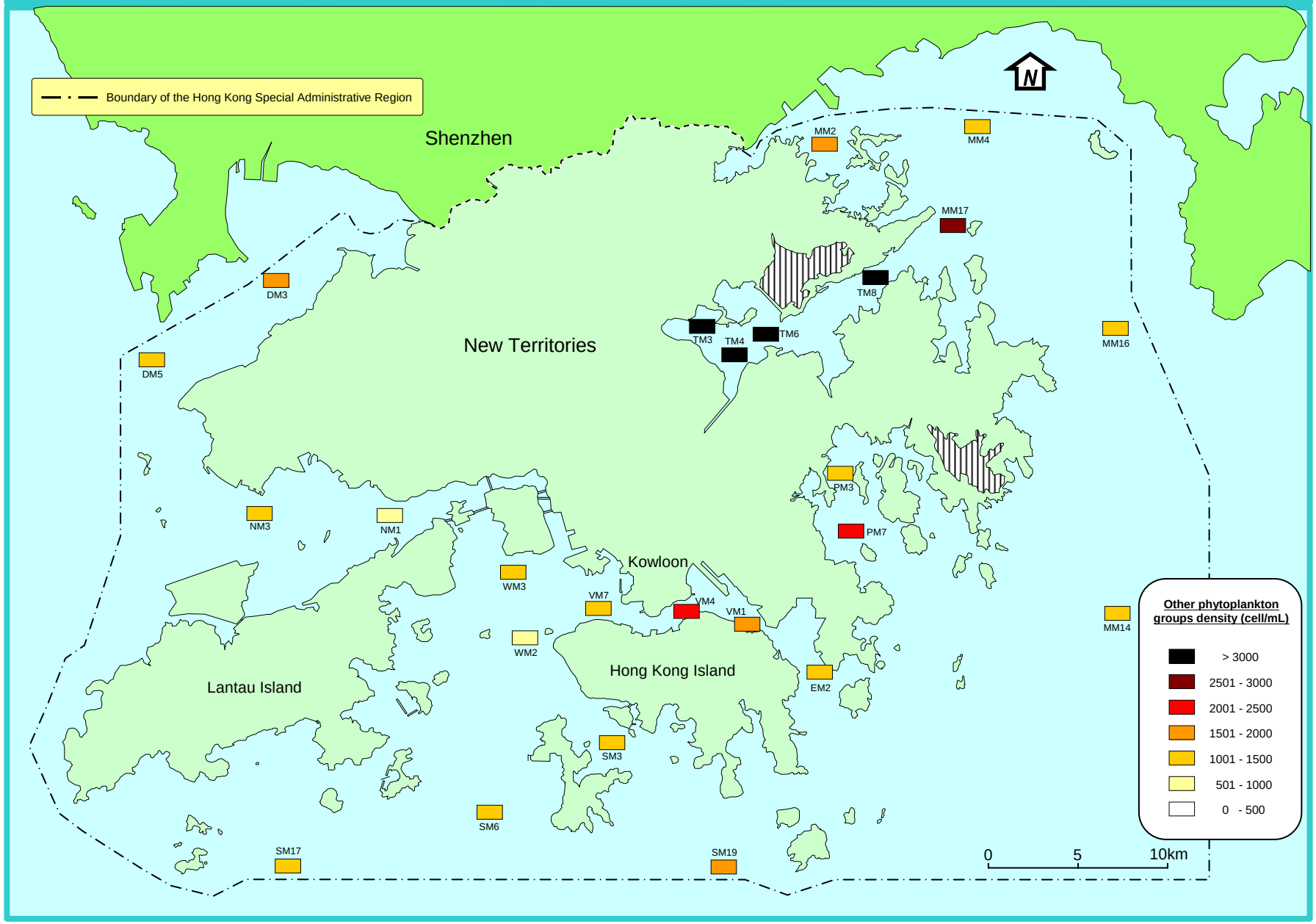
Annual mean densities (cell/mL) of diatoms at 25 monitoring stations in Hong Kong waters in 2008



Annual mean densities (cell/mL) of dinoflagellates at 25 monitoring stations in Hong Kong waters in 2008

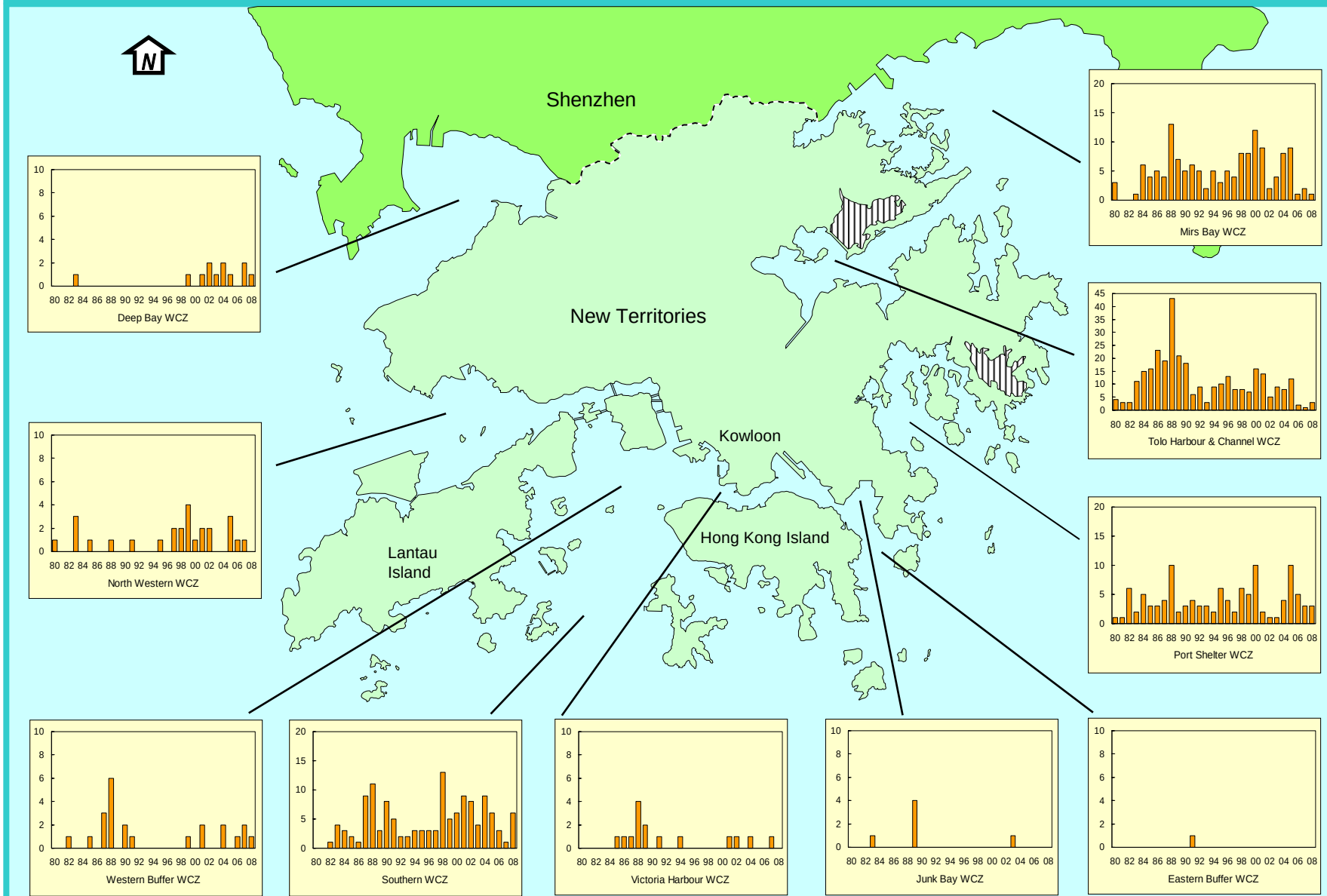


Annual mean densities (cell/mL) of other phytoplankton groups at 25 monitoring stations in Hong Kong waters in 2008



