CHEMICALS
IN THE ENVIRONMENT

Report on Environmental Survey and Monitoring

of Chemicals in FY2005

Environmental Health Department

Ministry of the Environment

Ministry of JAPAN

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Substance

BHC (HCH)	Benzenehexachloride (Hexachloro cyclohexane)
CFC	Chlorine fluorine carbons
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
HCB	Hexachlorobenzene
PBDD	Polybrominated dibenzo-p-dioxin
PBDE	Polybrominated diphenyl ether
PBDF	Polybrominated dibenzofuran
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzo-p-dioxin
PCDF	Polychlorinated dibenzofuran
TBT	Tributyltin compounds
TPT	Triphenyltin compounds

Other

CAS RN	CAS(Chemical Abstracts Service) Registry Number
FY	Fiscal Year (from April to March)
GC/MS	Gas Chromatography / Mass Spectrometry
LC/MS	Liquid Chromatography / Mass Spectrometry
MOE	Ministry of the Environment
MQL	Measured Quantitation Limit
MDL	Measured Detection Limit
ND	Not Detected
OECD	Organisation for Economic Co-operation and Development
POPs	Persistent Organic Pollutants
PRTR	Pollutant Release and Transfer Register

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Chemicals in the Environment

Introduction

The number of industrially produced chemical substances is estimated to be in the tens of thousands. Chemical substances have become indispensable in our daily lives, but they may also affect human health and the ecosystem, depending on the method employed for their production, use and disposal. Indeed, dioxins, PCBs, endocrine disruptors and other substances have caused serious social problems.

The Ministry of the Environment (MOE), Government of Japan, has been conducting successive investigations on the persistence of chemical substances in the general environment since 1974 and has published the results in "Chemicals in the Environment." The results of environmental surveys of FY2004 are compiled in "Chemicals in the Environment (FY2005)." We hope that those concerned with this issue will utilize this report and that the information provided will be helpful for the environmental preservation of this country.

Scope of investigation included in this report

As a method for selecting target substances, the following three types of surveys, each with their own purpose, were introduced so that the survey results could be effectively utilized for measures against chemical substances in the environment.

Initial Environmental Survey for grasping the status of environmental persistence of chemical substances and others, targeting the Designated Chemical Substances by the Law Concerning the Examination and Manufacture, etc. of Chemical Substances (hereinafter called the Chemical Substances Control Law), candidate substances for the PRTR System, unintentionally formed substances, and the substances required by social factors.

Environmental Survey for Exposure Study for grasping the exposure amount of chemical substances to humans and wildlife, which is necessary for the environmental risk assessment.

Monitoring Investigation for monitoring target substances included in the Stockholm Convention on Persistent Organic Pollutants (hereinafter called the POPs Treaty) and other substances that are possible candidates for target substances of the Treaty; highly persistent substances for which environmental standards are not yet established but grasping their annual environmental status is required from among Class 1 & 2 Specified Chemical Substances and Designated Chemical Substances specified in the Chemical Substances Control Law.

To avoid duplication, the results of chemical substances (dioxins, etc.) that have been monitored by other divisions of MOE are not included in this report (see below).

Environmental Investigation by Other Divisions of MOE

Name of Investigation	Media	Target Chemical Substances
Monitoring Investigation of Hazardous Air Pollution Substances	Air	Benzene, Aldehydes, Mercury and its compounds, Benzo[*a*]pyrene, etc.(19 species)
Water Quality Monitoring	Surface water, Ground water	Cadmium, Total Cyanogen, etc.
Environmental Investigation on Agrochemicals	Soil, Agricultural products, Air, Surface water	Pesticides
Monitoring of the Precautionary Monitoring Targets	Surface water, Ground water	Chloroform, *trans*-1,2-Dichloroethylene, etc.
Priority Substances for the Survey on Method and Monitoring	Water environment	Zinc, etc.
Investigation of Dioxins	Air, Surface water, Bottom sediment, Soil, Wildlife	PCDDs, PCDFs, Coplanar PCBs, PBDDs, PBDFs

Chapter 1 Outline of Environmental Investigation on the Status of Pollution by Chemical Substances

1. History of Environmental Survey of Chemical Substances

The Environmental Survey of Chemical Substances was started for the purpose of grasping the persistence of existing chemical substances in the general environment when the Law Concerning the Examination and Regulation of Manufacture, etc., of Chemical Substances (hereinafter "Chemical Substance Control Law") was enacted in 1973. For 10 years from FY1979 to 1988, the First Comprehensive Survey of Chemical Substances on Environmental Safety was conducted based on the Priority List consisting of about 2,000 chemical substances. Subsequently, for 10 years from FY1989, the Second Comprehensive Survey of Chemical Substances on Environmental Safety was conducted based on the Second Priority List consisting of about 1,100 chemical substances. In addition to the above, Wildlife Monitoring, Follow-up Survey of the Status of Pollution by Unintentionally Formed Chemical Substances, and Monitoring of Surface Water and Bottom Sediment have been undertaken. On the other hand, it became necessary to reconstruct the survey system based on the new standpoint, in order to correspond to current political issues as well as chemical and environmental status changes such as the enactment of the Law Concerning Reporting, etc., of Releases to the Environment of Specific Chemical Substances and Promoting Improvement of Their Management (hereinafter "the PRTR Law") and the effectuation of the Stockholm Convention on Persistent Organic Pollutants (hereinafter "the POPs Treaty"). Accordingly, the Revision of the General Inspection Survey of Chemical Substances was approved at the Third Special Committee for the Assessment of Chemical Substances, Central Environment Council held on May 22, 2002.

Surveys have been conducted since FY2002 in line with the revision policy, where substances are selected by the Expert Group on Substance Selection for Environmental Surveys of Chemical Substances corresponding to the needs of various divisions of governmental and other organizations so that the survey results might be utilized for the prevention of pollution by chemical substances in the environment. These surveys have been carried out using methods suitable for the respective purposes of the Initial Environmental Survey, the Environmental Survey for Exposure Study and the Monitoring Investigation.

From FY2005, the Detailed Environmental Survey and the Survey on Human Biological Samples will be newly included as important survey items, in addition to the Initial Environmental Survey, the Environmental Survey for Exposure Study and the Monitoring Investigation that have been conventionally carried out.

2. FY2004 Expert Group on Substance Selection for the General Inspection Survey

On April 28 and May 19, 2004, the Expert Group on Substance Selection for Environmental Surveys of Chemical Substances (an advisory organ for the Director of the Environmental Health Department) held meetings to discuss and select respective target substances and media for the Initial Environmental Survey, the Environmental Survey for Exposure Study and the Monitoring Investigation of the FY2004 Environmental Surveys on Chemical Substances. Selected as the survey target were substances whose investigations had been requested from divisions of governmental organizations or from scholars and practitioners. The selection of substances was based on: toxicity information; PRTR data, and if possible, results of PRTR data-based prediction of environmental persistence; feasibility of establishing analytical methods; and from the standpoint of social and administrative needs. The selection of survey media was in consideration of the relationship between the possible exposure route and media; for instance, multiple media were selected for a specific substance.

3. Scope of the survey

(1) Initial Environmental Survey

Twenty-two substances (groups) were selected as the survey targets whose initial environmental persistent status needs to be grasped from among the following substances: the Class II Monitoring Chemical Substances specified in the Chemical Substance Control Law; candidate substances for the PRTR Law; unintentionally formed substances; substances that should be surveyed from the viewpoint of the primary evaluation of environmental risks; and substances that should be surveyed in consideration of social factors. The selected substances included 4-aminophenol, 1,3-dichloropropene and dicofol. Research was undertaken to develop analytical methods for 15 substances (groups) including hydrazine.

(2) Environmental Survey for Exposure Study

Five substances (groups) were selected as the survey targets whose environmental exposure status needs to be grasped from among the substances for which the environmental risk primary assessment would be carried out. The selected substances consisted of *N*,*N*'-dimethyldodecylamine=*N*=oxide, hexane, perfluorooctane sulfate (PFOS), perfluorooctanoate (PFOA), and octabromodiphenyl ether.

(3) Monitoring Investigation

Eleven substances (groups) targeted by the POPs Treaty excluding dioxins (eight substances (groups) in this survey) and three other substances (groups) including organotin compounds were selected as substances from among the following substances: the target substances specified in the POPs Treaty and other substances that might be candidates for target substances of the Treaty; highly persistent substances among Class I & II Designated Chemical Substances and Class II Monitoring Chemical Substances specified in the Chemical Substances Control Law whose environmental standards were not yet established and whose annual environmental status needed to be understood.

Chapter 2 Summary of the FY2004 Initial Environmental Survey

1. Purpose of the Survey

The purpose of this Initial Environmental Survey is to grasp the status of environmental persistence of the following substances: the type II monitoring chemical substances specified in the Chemical Substances Control Law; candidate substances for the Pollutant Release and Transfer Register Law (the PRTR Law); unintentionally formed chemical substances; substances that should be surveyed from the viewpoint of the primary evaluation of environmental risks; and substances that should be surveyed in consideration of social factors.

2. Surveyed substances, media and areas

The FY2004 Initial Environmental Survey investigated the following 22 substances (groups) totaling 30 substances (groups)/media among substances/media discussed and selected by the FY2004 Expert Group on Substance Selection for Environmental Surveys of Chemical Substances.

Survey sites are shown in Figures 2-1 to 2-3. Surveys for surface water were conducted on 1 to 7 substances (groups) at 33 sites (Figure 2-1). Surveys for bottom sediment were conducted on 1 to 6 substances (groups) at 28 sites (Figure 2-1). Surveys for aquatic wildlife were conducted on 1 to 4 substances at 9 sites (Figure 2-2) including one where all the four target substances (groups) were surveyed. Surveys for air were conducted on 1 to 9 substances (groups) at 25 sites (Figure 2-3) including one where all the nine target substances (groups) were surveyed.

3. Survey results

The surveys for surface water detected two substances (groups) at two survey sites [4-aminophenol: at one of the two survey sites; pyridafenthion: at one of the 12 survey sites]. The surveys for bottom sediment detected four substances (groups) at six survey sites [dicofol: at two of the five survey sites; diphenylmethane: at two of the six survey sites; triphenylmethane: at one of the six survey sites; pentabromodiphenyl ether: at one of the four survey sites]. The surveys for aquatic wildlife detected two substances (groups) at three sites [1,2,5,6,9,10-hexabromocyclododecane: at one of the six survey sites; formaldehyde: at both of the two survey sites]. The surveys for air detected seven substances (groups) at 16 sites [1,3-dichloropropene: at eight of the 20 survey sites; 1-bromopropane: at 11 of 19 sites; 2,4,6-tribromophenol: at both of the two survey sites; 2-vinylpyridine: at one of the six survey sites; N,N'-diphenyl-p-phenylenediamine: at one survey site; pentachloronitrobenzene: at one of the 15 survey sites; polybromodiphenyl ethers (monobromodiphenyl ether, dibromodiphenyl ether, tribromodiphenyl ether, tetrabromodiphenyl ether, pentabromodiphenyl ether, hexabromodiphenyl ether, heptabromodiphenyl ether): at all three survey sites] (Table 2-2).

A total of 837 substances (groups) were surveyed in the past (from FY1974 to FY2004), of which 381 substances (groups) were detected in the general environment.

The detection results of the FY2004 Initial Environmental Survey were shown in Table 2-3.

Table 2-1 Target Substances and Media for the FY2004 Initial Environmental Survey

Survey No.	Target Substance	Number of surveyed areas per media			
		Surface water	Bottom sediment	Aquatic wildlife	Air
1	4-Aminophenol	3			
2	1-Aryloxy-2,3-epoxypropane	7			
3	Octachlorodipropyl ether	11	11		
4	1,3-Dichloropropene cis-1,3-Dichloropropene trans-1,3-Dichloropropene	17			21
5	1-Bromopropane				19
6	Dicohol		11		
7	Diphenylmethane Triphenylmethane		7		
8	Zinc pyrithione	7			
9	Short-chain polychlorinated paraffin (C10-C13) Short-chain polychlorinated paraffin (C10) Short-chain polychlorinated paraffin (C11) Short-chain polychlorinated paraffin (C12) Short-chain polychlorinated paraffin (C13)	2	2	2	
10	Tetrabromobisphenol-A				2
11	2,4,6-Tribromophenol				2
12	2-Vinylpyridine				6
13	Pyridaphenthione	12	12		
14	p-Phenylenediamines N,N'-Diphenyl-p-phenylenediamine (DPPD) N,N'-Ditolyl-p-phenylenediamine (DTPD) N,N'-Dixylyl-p-phenylenediamine (DPPD)	7			3
15	Fluazinam	16			
16	1,2,5,6,9,10-Hexabromocyclododecane			6	
17	Hexabromobiphenyls				3
18	Pentachloronitrobenzene		16	8	19
19	Formaldehyde			2	
20	Polybromodiphenyl ethers Bromodiphenyl ethers Dibromodiphenyl ethers Tribromodiphenyl ethers Tetrabromodiphenyl ethers Pentabromodiphenyl ethers Hexabromodiphenyl ethers Heptabromodiphenyl ethers				3
21	Pentabromodipheyl ethers		4		
22	2-Methoxyethanol	7			

Table 2-2 Summary of Results of the Environmental Survey

	Surface water	Bottom sediment	Aquatic wildlife	Air	Total
Number of Surveyed Substances	788	748	259	275	837
Number of Detected Substances	162	243	107	184	381
Ratio of Detection (%)	20.6	32.5	41.3	66.9	45.5

Figure 2-1 Locations of the Initial Environmental Survey forSurface Water and Bottom Sediment (FY2004)

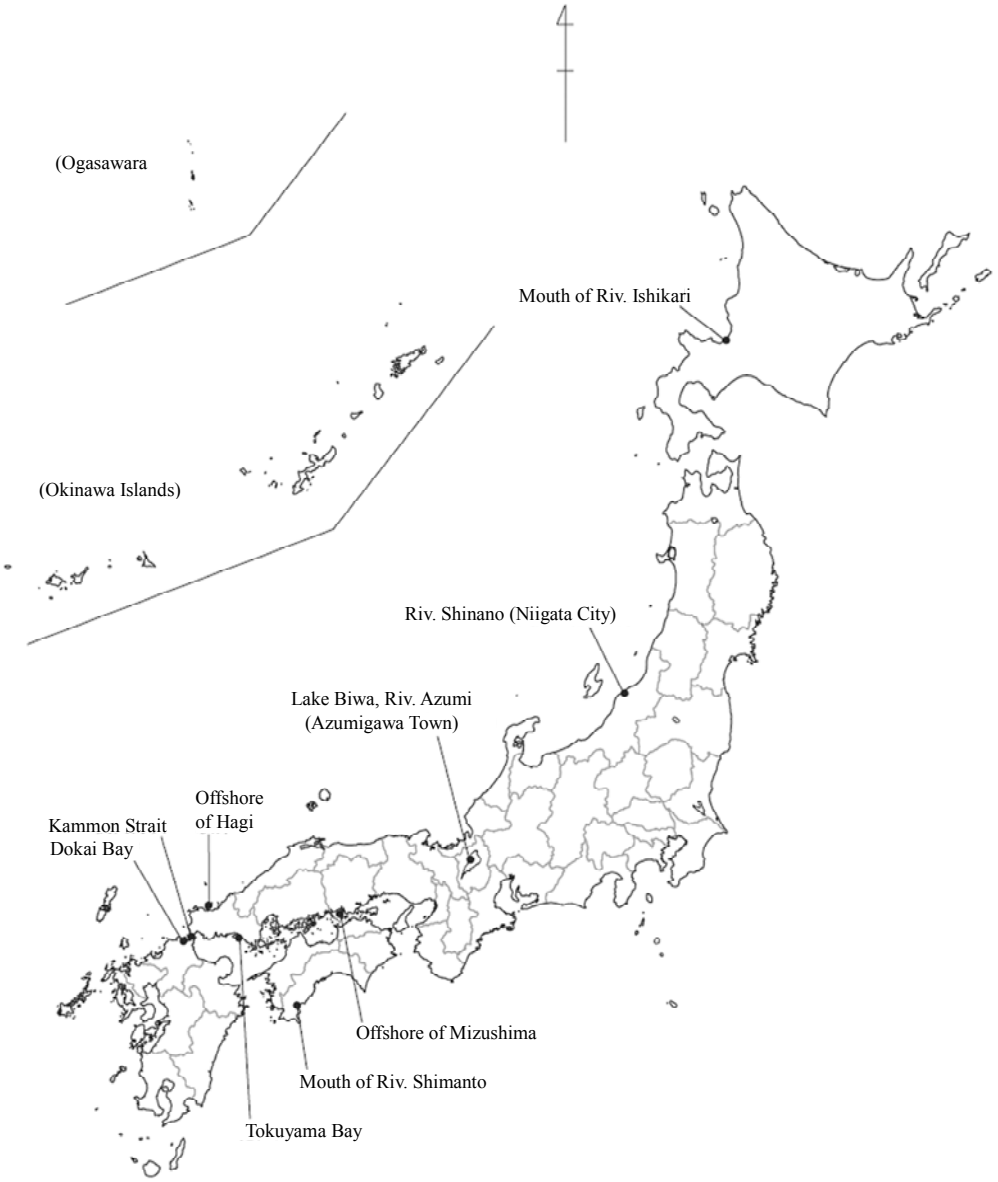


Figure 2-2 Locations of the Initial Environmental Survey for Aquatic Wildlife (FY2004)

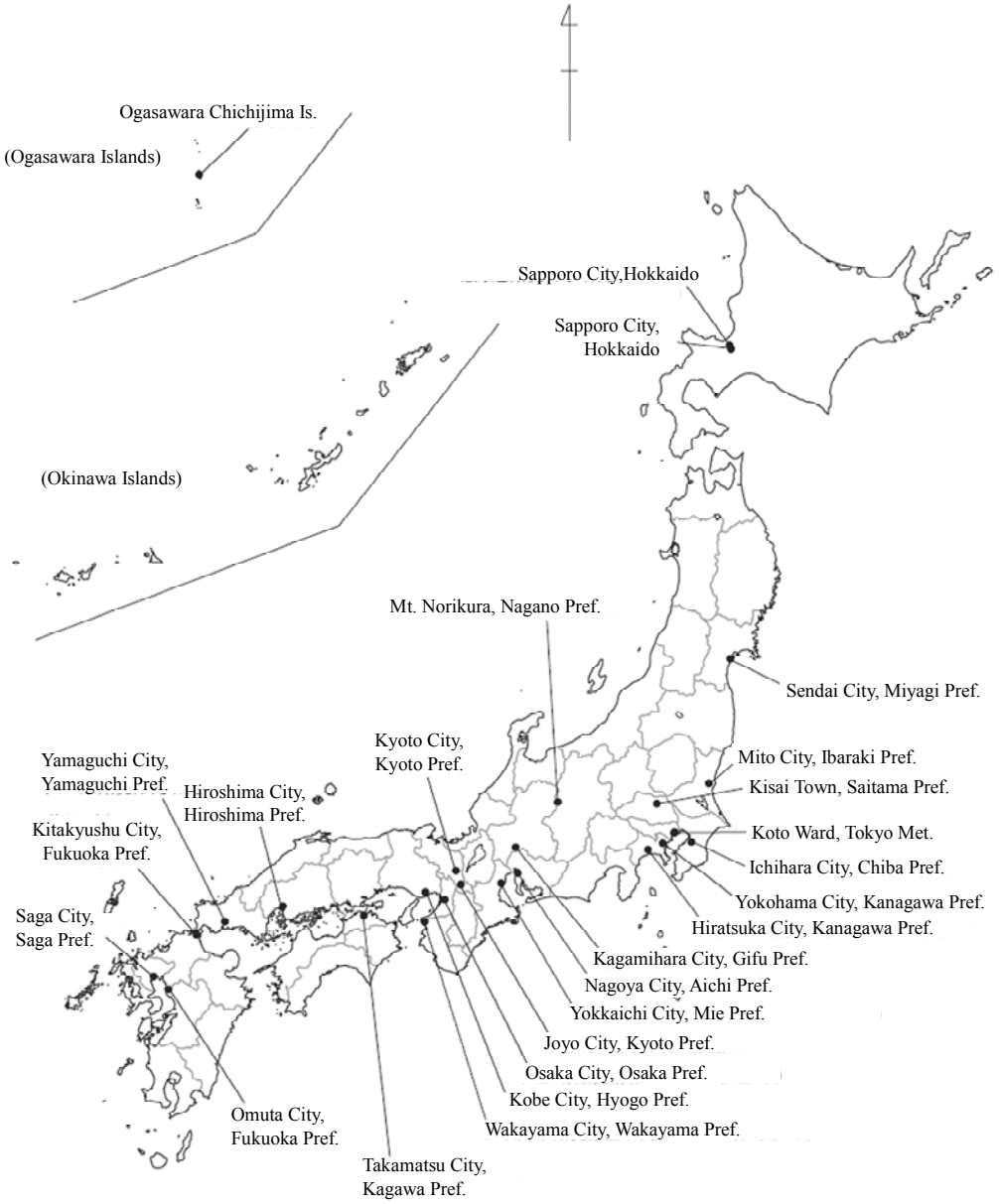


Figure 2-3 Locations of the Initial Environmental Survey for Air (FY2004)

Table 2-3 Detection Results of the FY2004 Initial Environmental Survey (1/3)

Survey No.	Substance	Surface water 33 areas in total		Bottom sediment 28 areas in total		Aquatic wildlife 9 areas in total		Air 25 areas in total	
		Detected Range (μg/L) (frequency(area))	Detection limit (μg/L)	Detected Range (ng/g-dry) (frequency(area))	Detection limit (ng/g-dry)	Detected Range (ng/g-wet) (frequency(area))	Detection limit (ng/g-wet)	Detected Range (ng/m^3) (frequency(area))	Detection limit (ng/m^3)
1	4-Aminophenol	0.02 – 0.05 (1/2)							
2	1-Aryloxy-2,3-epoxypropane	--- (0/7)							
3	Octachlorodipropyl ether	--- (0/9)		--- (0/9)	2.6				
4	1,3-Dichloropropene								
4-1	*cis*-1,3-Dichloropropene	--- (0/14)						9 – 100 (8/20)	9
4-2	*trans*-1,3-Dichloropropene	--- (0/14)						10 – 70 (7/20)	10
5	1-Bromopropane							27 – 270 (11/19)	25
6	Dicohol			1.7 – 6.4 (2/5)	1.2				
7	Diphenylmethane and Triphenylmethane								
7-1	Diphenylmethane			1.3 – 20 (2/6)	0.4				
7-2	Triphenylmethane			0.9 (1/6)	0.4				
8	Zinc pyrithione	--- (0/5)	0.02						
9	Short-chain polychlorinated paraffin (C_{10}-C_{13})								
9-1	Short-chain polychlorinated paraffin (C_{10})	--- (0/2)	0.0090	--- (0/2)	0.77	--- (0/2)	0.53		
9-2	Short-chain polychlorinated paraffin (C_{11})	--- (0/2)	0.023	--- (0/2)	3.0	--- (0/2)	1.5		
9-3	Short-chain polychlorinated paraffin (C_{12})	--- (0/2)	0.0086	--- (0/2)	0.34	--- (0/2)	0.20		
9-4	Short-chain polychlorinated paraffin (C_{13})	--- (0/2)	0.0055	--- (0/2)	0.92	--- (0/2)	0.56		

Table 2-3 (cont'd) Detection Results of the FY2004 Initial Environmental Survey (2/3)

Survey No.	Substance	Surface water 33 areas in total		Bottom sediment 28 areas in total		Aquatic wildlife 9 areas in total		Air 25 areas in total	
		Detected Range (μg/L) (frequency(area))	Detection limit (μg/L)	Detected Range (ng/g-dry) (frequency(area))	Detection limit (ng/g-dry)	Detected Range (ng/g-wet) (frequency(area))	Detection limit (ng/g-wet)	Detected Range (ng/m^3) (frequency(area))	Detection limit (ng/m^3)
10	Tetrabromobisphenol-A							--- (0/2)	0.03
11	2,4,6-Tribromophenol							0.03 – 0.14 (2/2)	0.02
12	2-Vinylpyridine							6.2 – 18 (1/6)	0.4
13	Pyridaphenthione	0.004 – 0.006 (1/12)	0.003	--- (0/12)	0.22				
14	*p*-Phenylenediamines								
14-1	*N,N'*-Diphenyl-*p*-phenylenediamine (DPPD)	--- (0/6)	0.006					0.002 – 0.009 (1/1)	0.001
14-2	*N,N'*-Ditolyl-*p*-phenylenediamine (DTPD)	--- (0/6)	0.009					--- (0/1)	0.0006
14-3	*N,N'*-Dixylyl-*p*-phenylenediamine (DPPD)	--- (0/6)	0.020					--- (0/1)	0.001
15	Fluazinam	--- (0/15)	0.0092						
16	1,2,5,6,9,10-Hexabromocyclododecane					43 – 77 (1/6)	7.1		
17	Hexabromobiphenyls							--- (0/1)	0.00025
18	Pentachloronitrobenzene			--- (0/12)	13	--- (0/8)	1	4.5 (1/15)	0.3
19	Formaldehyde					3,100 – 4,200 (2/2)	200		

Table 2-3 (cont'd) Detection Results of the FY2004 Initial Environmental Survey (3/3)

Survey No.	Substance	Surface water 33 areas in total		Bottom sediment 28 areas in total		Aquatic wildlife 9 areas in total		Air 25 areas in total	
		Detected Range (μg/L) (frequency(area))	Detection limit (μg/L)	Detected Range (ng/g-dry) (frequency(area))	Detection limit (ng/g-dry)	Detected Range (ng/g-wet) (frequency(area))	Detection limit (ng/g-wet)	Detected Range (ng/m^3) (frequency(area))	Detection limit (ng/m^3)
20	Polybromodiphenyl ethers							0.0015 – 0.020 (3/3)	0.0001
20-1	Bromodiphenyl ethers							0.000095 – 0.00027 (3/3)	0.00006
20-2	Dibromodiphenyl ethers							0.00023 – 0.0033 (3/3)	0.00010
20-3	Tribromodiphenyl ethers							0.00022 – 0.0043 (3/3)	0.00007
20-4	Tetrabromodiphenyl ethers							0.00035 – 0.0064 (3/3)	0.00008
20-5	Pentabromodiphenyl ethers							0.00035 – 0.0054 (3/3)	0.00006
20-6	Hexabromodiphenyl ethers							0.00040 – 0.0012 (2/3)	0.00018
20-7	Heptabromodiphenyl ethers							0.00015 – 0.00041 (3/3)	0.00014
21	Pentabromodipheyl ethers			0.050 (1/4)	0.035				
22	2-Methoxyethanol	--- (0/6)	1.9						

4. Evaluation of the survey results

The following is a summary of the FY2004 survey.

This survey assessed 22 target substances (groups), and detected two of the 10 target substances (groups) for surface water (4-aminophenol, pyridafenthion), four of the seven target substances (groups) for bottom sediment (dicofol, diphenylmethane and triphenylmethane, pentabromodiphenyl ether), two of the four target substances (groups) for aquatic wildlife (1,2,5,6,9,10-hexabromocyclododecane, formaldehyde), and seven of the nine target substances for air (1,3-dichloropropene, 1-bromopropane, 2,4,6-tribromophenol, 2-vinylpyridine, N,N'-diphenyl-p-phenylenediamine (DPPD), pentachloronitrobenzene, polybromodiphenyl ethers).

Evaluations of survey results for each substance (group) are described below.

(1) 4-aminophenol [media surveyed in FY2004: surface water]

Surface water: Surveys were conducted in FY1986 at nine survey sites with a detection limit of 0.8 μg/L, and the substance was not detected. Surveys were conducted in FY2004 with a detection limit of 0.02 μg/L, and the substance was detected at one of the two survey sites with a detection range between 0.02-0.05 μg/L.

(2) 1-allyloxy-2,3-epoxypropane [media surveyed in FY2004: surface water]

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.23 μg/L, and the substance was not detected at any of the seven survey sites.

(3) Octachlorodipropyl ether [media surveyed in FY2004: surface water, bottom sediment]

Surface water: Surveys were conducted in FY1981 with detection limits of 0.01-0.025 μg/L, and the substance was not detected at any of the eight survey sites. Surveys were conducted in FY1984 with detection limits of 0.001-0.002 μg/L, and the substance was not detected at any of the eight survey sites. Surveys were conducted in FY2004 with a detection limit of 0.0045 μg/L, and the substance was not detected at any of the nine survey sites. Octachlorodipropyl ether was not detected from surface water either in the previous surveys or under the conditions of the survey sites and the detection limit selected this time.

Bottom sediment: Surveys were conducted in FY1981 with detection limits of 1-2.9 ng/g-dry, and the substance was not detected at any of the eight survey sites. Surveys were conducted in FY1984 with detection limits of 0.05-0.23 ng/g-dry, and the substance was not detected at any of the eight survey sites. Surveys were conducted in FY2004 with a detection limit of 2.6 ng/g-dry, and the substance was not detected at any of the nine survey sites. Octachlorodipropyl ether was not detected from bottom sediment either in the previous surveys or under the conditions of the survey sites and the detection limit selected this time.

(4) *cis*-1,3-dichloropropene [media surveyed in FY2004: surface water, air]
**　　*trans*-1,3-dichloropropene [media surveyed in FY2004: surface water, air]**

***cis*-1,3-dichloropropene**

Surface water: Surveys were conducted with a detection limit of 0.009 μg/L, and the substance was not detected at any of the 14 survey sites.

Air: Surveys on the substance contained in air were conducted for the first time in FY2004 with a detection limit of 9 ng/m^3, and the substance was detected at eight of the 20 survey sites with a detection range between 9-100 ng/m^3.

***trans*-1,3-dichloropropene**

Surface water: Surveys were conducted with a detection limit of 0.008 μg/L, and the substance was not detected at any of the 14 survey sites. *Trans*-1,3-dichloropropene was not detected from surface water either in the previous surveys or under the conditions of the survey sites, the survey season, and the detection limit selected this time.

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 10 ng/m3, and the substance was detected at seven of the 20 survey sites with a detection range between 10-70 ng/m^3.

(5) 1-bromopropane [media surveyed in FY2004: air]

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 25 ng/m^3, and the substance was detected at 11 of the 19 survey sites with a detection range between 27-270 ng/m^3.

(6) Dicofol [media surveyed in FY2004: bottom sediment]

Bottom sediment: Surveys were conducted in FY1978 with detection limits of 3-11 ng/g-dry, and the substance was not detected at any of the eight survey sites. Surveys were conducted in FY2004 with a detection limit of 1.2 ng/g-dry, and the substance was detected at two of the five survey sites with a detection range between 1.7-6.4 ng/g-dry.

(7) Diphenylmethane and triphenylmethane [media surveyed in FY2004: bottom sediment]

Diphenylmethane

Bottom sediment: Surveys were conducted in FY1983 with detection limits of 4-41 ng/g-dry, and the substance was detected at two of the 11 survey sites with a detection range between 59-160 ng/g-dry. Surveys were conducted in FY1984 with a detection limit of 0.4-44 ng/g-dry, and the substance was detected at four of the 46 survey sites with a detection range between 0.6-1.9 ng/g-dry. Surveys were conducted in FY2004 with a detection limit of 0.4 ng/g-dry, and the substance was detected at two of the 6 survey sites with a detection range between 1.3-20 ng/g-dry.

Triphenylmethane

Bottom sediment: Surveys were conducted in FY1983 with a detection limit of 8-41 ng/g-dry, and the substance was not detected at any of the 11 survey sites. Surveys were conducted in FY2004 with a detection limit of 0.4 ng/g-dry, and the substance was detected at one of the six survey sites with a detection value of 0.9 ng/g-dry.

(8) Zinc pyrithione [media surveyed in FY2004: surface water]

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.02 μg/L, and the substance was not detected at any of the five survey sites. Zinc pyrithione was not detected from surface water under the conditions of the survey sites and the detection limit selected this time.

(9) Short-chained chlorinated paraffins (10-13 carbon atoms) [media surveyed in FY2004: surface water, bottom sediment, aquatic wildlife]

Short-chained chlorinated paraffin C10

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.0090 μg/L, and the substance was not detected at either of the two survey sites.

Bottom sediment: Surveys on this substance contained in bottom sediment were conducted for the first time in FY2004 with a detection limit of 0.77 ng/g-dry, and the substance was not detected at either of the two survey sites.

Aquatic wildlife: Surveys on this substance contained in aquatic wildlife were conducted for the first time in FY2004 with a detection limit of 0.53 ng/g-wet, and the substance was not detected at either of the two survey sites.

Short-chained chlorinated paraffins C11

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.023 μg/L, and the substance was not detected at either of the two survey sites.

Bottom sediment: Surveys on this substance contained in bottom sediment were conducted for the first time in FY2004 with a detection limit of 3.0 ng/g-dry, and the substance was not detected at either of the two survey sites.

Aquatic wildlife: Surveys on this substance contained in aquatic wildlife were conducted for the first time in FY2004 with a detection limit of 1.5 ng/g-wet, and the substance was not detected at either of the two survey sites.

Short-chained chlorinated paraffins C12

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.0086 μg/L, and the substance was not detected at either of the two survey sites.

Bottom sediment: Surveys on this substance contained in bottom sediment were conducted for the first time in FY2004 with a detection limit of 0.34 ng/g-dry, and the substance was not detected at either of the two survey sites.

Aquatic wildlife: Surveys on this substance contained in aquatic wildlife were conducted for the first time in FY2004 with a detection limit of 0.20 ng/g-wet, and the substance was not detected at either of the two survey sites.

Short-chained chlorinated paraffins C13

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.0055 μg/L, and the substance was not detected at either of the two survey sites.

Bottom sediment: Surveys on this substance contained in bottom sediment were conducted for the first time in FY2004 with a detection limit of 0.92 ng/g-dry, and the substance was not detected at either of the two survey sites.

Aquatic wildlife: Surveys on this substance contained in aquatic wildlife were conducted for the first time in FY2004 with a detection limit of 0.56 ng/g-wet, and the substance was not detected at either of the two survey sites.

(10) Tetrabromobisphenol A [media surveyed in FY2004: air]

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.03 ng/m^3, and the substance was not detected at either of the two survey sites. Tetrabromobisphenol A was not detected from air under the conditions of the survey sites and the detection limit selected this time.

(11) 2,4,6-tribromo phenol [media surveyed in FY2004: air]

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.02 ng/m^3, and the substance was detected at both of the two survey sites with a detection range between 0.03-0.14 ng/m^3.

(12) 2-vinylpyridine [media surveyed in FY2004: air]

Air: Surveys were conducted in FY1991 with a detection limit of 16 ng/m^3, and the substance was detected at four of the 17 survey sites with a detection range between 17-30 ng/m^3. Surveys were conducted in FY2004 with a detection limit of 0.4 ng/m^3, and the substance was detected at one of the six survey sites with a detection range between 6.2-18 ng/m^3. The detection ranges of the substance have been comparable to previous data. A lower detection limit was selected in this survey, and no major changes were observed in detection frequency or detection range.

(13) Pyridaphenthion [media surveyed in FY2004: surface water, bottom sediment]

Surface water: Surveys were conducted in FY2001 with a detection limit of 0.11 μg/L, and the substance was not detected at any of the 17 survey sites. Surveys were conducted in FY2004 with a detection limit of 0.003 μg/L, and the substance was detected at one of 12 survey sites with a detection range between 0.004-0.006 μg/L.

Bottom sediment: Surveys were conducted in FY2001 with a detection limit of 11 ng/g-dry, and the substance was not detected at any of the 17 survey sites. Surveys were conducted in FY2004 with

a detection limit of 0.22 ng/g-dry, and the substance was not detected at any of the 12 survey sites. Pyridaphenthion was not detected from bottom sediment either in the previous surveys, or under the conditions of the survey sites, the survey season, and the detection limit selected this time.

(14) *p*-phenylenediamines [media surveyed in FY2004: surface water, air]

***N,N'*-diphenyl-*p*-phenylenediamine (DPPD)**

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.006 μg/L, and the substance was not detected at any of the six survey sites.

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.001 ng/m3, and the substance was detected at the one survey site with a detection range between 0.002-0.009 ng/m3.

***N,N'*-ditolyl-*p*-phenylenediamine (DTPD)**

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.009 μg/L, and the substance was not detected at any of the six survey sites.

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.0006 ng/m^3, and the substance was not detected at the one survey site.

***N,N'*-dixylyl-*p*-phenylenediamine (DXPD)**

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.020 μg/L, and the substance was not detected at any of the six survey sites.

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.001 ng/m3, and the substance was not detected at the one survey site.

(15) Fluazinam [media surveyed in FY2004: surface water]

Surface water: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 0.0092 μg/L, and the substance was not detected at any of the 15 survey sites.

(16) 1,2,5,6,9,10-hexabromocyclododecane [media surveyed in FY2004: aquatic wildlife]

Aquatic wildlife: Surveys on this substance contained in surface water were conducted for the first time in FY2004 with a detection limit of 7.1ng/g-wet, detected at one of six survey sites with a detection range between 43-77 ng/g-wet.

(17) Hexabromobiphenyl [media surveyed in FY2004: air]

Air: Surveys on this substance contained in air were conducted for the first time in FY2004 with a detection limit of 0.25 pg/m^3, and the substance was not detected at the one survey site.

The development of an analytical method with greater sensitivity so as to obtain more data on this target substance, which has been proposed as a candidate substance for the POPs Treaty is working.

(18) Pentachloronitrobenzene [media surveyed in FY2004: bottom sediment, aquatic wildlife, air]

Bottom sediment: Surveys were conducted in FY1981 with a detection limit of 0.5 ng/g-dry, and the substance was not detected at any of the four survey sites. Surveys were conducted in FY1991 with a detection limit of 39 ng/g-dry, and the substance was not detected at any of the 17 survey sites. Surveys were conducted in FY2004 with a detection limit of 13 ng/g-dry, and the substance was not detected at any of the 12 survey sites. Pentachloronitrobenzene was not detected from bottom sediment either in the previous surveys or under the conditions of the survey sites, the survey season, and the detection limit selected this time.

Aquatic wildlife: Surveys were conducted in FY1991 with a detection limit of 35 ng/g-wet, and the substance was not detected at any of the 17 survey sites. Surveys were conducted in FY2004 with a detection limit of 1 ng/g-wet, and the substance was not detected at any of the eight survey sites.

Pentachloronitrobenzene was not detected from aquatic wildlife either in the previous surveys or under the conditions of the survey sites, the survey season, and the detection limit selected this time.

Air: Surveys were conducted in FY1991 with a detection limit of 6 ng/m^3, and the substance was detected at four of the 16 survey sites with a detection range between 6.2-13 ng/m^3. Surveys were conducted in FY2004 with a detection limit of 0.3 ng/m^3, and the substance was detected at one of the 15 survey sites with a detection value of 4.5 ng/m^3. Compared with previous surveys, a lower detection limit was selected in this survey, which produced lower detection frequency.

(19) Formaldehyde [media surveyed in FY2004: aquatic wildlife]

Aquatic wildlife: Surveys on this substance contained in aquatic wildlife were conducted for the first time in FY2004 with a detection limit of 200 ng/g-wet, and the substance was detected at both of the two survey sites with a detection range between 3,100-4,200 ng/m^3.

(20) Polybromodiphenyl ethers [media surveyed in FY2004: air]

Polybromodiphenyl ethers (1-7 bromine compounds)

Air: Surveys were conducted in FY2001 with a detection limit of 0.05-0.5 pg/m^3, and the substance was detected at all of the 12 survey sites with a detection range between 0.07-67 pg/ m^3. Surveys were conducted in FY2004 with a detection limit of 0.06 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 1.5-20 pg/ m^3. The persistence levels of the substance have been comparable to previous data.

Monobromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.4 pg/m^3, and the substance was detected at three of the 12 survey sites with a detection range between 0.4-2.0 pg/ m^3. Surveys were conducted in FY2004 with a detection limit of 0.06 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 0.095-0.27 pg/ m^3. Compared with previous surveys, a lower detection limit was selected in this survey, which produced a higher detection frequency, while resulting in a lower detection range.

Dibromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.2 pg/m^3, and the substance was detected at all of the 12 survey sites with a detection range between 0.2-12 pg/ m^3. Surveys were conducted in FY2004 with a detection limit of 0.10 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 0.23-3.3 pg/ m^3. The persistence levels of the substance have been comparable to previous data.

Tribromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.05 pg/m^3, and the substance was detected at all of the 12 survey sites with a detection range between 0.07-7.9 pg/m^3. Surveys were conducted in FY2004 with a detection limit of 0.07 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 0.22-4.3 pg/m^3. The persistence levels of the substance have been comparable to previous data.

Tetrabromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.5 pg/m^3, and the substance was detected at 10 of the 12 survey sites with a detection range between 0.5-10 pg/m^3. Surveys were conducted in FY2004 with a detection limit of 0.08 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 0.35-6.4 pg/m^3. The persistence levels of the substance have been comparable to previous data.

Pentabromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.09 pg/m^3, and the substance was detected at all of the 12 survey sites with a detection range between 0.10-9.3 pg/m^3. Surveys were conducted in FY2004 with a detection limit of 0.06 pg/m^3, and the substance was detected at all of the

three survey sites with a detection range between 0.35-5.4 pg/m^3. The persistence levels of the substance have been comparable to previous data.

Hexabromodiphenyl ether

Air: Surveys were conducted in FY2001 with a detection limit of 0.10 pg/m^3, and the substance was detected at all of the 12 survey sites with a detection range between 0.11-11 pg/m^3. Surveys were conducted in FY2004 with a detection limit of 0.18 pg/m^3, and the substance was detected at two of the three survey sites with a detection range between 0.40-1.2 pg/m^3. The persistence levels of the substance have been comparable to previous data.

Heptabromodiphenyl ether

Air: Surveys were conducted in FY2001 at 12 survey sites with a detection limit of 0.20 pg/m^3, and the substance was detected at nine of the 12 survey sites with a detection range between 0.21-38 pg/m^3. Surveys were conducted in FY2004 with a detection limit of 0.14 pg/m^3, and the substance was detected at all of the three survey sites with a detection range between 0.15-0.41 pg/m^3. The persistence levels of the substance have been comparable to previous data.

(21) Pentabromodiphenyl ethers [media surveyed in FY2004: bottom sediment]

Bottom sediment: Surveys of the substance in bottom sediment were conducted for the first time in FY2004 with a detection limit of 0.035 ng/g-dry, and the substance was detected at one of four survey sites with a detection value of 0.050 ng/g-dry.

(22) 2-methoxyethanol [media surveyed in FY2004: surface water]

Surface water: Surveys were conducted in FY1976 with a detection limit of 90-100 μg/L, and the substance was not detected at any of the 20 survey sites. Surveys were conducted in FY2004 with a detection limit of 1.9 μg/L, and the substance was not detected at any of the six survey sites. 2-methoxyethanol was not detected from surface water either in the previous surveys, or under the conditions of the survey sites and the detection limit selected this time.

Chapter 3 Results of the FY2004 Environmental Survey for Exposure Study

1. Purpose of the Survey

The purpose of this survey is to grasp the status of environmental persistence of the chemical substances such as the Class II Monitoring Chemical Substances specified in the Chemical Substances Control Law and Class I Designated Chemical Substances of the PRTR Law, which is necessary for understanding the exposure amount to humans and wildlife used in the environmental risk assessment targeting these chemical substances.

2. Surveyed substances, media and areas

The FY2004 Chemical Exposure Survey investigated the following five substances (groups) totaling eight substance (group)-medium combinations from among substance-medium combinations discussed and selected by the FY2004 Expert Group on Substance Selection for Environmental Surveys of Chemical Substances.

Table 3-1 Target Substances and Media for the FY2004 Environmental for Exposure Survey

Survey No.	Target Substance	Number of survey areas classified by media (number of households for diet)			
		Surface water	Air	Diet	Indoor air
1	N,N'-Dimethyldodecylamine=N=oxide	41			
2	Hexane	20	18		
3	Perfluorooctane sulfonic acid (PFOS)		20	50	
4	Perfluorooctanoic acid (PFOA)		20	50	
5	Octabromodiphenyl ether				68

Survey sites are shown in Figures 3-1 to 3-4. Surveys for surface water were conducted on two substances at 41 survey sites (Figure 3-1). Surveys for atmospheric air were conducted on three substances at 21 survey sites (Figure 3-2). Surveys for diet were conducted on two substances at 50 households in 10 areas (Figure 3-3). Surveys for room air were conducted on one substance (group) at 68 houses in four areas (Figure3-4).

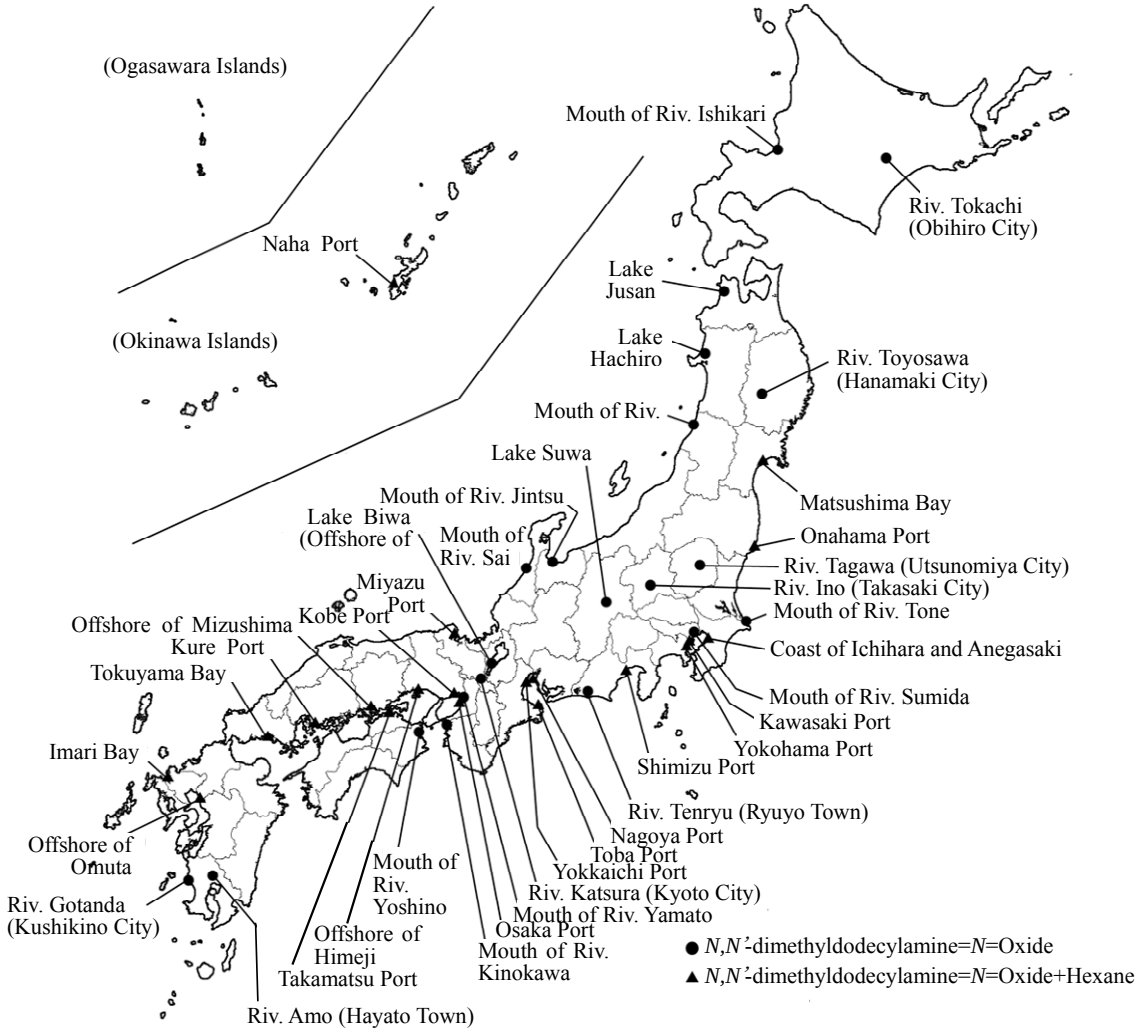


Figure 3-1 Locations of the Environmental Survey for Exposure Study (Surface water, FY2004)

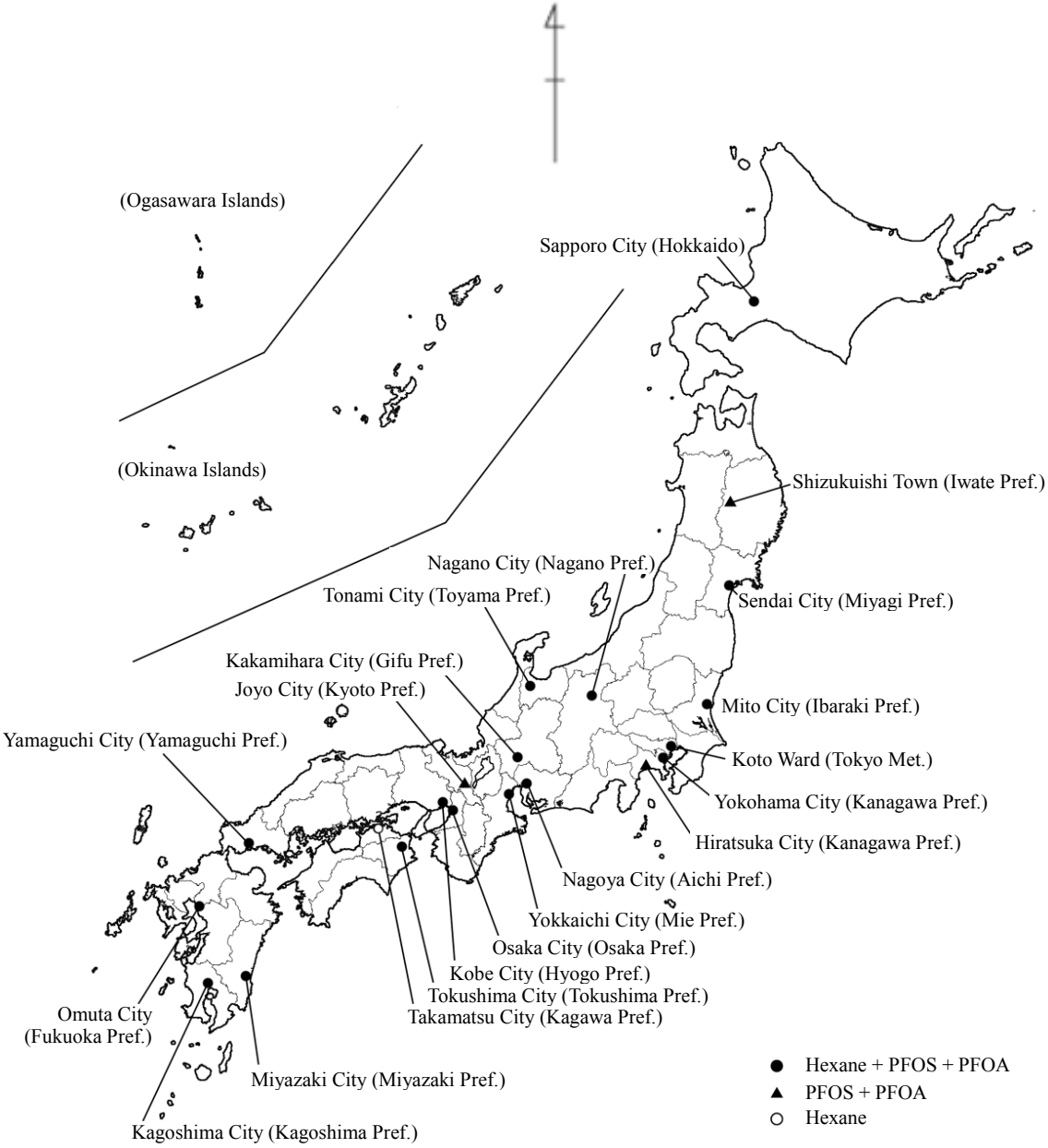


Figure 3-2 Locations of the Environmental Survey for Exposure Study (Air, FY2004)

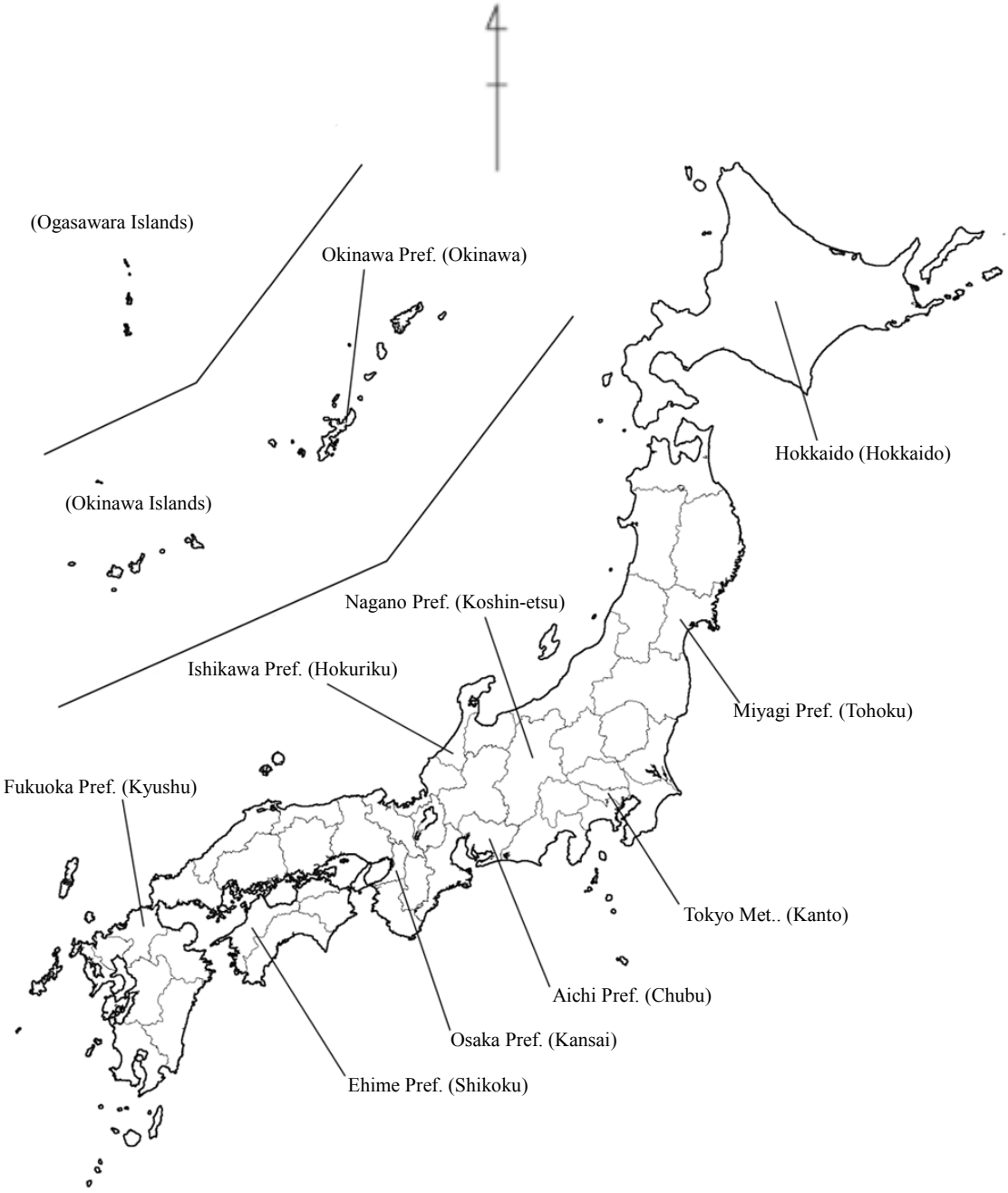


Figure 3-3 Locations of the Environmental Survey for Exposure Study (Diet, FY2004)

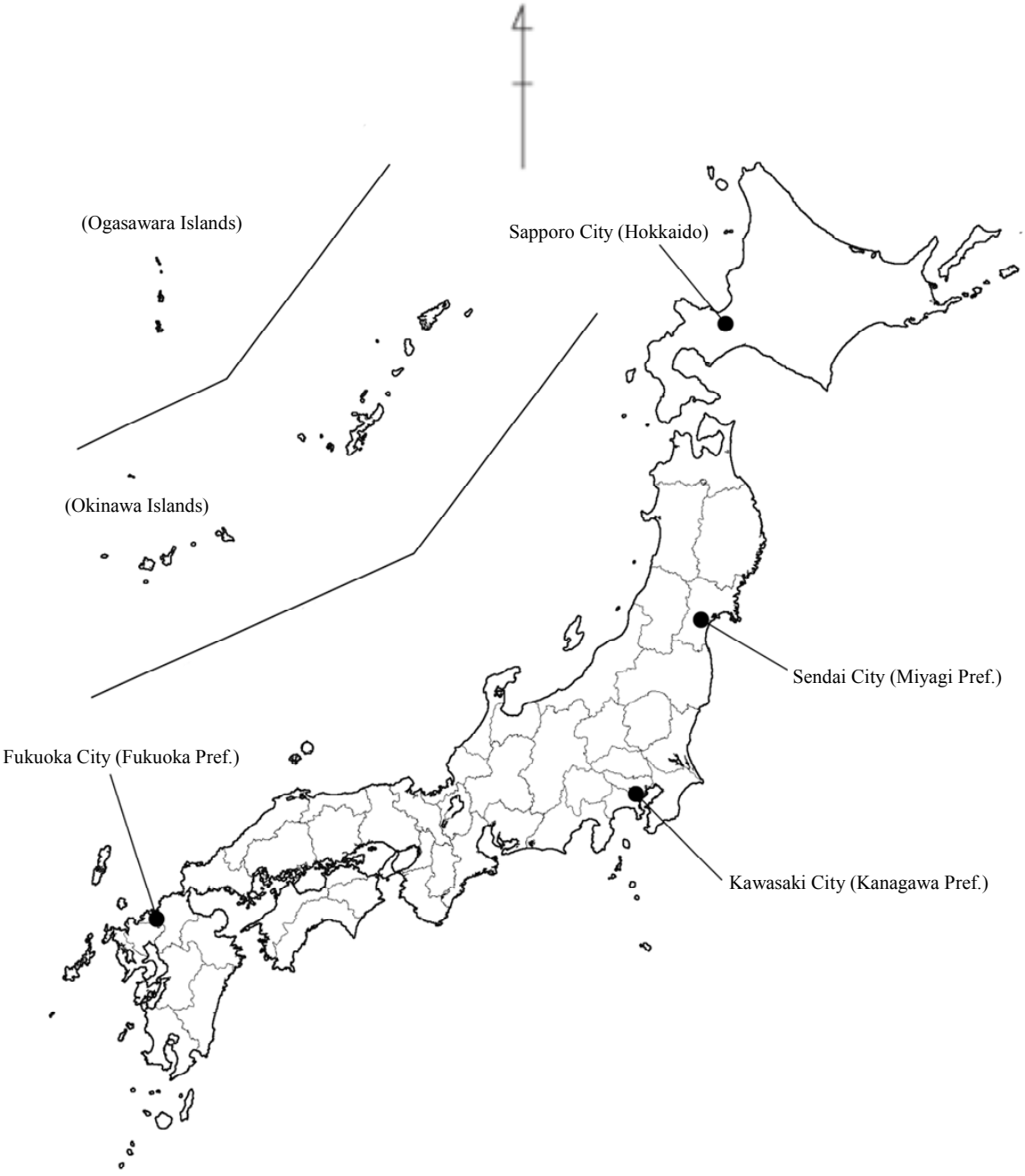


Figure 3-4 Locations of the Environmental Survey for Exposure Study (Indoor Air, FY2004)

3. Survey results

Among the five target substances (groups) totaling nine substance (group)-medium combinations, *N,N'*-dimethyldodecylamine=*N*=oxide was detected in surface water; hexane, PFOS and PFOA were detected in atmospheric air; and PFOS and PFOA were detected in diet (Table 3-2, Table 3-3).

4. Survey results of each substance (group)

(1) *N,N'*-dimethyldodecylamine=*N*=oxide [media surveyed in FY2004: surface water]

Surface water: Surveys were conducted with a detection limit of 0.003 μg/L, and the substance was detected in nine of 123 samples from four of the 41 survey sites, with a maximum detection concentration of 0.016 μg/L.

(2) Hexane [media surveyed in FY2004: surface water and atmospheric air]

Surface water: Surveys were conducted with a detection limit of 0.008 μg/L, and the substance was not detected at any of the 20 survey sites.

Atmospheric air: Surveys were conducted with a detection limit of 0.09 $\mu g/m^3$, and the substance was detected in 52 of the 53 samples from all the 18 survey sites, with a maximum detection concentration of 44 $\mu g/m^3$.

(3) Perfluorooctane sulfate (PFOS) [media surveyed in FY2004: atmospheric air and diet]

Atmospheric air: This was the first survey to investigate the substance persisting in atmospheric air. The survey was conducted with a detection limit of 0.09 pg/m^3, and the substance was detected in 57 of the 60 samples from all the 20 survey sites, with a maximum detection concentration of 44 pg/m^3.

Diet: This was the first survey to investigate the substance persisting in diet. The survey was conducted with a detection limit of 0.0033 ng/g-[fresh weight], and the substance was detected at 46 of the 50 surveyed households in all of 10 survey areas, with a maximum detection concentration of 0.12 ng/g-[fresh weight].

(4) Perfluorooctanoate (PFOA) [media surveyed in FY2004: atmospheric air and diet]

Atmospheric air: This was the first survey to investigate the substance persisting in atmospheric air. The survey was conducted with a detection limit of 0.14 pg/m^3, and the substance was detected in all of the 60 samples from all the 20 survey sites, with a maximum detection concentration of 5,300 pg/m^3.

Diet: This was the first survey to investigate the substance persisting in diet. The survey was conducted with a detection limit of 0.010 ng/g-[fresh weight], and the substance was detected at 10 of the 50 surveyed households in 6 of 10 survey areas, with a maximum detection concentration of 0.024 ng/g-[fresh weight].

(5) Octabromodiphenyl ether [media surveyed in FY2004: room air]

Room air: This was the first survey to investigate the substance persisting in room air. The survey was conducted with detection limits of 0.02-0.03 ng/m^3, and the substance was not detected at any of the 68 houses in four areas.

As well as room air, outside air was sampled 1 m away from the surveyed houses and analyzed for the comparison and discussion of the relationship between room air and outside air at each survey site. The result was the same as in samples of room air: the substance was not detected in any of the samples of outside air.

Table 3-2 Results of the Environmental Survey for Exposure Study in FY2004

Survey No.	Target substance	Surface water		Air		Diet		Indoor air	
		Detected range	Median	Detected range	Median	Detected range	Median	Detected range	Median
		(unit)		(unit)		(unit)		(unit)	
		(frequency/area))		(frequency/area))		(frequency/area))		(frequency/area))	
1	N,N'-Dimethyldodecylamine=N=oxide	nd -16	nd						
		(ng/L)							
		(4/41)							
2	Hexane	nd	nd	nd - 44	0.82				
		(ng/L)		($\mu g/m^3$)					
		(0/20)		(18/18)					
3	Perfluorooctane sulfonic acid (PFOS)			nd - 44	1.5	nd – 0.12	0.067		
				(pg/m^3)		(ng/g-wet)			
				(20/20)		(34/50)			
4	Perfluorooctanoic acid (PFOA)			0.22 – 5,300	5.8	nd – 0.024	nd		
				(pg/m^3)		(ng/g-wet)			
				(20/20)		(0/50)			
5	Octabromodiphenyl ether							nd	nd
								(ng/m^3)	
								(0/68)	

Note 1: Halftone screened area (gray) denotes that the survey was conducted in other media not targeted in this survey.
Note 2: Frequency (area) indicates: Number of detected areas / Number of surveyed areas.
Note 3: [---] in the range column denotes that there was no detected sample.

Table 3-3 Detection Limits for Exposure Study in FY2004

Survey No.	Target substance	Surface water	Air	Diet	Indoor air
		Detection Limit (unit)	Detection Limit (unit)	Quantitation Limit (unit)	Detection Limit (unit)
1	N,N'-Dimethyldodecylamine=N=oxide	3 (ng/L)			
2	Hexane	8 (ng/L)	0.09 ($\mu g/m^3$)		
3	Perfluorooctane sulfonic acid (PFOS)		0.09 (pg/m^3)	0.01 (ng/g-wet)	
4	Perfluorooctanoic acid (PFOA)		0.14 (pg/m^3)	0.01 (ng/g-wet)	
5	Octabromodiphenyl ether				0.02 – 0.03 (ng/m^3)

Chapter 4 Summary of the FY2004 Monitoring Investigation

1. Purpose of the survey

The purpose of this survey is to conduct the monitoring of the following substances on an annual basis: target substances specified in the Stockholm Convention on Persistent Organic Pollutants (which took effect on May 17, 2004. Hereinafter "POPs Treaty") and other substances that may be candidates for target substances of the Treaty; highly persistent substances whose environmental standards are not yet established and annual environmental status needs to be understood, among Class I & II Designated Chemical Substances and Class II Monitoring Chemical Substances specified in the Chemical Substances Control Law.

* POPs (persistent organic pollutants)

2. Surveyed substances, media and areas

The FY2004 Monitoring Survey investigated the following 11 substances (groups) totaling 43 substance (group)-medium combinations among substance-medium combinations discussed and selected by the FY2004 Expert Group on Substance Selection for Environmental Surveys of Chemical Substances. Among them, target substances specified in the POPs Treaty are PCBs, HCB, aldrin, dieldrin, endrin, DDTs, chlordanes, heptachlors, toxaphenes and mirex. Other target substances are HCHs, hexabromobenzene and dioctyltin compounds.

Survey sites are shown in Figures 4-1 to 4-4. Surveys for surface water were conducted at 40 survey sites (Figure 4-1). Surveys for bottom sediment were conducted at 63 survey sites (Figure 4-2). Surveys for wildlife (shellfish, fish and birds) were conducted at 22 survey sites (Figure 4-3). Surveys for atmospheric air were conducted at 37 survey sites (Figure 4-4). At any of the survey sites, the same target substances were monitored for each medium: as for surface water, bottom sediment and wildlife, 11 substances (groups) were monitored; and as for atmospheric air, 10 substances (groups) were monitored.

3. Method of assessment

The General Inspection Survey was reexamined in FY2002 and the system of the survey was modified in FY2002. Thus, continuity of the survey has been discussed, comparing the target substances, survey sites and quantification (detection) limits before and after the modification. Subsequently, changes in the persistence of each substance were evaluated based on the results of continuity investigation.

The Monitoring Investigation has been carried out for a long time, and changes have been made to survey sties, analytical methods and survey species.

Therefore, it is difficult to directly compare recent data with old data obtained at the beginning of the Survey. Still these data can be evaluated with continuity through assessment by each common survey site or survey season.

Surveys on the following substances persisting in surface water were carried out in and before FY2001: HCB, dieldrin, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, *trans*-chlordane, *cis*-chlordane, *trans*-nanochlor, *cis*-nanochlor, oxychlordane, α-HCH, and β-HCH. However, it should be remembered that a higher detection limit (10,000 pg/L) was used in these surveys, resulting in lower detection rate.

Table 4-1 Target Substances and Media for the FY2004 Monitoring Investigation

Survey No.	Target Substance	Media			
		Surface water	Air	Diet	Indoor air
1	PCBs (Total PCB and following items were measured) Mono-CBs, Di-CBs, Tri-CBs, Tetra-CBs, Penta-CBs, Hexa-CBs, Hepta-CBs, Octa-CBs, Nona-CBs, Deca-CB	○	○	○	○
2	HCB (Hexachlorobenzene)	○	○	○	○
3	Drins Aldrin, Dieldrin, Endrin	○	○	○	○
4	DDTs *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD *o,p'*-DDT, *o,p'*-DDE, *o,p'*-DDD	○	○	○	○
5	Chlordanes *trans*-Chlordane, *cis*-Chlordane, *trans*-Nonachlor, *cis*-Nonachlor Oxychlordane	○	○	○	○
6	Heptachlors Heptachlor, *trans*-Heptachlor epoxide, *cis*-Heptachlor epoxide	○	○	○	○
7	Toxaphenes 2-endo-3-exo-5-endo-6-exo-8,8,10,10-Octachlorobornane, 2-endo-3-exo-5-endo-6-exo-8,8,9,10,10-Nonachlorobornane	○	○	○	○
8	Mirex	○	○	○	○
9	HCHs (Hexachlorocyclohexanes) α-HCH, β-HCH, γ-HCH, δ-HCH	○	○	○	○
10	HBB (Hexabromobenzene)	○	○	○	○
11	Organotin compounds (Dioctyltin compounds)	○	○	○	

Figure 4-1 Locations of the Monitoring Investigation for Surface Water (FY2004)

Figure 4-2 Locations of the Monitoring Investigation for Bottom Sediment (FY2004)

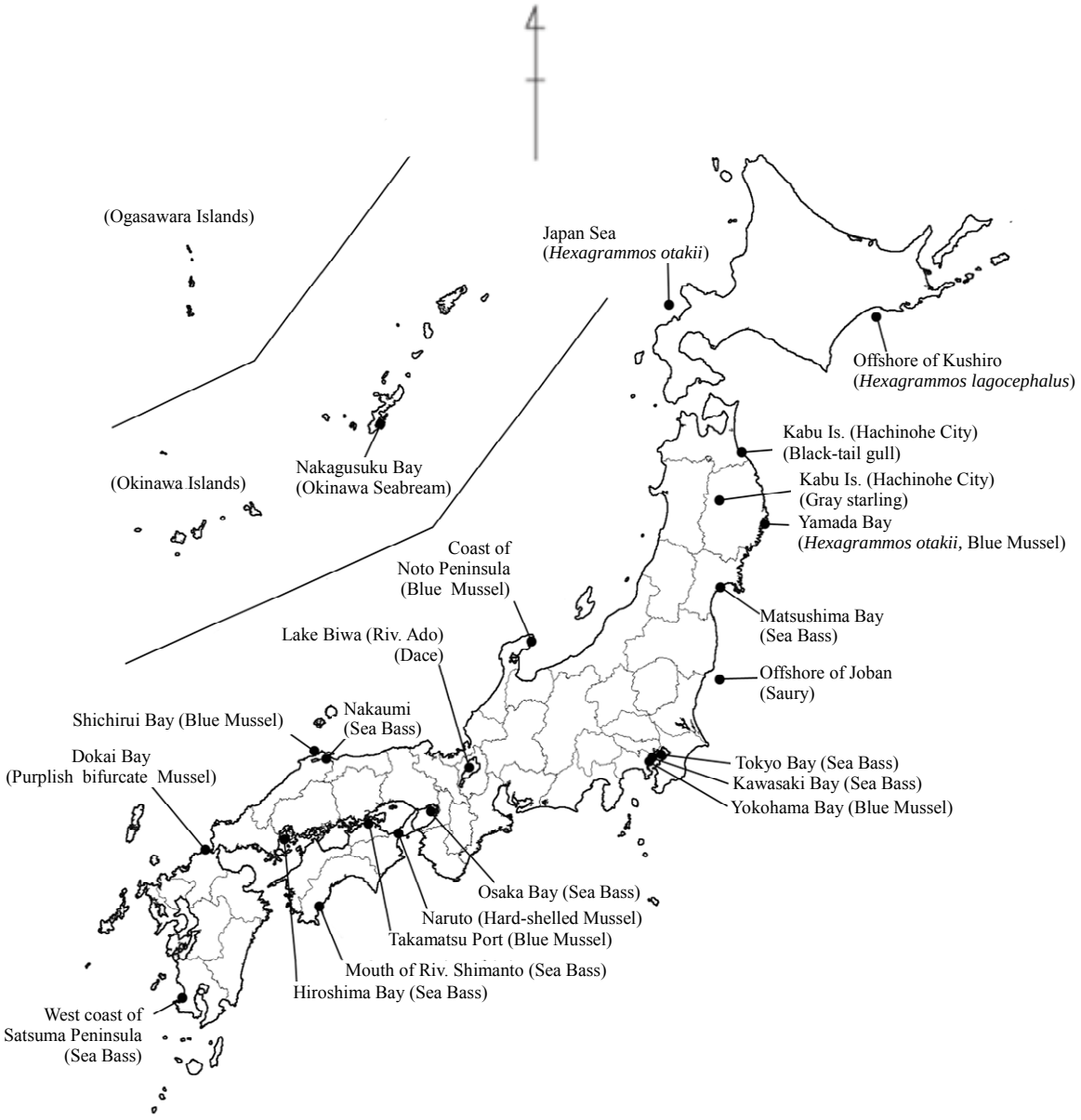


Figure 4-3 Locations of the Monitoring Investigation for Aquatic Wildlife (FY2004)

Figure 4-4 Locations of the Monitoring Investigation for Air (FY2004)

4. Survey results

Summary of the detection results of the FY2004 survey is shown in Table 4-2 and Table 4-3.