Frequency of red tides in 10 Water Control Zones in Hong Kong, 1980 - 2008

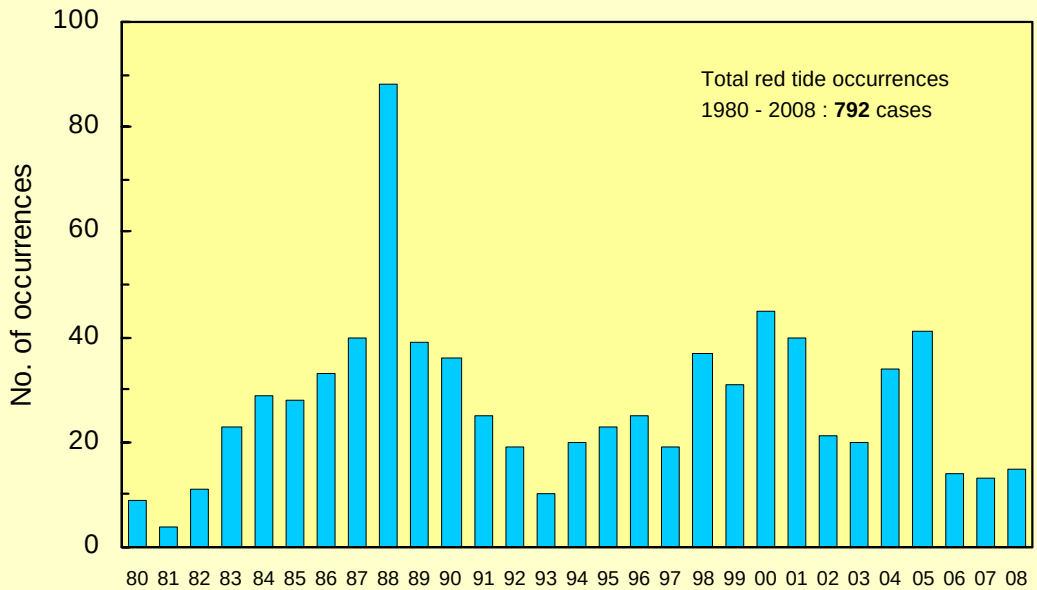
Source: Agriculture, Fisheries and Conservation Department and Environmental Protection Department



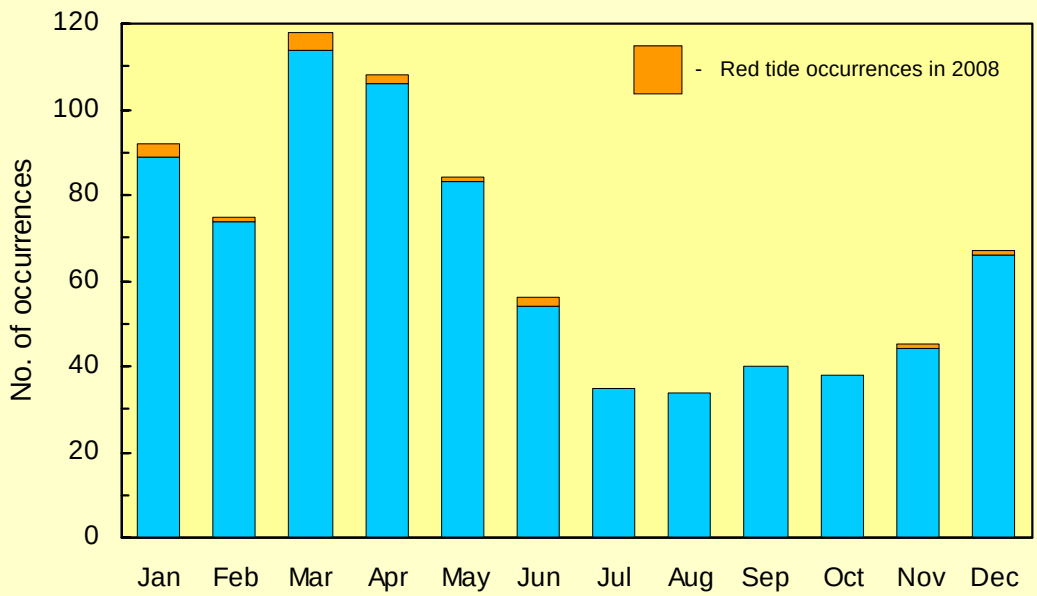
Occurrence of red tides in Hong Kong waters, 1980 – 2008

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

Yearly Distribution

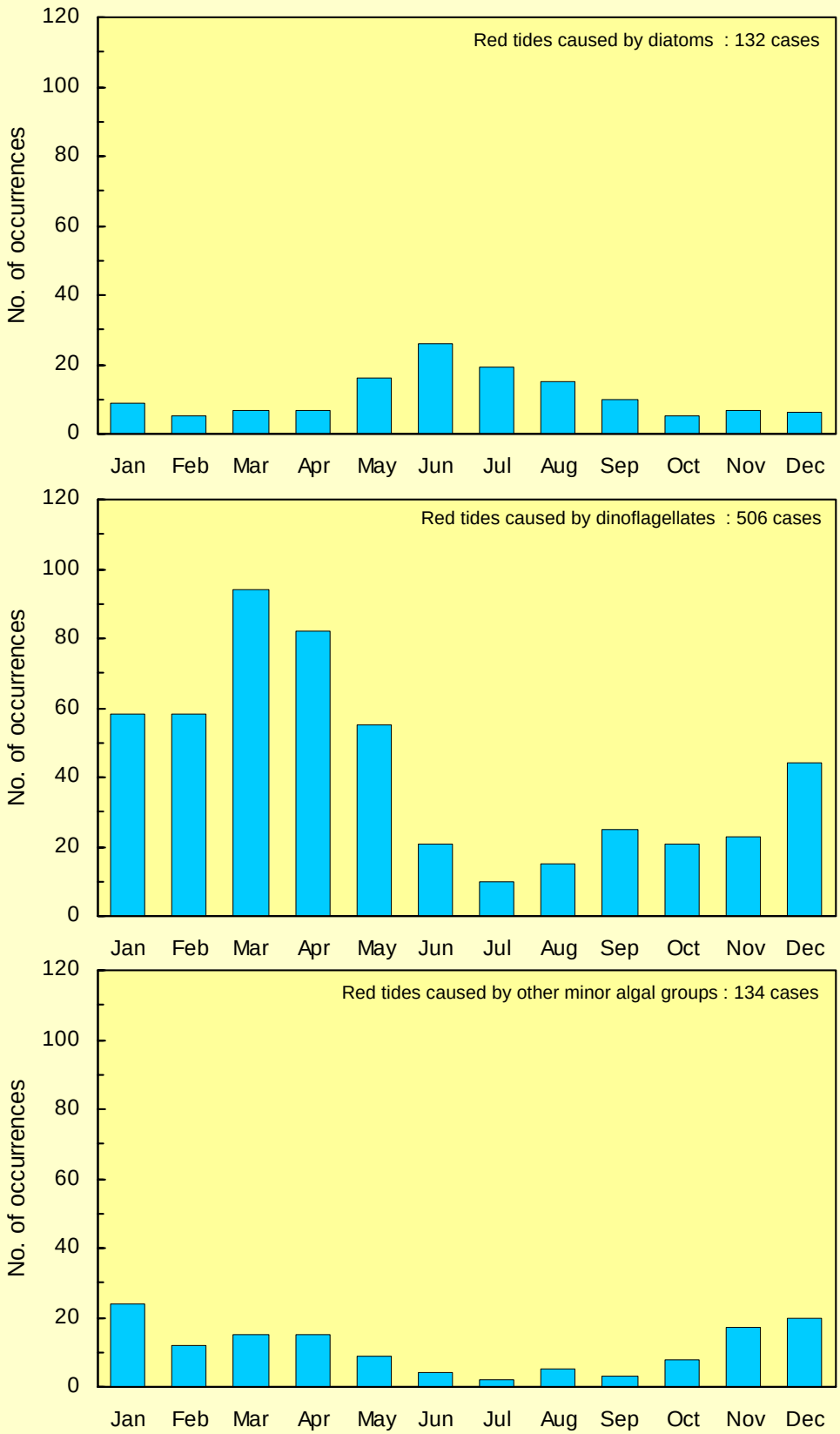


Monthly Distribution



Seasonal occurrence of red tides caused by different phytoplankton groups in Hong Kong, 1980 – 2008

(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 2008.