As for PCBs, HCB, drins, DDTs, chlordanes, heptachlors, toxaphenes, mirex and HCHs, annual changes of their persistence in surface water, bottom sediment, wildlife and atmospheric air are diagramed in Figures 4-5 to 4-30.

Note that the annual changes in the persistence of the following substances in surface water in FY2001 or earlier are not provided because the detection limit used in the past was 1,000 or more times higher than that used in FY2004: HCB, dieldrin, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, *trans*-chlordane, *cis*-chlordane, *trans*-nanochlor, *cis*-nanochlor, oxychlordane, α-HCH, and β-HCH.

PCBs	Figures 4-5-A to D
HCB	Figures 4-6-A to D
Drins	Figures 4-7-A to 4-9-D
DDTs	Figures 4-10-A to 4-15-D
Chlordanes	Figures 4-16-A to 4-20-D
Heptachlors	Figures 4-21-A to 4-22-D
Toxaphenes	Figures 4-23-A to 4-25
Mirex	Figures 4-26-A to D
HCHs	Figures 4-27-A to 4-30-D

Table 4-2 Results of the Environmental Survey for Monitoring Investigation in FY2004

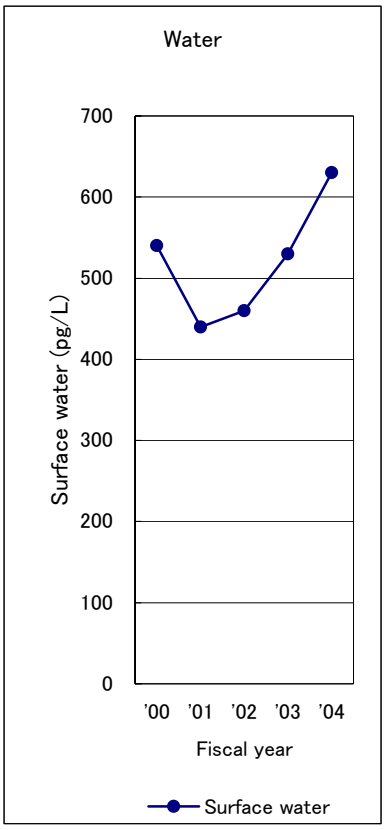
Survey No.	Target Substance	Surface water 38 areas, 38samples		Bottom sediment 63 areas, 189 samples		Wildlife						Air			
						Shellfish 7 areas, 31 samples		Fish 14 areas, 70 samples		Birds 2 areas, 10 samples		First (Warm season) 37 areas, 37 samples		Second (Cold season) 37 areas, 37 samples	
		Range (pg/L)	Geometrical mean (pg/L)	Range (pg/g-dry)	Geometrical mean (pg/g-dry)	Range (pg/g-wet)	Geometrical mean (pg/g-wet)	Range (pg/g-wet)	Geometrical mean (pg/g-wet)	Range (pg/g-wet)	Geometrical mean (pg/g-wet)	Range (pg/m^3)	Geometrical mean (pg/m^3)	Range (pg/m^3)	Geometrical mean (pg/m^3)
1	PCBs	140 ~ 4,400	630	38 ~ 1,300,000	7,300	1,500 ~ 150,000	7,700	990 ~ 540,000	15,000	5,900 ~ 13,000	8,900	25 ~ 3,300	240	20 ~ 1,500	130
2	HCB	tr(11) ~ 180	30	tr(6) ~ 25,000	130	14 ~ 80	30	26 ~ 1,800	220	410 ~ 2,200	970	47 ~ 430	130	51 ~ 390	98
3	Drins														
3-1	Aldrin	nd ~ 13	tr(1.5)	nd ~ 390	9	nd ~ 46	tr(1.7)	nd ~ tr(2.4)	nd	nd	nd	nd ~ 14	tr(0.12)	nd ~ 13	tr(0.08)
3-2	Dieldrin	9 ~ 430	55	tr(1.9) ~ 3,700	58	42 ~ 69,000	510	tr(23) ~ 2,800	240	370 ~ 960	590	1.1 ~ 280	17	0.81 ~ 76	5.5
3-3	Endrin	tr(0.7) ~ 100	7	nd ~ 6,900	13	tr(5.7) ~ 4,600	54	nd ~ 220	18	nd ~ 62	tr(11)	tr(0.054) ~ 6.5	0.64	nd ~ 1.9	0.23
4	DDTs														
4-1	*p,p'*-DDT	nd ~ 310	15	7 ~ 98,000	330	48 ~ 2,600	280	6 ~ 53,000	310	160 ~ 700	330	0.41 ~ 37	4.7	0.29 ~ 13	1.8
4-3	*p,p'*-DDE	tr(6) ~ 680	36	8 ~ 39,000	630	220 ~ 8,400	1,000	390 ~ 52,000	2,500	6,800 ~ 200,000	34,000	0.62 ~ 95	6.1	0.85 ~ 43	2.9
4-5	*p,p'*-DDD	tr(2.4) ~ 740	19	4 ~ 75,000	550	8 ~ 8,900	300	56 ~ 9,700	640	52 ~ 1,400	310	tr(0.036) ~ 1.4	0.24	tr(0.025) ~ 0.91	0.12
4-2	*o,p'*-DDT	nd ~ 85	tr(4.5)	tr(1.1) ~ 17,000	52	20 ~ 910	130	4 ~ 1,800	130	tr(0.9) ~ 43	8	0.54 ~ 22	5.1	0.35 ~ 9.4	1.5
4-4	*o,p'*-DDE	tr(0.6) ~ 170	3	nd ~ 28,000	35	19 ~ 360	70	tr(0.9) ~ 5,800	68	nd ~ 4	tr(1.0)	0.14 ~ 8.9	1.1	0.14 ~ 3.9	0.53
4-6	*o,p'*-DDD	tr(0.7) ~ 81	6	tr(0.7) ~ 16,000	120	6 ~ 2,800	160	nd ~ 1,700	100	nd ~ 25	tr(5.6)	tr(0.052) ~ 2.6	0.31	nd ~ 0.86	tr(0.13)
5	Chlordanes														
5-1	*trans*-Chlordane	5 ~ 1,200	32	3 ~ 26,000	95	53 ~ 2,800	510	tr(17) ~ 5,200	190	nd ~ tr(26)	tr(14)	2.2 ~ 1,300	110	1.5 ~ 360	35
5-2	*cis*-Chlordane	10 ~ 1,900	92	4 ~ 36,000	140	91 ~ 14,000	1,200	68 ~ 9,800	580	tr(5.8) ~ 240	39	2.3 ~ 1,000	92	1.2 ~ 290	29
5-3	*trans*-Nonachlor	tr(3) ~ 1,100	25	3 ~ 23,000	83	110 ~ 3,400	710	140 ~ 21,000	1,000	390 ~ 1,200	680	1.9 ~ 870	72	0.95 ~ 240	23
5-4	*cis*-Nonachlor	0.8 ~ 340	7.5	tr(0.8) ~ 9,400	46	43 ~ 1,800	280	48 ~ 10,000	410	73 ~ 240	130	0.36 ~ 130	10	0.087 ~ 28	2.7
5-5	Oxychlordane	tr(0.7) ~ 47	3.2	nd ~ 140	tr(2.0)	14 ~ 1,700	110	25 ~ 1,500	150	320 ~ 730	460	0.41 ~ 7.8	1.9	0.27 ~ 3.9	0.80
6	Heptachlors														
6-1	Heptachlors	nd ~ 29	nd	nd ~ 170	tr(2.5)	nd ~ 16	tr(3.5)	nd ~ 460	tr(1.9)	nd ~ tr(1.5)	nd	0.46 ~ 200	23	0.53 ~ 100	11
6-2	*trans*-Heptachlor epoxide	nd	nd	nd ~ tr(2.5)	nd	nd ~ 55	tr(4.0)	nd ~ tr(10)	nd	nd	nd	nd ~ tr(0.38)	nd	nd	nd
6-3	*cis*-Heptachlor epoxide	2 ~ 77	10	nd ~ 230	tr(4.4)	tr(9.8) ~ 840	57	tr(3.3) ~ 620	46	190 ~ 350	270	0.65 ~ 9.7	2.8	0.44 ~ 7.0	1.1
7	Toxaphenes														
7-1	Parlar-26	nd	nd	nd	nd	nd ~ tr(32)	nd	nd ~ 1,000	tr(40)	nd ~ 810	71	tr(0.17) ~ 0.46	0.27	tr(0.094) ~ 0.50	tr(0.15)
7-2	Parlar-50	nd	nd	nd	nd	nd ~ tr(45)	tr(16)	nd ~ 1,300	54	nd ~ 1,000	83	nd	nd	nd	nd
7-3	Parlar-62	nd	nd	nd	nd	nd	nd	nd ~ 870	nd	nd ~ 280	tr(64)	nd	nd	nd	nd
8	Mirex	nd ~ 1.1	nd	nd ~ 220	2.1	tr(1.1) ~ 12	4.5	3.8 ~ 180	11	33 ~ 110	61	tr(0.042) ~ 0.16	0.099	tr(0.019) ~ 0.23	tr(0.046)
9	HCHs														
9-1	α-HCH	13 ~ 5,700	150	tr(1.5) ~ 5,700	140	tr(12) ~ 1,800	35	nd ~ 2,900	57	58 ~ 1,600	120	24 ~ 3,200	160	11 ~ 680	68
9-2	β-HCH	31 ~ 3,400	260	4 ~ 53,000	220	22 ~ 1,800	69	tr(3.9) ~ 1,100	100	1,100 ~ 4,800	2,200	0.53 ~ 110	6.6	0.32 ~ 78	2.6
9-3	γ-HCH	21 ~ 8,200	91	tr(0.8) ~ 4,100	46	nd ~ 230	tr(19)	nd ~ 660	tr(27)	tr(11) ~ 1,200	34	4.5 ~ 860	46	2.6 ~ 230	19
9-4	δ-HCH	tr(1.4) ~ 670	24	tr(0.5) ~ 5,500	48	nd ~ 1,500	tr(3.0)	nd ~ 270	tr(4.1)	6 ~ 260	16	0.15 ~ 93	2.2	tr(0.07) ~ 18	0.76
10	HBB	nd	nd	nd ~ 34	nd	nd	nd	nd ~ tr(0.12)	nd	nd	nd	nd ~ 610	tr(18)	nd ~ 380	nd
11	DOT	nd	nd	nd ~ 88	tr(2.6)	nd	nd	nd ~ tr(2.5)	nd	nd	nd				

(Notice) "nd" was taken into account as a half value of detection limit.

Table 4-3 Detection Limits for Monitoring Investigation in FY2004

Survey No.	Target Substance	Surface water	Bottom sediment	Wildlife			Air	
				Shellfish	Fish	Birds	First (Warm season)	Second (Cold season)
		MQL (pg/L)	MQL (pg/g-dry)	MQL (pg/g-wet)	MQL (pg/g-wet)	MQL (pg/g-wet)	MQL (pg/m^3)	MQL (pg/m^3)
1	PCBs*	0.4～10 [0.2～4]	0.2～2 [0.06～0.6]	2.1～18 [0.61～6.1]	2.1～18 [0.61～6.1]	2.1～18 [0.61～6.1]	0.024～0.99 [0.0081～0.33]	0.024～0.99 [0.0081～0.33]
2	HCB	30 [8]	7 [3]	14 [4.6]	14 [4.6]	14 [4.6]	1.1 [0.37]	1.1 [0.37]
3	Drins							
3-1	Aldrin	2 [0.4]	2 [0.6]	4 [1.3]	4 [1.3]	4 [1.3]	0.15 [0.05]	0.15 [0.05]
3-2	Dieldrin	2 [0.5]	3 [0.9]	31 [10]	31 [10]	31 [10]	0.33 [0.11]	0.33 [0.11]
3-3	Endrin	2 [0.5]	3 [0.9]	12 [4.2]	12 [4.2]	12 [4.2]	0.14 [0.048]	0.14 [0.048]
4	DDTs							
4-1	*p,p'*-DDT	6 [2]	2 [0.5]	3.2 [1.1]	3.2 [1.1]	3.2 [1.1]	0.22 [0.074]	0.22 [0.074]
4-3	*p,p'*-DDE	8 [3]	3 [0.8]	8.2 [2.7]	8.2 [2.7]	8.2 [2.7]	0.12 [0.039]	0.12 [0.039]
4-5	*p,p'*-DDD	3 [0.8]	2 [0.7]	2.2 [0.7]	2.2 [0.7]	2.2 [0.7]	0.053 [0.018]	0.053 [0.018]
4-2	*o,p'*-DDT	5 [2]	2 [0.6]	1.8 [0.61]	1.8 [0.61]	1.8 [0.61]	0.093 [0.031]	0.093 [0.031]
4-4	*o,p'*-DDE	2 [0.5]	3 [0.8]	2.1 [0.69]	2.1 [0.69]	2.1 [0.69]	0.037 [0.012]	0.037 [0.012]
4-6	*o,p'*-DDD	2 [0.5]	2 [0.5]	5.7 [1.9]	5.7 [1.9]	5.7 [1.9]	0.14 [0.048]	0.14 [0.048]
5	Chlordanes							
5-1	*trans*-Chlordane	5 [2]	3 [0.9]	48 [16]	48 [16]	48 [16]	0.69 [0.23]	0.69 [0.23]
5-2	*cis*-Chlordane	6 [2]	4 [2]	18 [5.8]	18 [5.8]	18 [5.8]	0.57 [0.19]	0.57 [0.19]
5-3	*trans*-Nonachlor	4 [2]	2 [0.6]	13 [4.2]	13 [4.2]	13 [4.2]	0.48 [0.16]	0.48 [0.16]
5-4	*cis*-Nonachlor	0.6 [0.2]	2 [0.6]	3.4 [1.1]	3.4 [1.1]	3.4 [1.1]	0.072 [0.024]	0.072 [0.024]
5-5	Oxychlordane	2 [0.5]	3 [0.8]	9.2 [3.1]	9.2 [3.1]	9.2 [3.1]	0.13 [0.042]	0.13 [0.042]
6	Heptachlors							
6-1	Heptachlors	5 [2]	3 [0.9]	4.1 [1.4]	4.1 [1.4]	4.1 [1.4]	0.23 [0.078]	0.23 [0.078]
6-2	*trans*-Heptachlor epoxide	0.9 [0.3]	4 [2]	12 [4]	12 [4]	12 [4]	0.6 [0.2]	0.6 [0.2]
6-3	*cis*-Heptachlor epoxide	2 [0.4]	6 [2]	9.9 [3.3]	9.9 [3.3]	9.9 [3.3]	0.052 [0.017]	0.052 [0.017]
7	Toxaphenes							
7-1	Parlar-26	9 [3]	60 [20]	42 [14]	42 [14]	42 [14]	0.20 [0.066]	0.20 [0.066]
7-2	Parlar-50	20 [7]	60 [20]	46 [15]	46 [15]	46 [15]	1.2 [0.4]	1.2 [0.4]
7-3	Parlar-62	90 [30]	2,000 [400]	98 [33]	98 [33]	98 [33]	2.4 [0.81]	2.4 [0.81]
8	Mirex	0.4 [0.2]	2 [0.5]	2.5 [0.82]	2.5 [0.82]	2.5 [0.82]	0.05 [0.017]	0.05 [0.017]
9	HCHs							
9-1	α-HCH	6 [2]	2 [0.6]	13 [4.3]	13 [4.3]	13 [4.3]	0.33 [0.11]	0.33 [0.11]
9-2	β-HCH	4 [2]	3 [0.8]	6.1 [2.0]	6.1 [2.0]	6.1 [2.0]	0.12 [0.041]	0.12 [0.041]
9-3	γ-HCH	20 [7]	2 [0.5]	31 [10]	31 [10]	31 [10]	0.23 [0.076]	0.23 [0.076]
9-4	δ-HCH	2 [0.7]	2 [0.5]	4.6 [1.5]	4.6 [1.5]	4.6 [1.5]	0.15 [0.05]	0.15 [0.05]
10	HBB	2.0 [0.6]	2.7 [0.9]	0.3 [0.1]	0.3 [0.1]	0.3 [0.1]	29 [9.7]	29 [9.7]
11	DOT	5.5 [1.9]	6.0 [2.0]	3 [1]	3 [1]	3 [1]		

* Value in parenthesis [ ] indicates MDL (Method Detection Limit).
MQL = MDL * 3



Surface water MQL [MDL](pg/g-dry)
FY2000 [0.03～2]
FY2001 [0.03～30]
FY2002 0.18～0.90 [0.06～0.30]
FY2003 0.3～6 [0.07～2]
FY2004 0.4～10 [0.2～4]
・Geometric mean was calculated, assuming nd as one half of the detection limit.。

Figure 4-5-A Annual Change of PCBs in Surface Water (geometric mean)

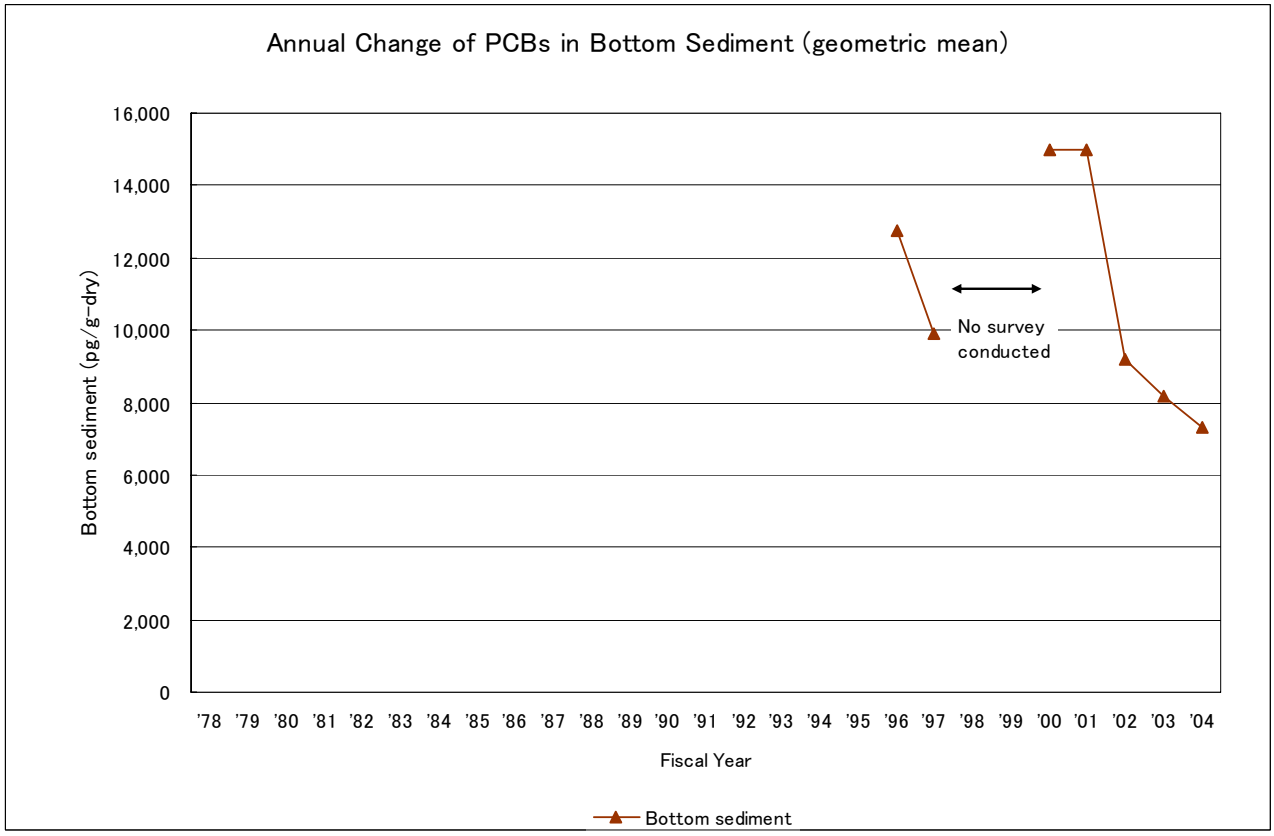


Figure 4-5-B Annual Change of PCBs in Bottom Sedimant (geometric mean)

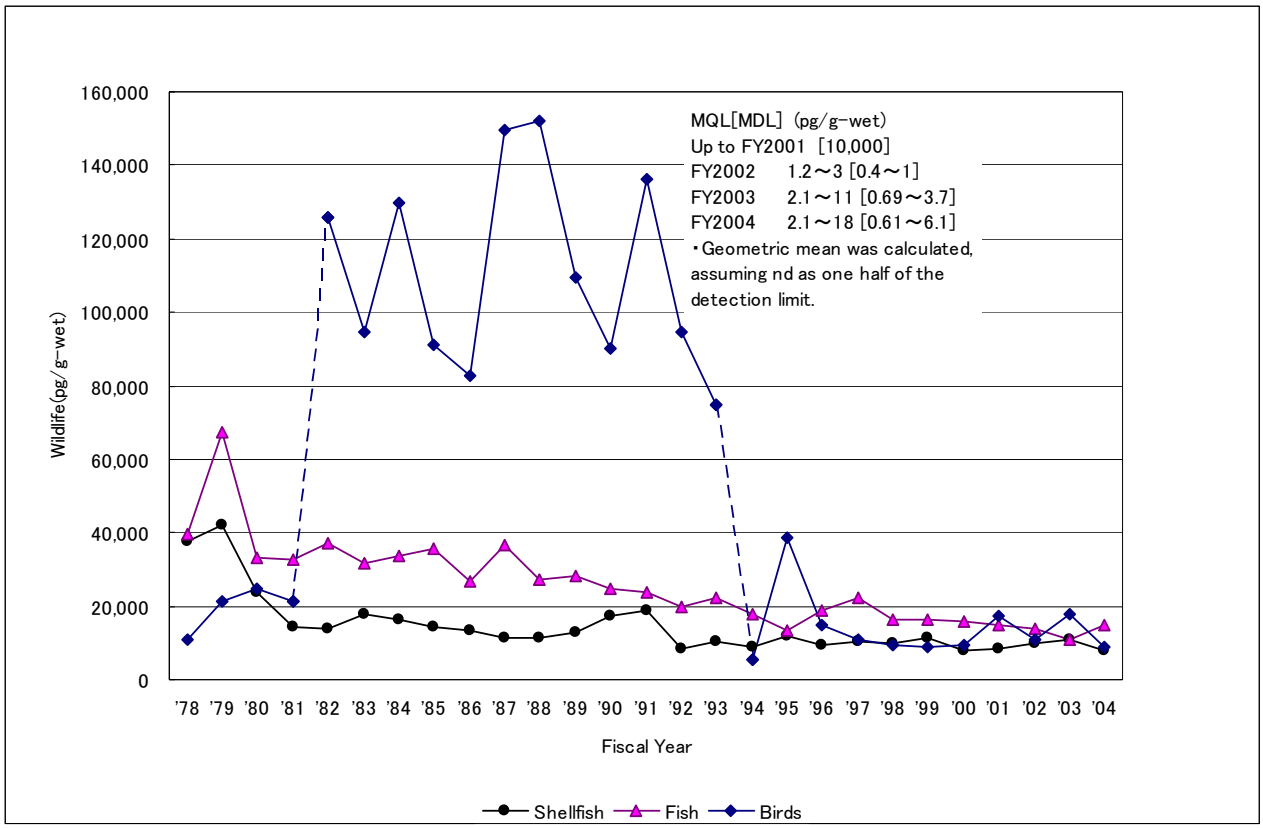
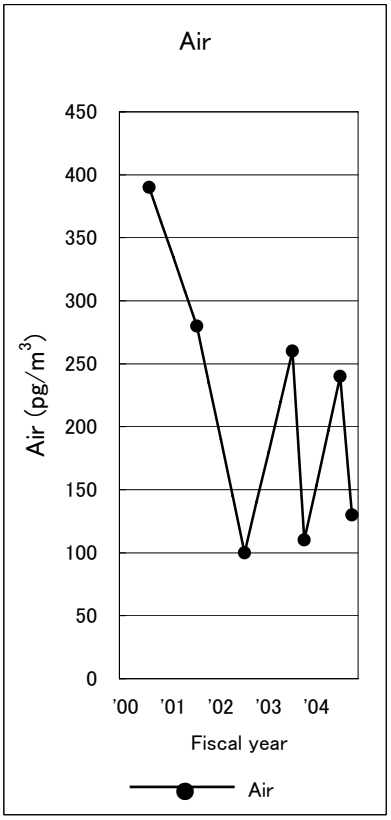
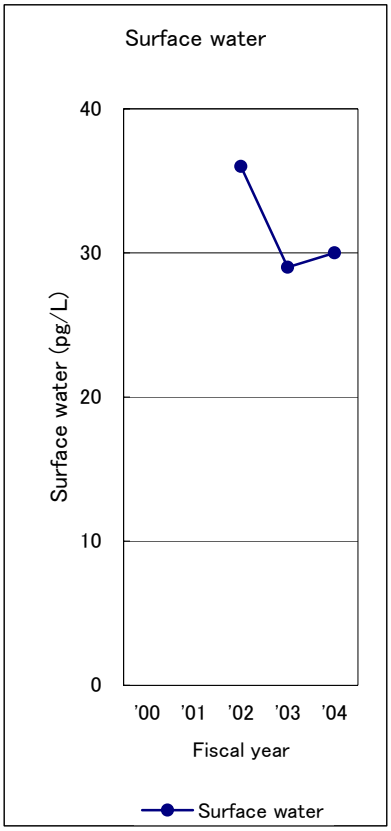


Figure 4-5-C Annual Change of PCBs in Wildlife (fish, shellfish, birds) (geometric mean)



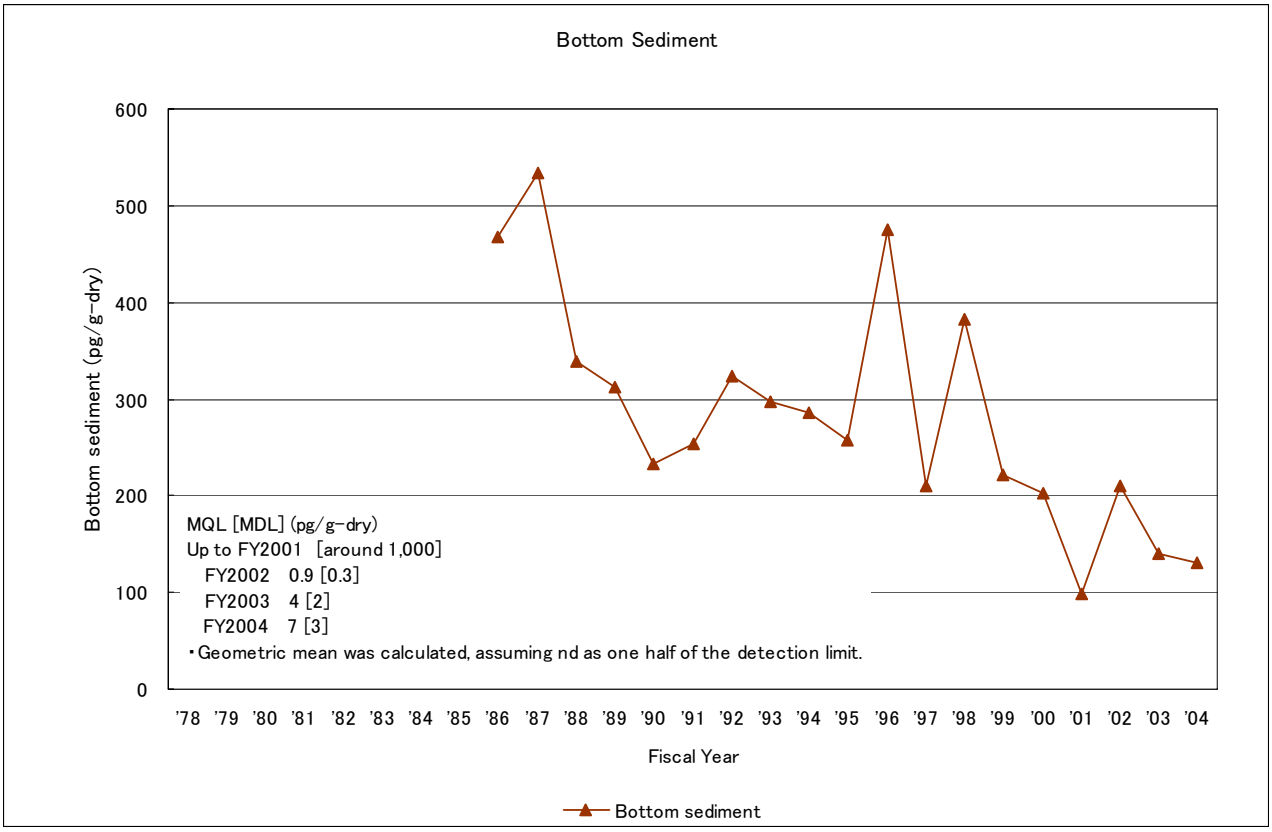
MQL [MDL] (pg/m^3)
FY2000 [0.0004～3]
FY2001 [0.0004～5]
FY2002 0.015～90 [0.005～30]
FY2003 0.013～3.2 [0.0043～1.1]
FY2004 0.024～0.99 [0.008～0.33]
・Geometric mean was calculated, assuming nd as one half of the detection limit

Figure 4-5-D Annual Change of PCBs in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.6 [0.2]
FY2003 5 [2]
FY2004 30 [8]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-6-A Annual Change of HCBs in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
Up to FY2001 [around 1,000]
FY2002 0.9 [0.3]
FY2003 4 [2]
FY2004 7 [3]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-6-B Annual Change of HCBs in Bottom Sedimant (geometric mean)

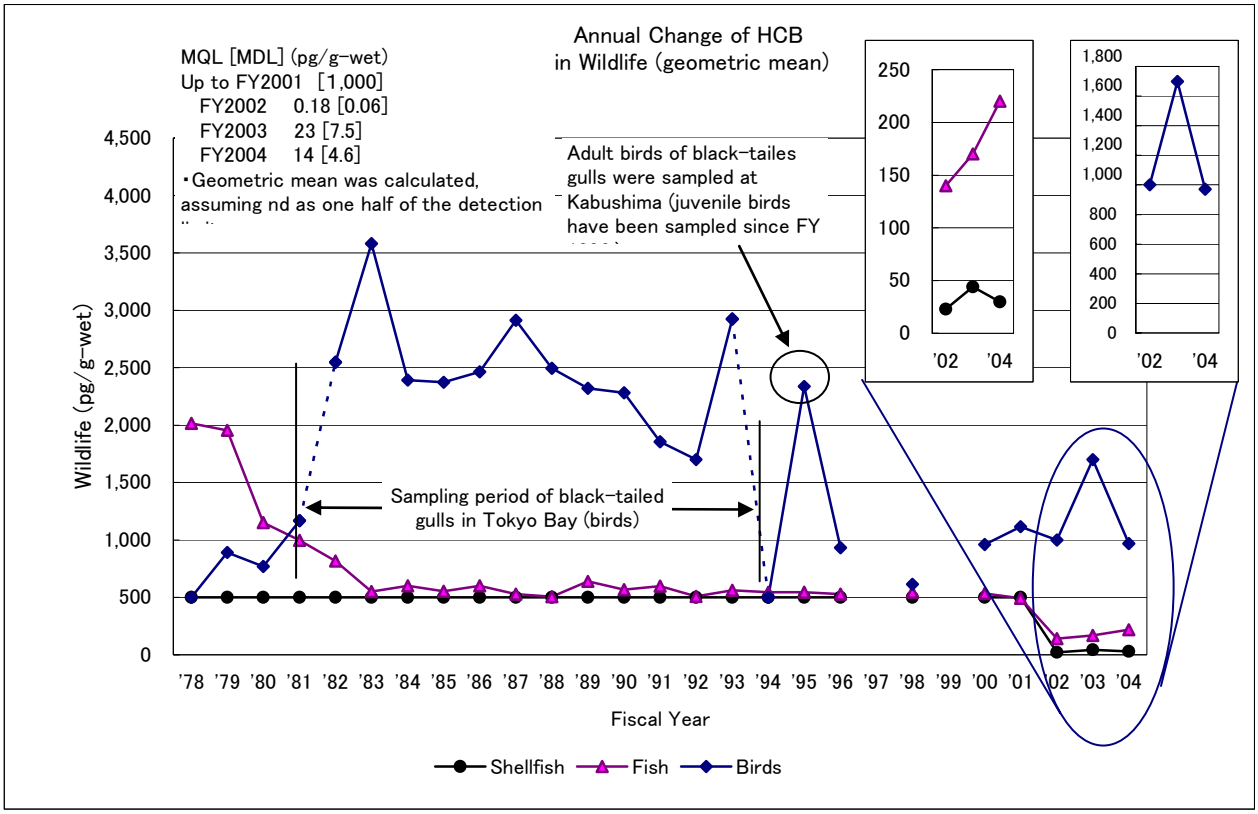
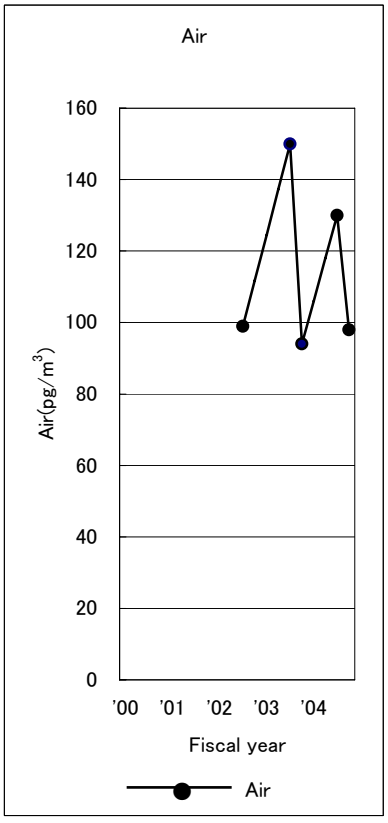
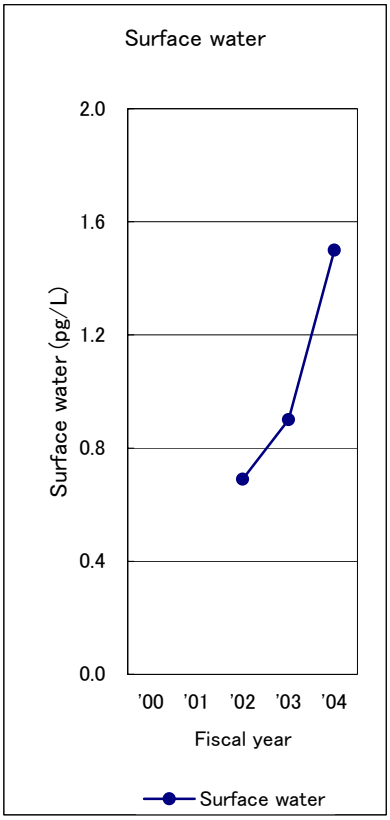


Figure 4-6-C Annual Change of HCBs in Wildlife (fish, shellfish, birds) (geometric mean)



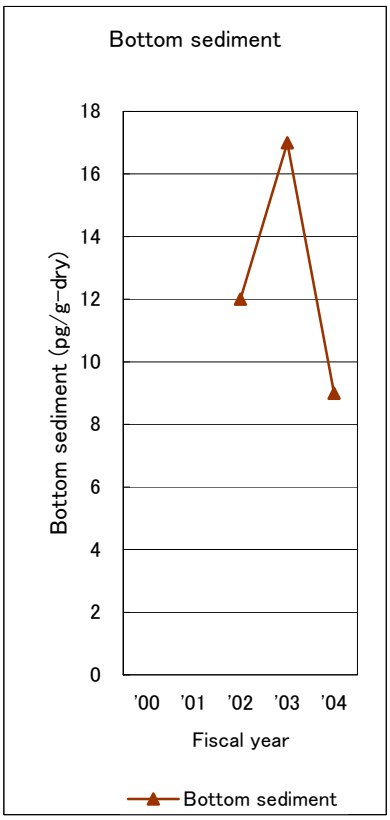
MQL [MDL] (pg/m^3)
FY2002 0.9 [0.3]
FY2003 2.3 [0.78]
FY2004 1.1 [0.37]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-6-D Annual Change of HCBs in Air (geometric mean)



NQL [MDL] (pg/g-dry)
FY2002 0.6 [0.2]
FY2003 0.6 [0.2]
FY2004 2 [0.4]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-7-A Annual Change of Aldrin in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 6 [2]
FY2003 2 [0.6]
FY2004 2 [0.6]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-7-B Annual Change of Aldrin in Bottom Sedimant (geometric mean)

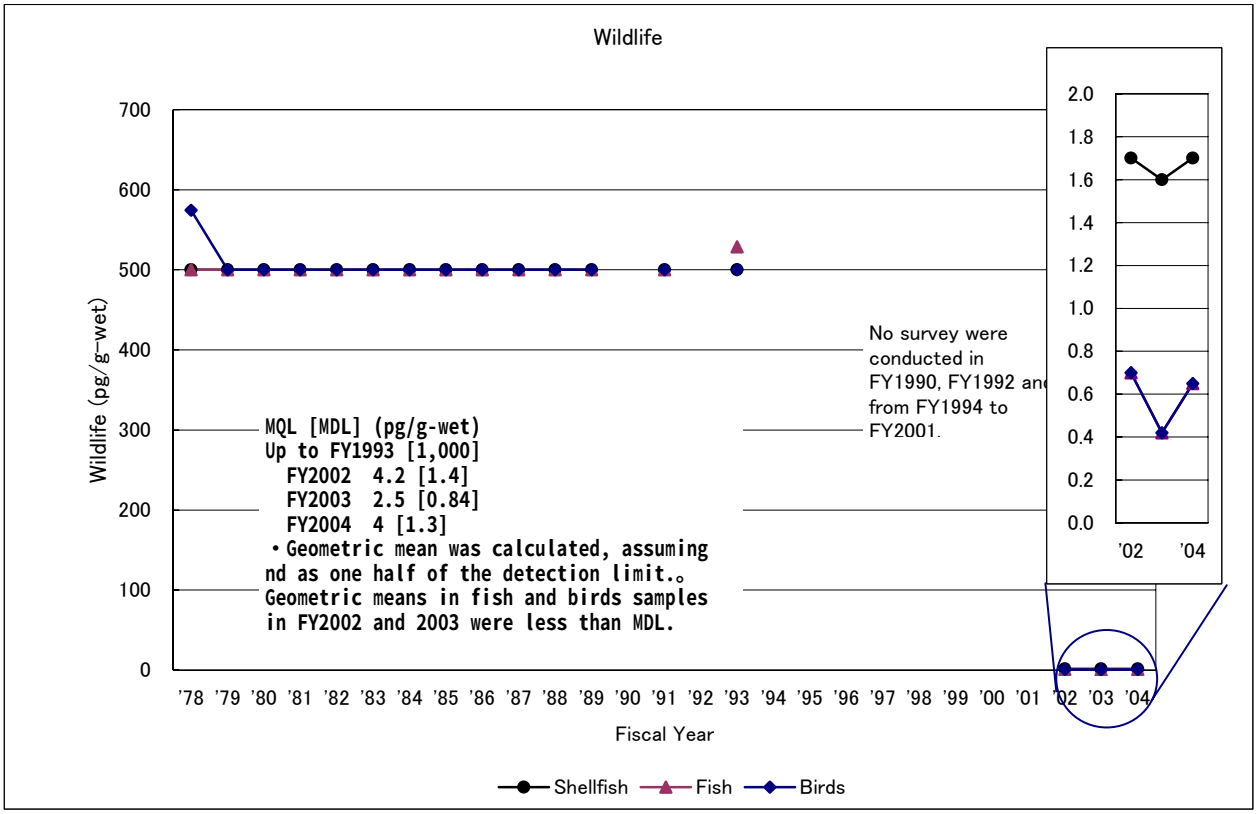
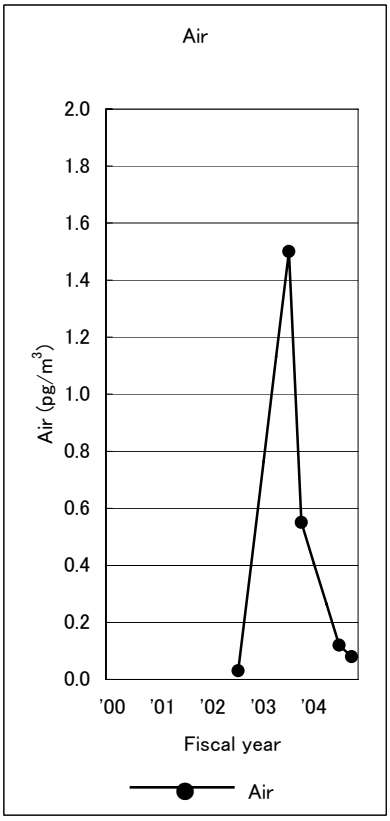
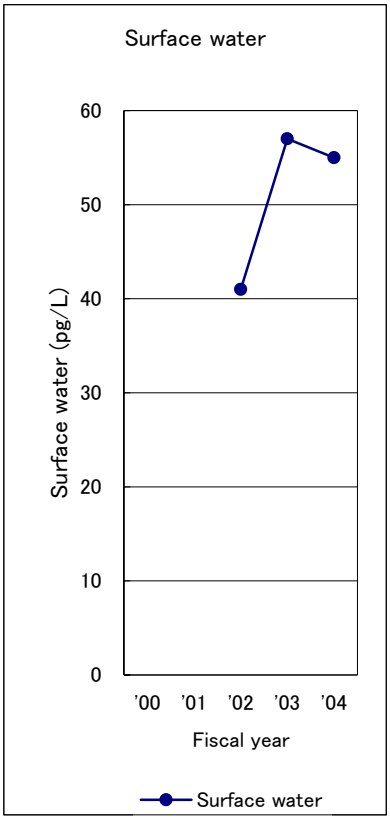


Figure 4-7-C Annual Change of Aldrin in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.060 [0.020]
FY2003 0.023 [0.0077]
FY2004 0.15 [0.05]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-7-D Annual Change of Aldrin in Air (geometric mean)



NQL [MDL] (pg/g-dry)
FY2002 1.8 [0.6]
FY2003 0.7 [0.3]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-8-A Annual Change of Dieldrin in Surface Water (geometric mean)

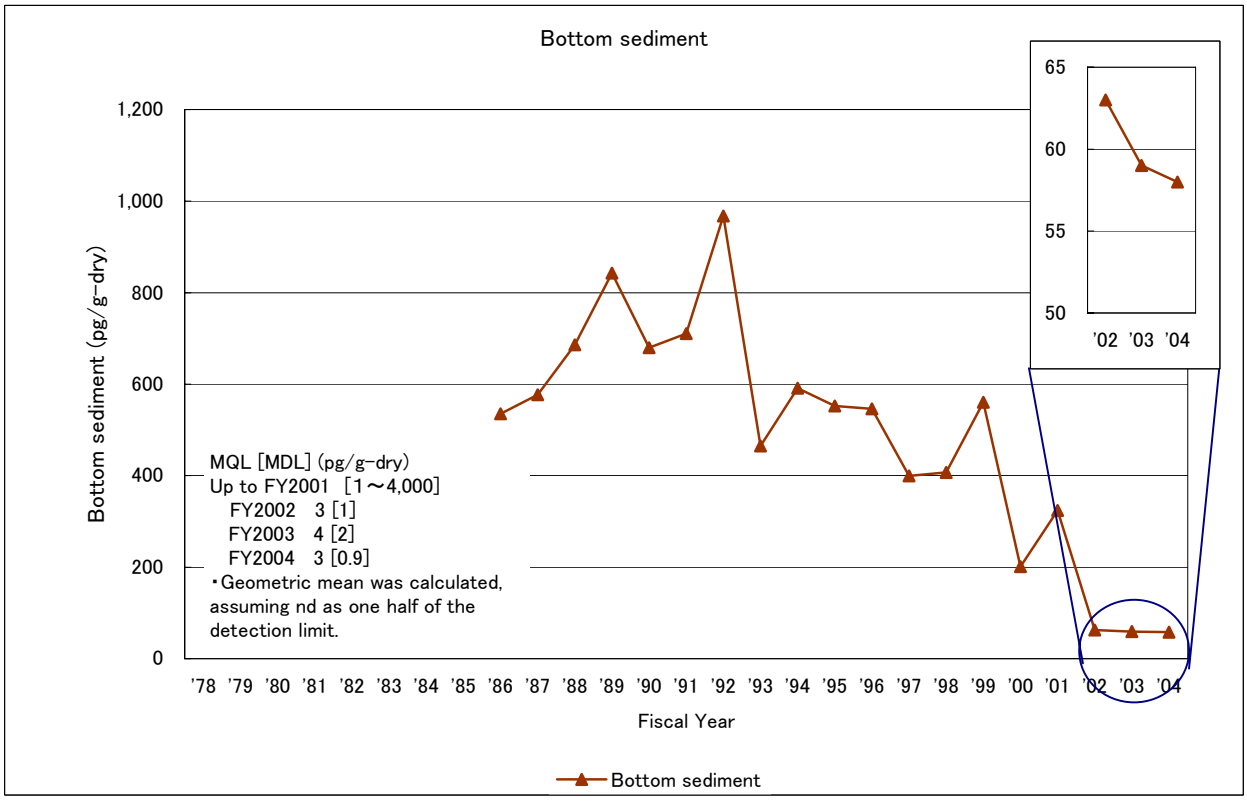


Figure 4-8-B Annual Change of Dieldrin in Bottom Sedimant (geometric mean)

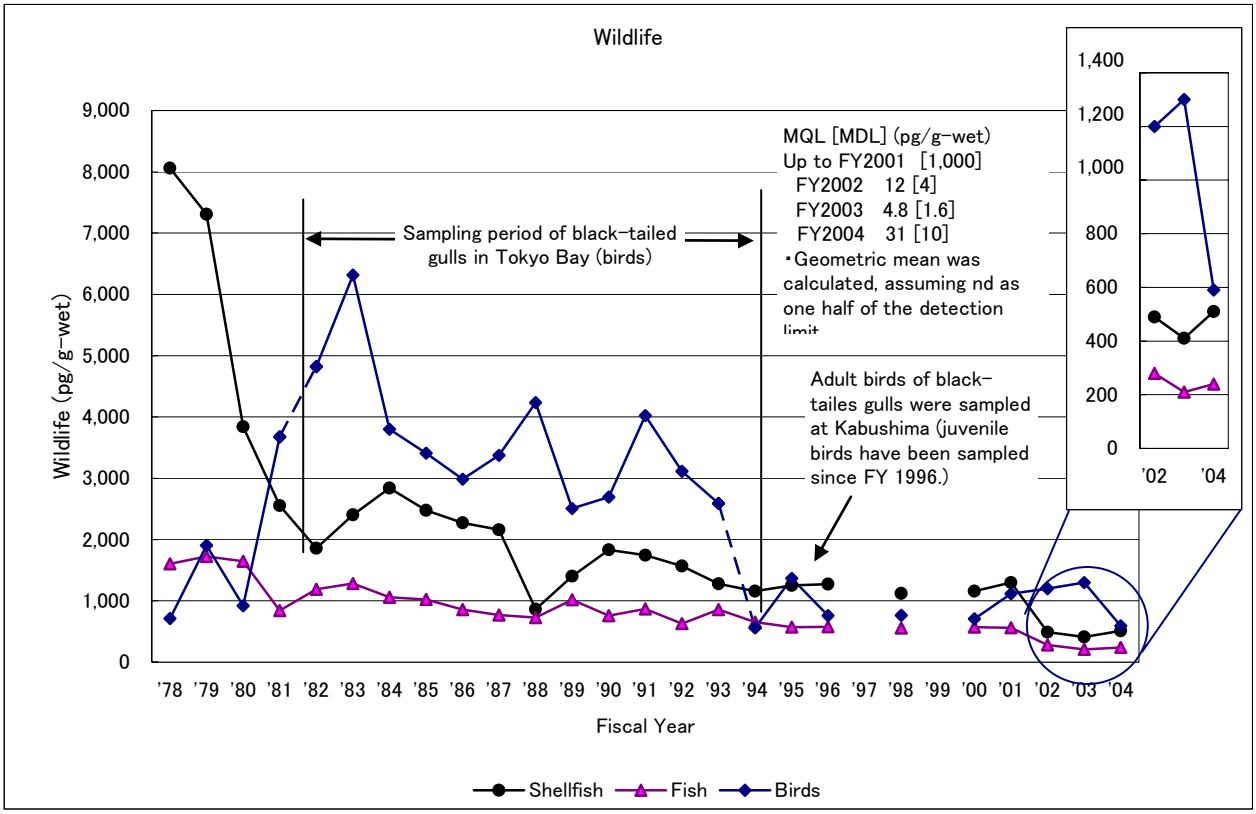
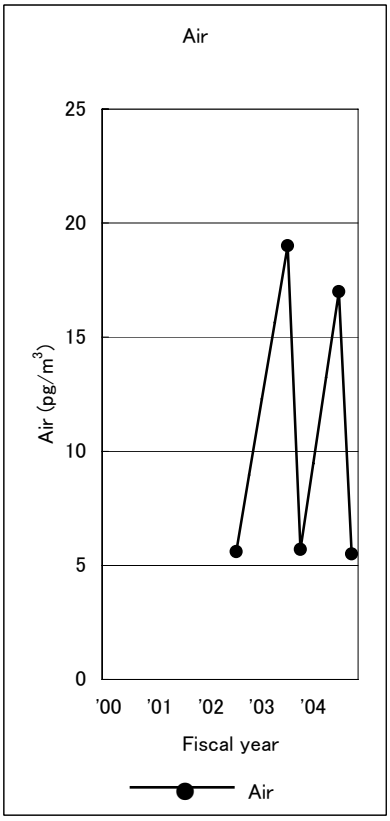
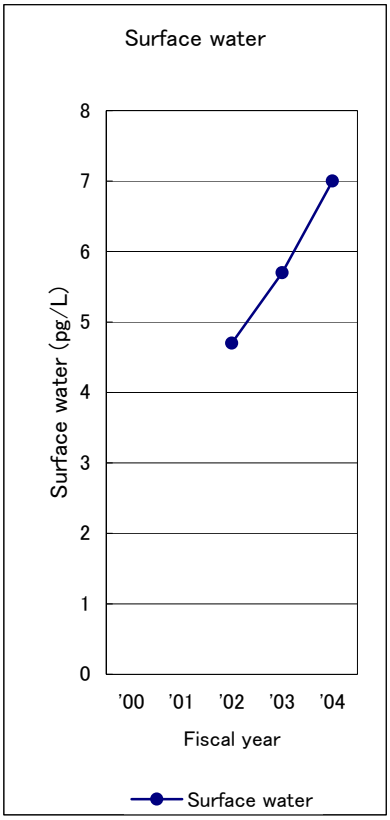


Figure 4-8-C Annual Change of Dieldrin in Wildlife (fish, shellfish, birds) (geometric mean)



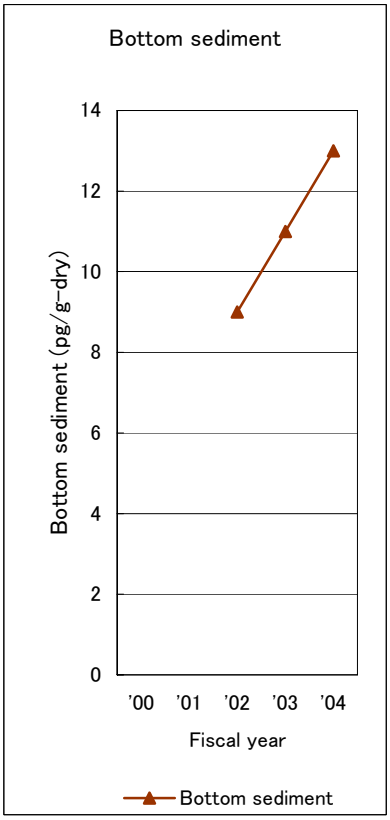
MQL [MDL] (pg/m^3)
FY2002 0.60 [0.20]
FY2003 2.1 [0.70]
FY2004 0.33 [0.11]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-8-D Annual Change of Dieldrin in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 6.0 [2.0]
FY2003 0.7 [0.3]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection

Figure 4-9-A Annual Change of Endrin in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 6 [2]
FY2003 5 [2]
FY2004 3 [0.9]
・Geometric mean was calculated, assuming nd as one half of the detection

Figure 4-9-B Annual Change of Endrin in Bottom Sedimant (geometric mean)

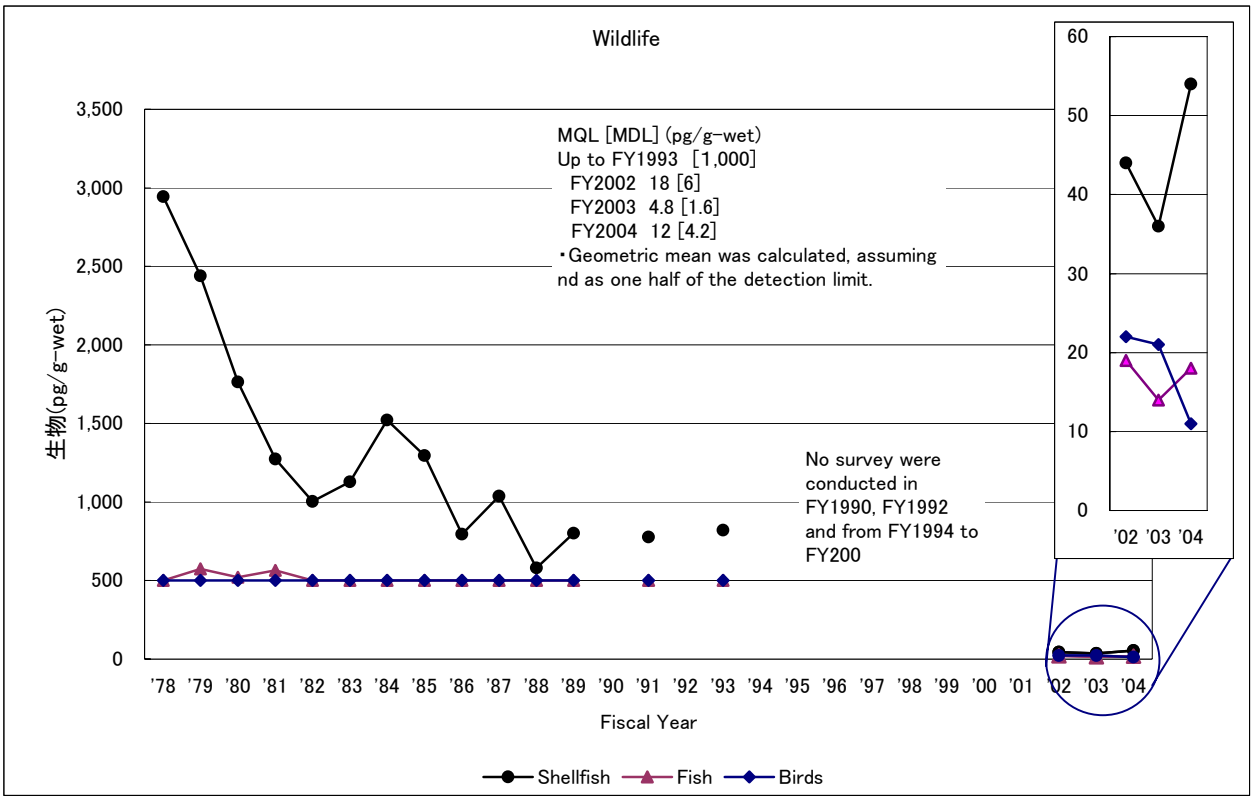
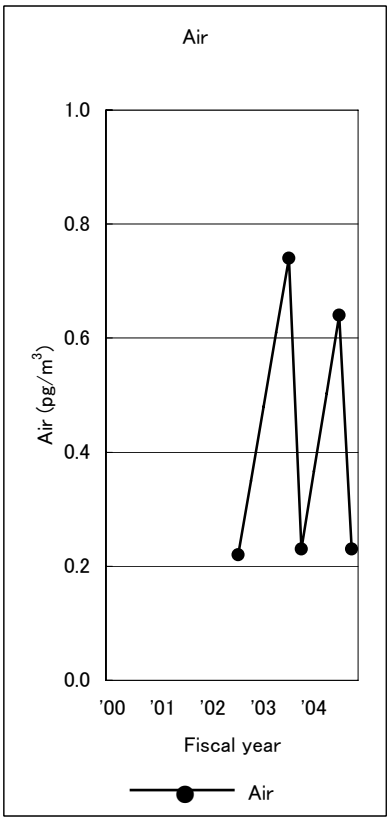
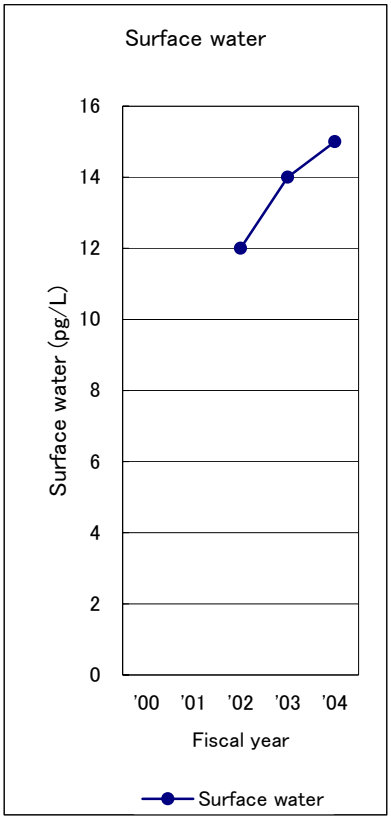


Figure 4-9-C Annual Change of Endrin in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.090 [0.030]
FY2003 0.042 [0.014]
FY2004 0.14 [0.048]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-9-D Annual Change of Endrin in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.6 [0.2]
FY2003 3 [0.9]
FY2004 6 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-10-A Annual Change of *p,p'*-DDT in Surface Water (geometric mean)

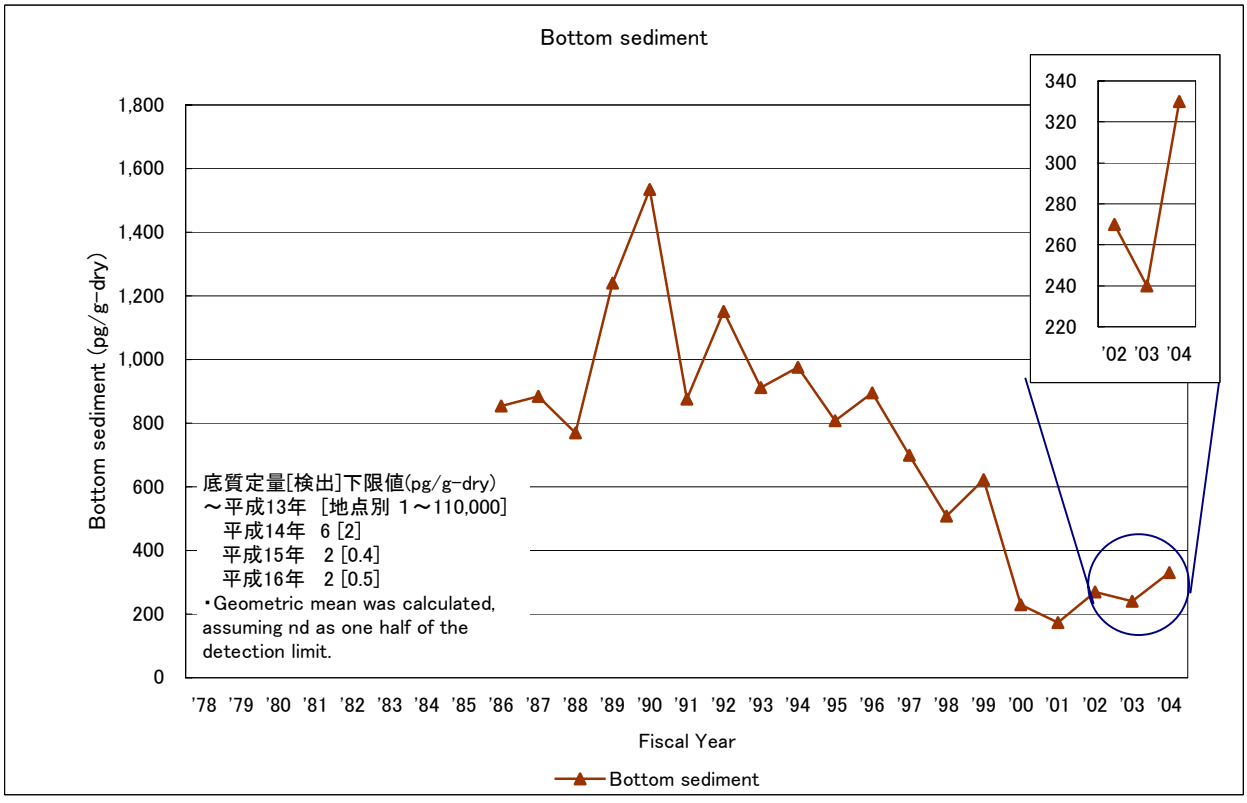


Figure 4-10-B Annual Change of *p,p'*-DDT in Bottom Sedimant (geometric mean)

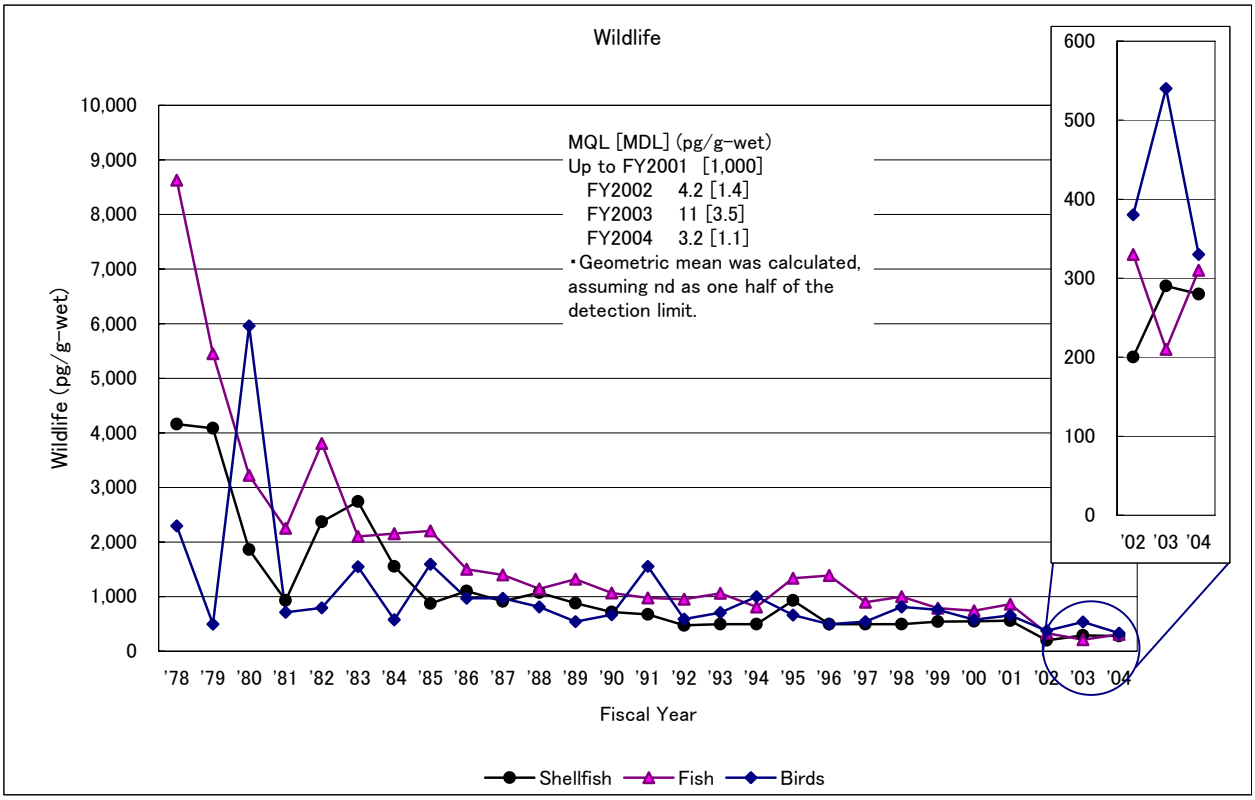
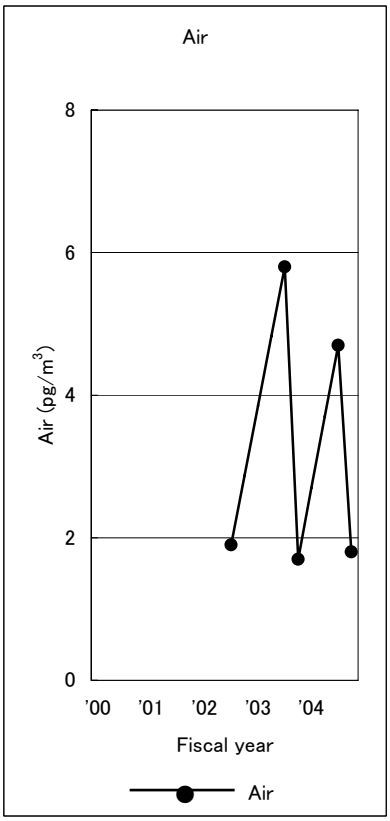
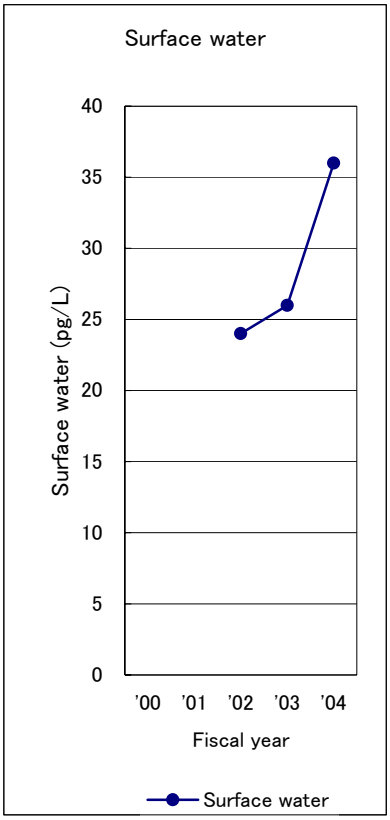


Figure 4-10-C Annual Change of *p,p'*-DDT in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.24 [0.08]
FY2003 0.14 [0.046]
FY2004 0.22 [0.074]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-10-D Annual Change of *p,p'*-DDT in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.6 [0.2]
FY2003 4 [2]
FY2004 8 [3]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-11-A Annual Change of *p,p'*-DDE iin Surface Water (geometric mean)

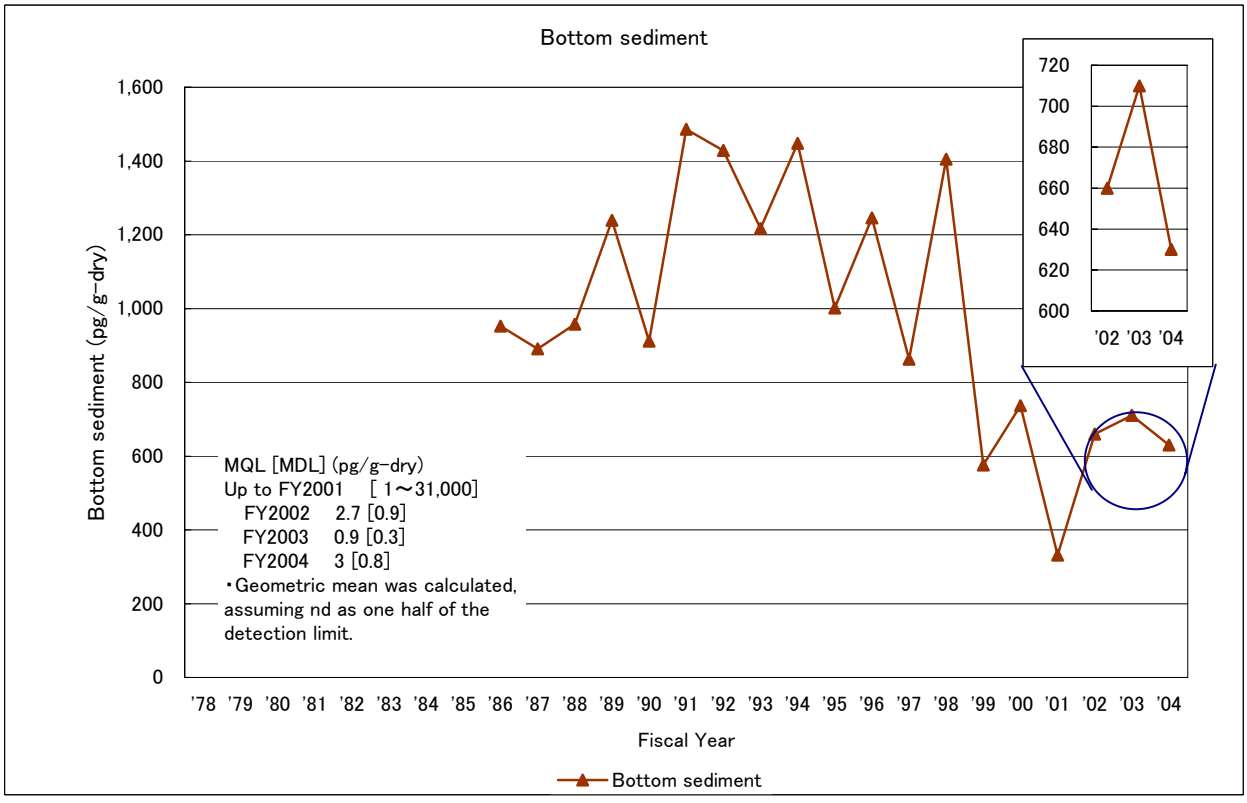


Figure 4-11-B Annual Change of *p,p'*-DDE in Bottom Sedimant (geometric mean)