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		
Skeletonema costatum	40.7	8	*Chaetoceros* spp.	38.8	11	*Skeletonema costatum*	36.5	11
Chaetoceros spp.	20.4	12	*Skeletonema costatum*	31.0	9	*Thalassiosira* spp.	32.3	12
Leptocylindrus danicus	17.7	11	*Thalassiosira* spp.	15.3	12	*Chaetoceros* spp.	17.8	10
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Gymnodinium spp.	39.3	12	*Gymnodinium* spp.	31.6	12	*Gymnodinium vestifici*	31.1	9
Gymnodinium vestifici	13.5	12	*Scrippsiella* spp.	22.5	10	*Gymnodinium* spp.	19.8	8
Prorocentrum minimum	6.3	6	*Gymnodinium vestifici*	13.4	12	*Amphidinium spp.*	13.9	10
Others			Others			Others		
small flagellates	82.6	12	small flagellates	84.5	12	small flagellates	74.2	12
Plagioselmis prolonga	13.6	12	*Plagioselmis prolonga*	11.8	12	*Plagioselmis prolonga*	19.6	12
Teleaulax acuta	2.3	10	*Teleaulax acuta*	3.1	12	*Teleaulax acuta*	5.4	12
Mirs Bay			**Victoria Harbour**			**Western Buffer**		
Diatoms			Diatoms			Diatoms		
Pseudo-nitzschia delicatissima	43.3	11	*Skeletonema costatum*	61.5	9	*Skeletonema costatum*	45.6	10
Skeletonema costatum	14.0	10	*Thalassiosira* spp.	33.8	12	*Chaetoceros* spp.	14.6	10
Thalassiosira spp.	13.9	12	*Chaetoceros* spp.	2.3	11	*Thalassiosira* spp.	10.5	12
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Gymnodinium spp.	35.6	12	*Gymnodinium* spp.	48.7	12	*Gymnodinium* spp.	28.1	10
Prorocentrum dentatum	20.9	4	*Gyrodinium fusiforme*	14.9	10	*Gymnodinium vestifici*	20.8	6
Gymnodinium vestifici	11.0	12	*Gymnodinium vestifici*	13.0	11	*Gyrodinium fusiforme*	18.7	8
Others			Others			Others		
small flagellates	86.6	12	small flagellates	74.9	12	small flagellates	81.4	12
Plagioselmis prolonga	10.8	12	*Plagioselmis prolonga*	18.8	12	*Plagioselmis prolonga*	13.3	12
Teleaulax acuta	1.6	10	*Teleaulax acuta*	5.3	12	*Teleaulax acuta*	3.1	10
Eastern Buffer			**Southern**			**Deep Bay**		
Diatoms			Diatoms			Diatoms		
Skeletonema costatum	54.8	5	*Thalassiosira* spp.	45.4	12	*Skeletonema costatum*	54.1	10
Thalassiosira spp.	24.7	12	*Chaetoceros* spp.	28.4	12	*Thalassiosira* spp.	41.0	12
Chaetoceros spp.	9.4	12	*Skeletonema costatum*	13.4	9	*Chaetoceros* spp.	1.9	8
Dinoflagellates			Dinoflagellates			Dinoflagellates		
Gymnodinium spp.	42.3	10	*Gymnodinium* spp.	27.8	12	*Scrippsiella* spp.	29.0	6
Gymnodinium vestifici	22.6	8	*Gymnodinium vestifici*	21.8	12	*Gymnodinium* spp.	23.6	12
Amphidinium spp.	10.9	7	*Scrippsiella* spp.	20.3	9	*Gymnodinium vestifici*	20.2	8
Others			Others			Others		
small flagellates	72.8	12	small flagellates	80.1	12	small flagellates	49.5	12
Plagioselmis prolonga	20.6	12	*Plagioselmis prolonga*	11.5	12	*Plagioselmis prolonga*	28.3	12
Teleaulax acuta	6.1	10	*Teleaulax acuta*	4.5	12	*Teleaulax acuta*	17.2	12

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

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

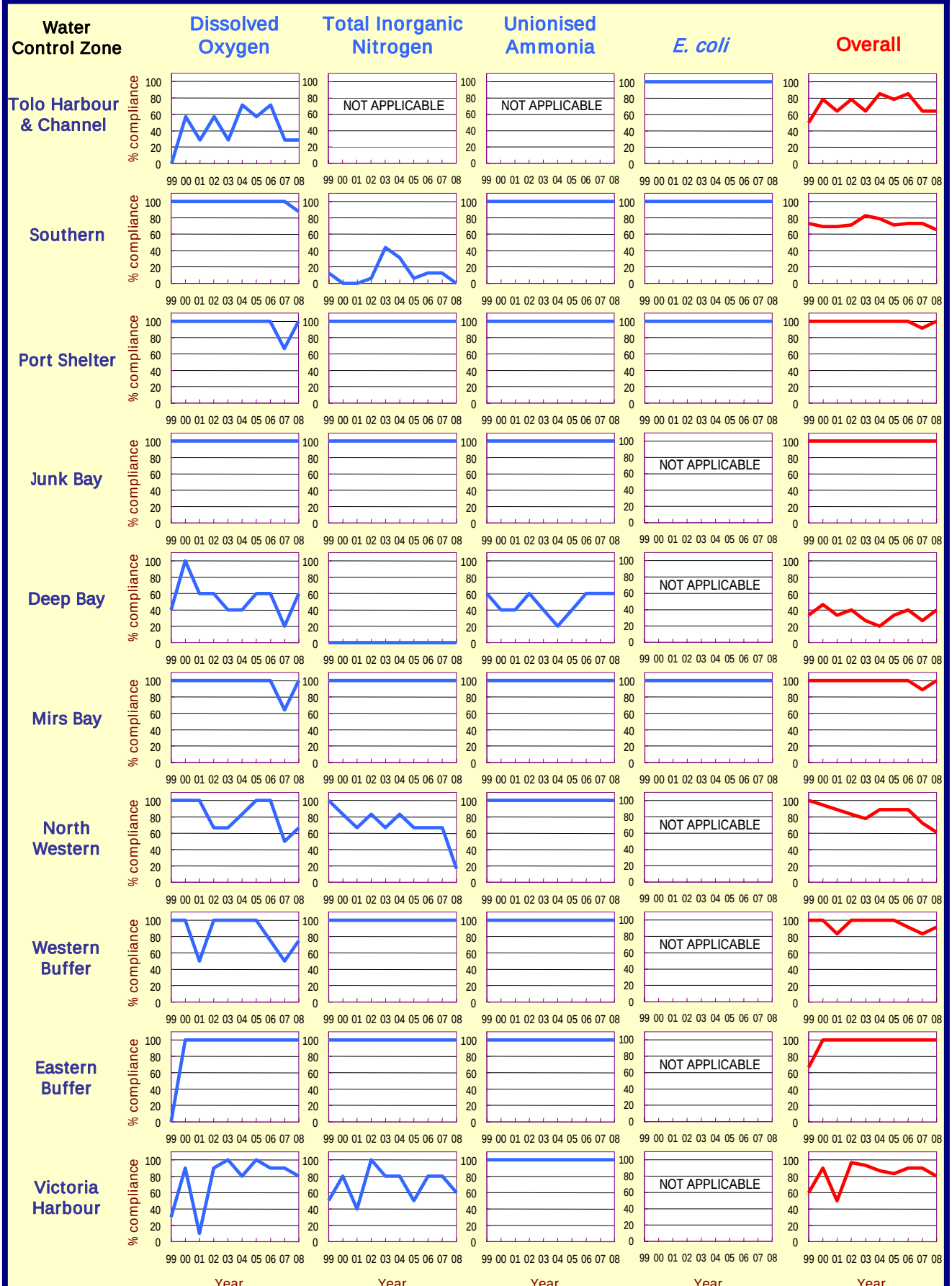
Occurrence and distribution of red tide species in different Water Control Zones (WCZs), 1980 -2008

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	61	66		53			54	5	7		246
Skeletonema costatum	23	3		1	3	9	11	3	9	2	64
Mesodinium rubrum	8	8		9	1		17	6	1	2	52
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	4		1			1				14
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
Phaeocystis globosa		1					5			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
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
Fibrocapsa japonica				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
Thalassiosira tealata							1				1
Thalassomonas spp.	1										1
Trichodesmium thiebautii							1				1
Total : 83 species	380	143	1	115	7	14	129	26	22	12	849

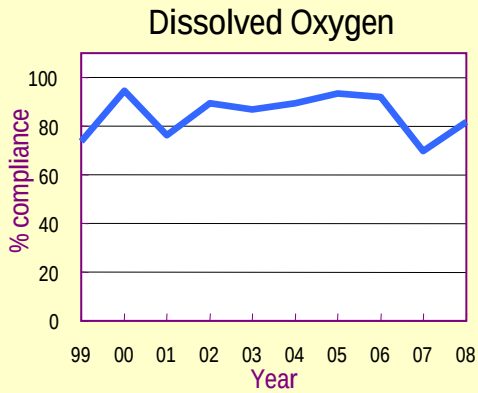
Note: a red tide incident may involve more than one causative species.