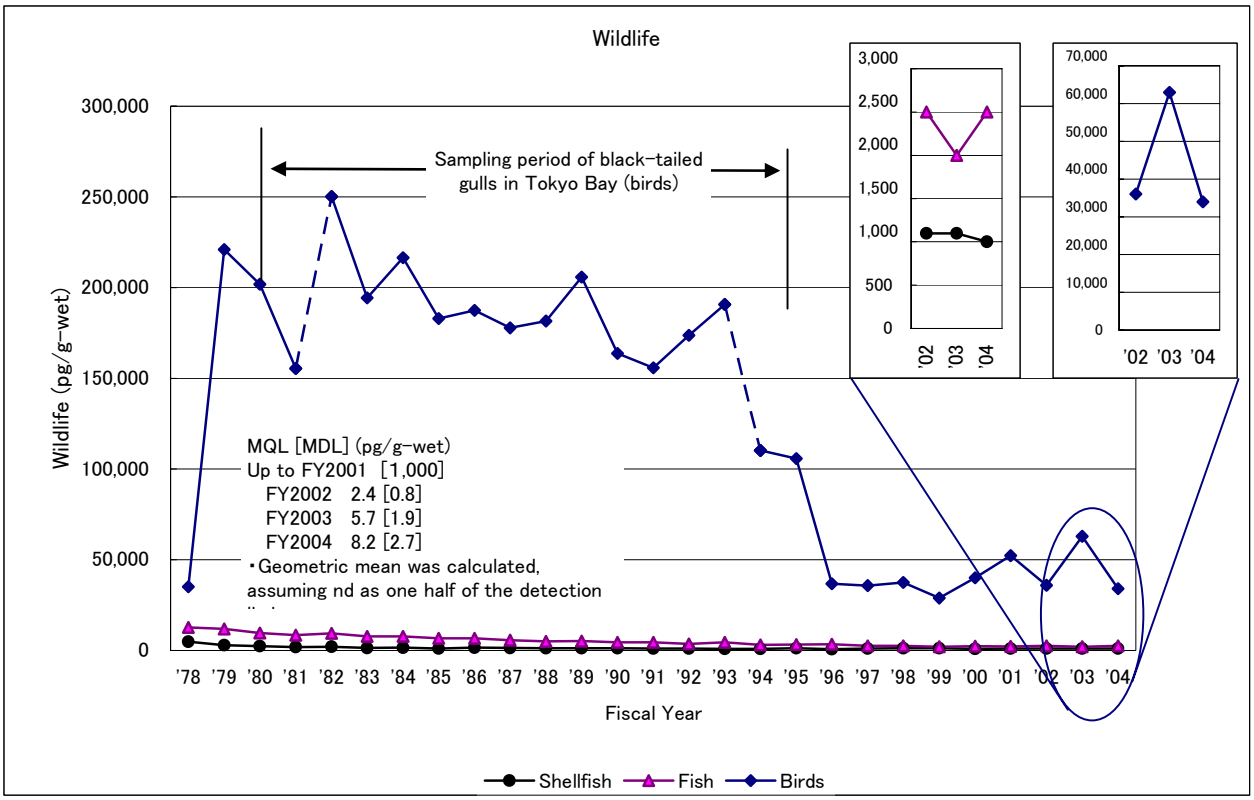
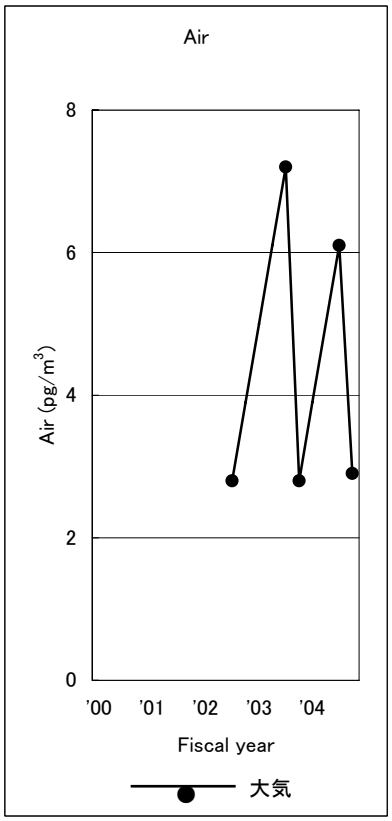
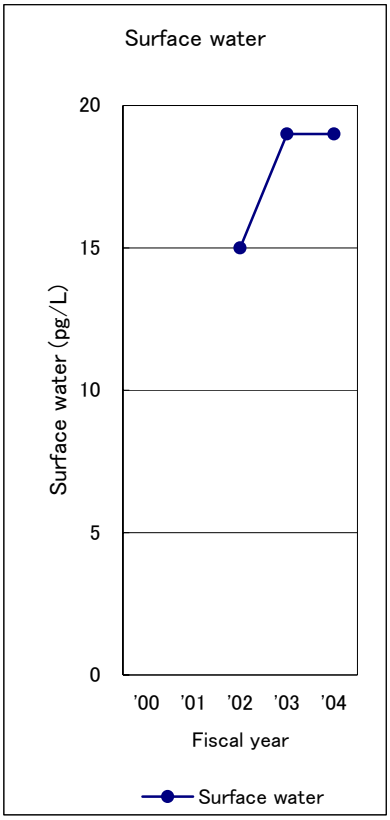


Figure 4-11-C Annual Change of *p,p'*-DDE in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.09 [0.03]
FY2003 0.40 [0.13]
FY2004 0.12 [0.039]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-11-D Annual Change of *p,p'*-DDE in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.24 [0.08]
FY2003 2 [0.5]
FY2004 3 [0.8]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-12-A Annual Change of *p,p'*-DDD in Surface Water (geometric mean)

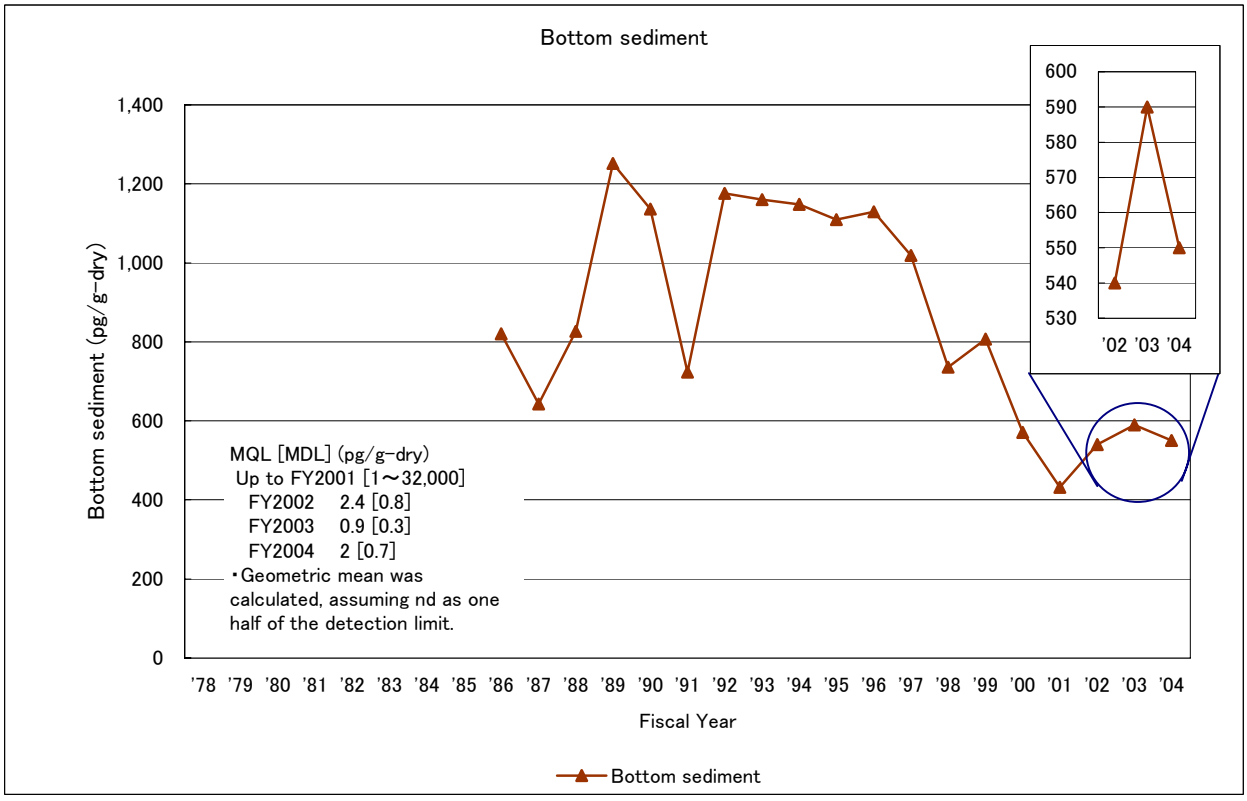


Figure 4-12-B Annual Change of *p,p'*-DDD in Bottom Sedimant (geometric mean)

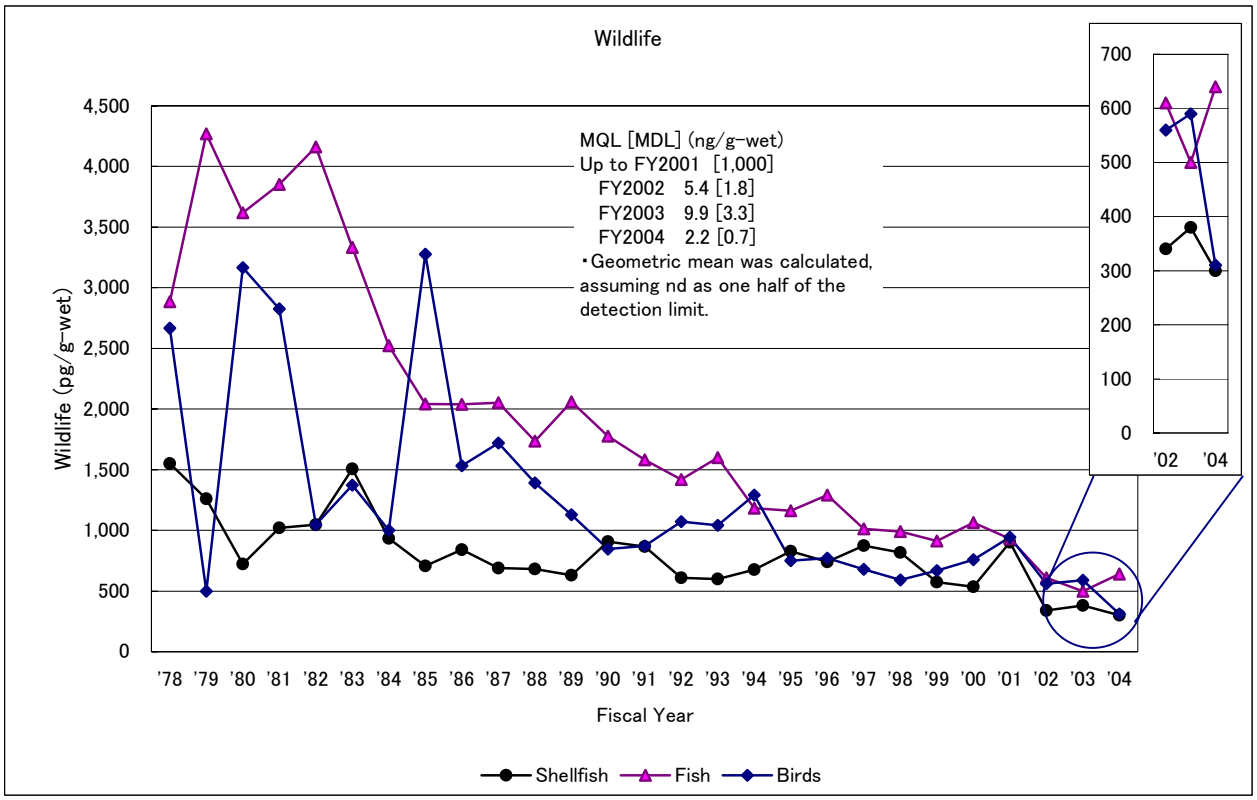
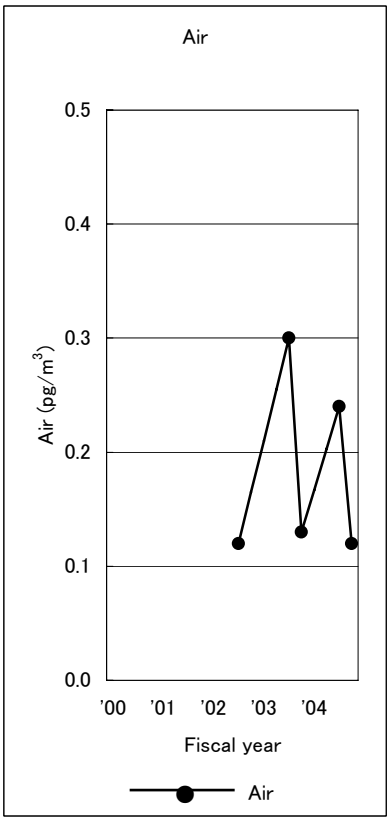
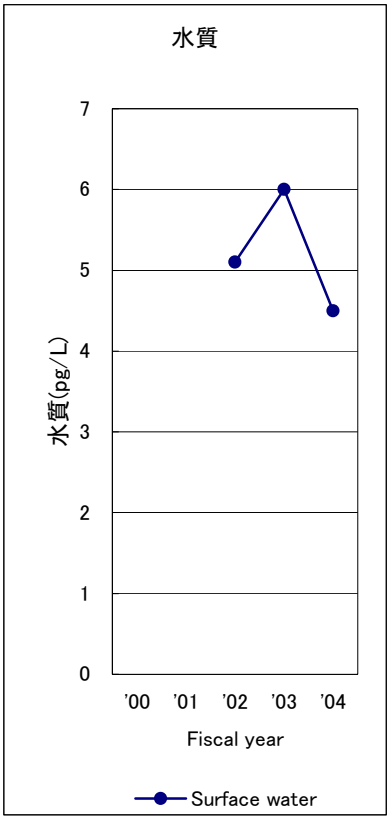


Figure 4-12-C Annual Change of *p,p'*-DDD in Wildlife (fish, shellfish, birds) (geometric mean)



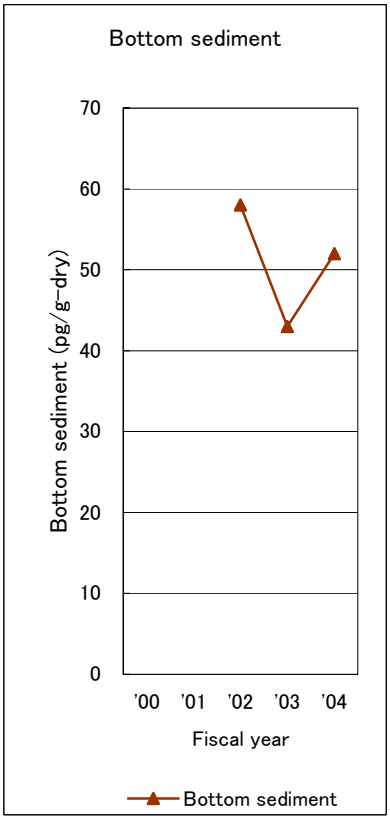
MQL [MDL] (pg/m^3)
FY2002 0.018 [0.006]
FY2003 0.054 [0.018]
FY2004 0.053 [0.018]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-12-D Annual Change of *p,p'*-DDD in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 1.2 [0.4]
FY2003 3 [0.7]
FY2004 5 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-13-A Annual Change of *o,p'*-DDT in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 6 [2]
FY2003 0.8 [0.3]
FY2004 2 [0.6]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-13-B Annual Change of *o,p'*-DDT in Bottom Sedimant (geometric mean)

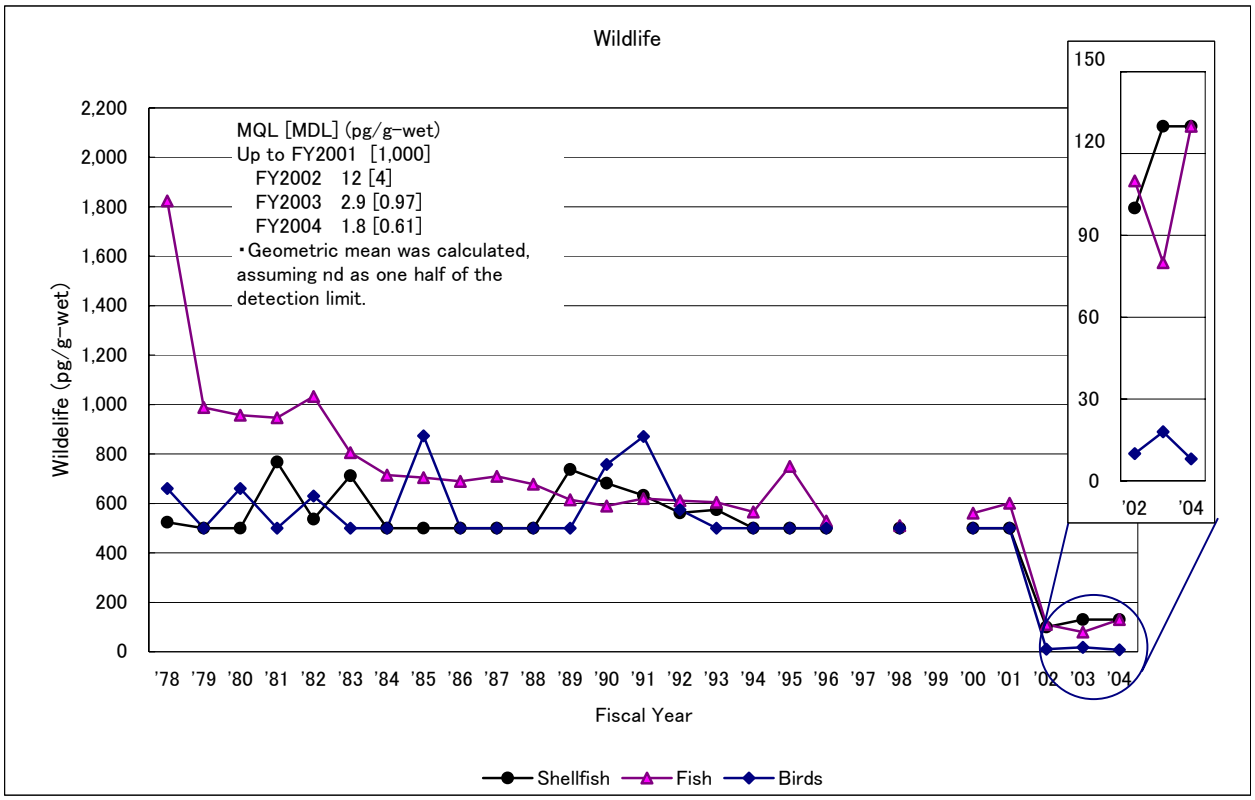
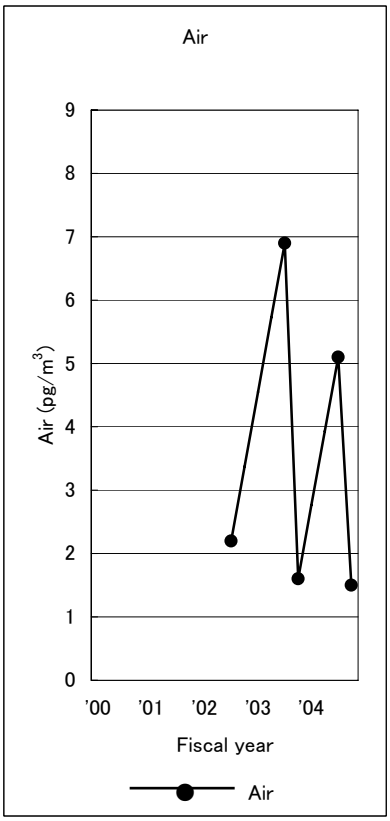
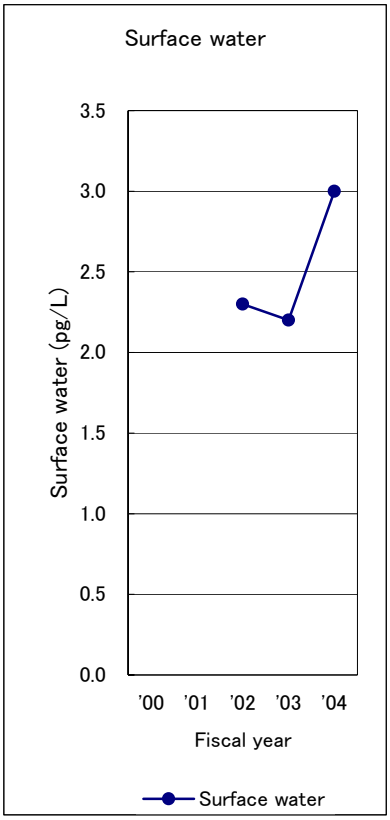


Figure 4-13-C Annual Change of *o,p'*-DDT in Wildlife (fish, shellfish, birds) (geometric mean)



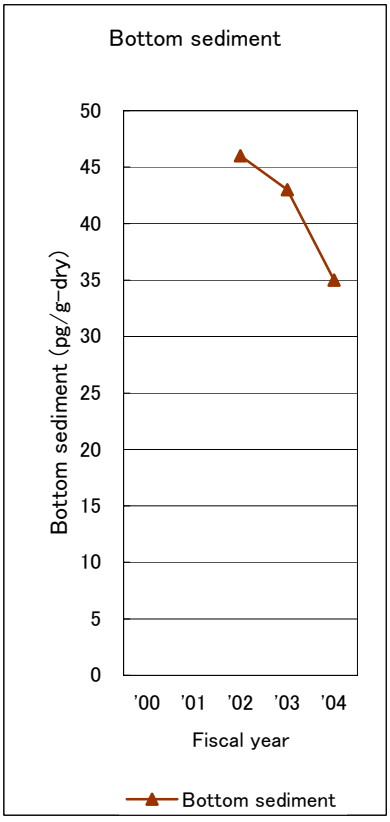
MQL [MDL] (pg/m^3)
FY2002 0.15 [0.05]
FY2003 0.12 [0.040]
FY2004 0.093 [0.031]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-13-D Annual Change of *o,p'*-DDT in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.9 [0.3]
FY2003 0.8 [0.3]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-14-A Annual Change of *o,p'*-DDE in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 3 [1]
FY2003 0.6 [0.2]
FY2004 3 [0.8]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-14-B Annual Change of *o,p'*-DDE in Bottom Sedimant (geometric mean)

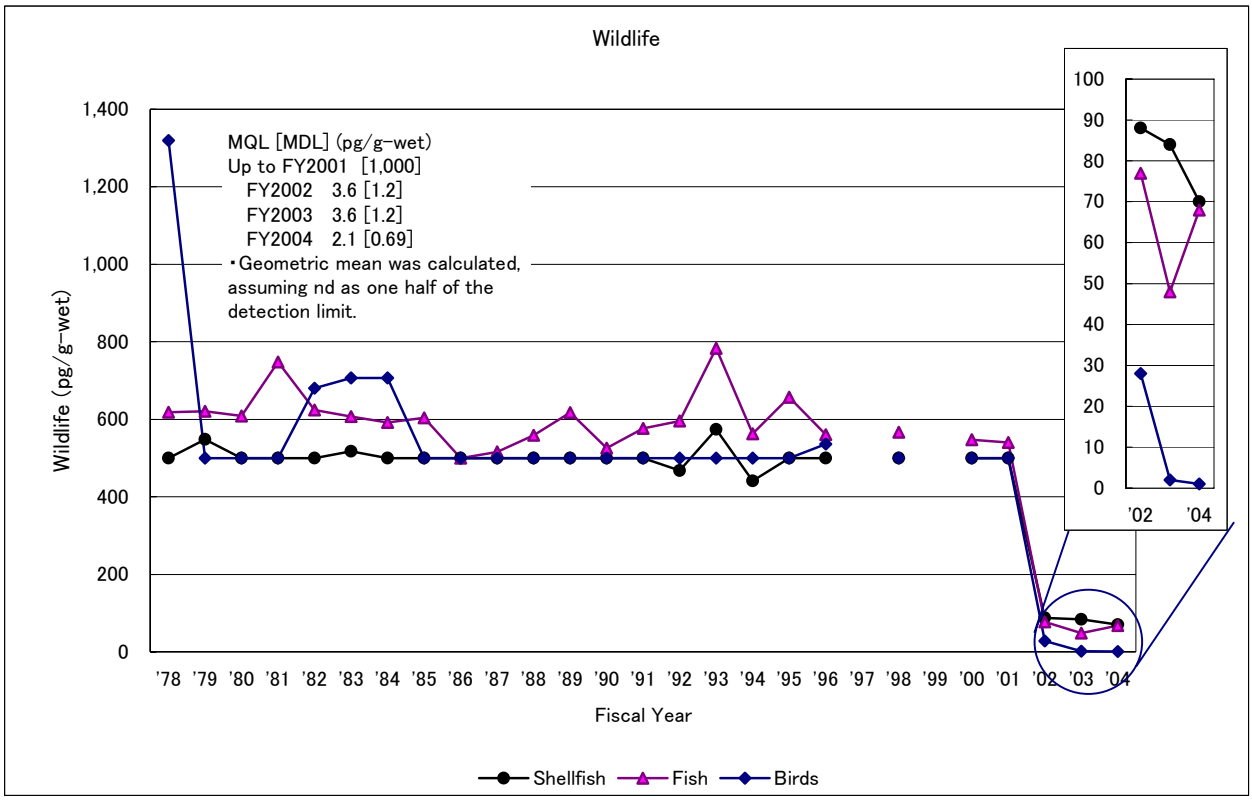
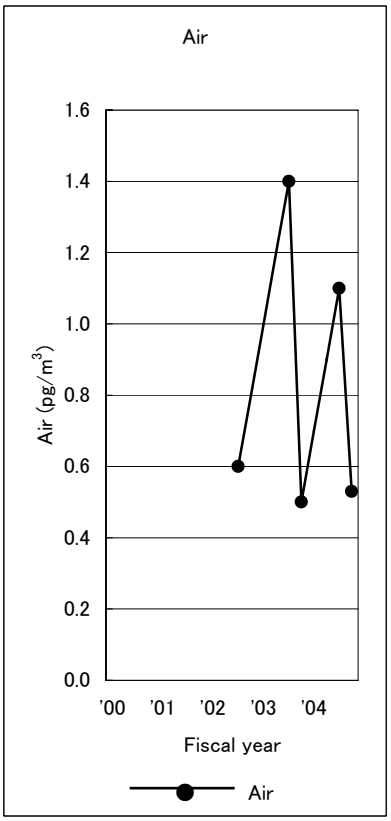
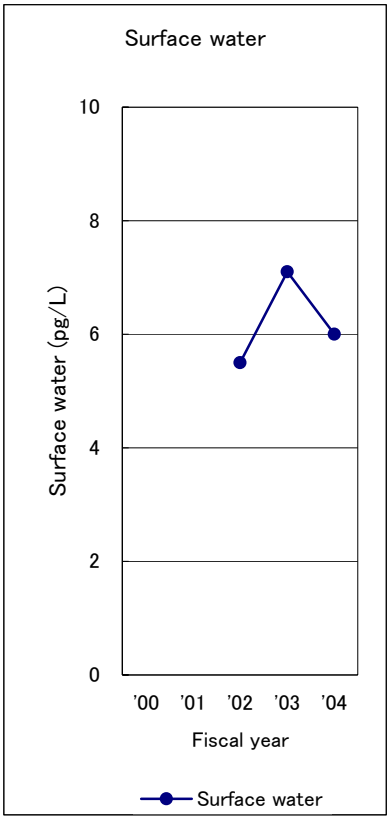


Figure 4-14-C Annual Change of *o,p'*-DDE in Wildlife (fish, shellfish, birds) (geometric mean)



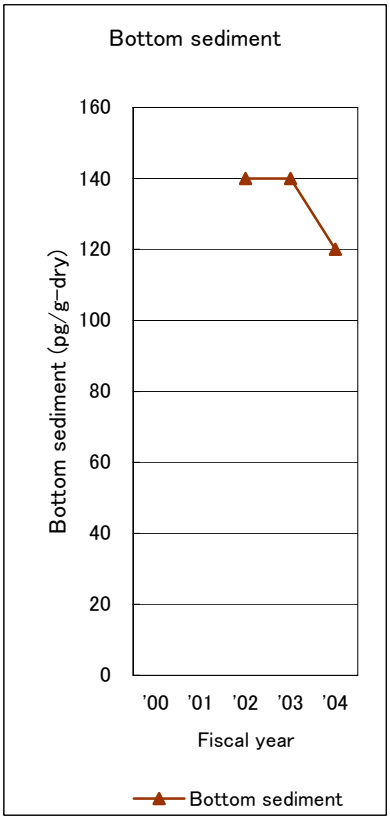
MQL [MDL] (pg/m^3)
FY2002 0.03 [0.01]
FY2003 0.020 [0.0068]
FY2004 0.037 [0.012]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-14-D Annual Change of *o,p'*-DDE in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.6 [0.2]
FY2003 0.8 [0.3]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-15-A Annual Change of *o,p'*-DDD in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 6 [2]
FY2003 2 [0.5]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-15-B Annual Change of *o,p'*-DDD in Bottom Sedimant (geometric mean)

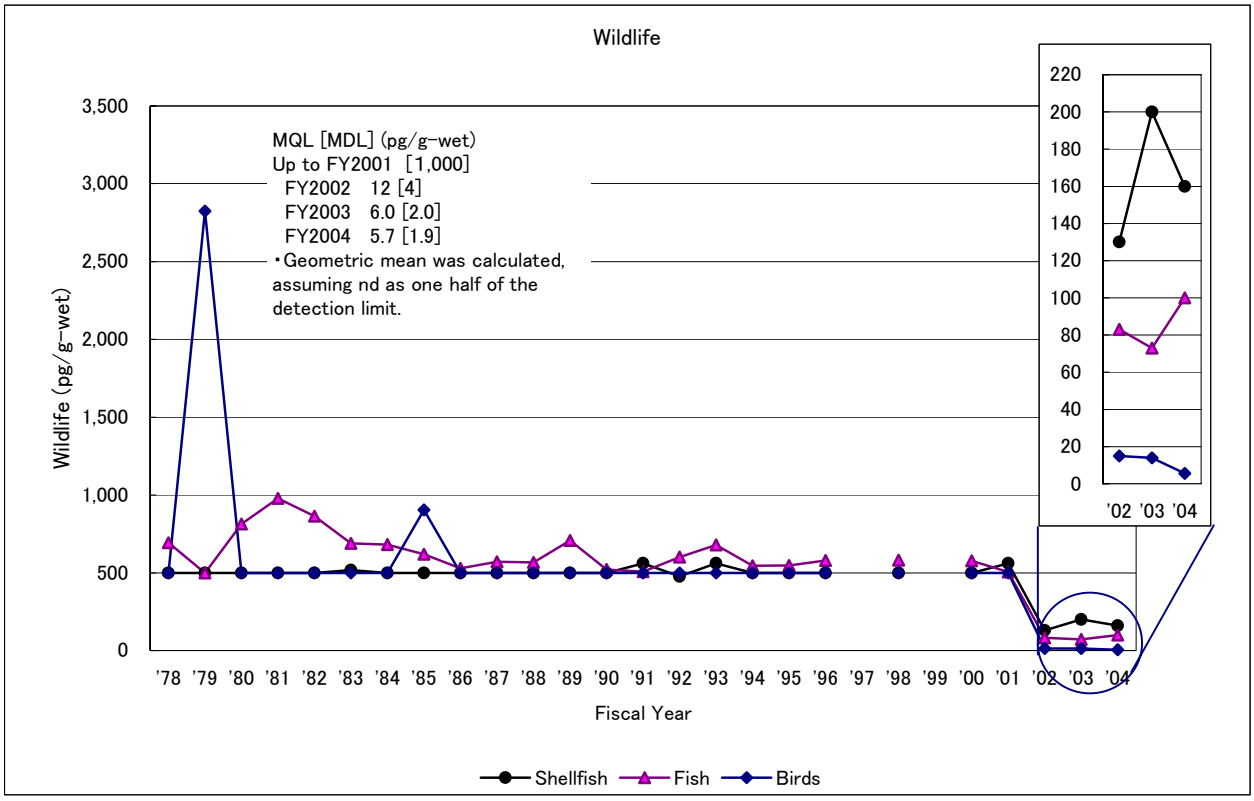
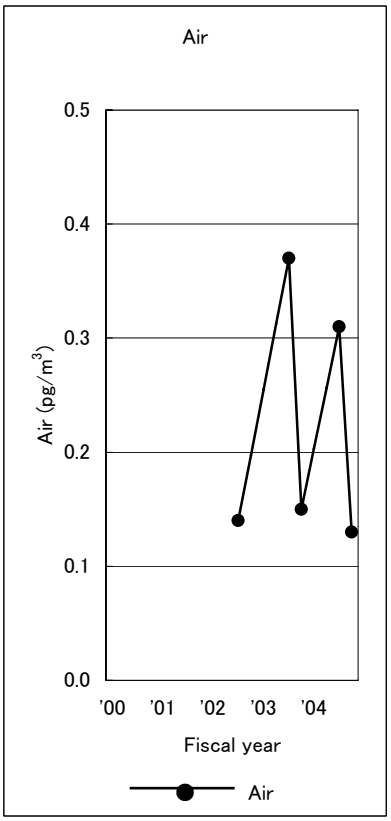
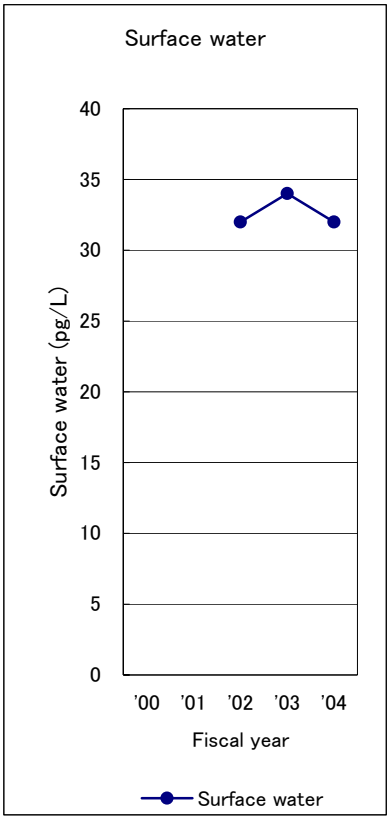