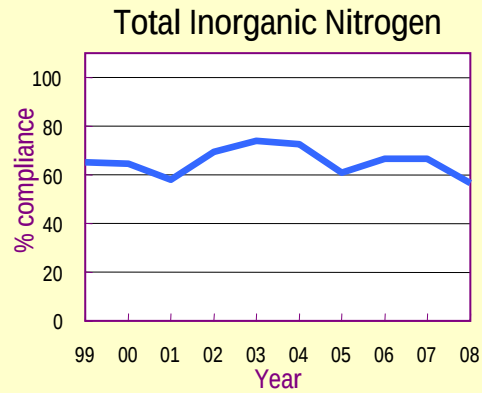
Source: Agriculture, Fisheries and Conservation Department and Environmental Protection Department

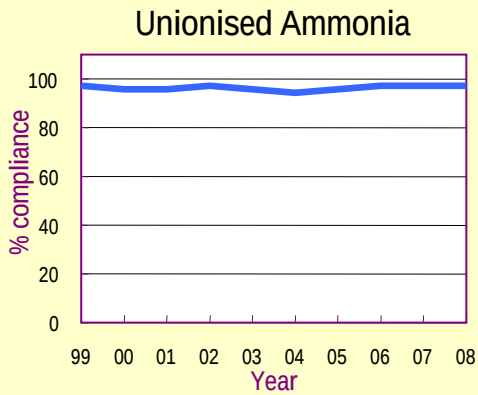
Level of compliance with key marine Water Quality Objectives for 10 Water Control Zones in Hong Kong, 1999 - 2008

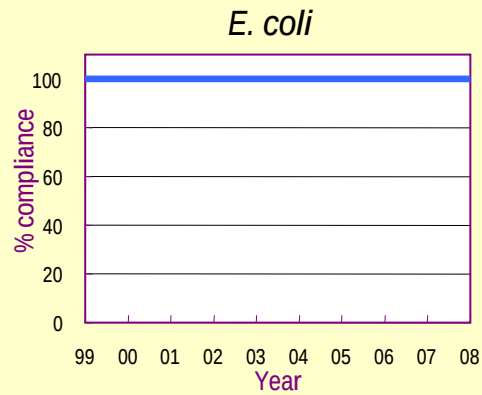


Level of compliance with key marine Water Quality Objectives in Hong Kong, 1999 - 2008

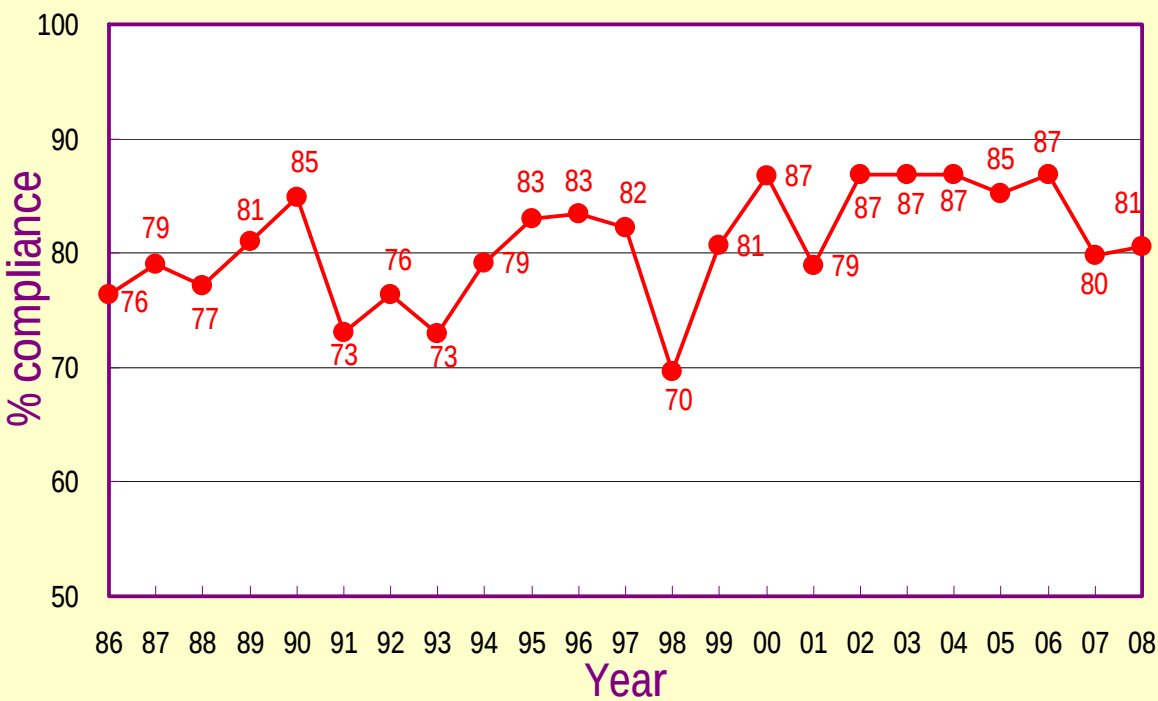




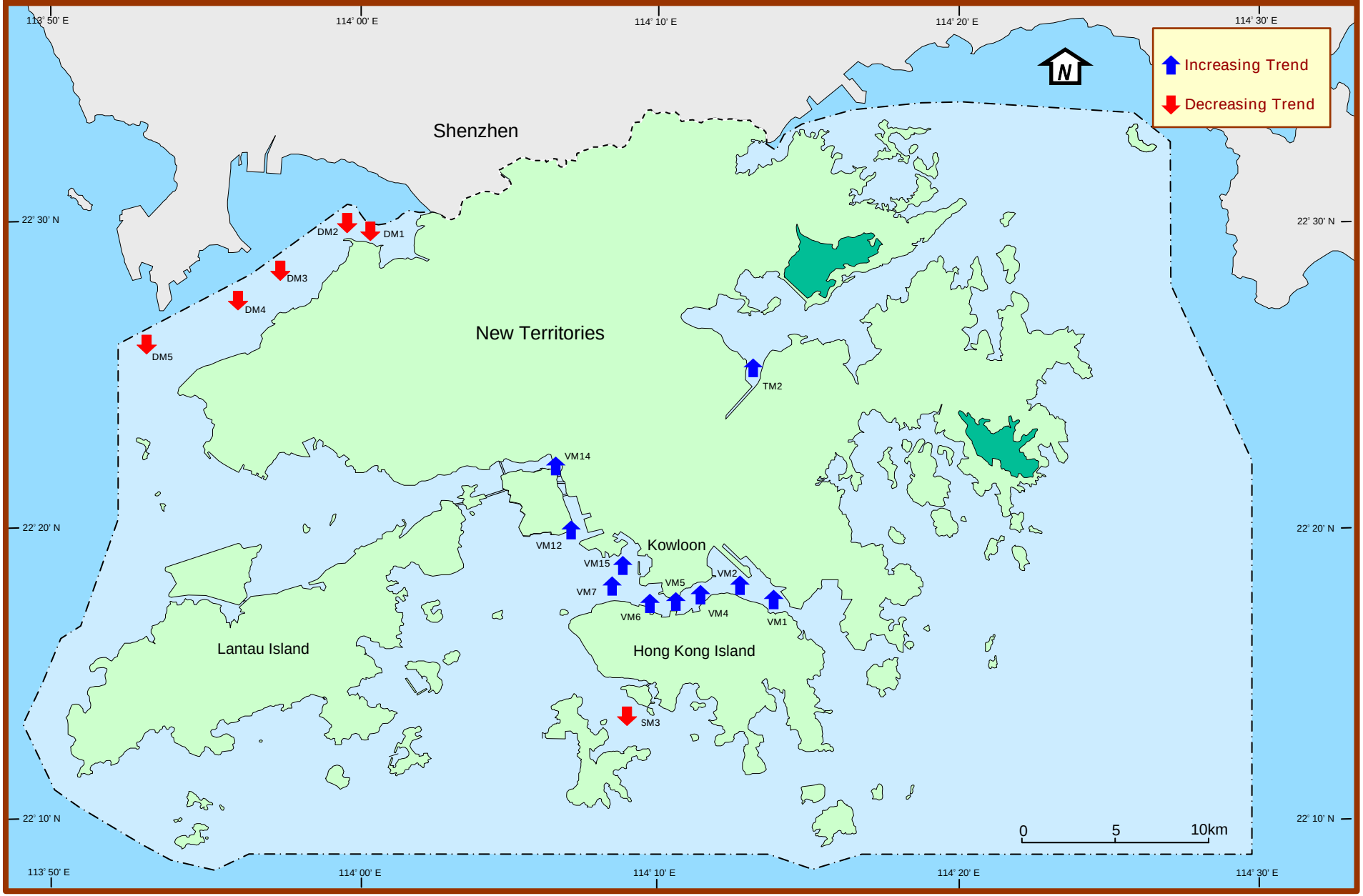




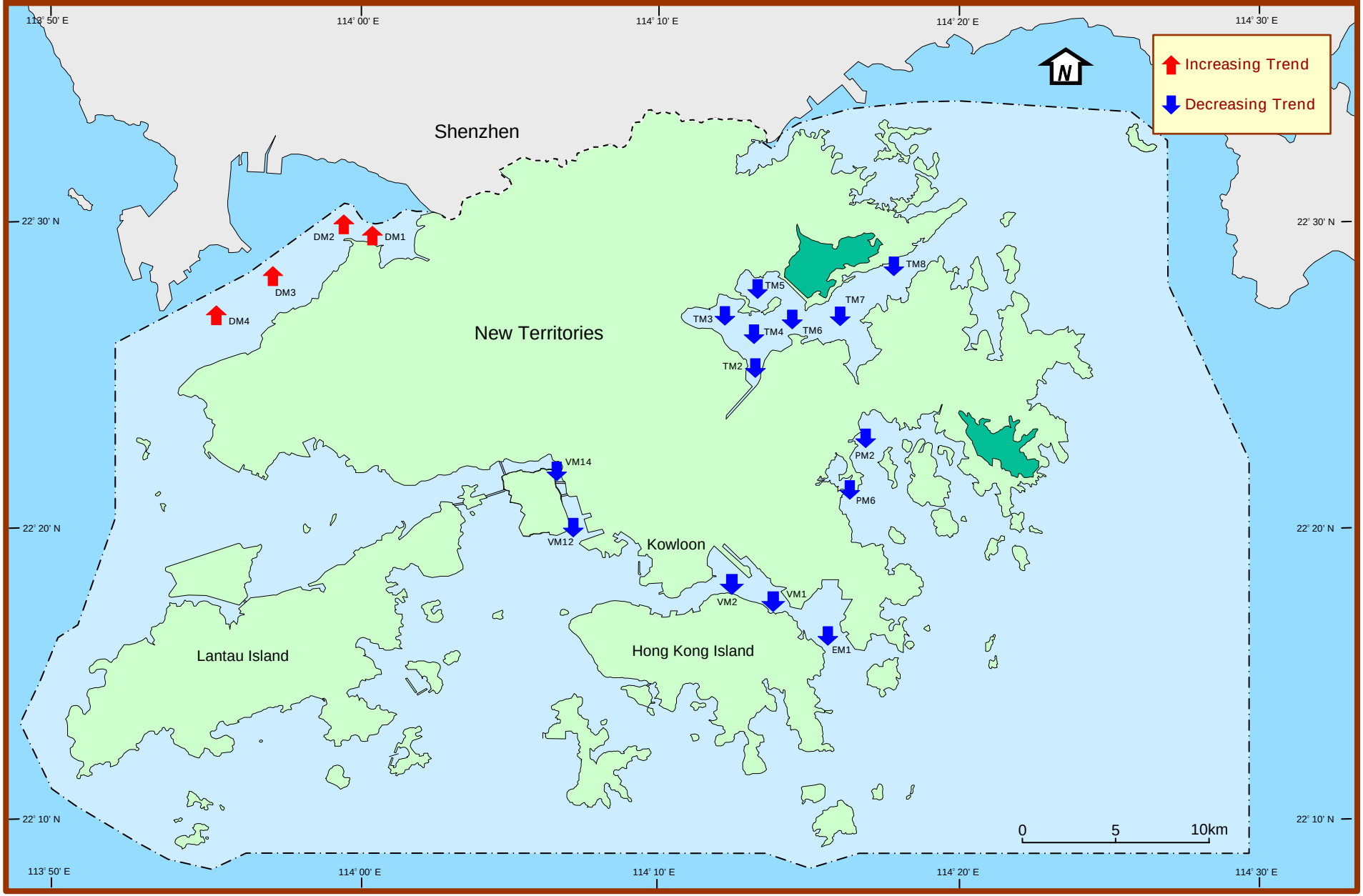
Overall level of compliance with key marine Water Quality Objectives in Hong Kong, 1986 - 2008