Figure 4-15-C Annual Change of *o,p'*-DDD in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.021 [0.006]
FY2003 0.042 [0.014]
FY2004 0.14 [0.048]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-15-D Annual Change of *o,p'*-DDD in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 1.5 [0.5]
FY2003 5 [2]
FY2004 5 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-16-A Annual Change of *trans*-Chlordane in Surface Water (geometric mean)

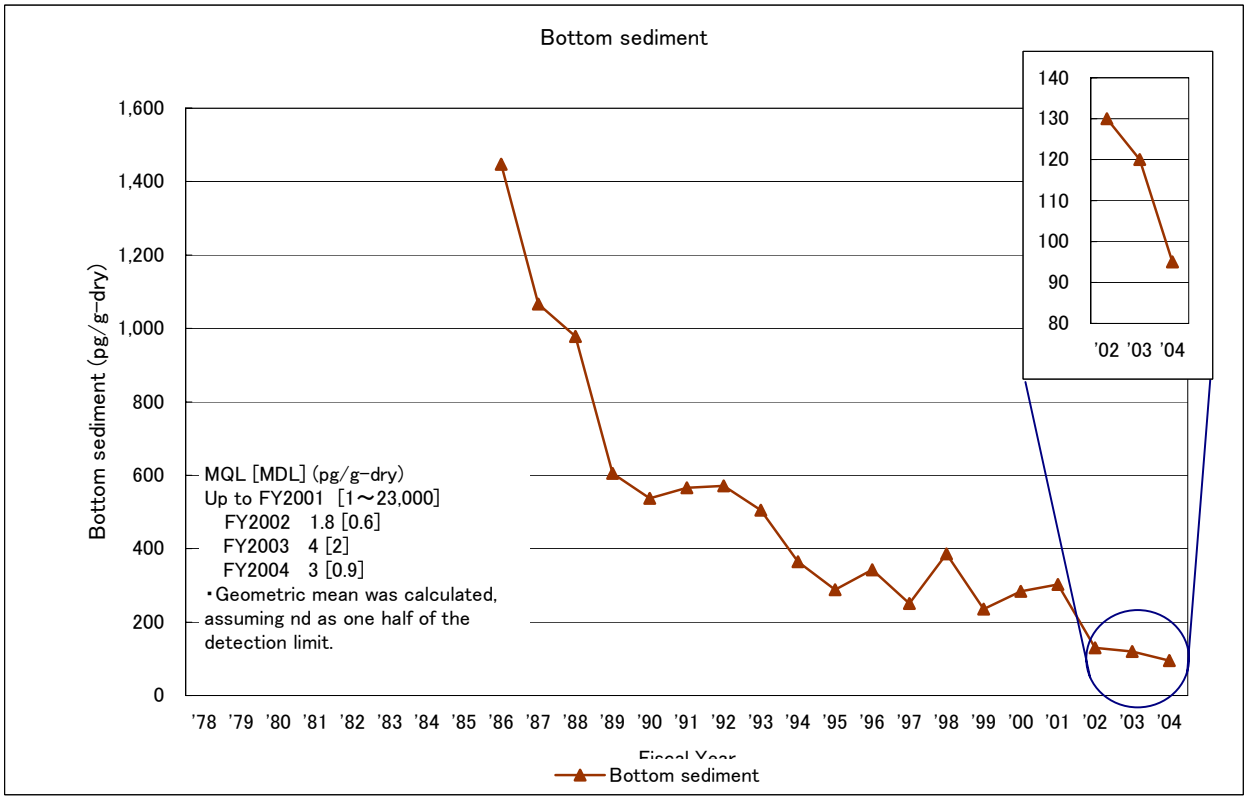


Figure 4-16-B Annual Change of *trans*-Chlordane in Bottom Sedimant (geometric mean)

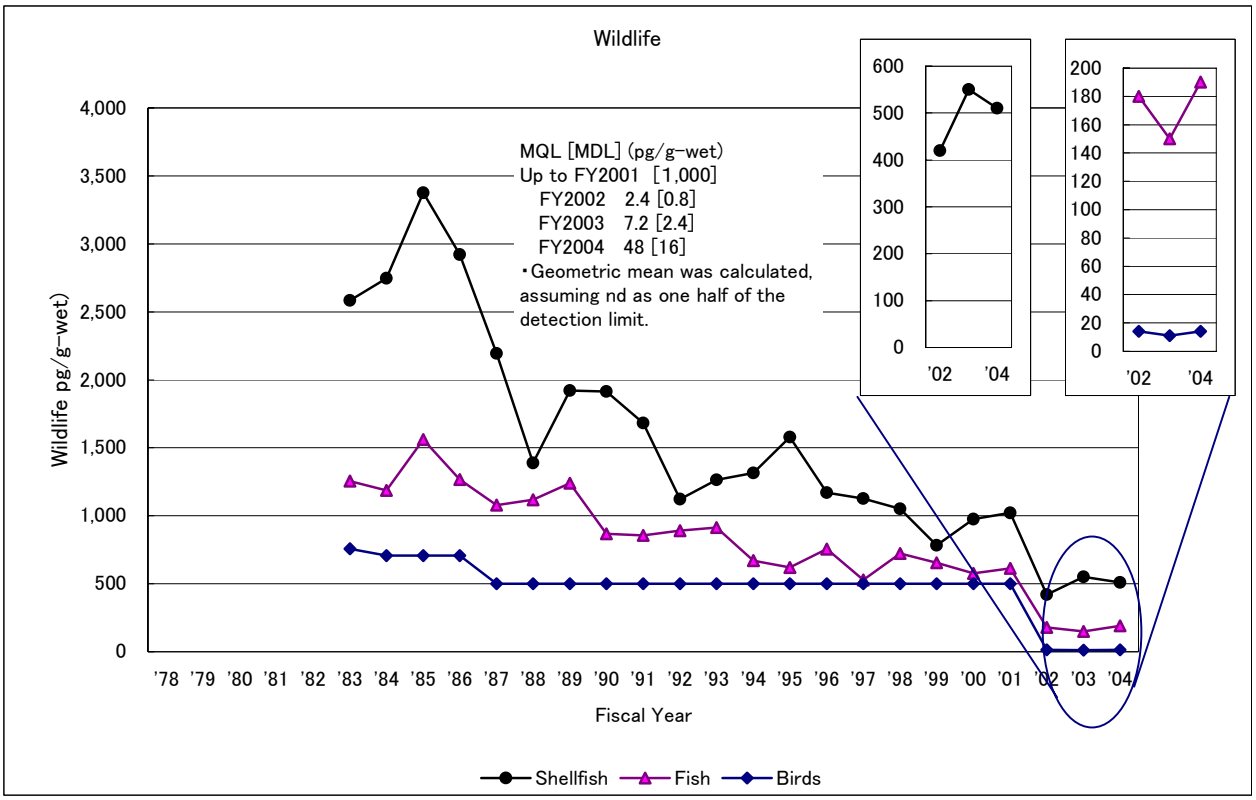
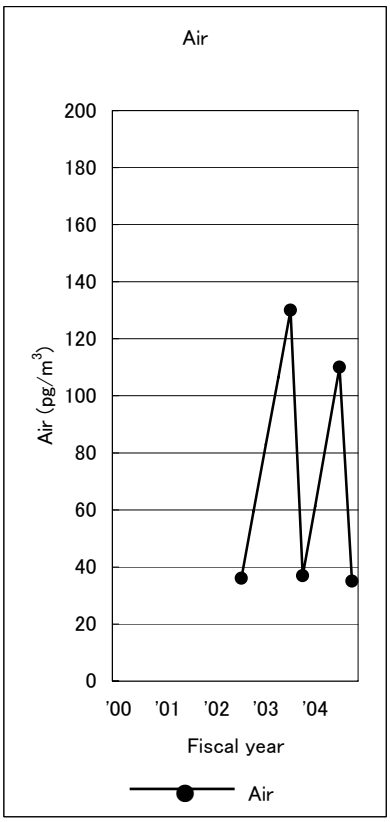
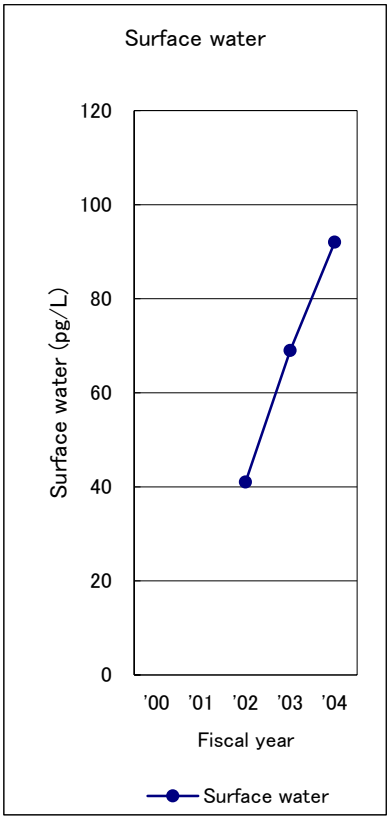


Figure 4-16-C Annual Change of *trans*-Chlordane in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.60 [0.20]
FY2003 0.86 [0.29]
FY2004 0.69 [0.23]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-16-D Annual Change of *trans*-Chlordane in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.9 [0.3]
FY2003 3 [0.9]
FY2004 6 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-17-A Annual Change of *cis*-Chlordane in Surface Water (geometric mean)

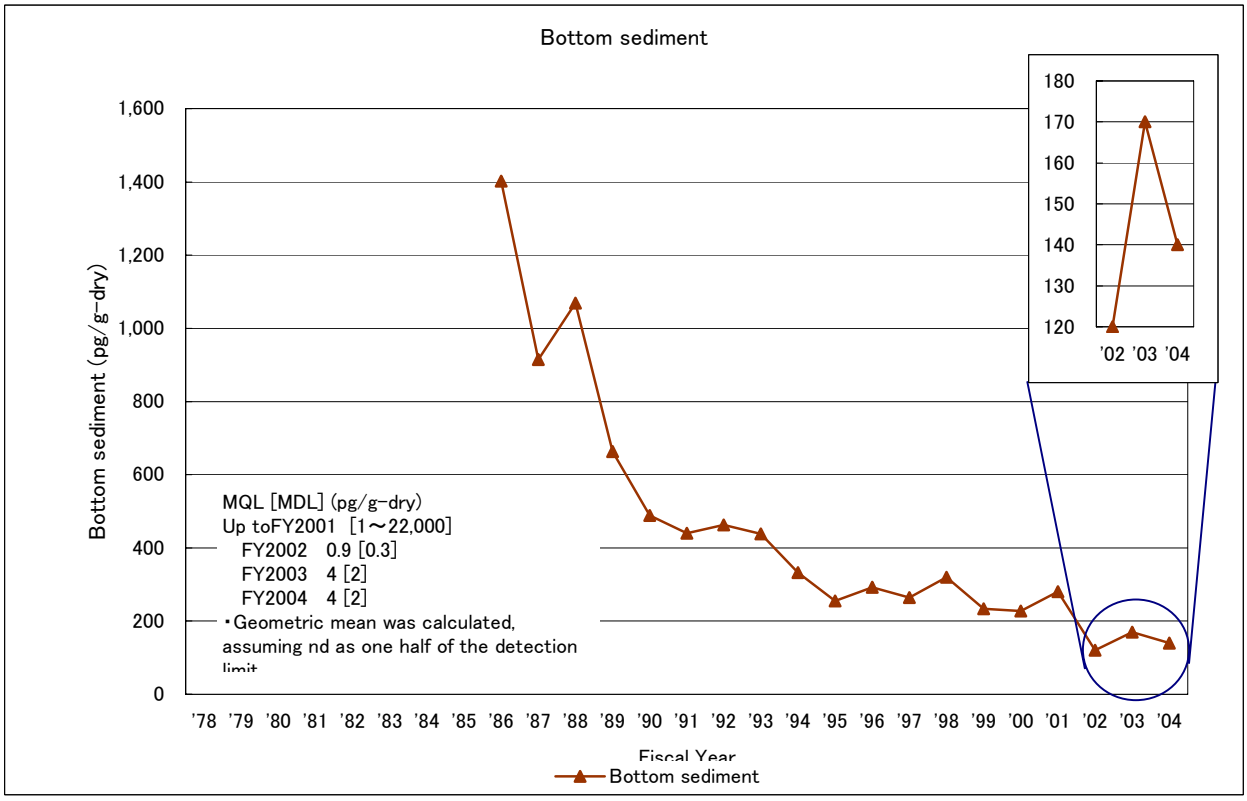


Figure 4-17-B Annual Change of *cis*-Chlordane in Bottom Sedimant (geometric mean)

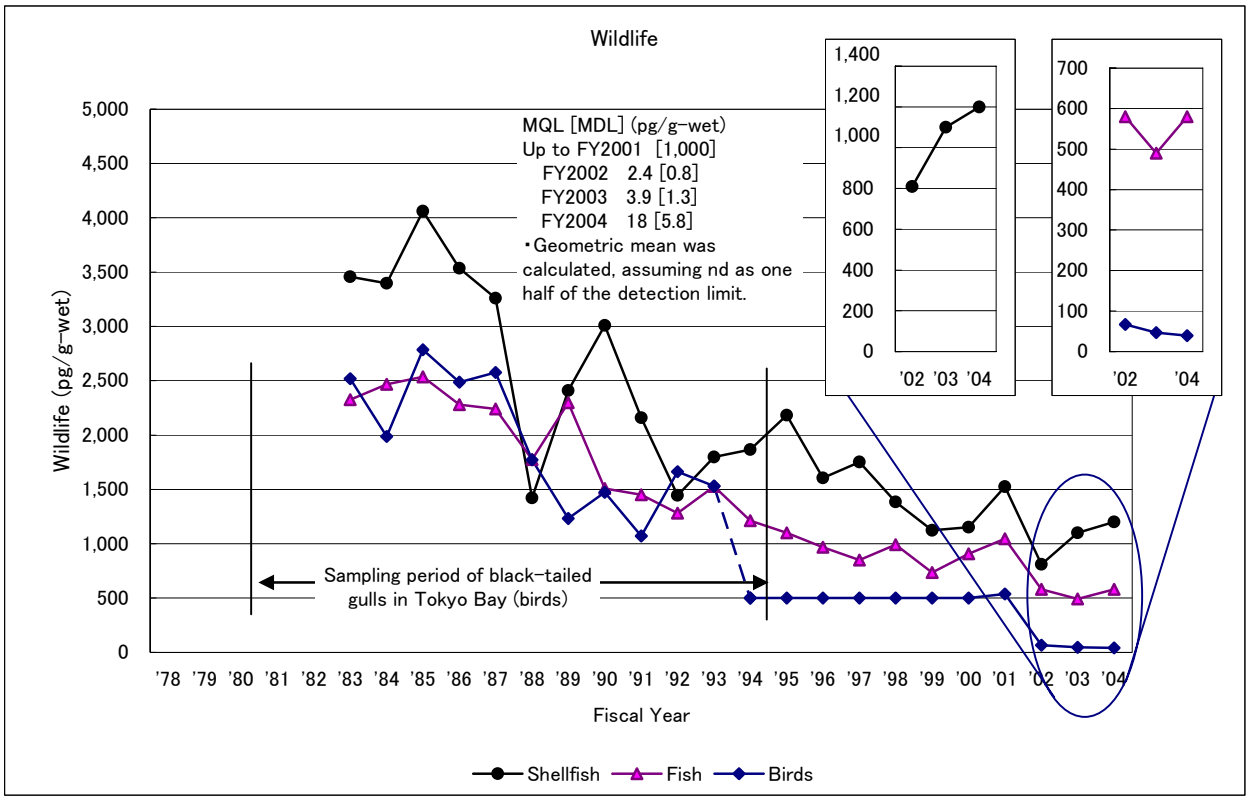
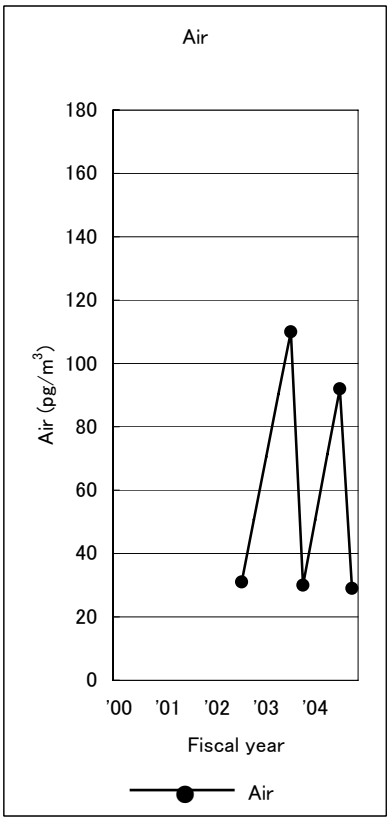
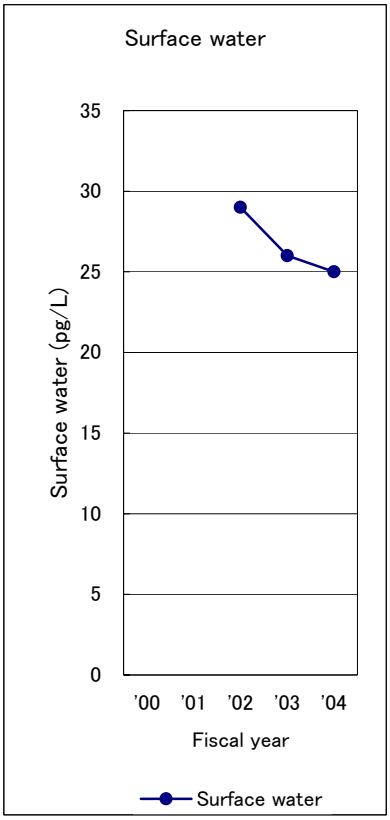


Figure 4-17-C Annual Change of *cis*-Chlordane in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2002 0.60 [0.20]
FY2003 0.51 [0.17]
FY2004 0.57 [0.19]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-17-D Annual Change of *cis*-Chlordane in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 1.2 [0.4]
FY2003 2 [0.5]
FY2004 4 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-18-A Annual Change of *trans*-Nonachlor in Surface Water (geometric mean)

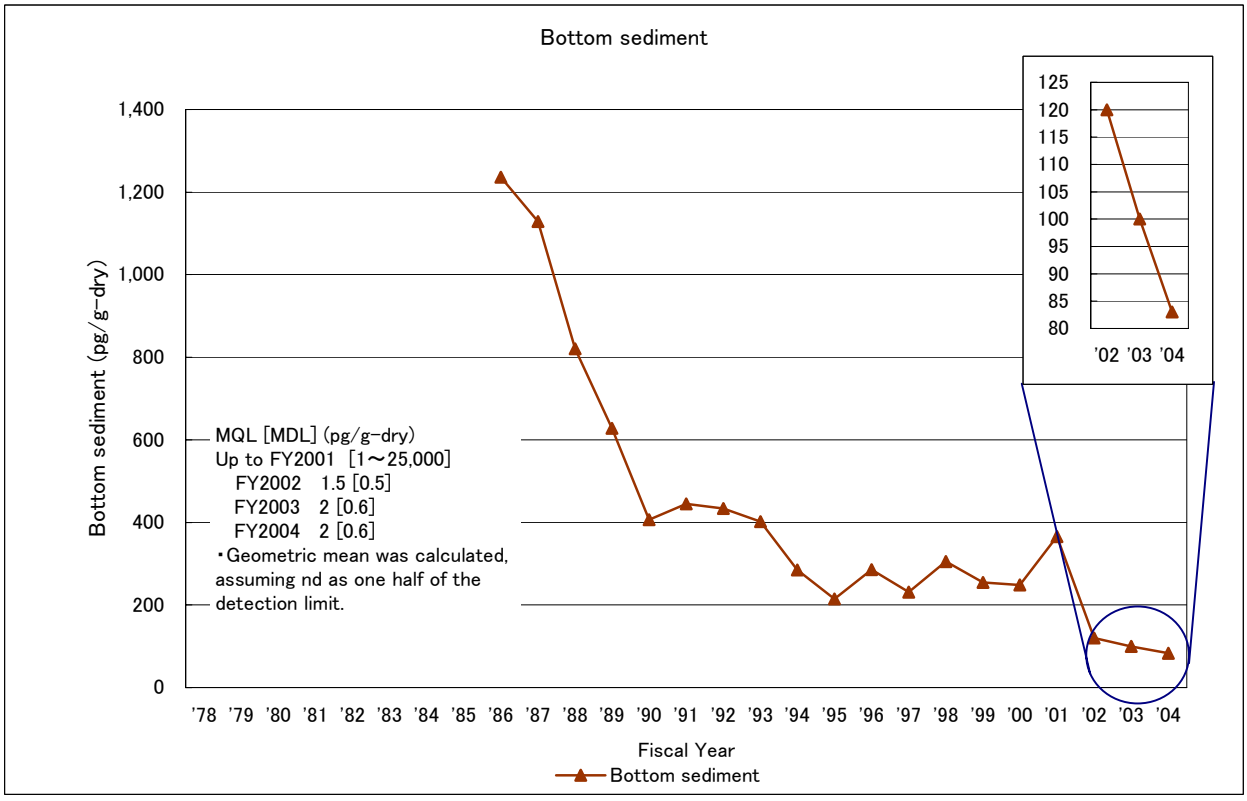


Figure 4-18-B Annual Change of *trans*-Nonachlor in Bottom Sedimant (geometric mean)

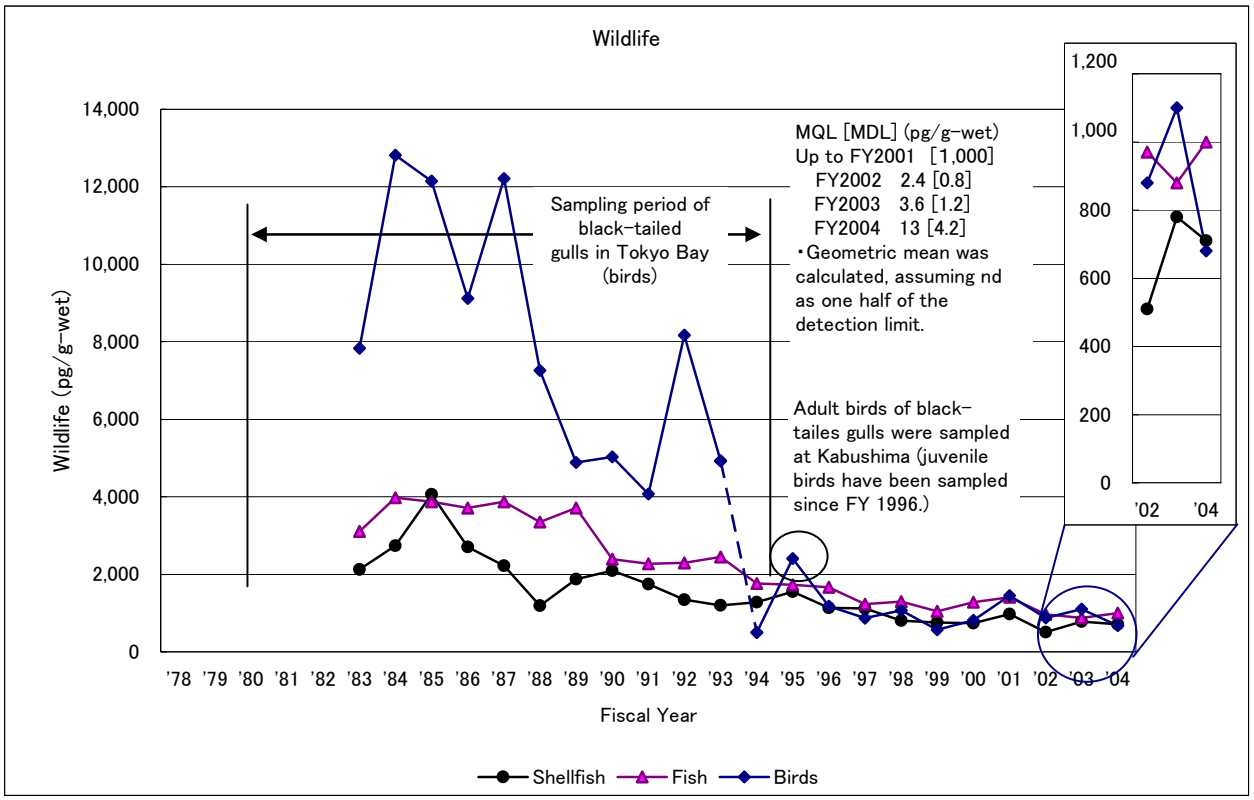
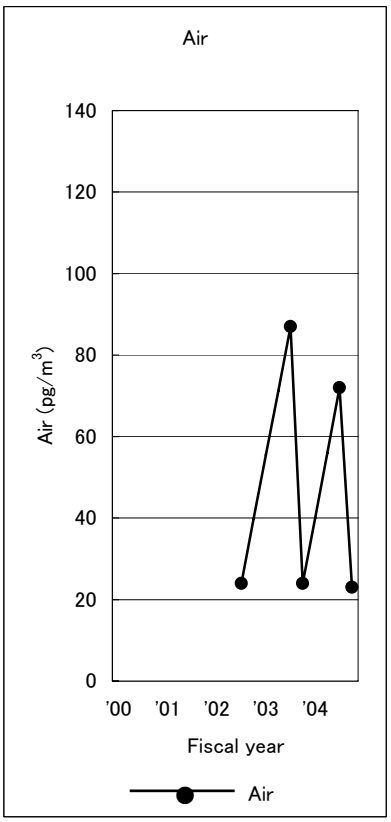
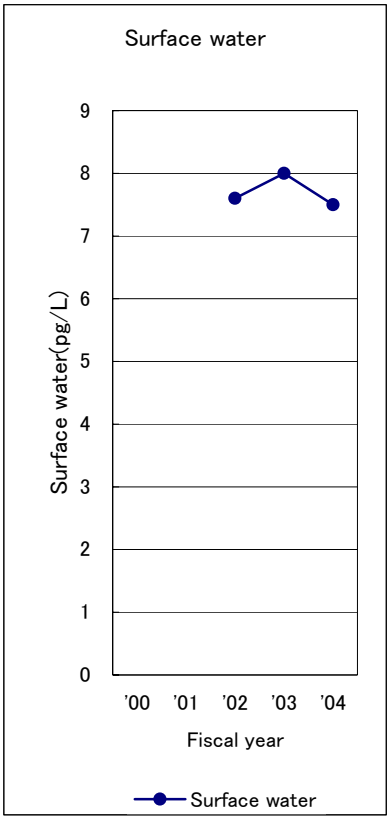


Figure 4-18-C Annual Change of *trans*-Nonachlor in Wildlife (fish, shellfish, birds) (geometric mean)



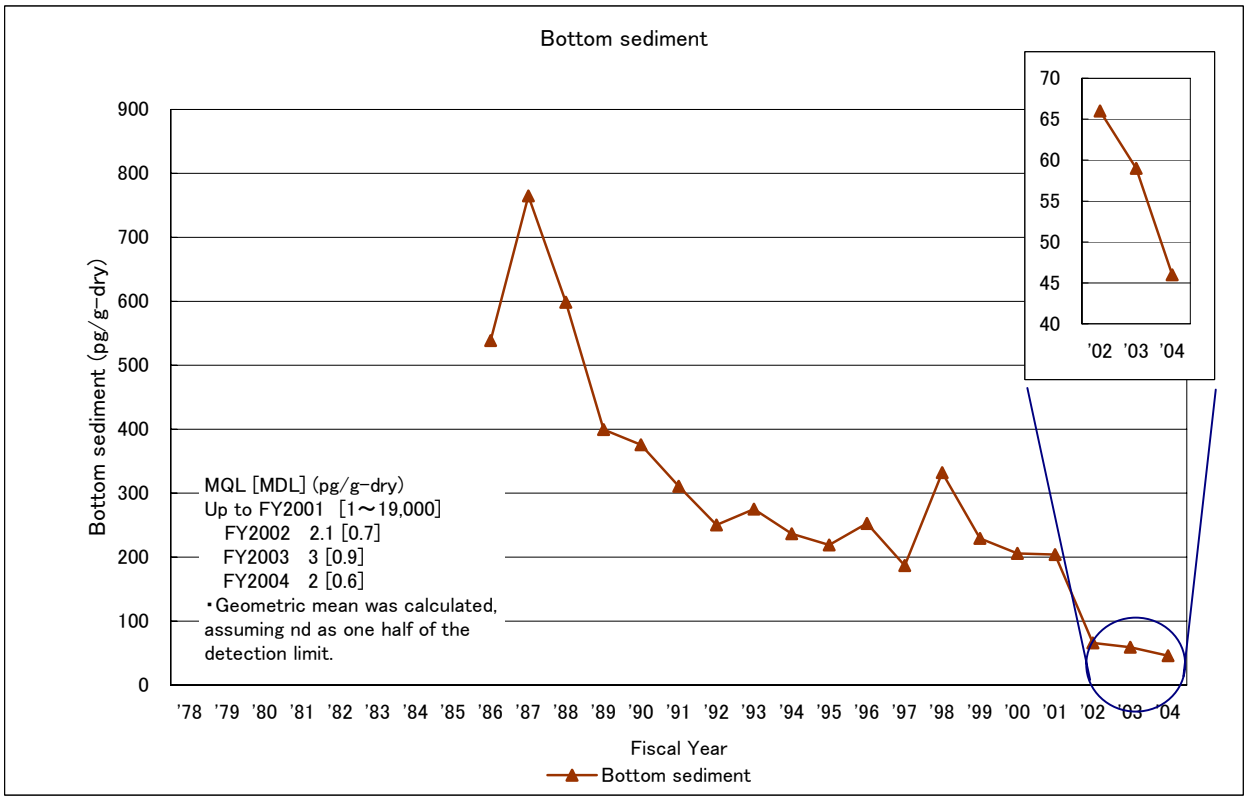
MQL [MDL] (pg/m^3)
FY2002 0.30 [0.10]
FY2003 0.35 [0.12]
FY2004 0.48 [0.16]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-18-D Annual Change of *trans*-Nonachlor in Air (geometric mean)



MQl [MDL] (pg/g-dry)
FY2002 1.8 [0.6]
FY2003 0.3 [0.1]
FY2004 0.6 [0.2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-19-A Annual Change of *cis*-Nonachlor in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
Up to FY2001 [1～19,000]
FY2002 2.1 [0.7]
FY2003 3 [0.9]
FY2004 2 [0.6]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-19-B Annual Change of *cis*-Nonachlor in Bottom Sedimant (geometric mean)

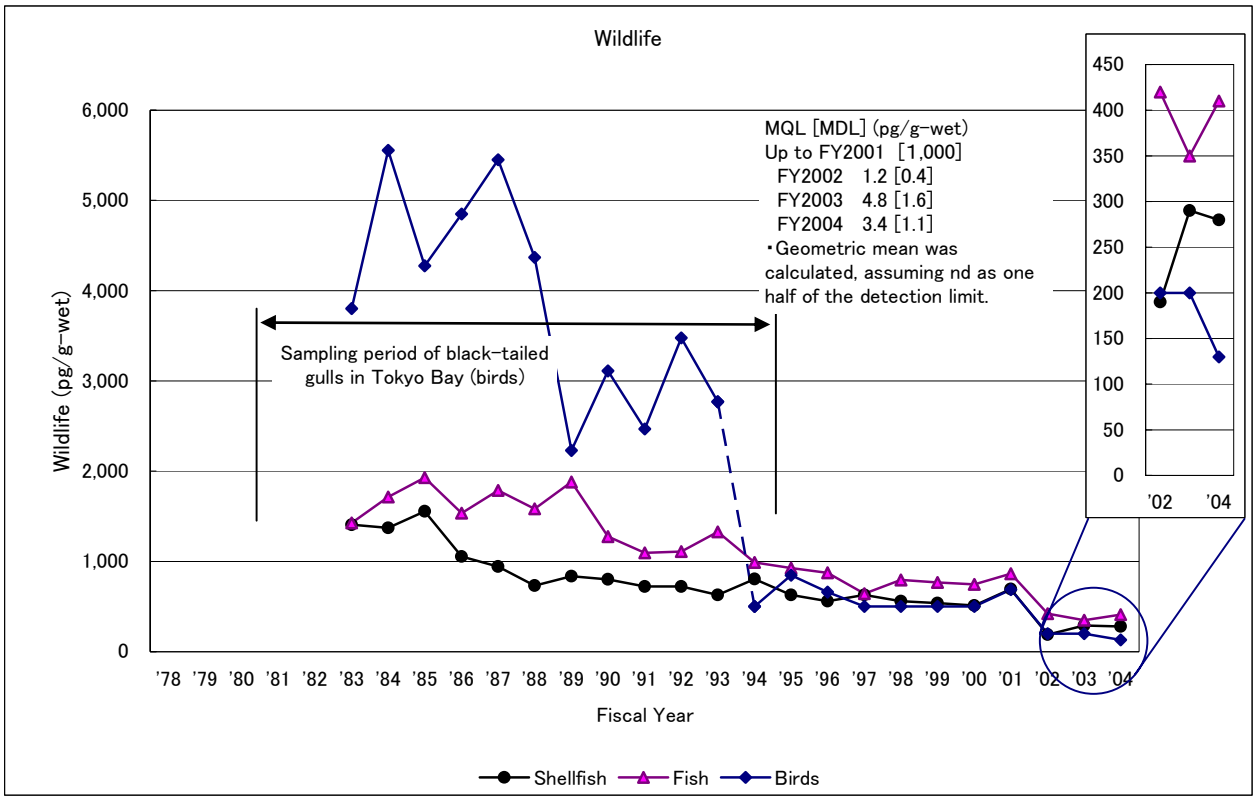
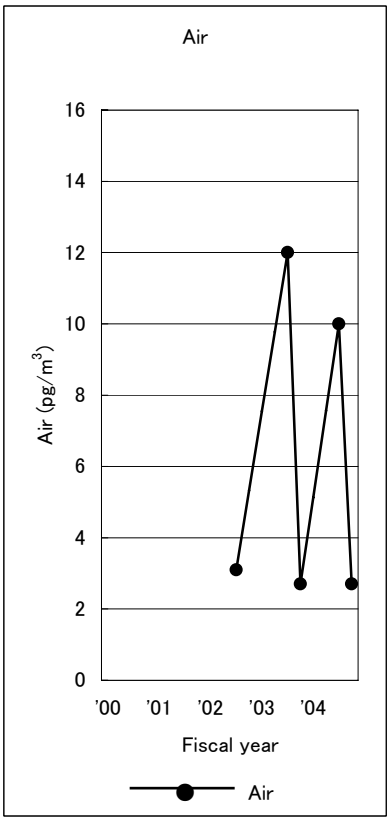
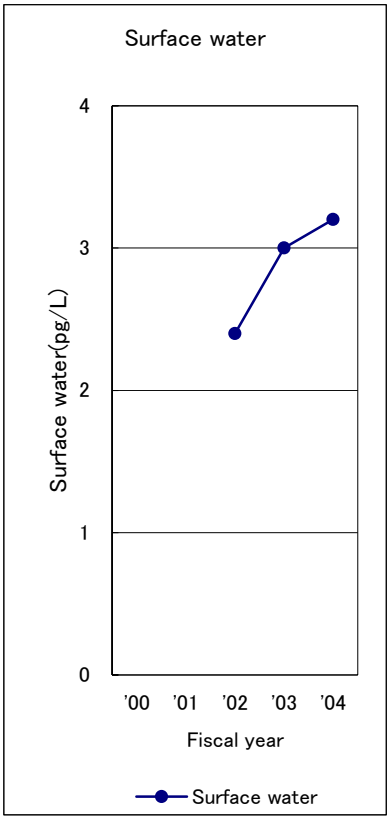


Figure 4-19-C Annual Change of *cis*-Nonachlor in Wildlife (fish, shellfish, birds) (geometric mean)