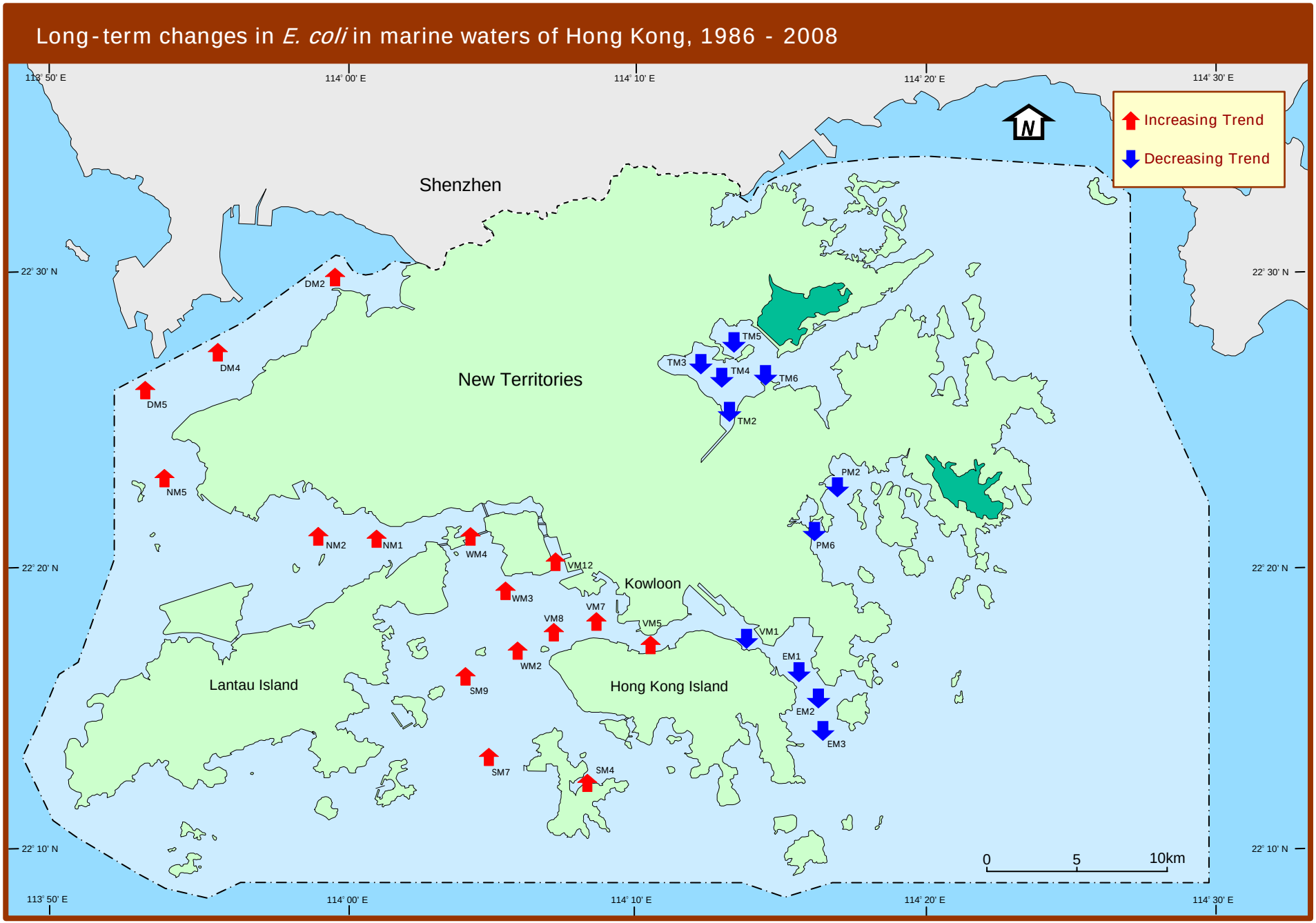


Long-term changes in dissolved oxygen in marine waters of Hong Kong, 1986 - 2008

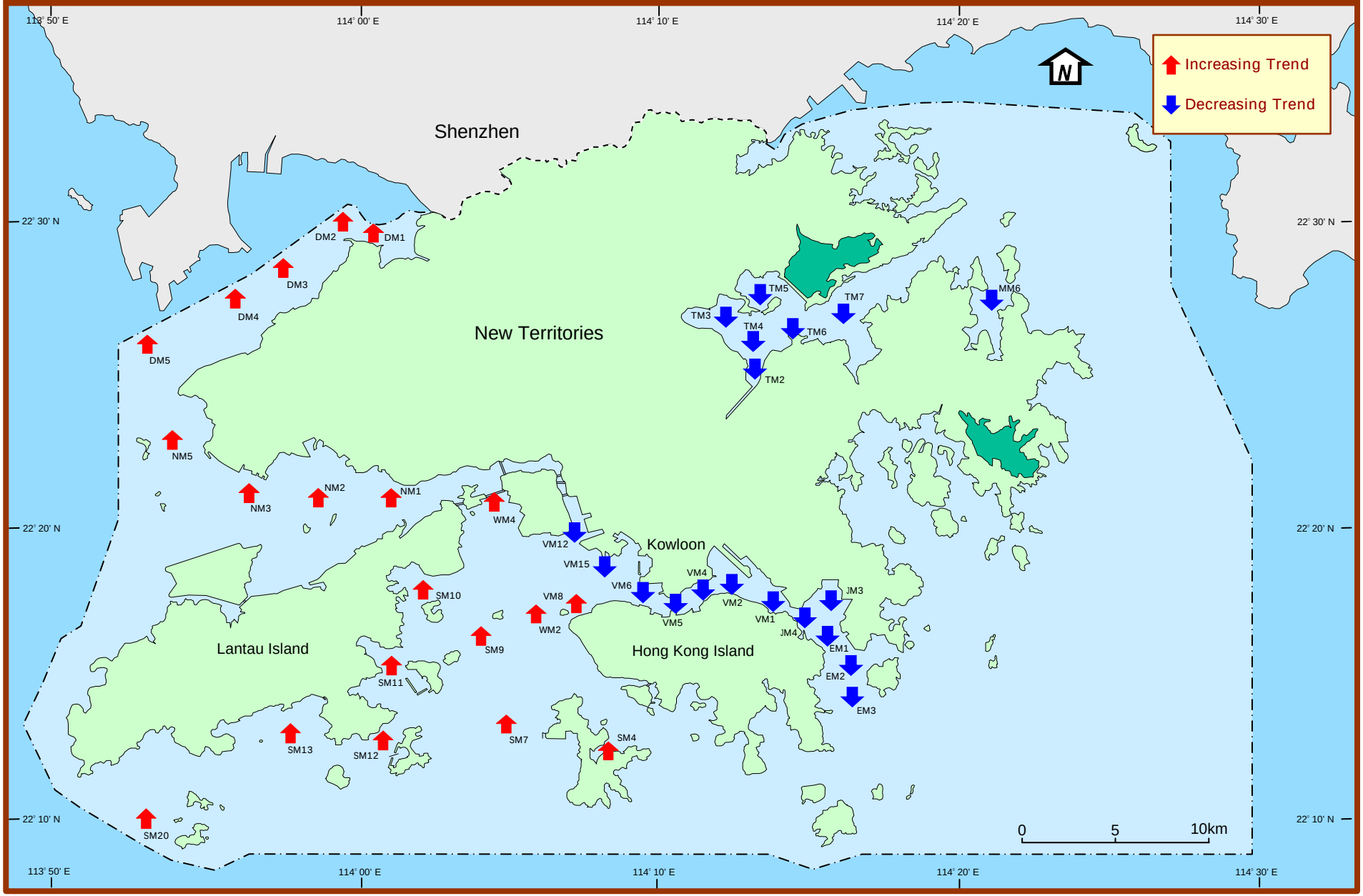


Long-term changes in 5-day Biochemical Oxygen Demand in marine waters of Hong Kong, 1986 - 2008

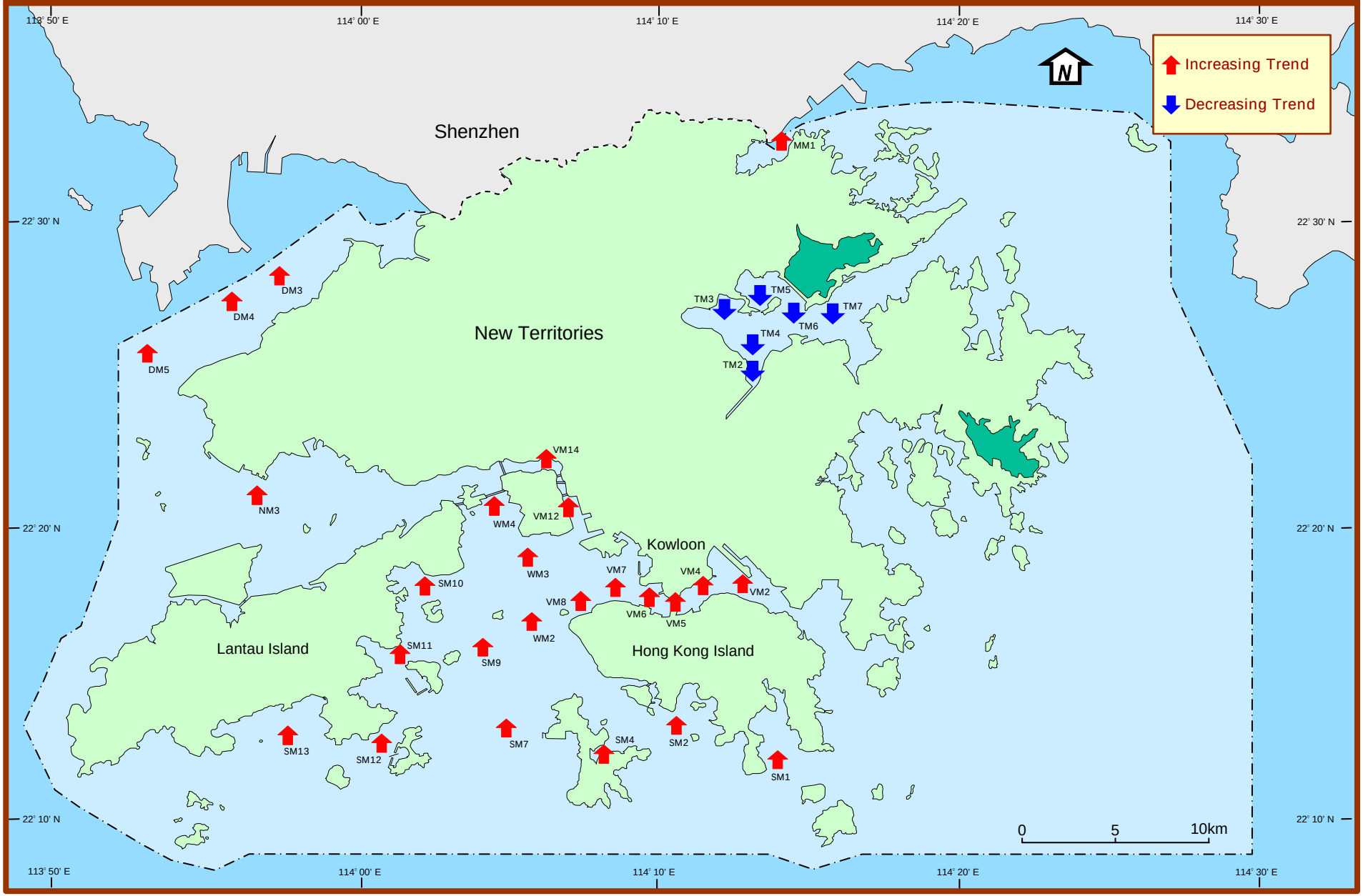



Long-term changes in *E. coli* in marine waters of Hong Kong, 1986 - 2008
Increasing Trend
Decreasing Trend
N
Shenzhen
New Territories
Kowloon
Lantau Island
Hong Kong Island
DM2
DM4
DM5
NM5
NM2
NM1
WM4
VM12
WM3
VM7
VM8
VM5
WM2
SM9
SM7
SM4
TM5
TM3
TM4
TM6
TM2
PM2
PM6
VM1
EM1
EM2
EM3
113° 50' E
114° 00' E
114° 10' E
114° 20' E
114° 30' E
22° 30' N
22° 20' N
22° 10' N
0
5
10km

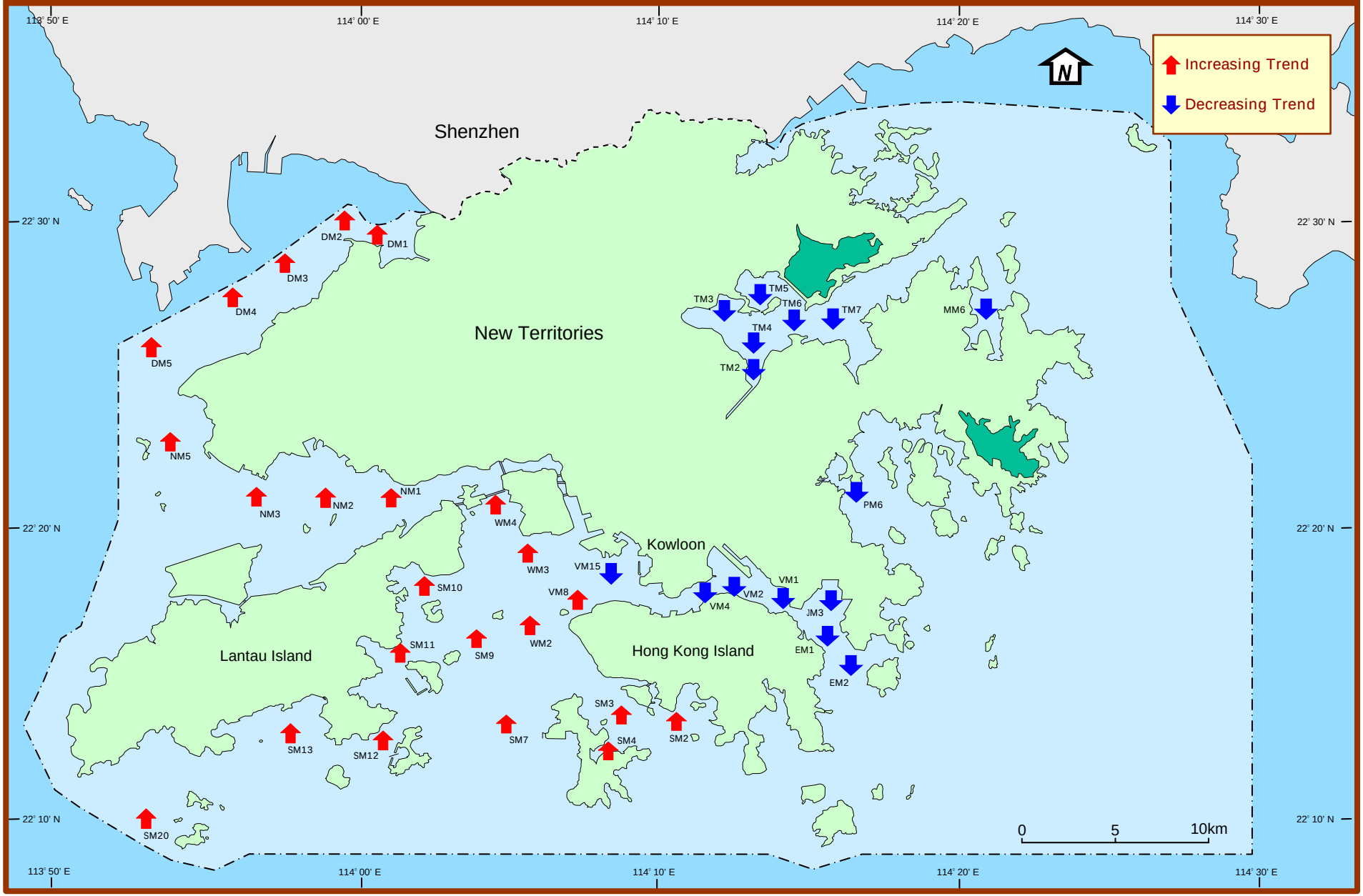
Long-term changes in ammonia nitrogen in marine waters of Hong Kong, 1986 - 2008



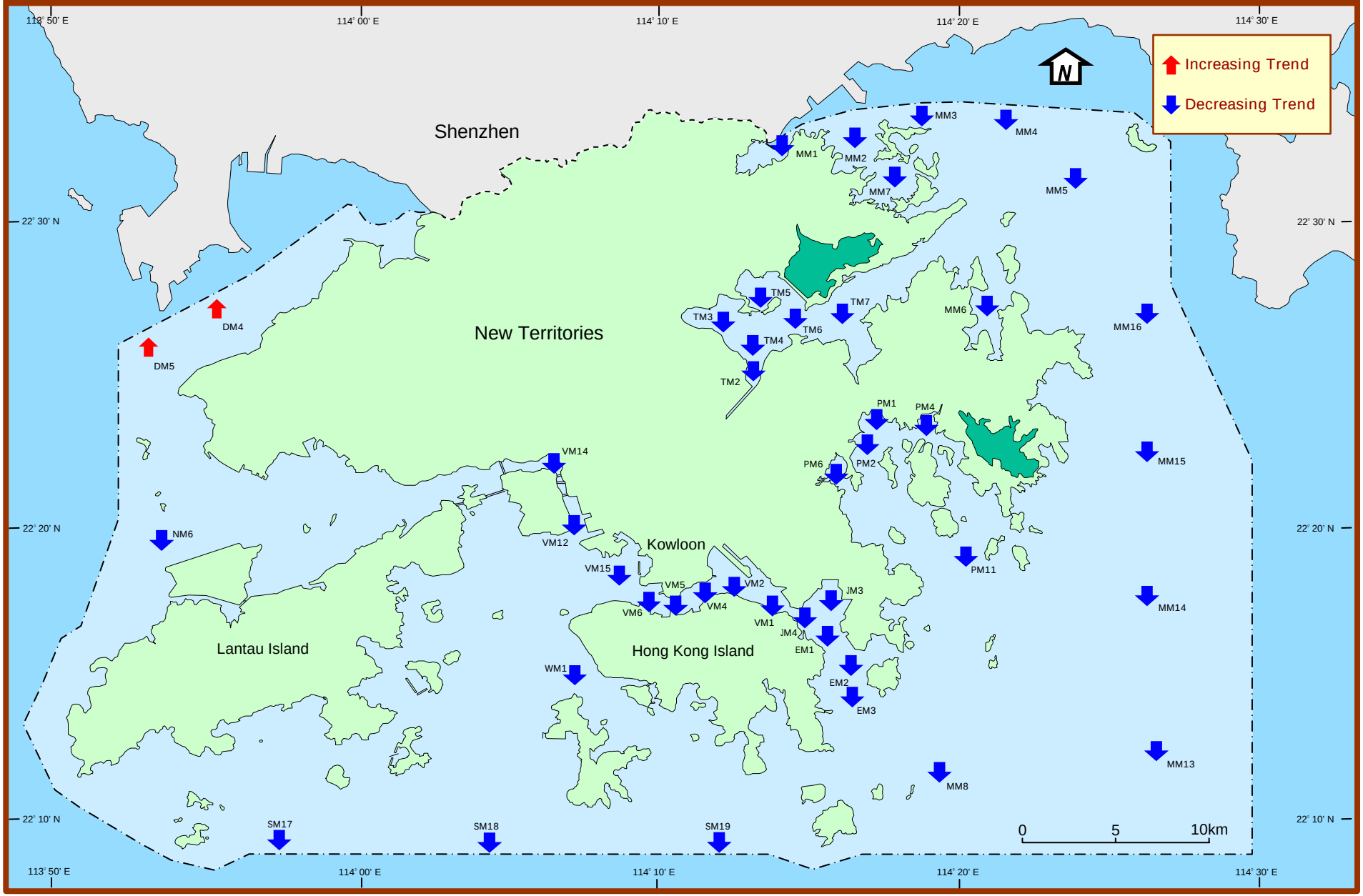
Long-term changes in nitrate nitrogen in marine waters of Hong Kong, 1986 - 2008