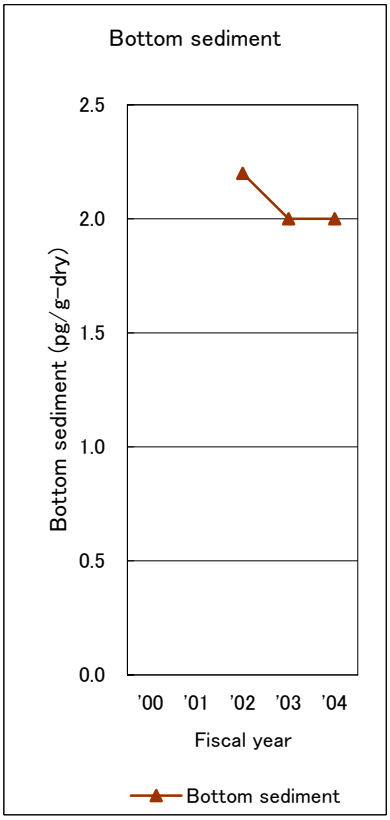
MQL [MDL] (pg/m^3)
FY2002 0.030 [0.010]
FY2003 0.026 [0.0088]
FY2004 0.072 [0.024]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-19-D Annual Change of *cis*-Nonachlor in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 1.2 [0.4]
FY2003 2 [0.5]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-20-A Annual Change of Oxychlordane in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 1.5 [0.5]
FY2003 1 [0.4]
FY2004 3 [0.8]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-20-B Annual Change of Oxychlordane in Bottom Sedimant (geometric mean)

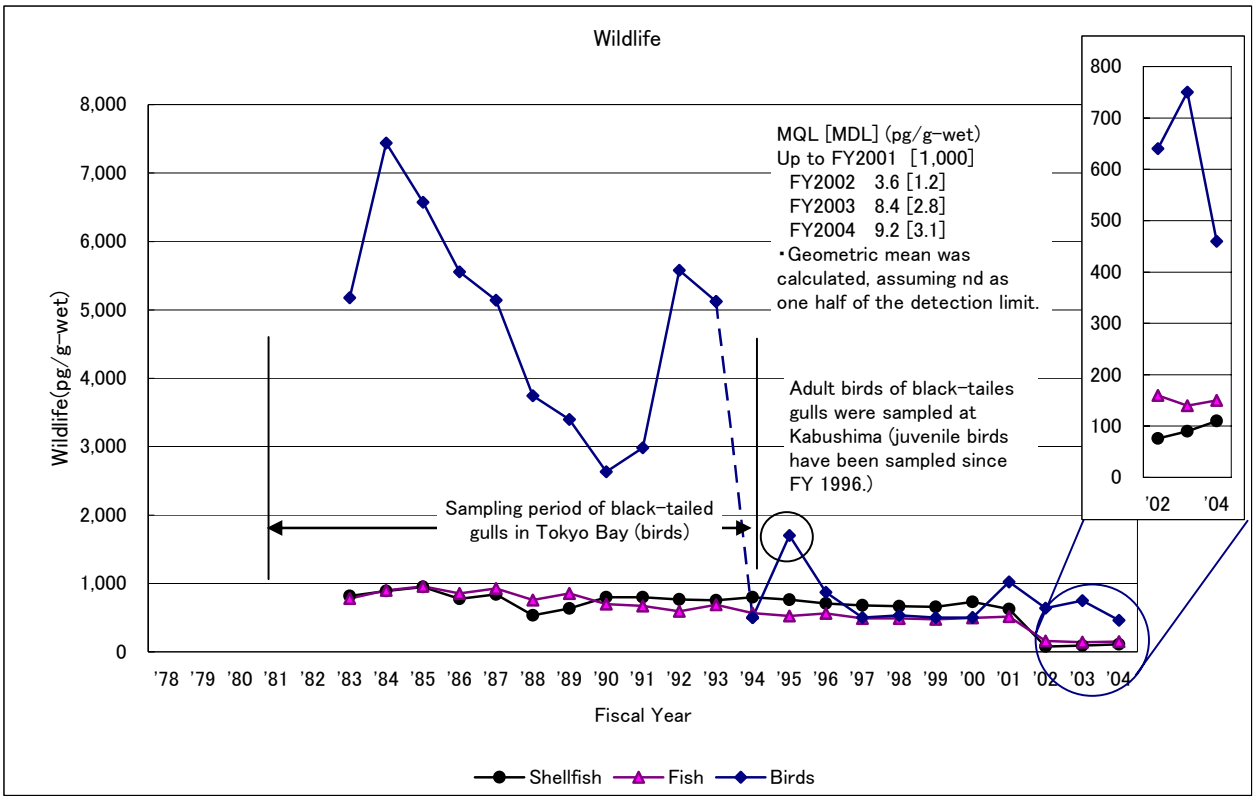
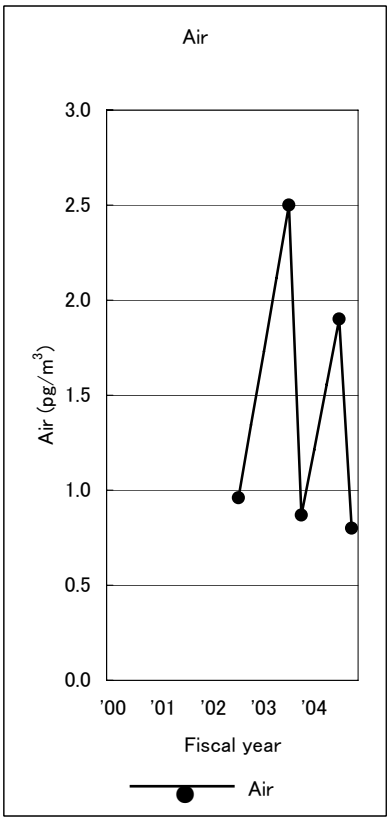
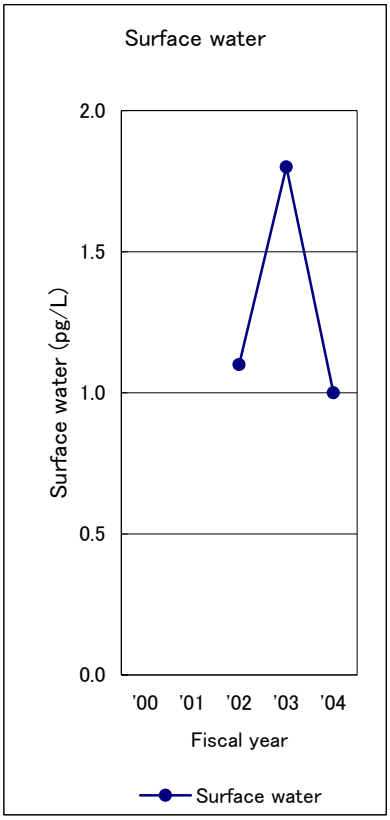


Figure 4-20-C Annual Change of Oxychlordane in Wildlife (fish, shellfish, birds) (geometric mean)



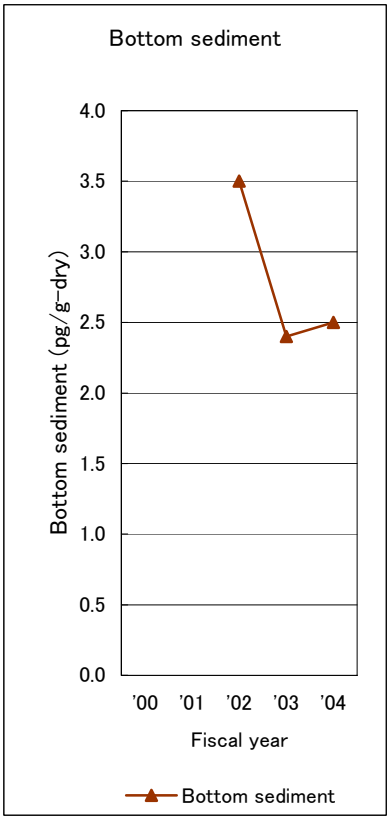
MQL [MDL] (pg/m^3)
FY2002 0.024 [0.008]
FY2003 0.045 [0.015]
FY2004 0.13 [0.042]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-20-D Annual Change of Oxychlordane in Air (geometric mean)



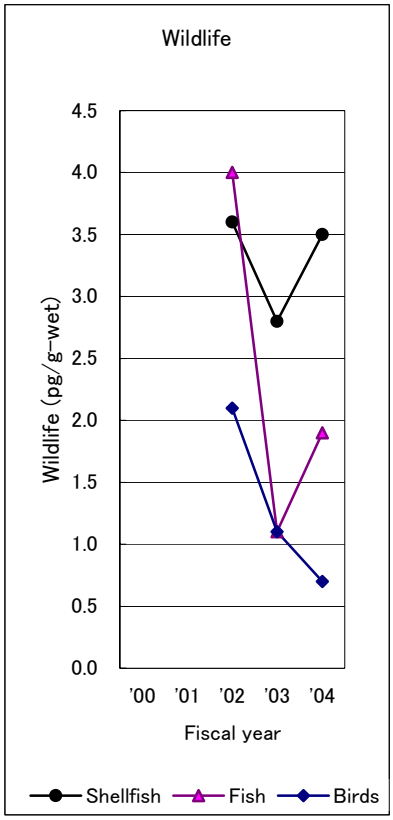
MQL [MDL] (pg/g-dry)
FY2002 1.5 [0.5]
FY2003 2 [0.5]
FY2004 5 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-21-A Annual Change of Heptachlor in Surface Water (geometric mean)



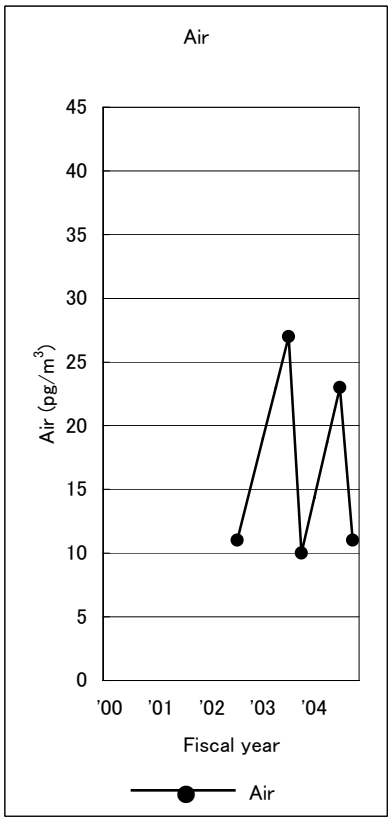
MQL [MDL] (pg/g-dry)
FY2002 1.8 [0.6]
FY2003 3 [1]
FY2004 3 [0.9]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-21-B Annual Change of Heptachlor in Bottom Sedimant (geometric mean)



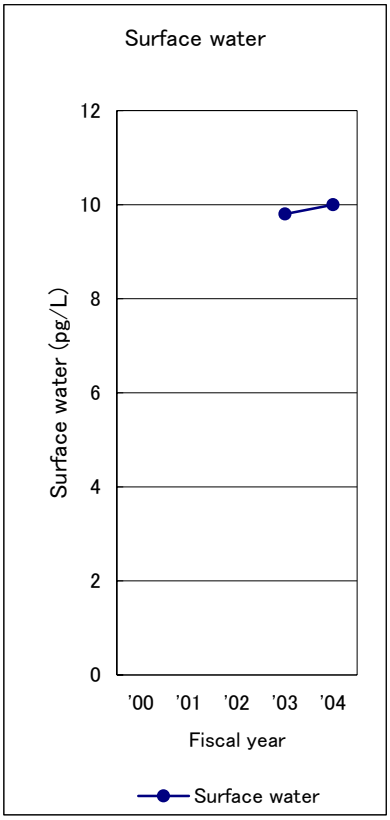
MQL [MDL] (pg/g-wet)
FY2002 4.2 [1.4]
FY2003 6.6 [2.2]
FY2004 4.1 [1.4]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-21-C Annual Change of Heptachlor in Wildlife (fish, shellfish, birds) (geometric mean)



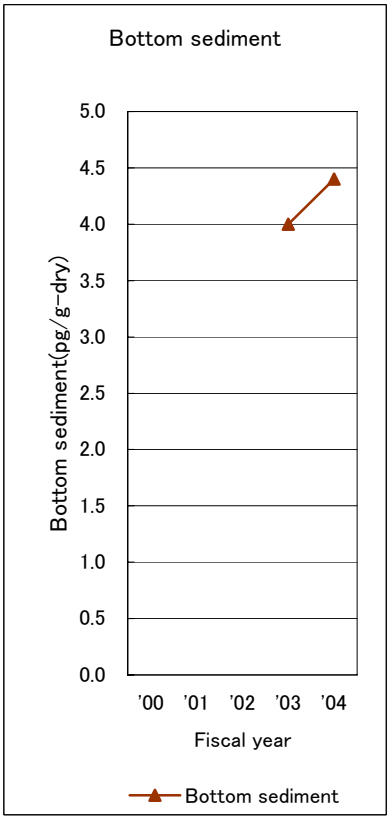
MQL [MDL] (pg/m^3)
FY2002 0.12 [0.04]
FY2003 0.25 [0.085]
FY2004 0.23 [0.078]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-21-D Annual Change of Heptachlor in Air (geometric mean)



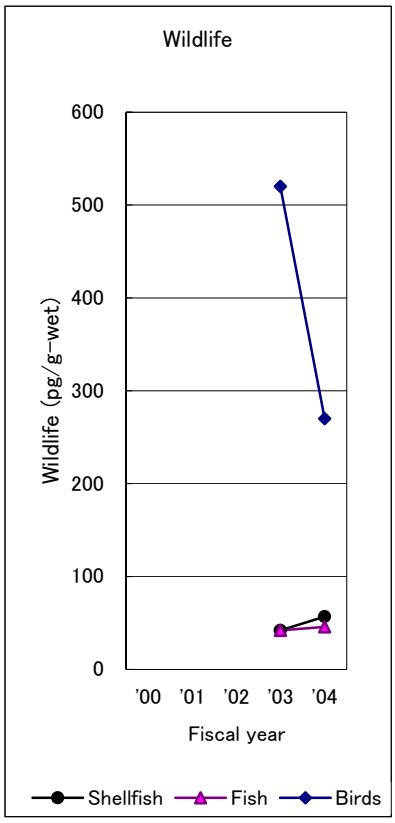
MQL [MDL] (pg/g-dry)
FY2003 0.7 [0.2]
FY2004 2 [0.4]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-22-A Annual Change of *cis*-Heptachlor epoxide in Surface Water (geometric mean)



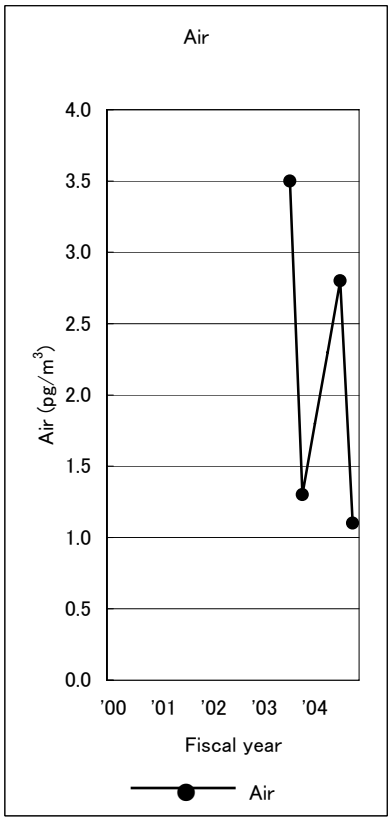
MQL [MDL] (pg/g-dry)
FY2003 3 [1]
FY2004 6 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-22-B Annual Change of *cis*-Heptachlor epoxide in Bottom Sedimant (geometric mean)



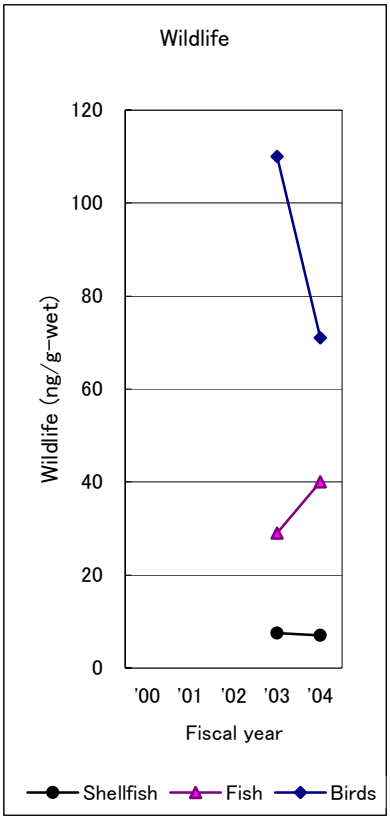
MQL [MDL] (pg/g-wet)
FY2003 6.9 [2.3]
FY2004 9.9 [3.3]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-22-C Annual Change of *cis*-Heptachlor epoxide in Wildlife (fish, shellfish, birds) (geometric mean)



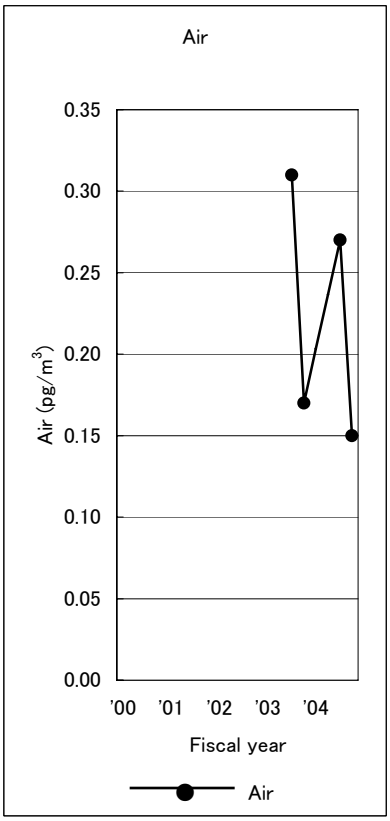
MQL [MDL] (pg/m^3)
FY2003 0.015 [0.0048]
FY2004 0.052 [0.017]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-22-D Annual Change of *cis*-Heptachlor epoxide in Air (geometric mean)



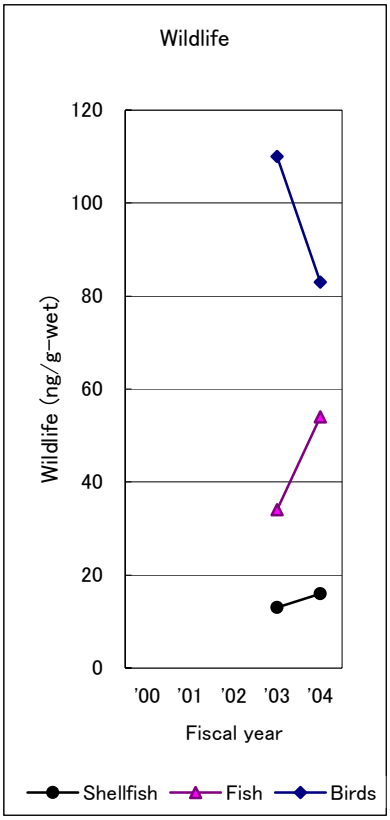
MQL [MDL] (ng/g-wet)
FY2003 45 [15]
FY2004 42 [14]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-23-A Annual Change of Toxaphene (Parlar 26) in Wildlife (fish, shellfish, birds) (geometric mean)



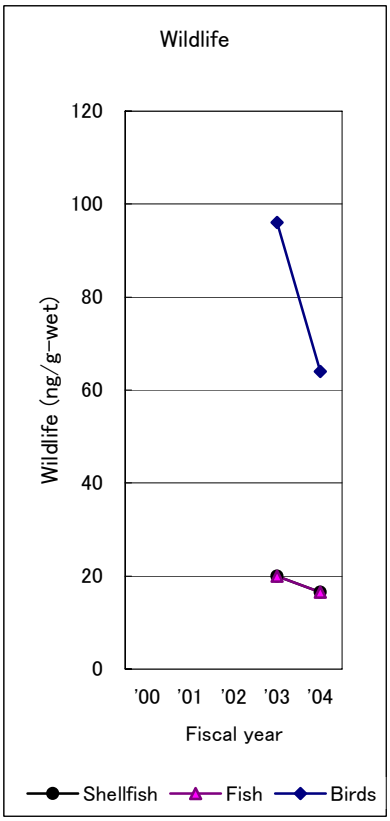
MQL [MDL] (pg/m^3)
FY2003 0.20 [0066]
FY2004 0.20 [0.066]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-23-B Annual Change of Toxaphene (Parlar 26) in Air (geometric mean)



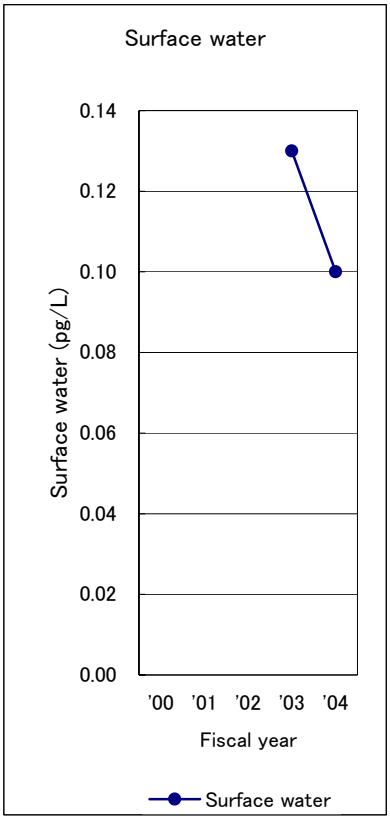
MQL [MDL] (ng/g-wet)
FY2003 33 [11]
FY2004 46 [15]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-24 Annual Change of Toxaphene (Parlar 50) in Wildlife (fish, shellfish, birds) (geometric mean)



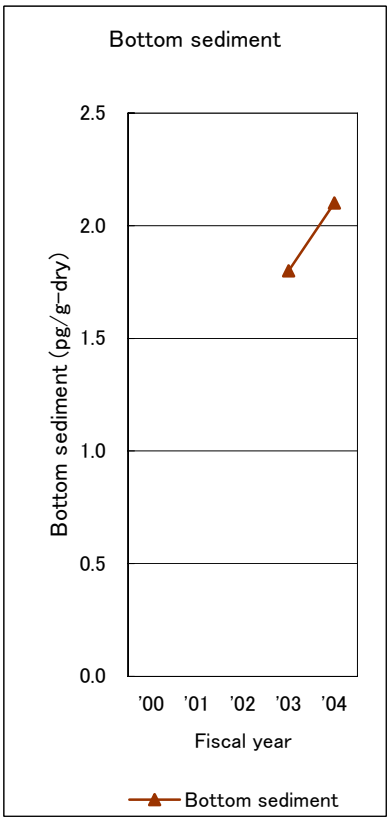
MQL [MDL] (ng/g-wet)
FY2003 120 [40]
FY2004 98 [33]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-25 Annual Change of Toxaphene (Parlar 62) in Wildlife (fish, shellfish, birds) (geometric mean)



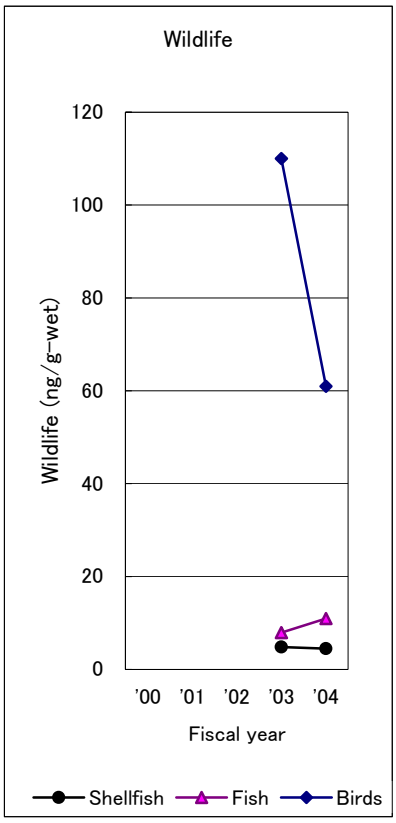
MQL [MDL] (pg/g-dry)
FY2003 40 [20]
FY2004 9 [3]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-26-A Annual Change of Mirex in Surface Water (geometric mean)



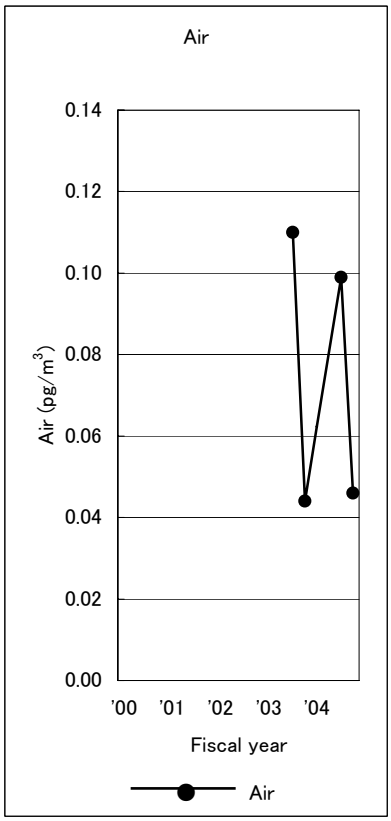
MQL [MDL] (pg/g-dry)
FY2003 2 [0.4]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-26-B Annual Change of Mirex in Bottom Sedimant (geometric mean)



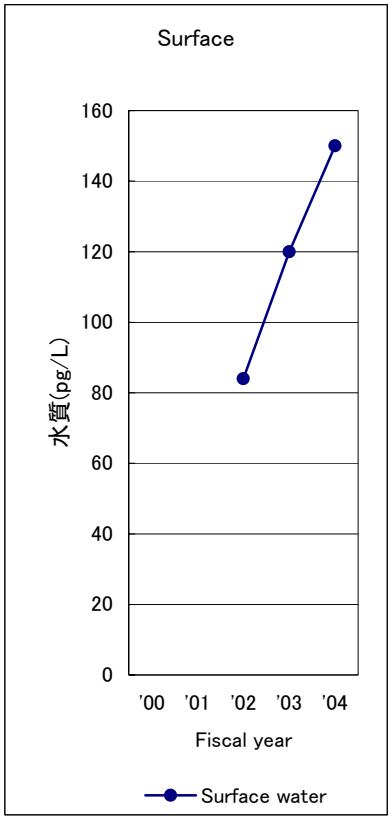
MQL [MDL](ng/g-wet)
FY2003 2.4 [0.81]
FY2004 2.5 [0.82]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-26-C Annual Change of Mirex in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2003 0.0084 [0.0028]
FY2004 0.05 [0.017]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-26-D Annual Change of Mirex in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.9 [0.3]
FY2003 3 [0.9]
FY2004 6 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-27-A Annual Change of α-HCH in Surface Water (geometric mean)

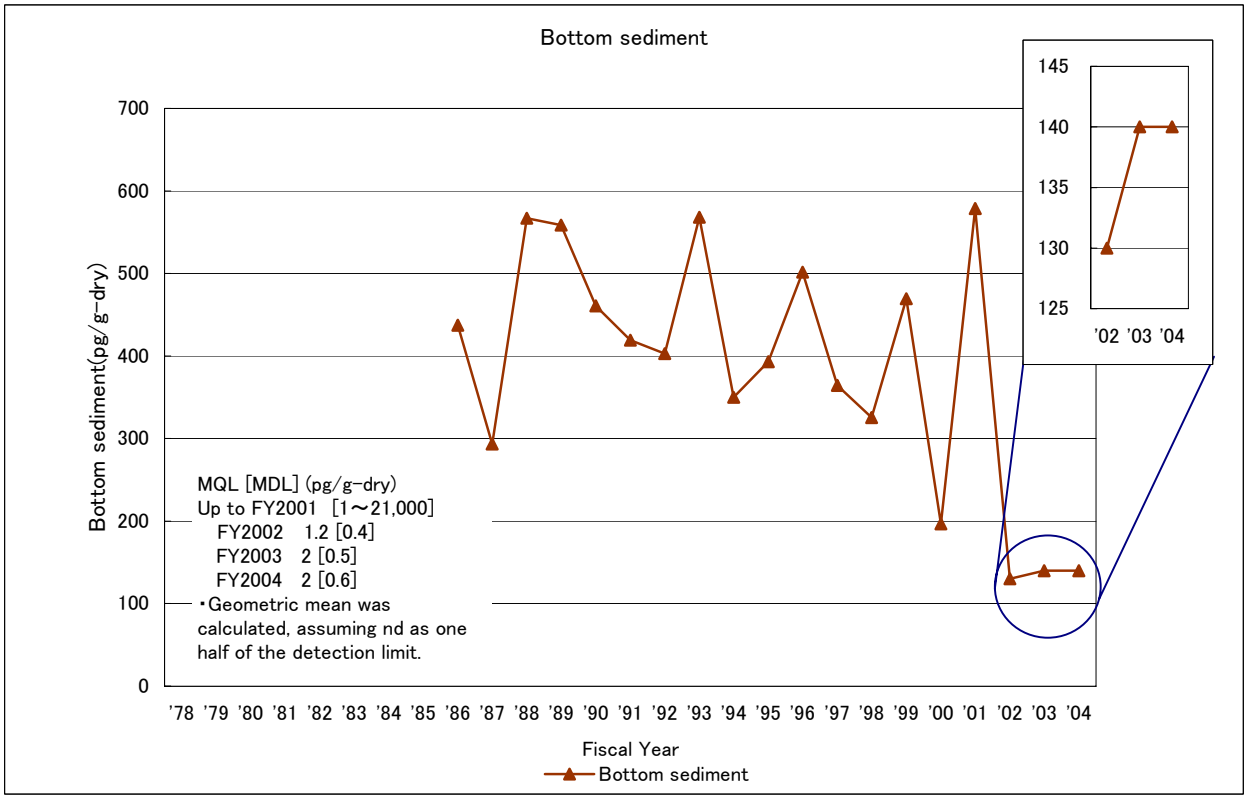


Figure 4-27-B Annual Change of α-HCH in Bottom Sedimant (geometric mean)

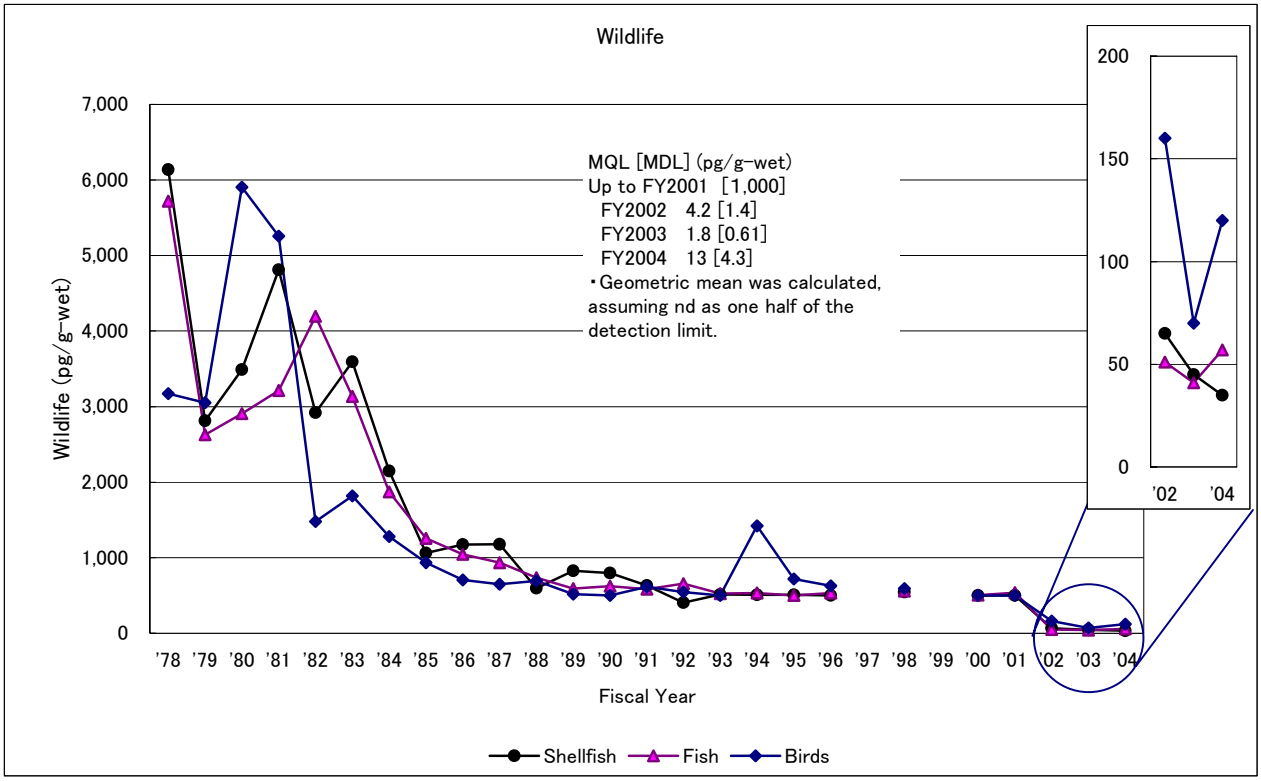
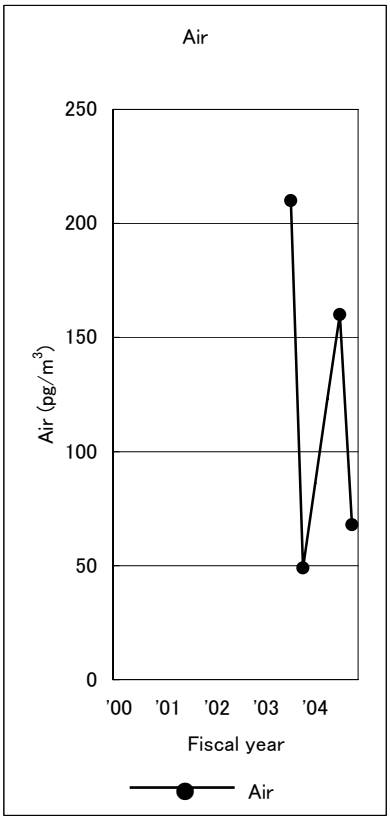
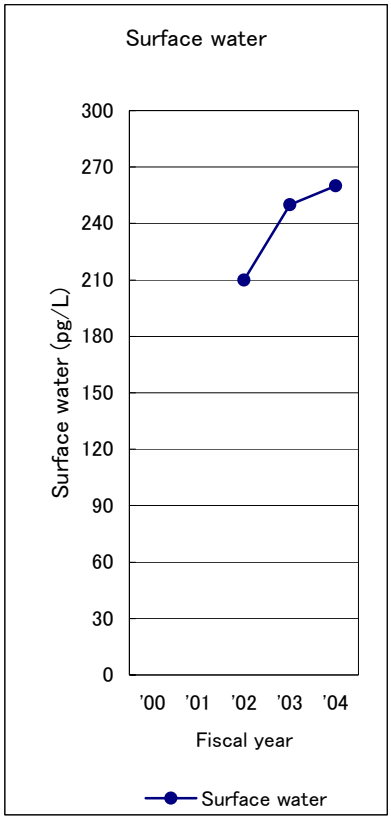


Figure 4-27-C Annual Change of α-HCH in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2003 0.71 [0.24]
FY2004 0.33 [0.11]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-27-D Annual Change of α-HCH in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2002 0.9 [0.3]
FY2003 3 [0.7]
FY2004 4 [2]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-28-A Annual Change of β-HCH in Surface Water (geometric mean)