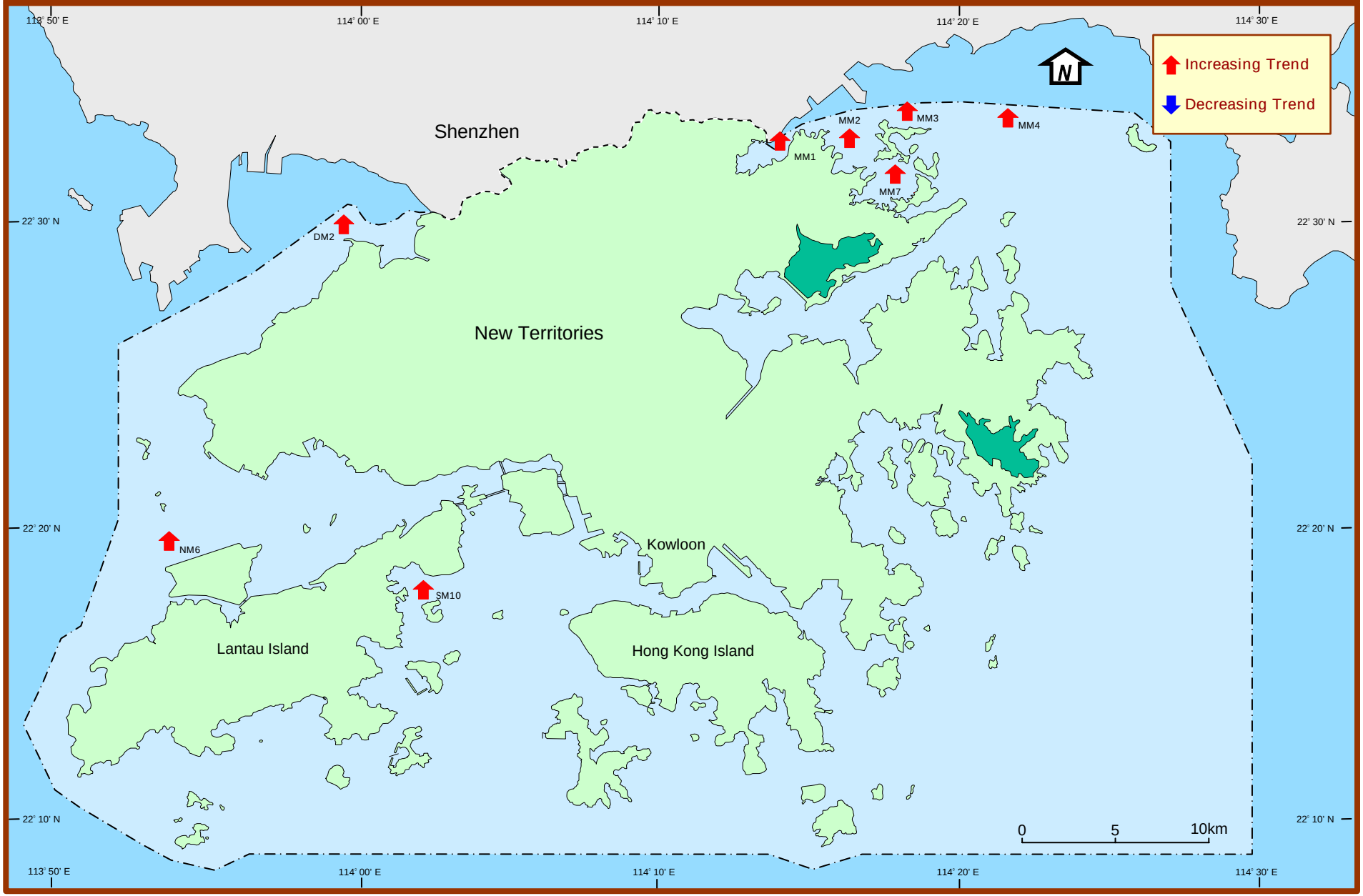
Long-term changes in total inorganic nitrogen in marine waters of Hong Kong, 1986 - 2008



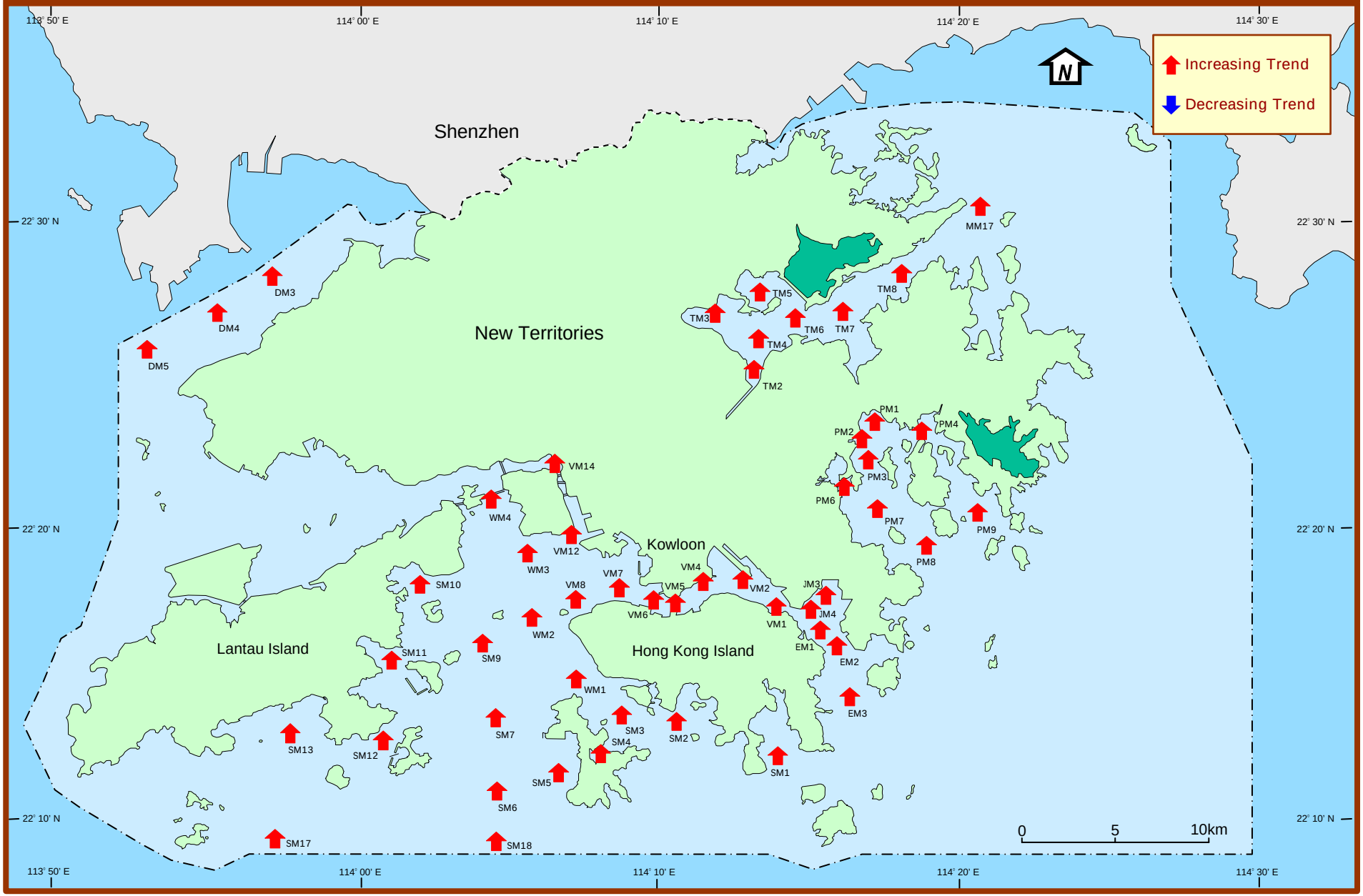
Long-term changes in orthophosphate phosphorus in marine waters of Hong Kong, 1986 - 2008



Long-term changes in chlorophyll-*a* in marine waters of Hong Kong, 1986 - 2008



Long-term changes in temperature in marine waters of Hong Kong, 1986 - 2008



Long-term changes in pH in marine waters of Hong Kong, 1986 - 2008