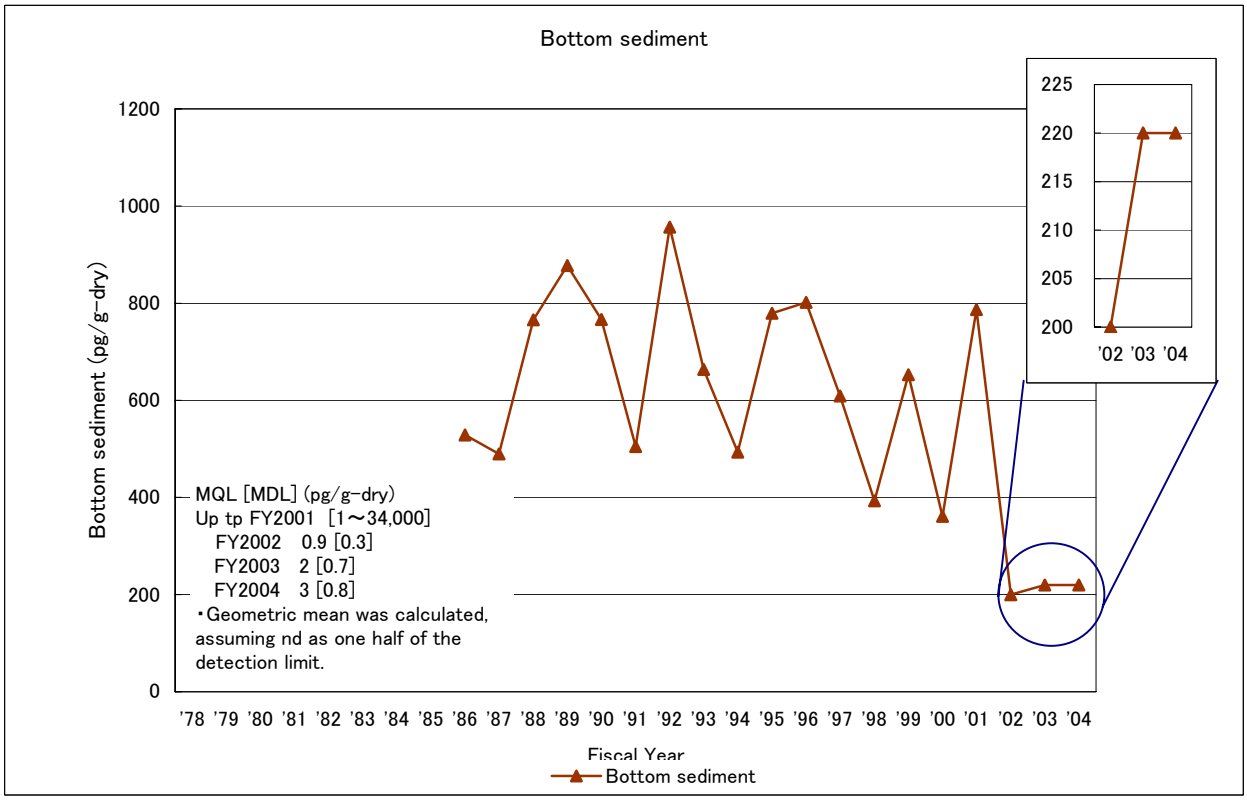


Figure 4-28-B Annual Change of β-HCH in Bottom Sedimant (geometric mean)

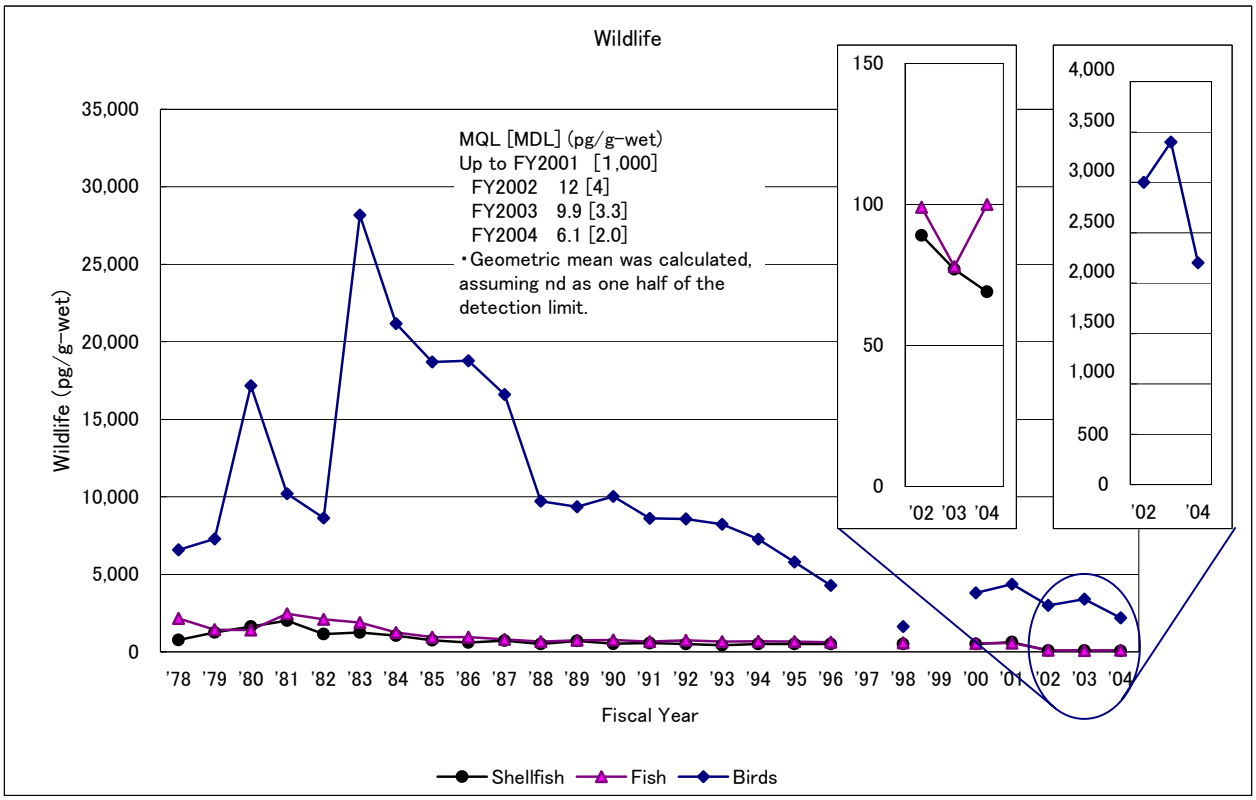
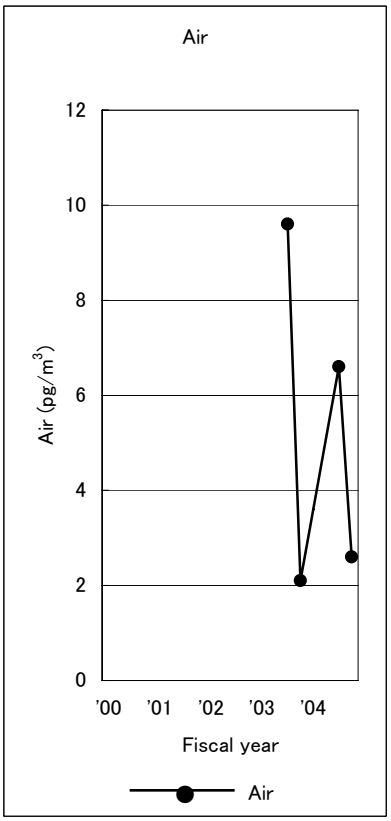
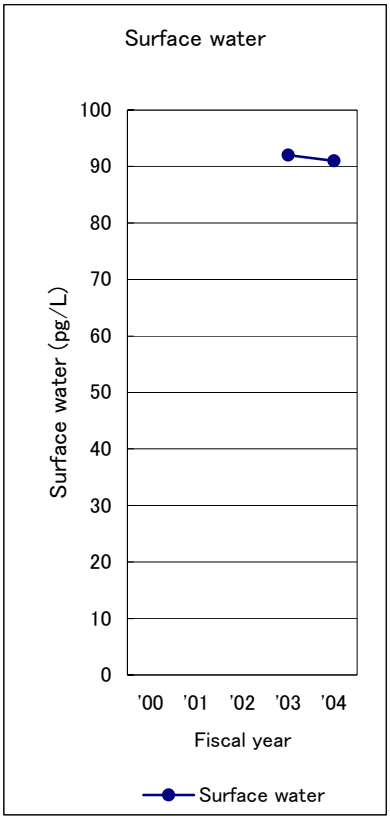


Figure 4-28-C Annual Change of β-HCH in Wildlife (fish, shellfish, birds) (geometric mean)



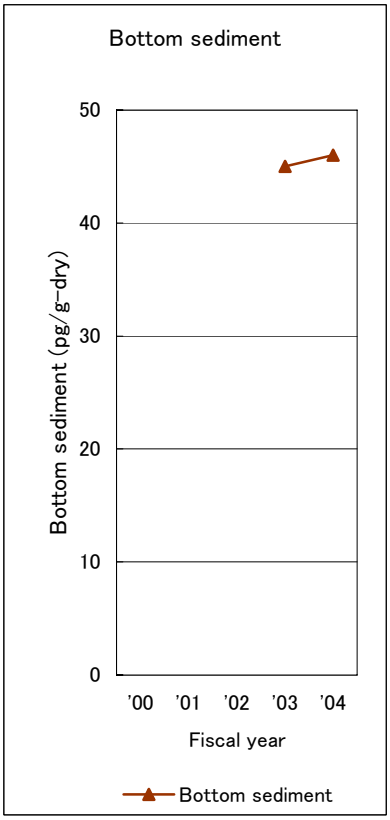
MQL [MDL] (pg/m^3)
FY2003 0.19 [0.063]
FY2004 0.12 [0.041]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-28-D Annual Change of β-HCH in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2003 7 [2]
FY2004 20 [7]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-29-A Annual Change of γ-HCH in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2003 2 [0.4]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-29-B Annual Change of γ-HCH in Bottom Sedimant (geometric mean)

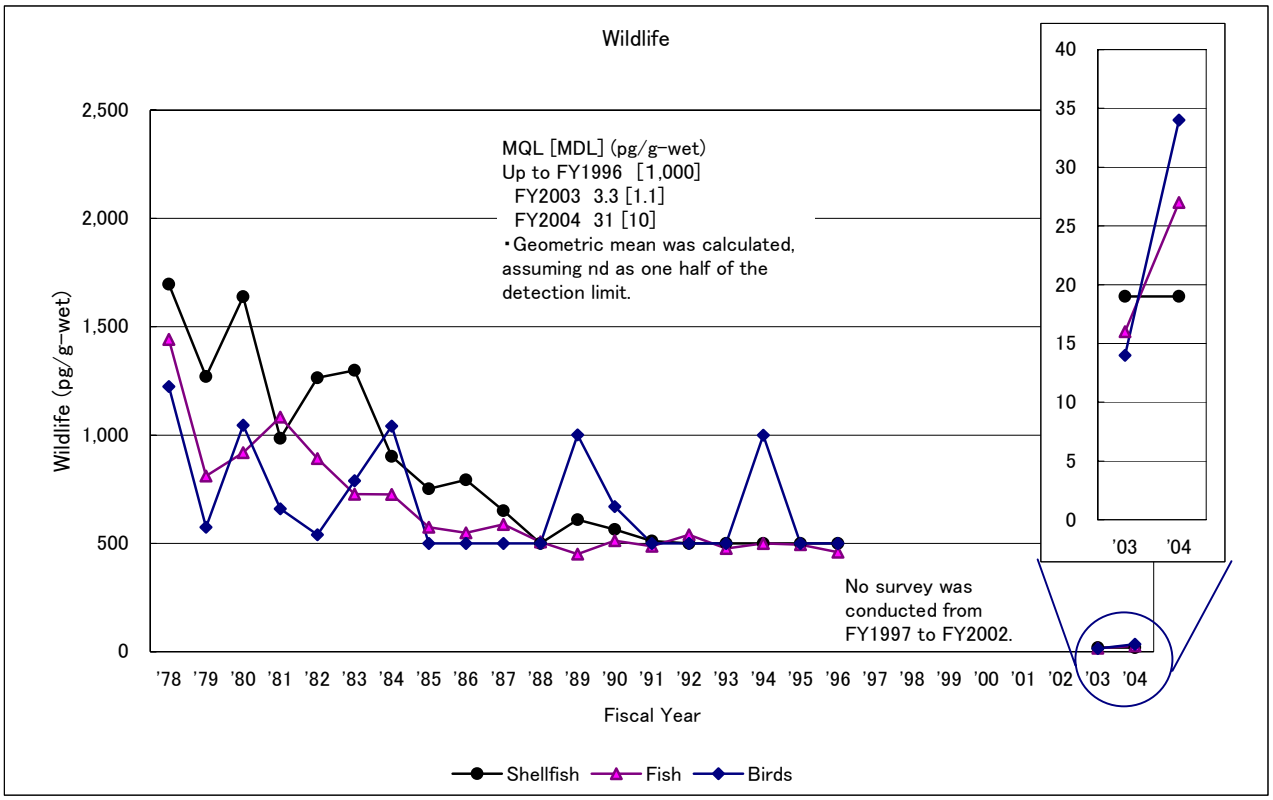
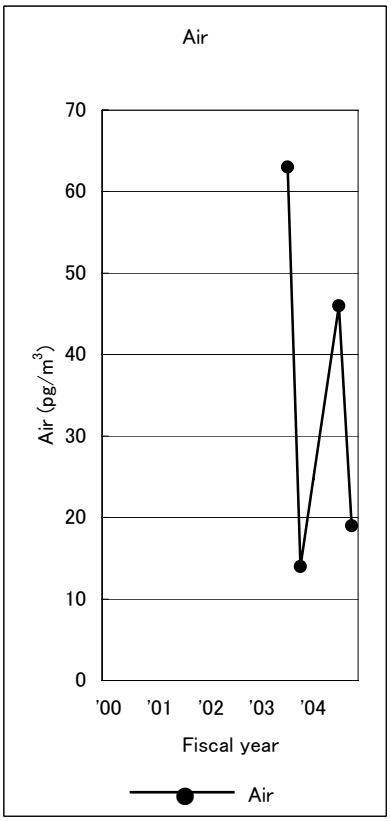
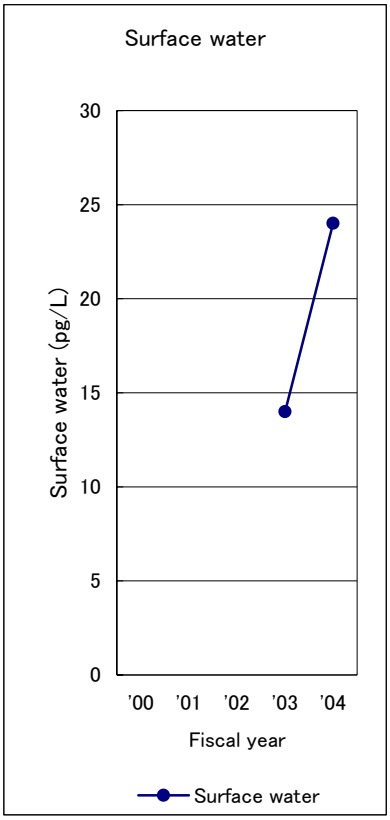


Figure 4-29-C Annual Change of γ-HCH in Wildlife (fish, shellfish, birds) (geometric mean)



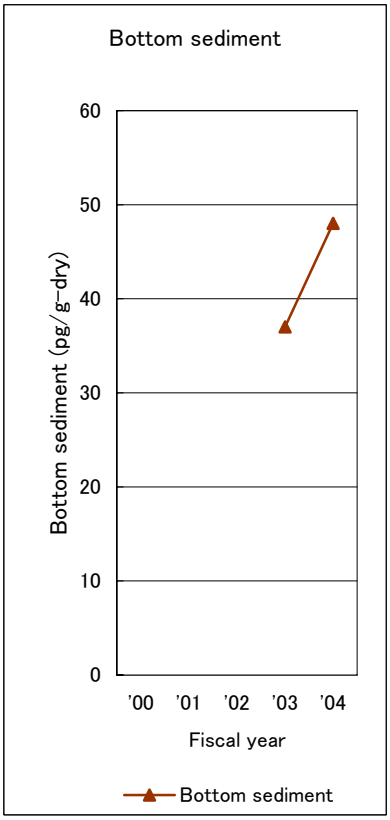
MQL [MDL] (pg/m^3)
FY2003 0.57 [0.19]
FY2004 0.23 [0.076]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-29-D Annual Change of γ-HCH in Air (geometric mean)



MQL [MDL] (pg/g-dry)
FY2003 2 [0.5]
FY2004 2 [0.7]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-30-A Annual Change of δ-HCH in Surface Water (geometric mean)



MQL [MDL] (pg/g-dry)
FY2003 2 [0.7]
FY2004 2 [0.5]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-30-B Annual Change of δ-HCH in Bottom Sedimant (geometric mean)

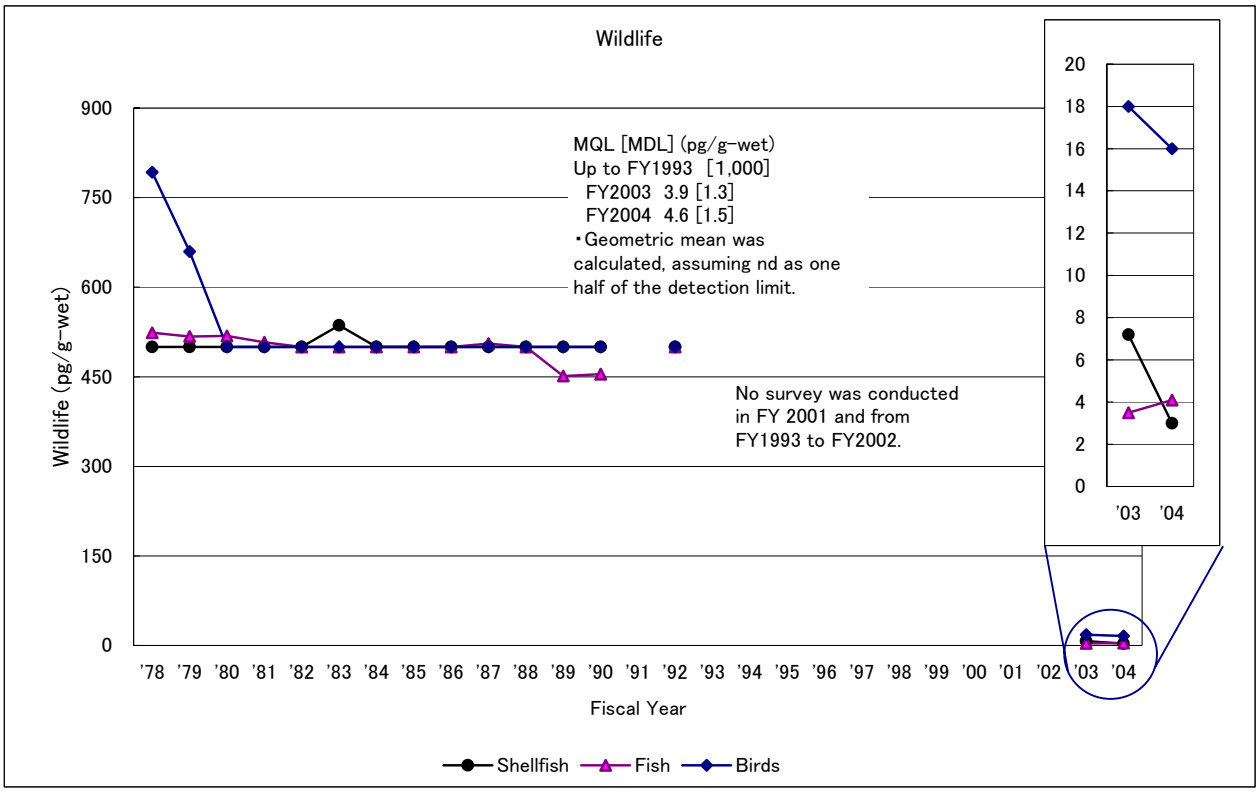
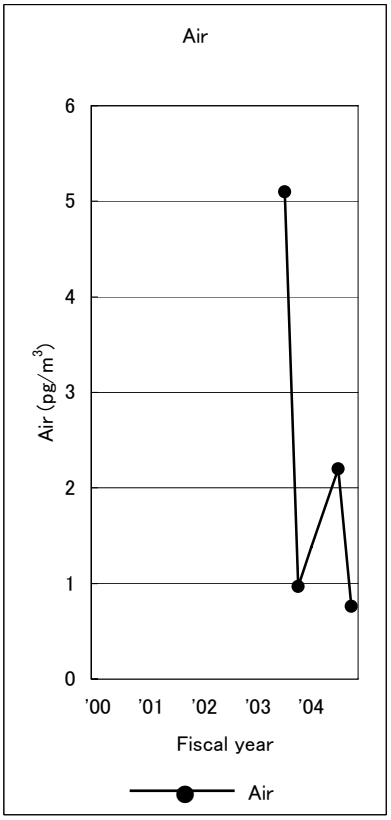


Figure 4-30-C Annual Change of δ-HCH in Wildlife (fish, shellfish, birds) (geometric mean)



MQL [MDL] (pg/m^3)
FY2003 0.03 [0.01]
FY2004 0.15 [0.05]
・Geometric mean was calculated, assuming nd as one half of the detection limit.

Figure 4-30-D Annual Change of δ-HCH in Air (geometric mean)

5. Evaluation of survey results

Summary of the results of FY2004 survey is as follows.

The target substances monitored in this survey are PCBs, HCB, three drins (aldrin, dieldrin and endrin), six DDTs (*p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, *o,p'*-DDT, *o,p'*-DDE and *o,p'*-DDD), five chlordanes (*cis*-chlordane, *trans*-chlordane, *cis*-nanochlor, *trans*-nanochlor and oxychlordane), three heptachlors (heptachlor, *cis*-heptachlor epoxide and *trans*-heptachlor epoxide), three toxaphenes (Parlar-26, Parlar-50 and Parlar-62), mirex, four HCHs (α-HCH, β-HCH, γ-HCH and δ-HCH), hexabromobenzene and dioctyltin compounds.

High-sensitivity analyses were carried out in FY2004, in succession from FY2002 and FY2003. The POPs, especially, were detected in all the substance-medium combinations, except that toxaphenes were not detected in surface water and bottom sediment.

Evaluations of survey results for each substance (group) are described below.

(1) PCBs

Surface water: The substance persisting in surface water has been surveyed in the last five years with comparable detection limits, which allow the continuous evaluation of the results. Survey sites having been used since FY2002 and later are different from those used in FY2001 and earlier. The geometric means for FY2000 to FY2004 were 540 pg/L, 440 pg/L, 460 pg/L, 530 pg/L and 630 pg/L, respectively, indicating that their persistence has a leveling-off tendency. The substances were detected in all the samples from all the survey sites every year, and their persistence is still recognized in widespread areas.

Bottom sediment: The substance persisting in bottom sediment has been surveyed in the last five years with comparable detection limits, which allow the continuous evaluation of the results. Survey sites having been used since FY2002 and later are different from those used in FY 2001 and earlier. The geometric means in FY2000 to FY2004 were 15,000 pg/g-dry, 15,000 pg/g-dry, 9,200 pg/g-dry, 8,200 pg/g-dry and 7,300 pg/g-dry, respectively, indicating that its persistent levels were somewhat lower in FY2002, FY2003 and FY2004 than in FY2000 and FY2001. The genomic means showed decreases in FY2002, FY2003 and FY2004. The substances were detected in all the samples from all the survey sites every year, and their persistence is still recognized in widespread areas.

Shellfish: The persistent concentrations of the substance showed a decreasing tendency in early years between FY1979 and FY1981. The values in recent years until FY2001 were mostly below a detection limit (10,000 pg/g-wet), and therefore it is difficult to grasp the tendency of their persistence from medians, 70% values and 80% values. Comparable detection limits were used in FY2002 and later, which allow the continuous evaluation of the results. Changes were made to survey sites as follows: two sites were excluded in FY2003 (*Mytilus edulis galloprovincialis* [blue mussel] at the Miura Peninsula, and *Septifer virgatus* [purplish bifurcate mussel] at Mishima); one site was added in FY2004 (*Mytilus edulis galloprovincialis* [blue mussel] at Takamatsu Port in Kagawa Prefecture); survey species was changed at one survey site (*Mytilus edulis galloprovincialis* [blue mussel] → *Septifer virgatus* [purplish bifurcate mussel] at Dokai Bay in Kitakyushu City). The substances were detected in all the samples from all the survey sites in FY2004. The substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Fish: Persistent concentration of the substance showed a decreasing tendency from FY1978, the beginning of the survey, to FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. The substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of their persistence in birds because of the change of survey areas, in addition to the fact that only two areas were surveyed, their persistence is still recognized.

Atmospheric air: The persistence of the substance has been surveyed in the last five years with comparable detection limits, which allow the continuous evaluation of the results. Survey sites having

been used since FY2002 and later are different from those used in FY 2001 and earlier. The geometric means for FY2000 to FY2003 were 390 pg/m^3, 280 pg/m^3, 100 pg/m^3, 260 pg/m^3 (FY2003, warm season) and 110 pg/m^3 (FY2003, cold season), respectively. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Since PCBs are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate. As the disposal of PCBs by decomposition has been started, its effects and influences must be taken into account. In addition to the total PCBs, homologs of PCBs and coplanar PCB have hitherto been monitored at irregular intervals.

(2) HCB

Surface water: The persistent concentrations of the substance were mostly below a detection limit (about 10,000 pg/L) from FY1986 to FY1998. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Bottom sediment: Persistent concentration of the substance showed a decreasing tendency from FY1986, the beginning of the survey, to FY2001. The substances were detected in all the samples from all the survey sites in FY2004. The substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Shellfish: The persistent concentrations of the substance were mostly below a detection limit (1,000 pg/g-wet) from FY1978 to FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Fish: The persistent concentrations of the substance showed a decreasing tendency in early years between FY1978 and FY1984. The values were mostly below a detection limit (1,000 pg/g-wet) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence in birds because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Since HCB is a substance specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace its fate.

(3) Drins (aldrin, dieldrin and endrin)

Aldrin

Surface water and bottom sediment: The substance has been detected at almost all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish: The persistent concentrations of the substance were below a detection limit (1,000 pg/g-wet) from FY1978 to FY1993, but no monitoring surveys were conducted between FY1994 and FY2001. The persistent concentrations in FY2004 were comparable to those in FY2002 and FY2003. The substance has been detected at about half of the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Fish: The persistent concentrations of the substance were mostly below a detection limit (1,000 pg/g-wet) from FY1978 to FY1993, but no monitoring surveys were conducted between FY1994 and FY2001. The substance was detected at two survey sites in FY2004, though the values were below a detection limit. The substance has been detected since FY2002—at one of the 14 survey sites (FY2002), at seven of the 14 survey sites (FY2003), at two of the 14 survey sites(FY2004)—and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence in birds because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in FY2004 were comparable to those in FY2002. In FY2003 the values were higher in warm season than in cold season, while the survey results in FY2004 showed no differences between the warm season and the cold season. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Dieldrin

Surface water: The persistent concentrations of the substance were below a detection limit (about 10,000 pg/L) from FY1986, the beginning of the survey, to FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Bottom sediment: The persistent concentrations of the substance were mostly below a detection limit (about 1,000 pg/g-dry) from FY1986, the beginning of the survey, to FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish and fish: Persistent concentration of the substance showed a decreasing tendency from FY1978, the beginning of the survey, to FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence in birds because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Endrin

Surface water and bottom sediment: The persistence of the substance has been monitored since FY2002. The substance has have been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish: The persistent concentrations of the substance were monitored at some specific areas from FY1978 to FY1993, but no monitoring surveys were conducted between FY1994 and FY2001. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Fish: The persistent concentrations of the substance were mostly below a detection limit (about 1,000 pg/g-wet) from FY1978 to FY1993, but no monitoring surveys were conducted between FY1994 and FY2001. In FY2004, the substance was detected in 57 of the 70 samples from 13 of the 14 survey sites. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Since aldrin, dieldrin and endrin are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate.

(4) DDTs

***p,p'*-DDT**

Surface water: The persistent concentrations of the substance were below a detection limit (10,000 pg/L) from FY1986 to FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Bottom sediment: The persistent concentrations of the substance showed a decreasing tendency from FY1990 to FY2001. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish: Persistent concentration of the substance showed a decreasing tendency from FY1978, the beginning of the survey, to FY1981. The persistent concentrations of the substance were mostly below a detection limit (1,000 pg/g-wet) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Fish: Persistent concentration of the substance showed a decreasing tendency from FY1978, the beginning of the survey, to FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

***p,p'*-DDE, *p,p'*-DDD**

Surface water: During the period from FY1986, the beginning of the survey, to FY2001, *p,p'*-DDE was detected at only one survey site in FY1987, and therefore it is difficult to grasp the tendency of their persistence through the whole survey period. The substances were detected in all the samples from all the survey sites in FY2004. Both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Bottom sediment: The persistent concentrations of both the substances showed a decreasing tendency from FY1986, the beginning of the survey, to FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Shellfish: The persistence of *p,p'*-DDE showed no changes from FY1978, the beginning of the survey, to recent years. The persistence of *p,p'*-DDD showed a mild decreasing tendency at the beginning of the survey, but leveled off in FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of their persistence from detection frequency and detection number, both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Fish: The persistence of *p,p'*-DDE showed no changes from FY1978, the beginning of the survey, to FY2001. The persistence of *p,p'*-DDD showed a mild decreasing tendency from FY1978, the beginning of the survey, to FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of their persistence from detection frequency and detection number, both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of their persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, their persistence is still recognized.

Atmospheric air: The persistence of both the substances has been monitored since FY2002. The persistent concentrations of both the substances in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. Both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

***o,p'*-DDT, *o,p'*-DDE, *o,p'*-DDD**

Surface water and bottom sediment: The persistence of the substances has been monitored since FY2002. The three substances were detected in all the samples from all the survey sites in FY2004.

The three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Shellfish: The persistence of each substance showed no changes from FY1978, the beginning of the survey, to FY2001. The three substances were detected in all the samples from all the survey sites in FY2004. The three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Fish: The persistence of *o,p'*-DDT showed a mild decreasing tendency from FY1978, the beginning of the survey, to FY2001. On the other hand, the persistence of the others showed no changes from FY1978, the beginning of the survey, to FY2001, mostly below a detection limit (1,000 pg/g-wet). The three substances were detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of their persistence from detection frequency and detection number, the three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of their persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, their persistence is still recognized.

Atmospheric air: The persistence of the three substances has been monitored since FY2002. The persistent concentrations of the three substances in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Since DDTs are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate.

(5) Chlordanes

***trans*-chlordane**

Surface water: During the period from FY1986, the beginning of the survey, to FY2001, the substance was detected only twice, in one sample each in FY1987 and FY1993, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Bottom sediment: The persistence of the substance showed a decreasing tendency from FY1986, the beginning of the survey, to FY2001. The persistent concentrations were mostly around a detection limit (1,000 pg/g-dry) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish and fish: The persistence of the substance showed a mild decreasing tendency from FY1983, the beginning of the survey, to FY2001. The persistent concentrations were mostly around a detection limit (1,000 pg/g-wet) in FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

***cis*-chlordane**

Surface water: The persistent concentrations of the substance were mostly below a detection limit (10,000 pg/L) from FY1986, the beginning of the survey, to FY2001, and therefore it is difficult to grasp the tendency of its persistence through the whole survey period. The substance was detected in all the samples from all the survey sites in FY2004. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Bottom sediment: The persistence of the substance showed a decreasing tendency from FY1986, the beginning of the survey, to FY2001. The persistent concentrations were mostly around a detection limit (1,000 pg/g-dry) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish and fish: The persistence of the substance showed a decreasing tendency from FY1983, the beginning of the survey, to FY2001. The persistent concentrations were mostly below a detection limit (1,000 pg/g-wet) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of its persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, its persistence is still recognized.

Atmospheric air: The persistence of the substance has been monitored since FY2002. The persistent concentrations of the substance in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

***trans*-nanochlor, *cis*-nanochlor and oxychlordane**

Surface water: The persistent concentrations of *trans*-nanochlor and *cis*-nanochlor were mostly below a detection limit (10,000 pg/L) from FY1986, the beginning of the survey, to FY2001. The persistent concentrations of oxychlordane were below a detection limit (10,000 pg/L) until FY1987, and no monitoring surveys were conducted between FY1988 and FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Higher detection limits were used in FY2001 and earlier, and no monitoring surveys were conducted on oxychlordane between FY1988 and FY2001. Although for these reasons it is difficult to grasp the recent tendency of their persistence,

the three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Bottom sediment: The persistence of *trans*-nanochlor and *cis*-nanochlor showed a decreasing tendency from FY1986, the beginning of the survey, to FY2001. The persistent concentrations were mostly around the detection limit (1,000 pg/g-dry) in FY2001. The persistent concentrations of oxychlordane were below a detection limit (10,000 pg/L) until FY1987, and no monitoring surveys were conducted between FY1988 and FY2001. In FY2004, *trans*-nanochlor and *cis*-nanochlor were detected in all the samples from all the survey sites, and oxychlordane was detected in 129 of 189 samples from 54 of 63 sites. Higher detection limits were used in FY2001 and earlier, and no monitoring surveys were conducted on oxychlordane between FY1988 and FY2001. Although for these reasons it is difficult to grasp the recent tendency of its persistence, the three substances have been detected virtually in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas.

Shellfish and fish: The persistence of the three substances showed a mild decreasing tendency from FY1983, the beginning of the survey, to FY2001. As for oxychlordane, the persistent concentrations were mostly below a detection limit (1,000 pg/g-wet) in FY2001. The substance was detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of their persistence from detection frequency and detection number, the three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Birds: Although it is difficult to grasp the tendency of their persistence because of the change of survey areas, in addition to the fact that only two areas were surveyed, their persistence is still recognized.

Atmospheric air: The persistence of the three substances has been monitored since FY2002. The persistent concentrations of the three substances in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in FY2002 and in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. The three substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

Since chlordanes are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate.

(6) Heptachlors

Monitoring has been carried out since FY2002 to investigate heptachlors persisting in each of all the media. Their persistence is recognized according to the results of the FY2004 monitoring described as follows: as for surface water, the substances were detected at nine of the 38 survey sites; as for bottom sediment, the substances were detected at 53 of the 63 survey sites; for shellfish, the substances were detected at 11 of the 14 survey sites; and for birds, the substances were detected at one of the two survey sites. As for atmospheric air, the substances were detected in all the samples from all the survey sites, and their persistence is recognized in widespread areas.

Monitoring has been carried out since FY2002 to investigate *trans*- and *cis*-heptachlor epoxides persisting in each of all the media. *Trans*-heptachlor epoxide has been detected in the media, except birds, from some survey sites, and its persistence is recognized. *Cis*-heptachlor epoxide has been detected in all the samples of surface water, wildlife and atmospheric air from all the survey sites, as well as in most of the samples of bottom sediment from nearly all the survey sites, and its persistence is recognized in widespread areas.

Since heptachlors are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate.

(7) Toxaphenes

Monitoring has been carried out since FY2003 to investigate toxaphenes persisting in each of all the media. They have been detected in samples from many survey sites: Parlar-26 has been detected in wildlife (shellfish, fish and birds), Parlar-50 in wildlife (shellfish, fish and birds), and Parlar-62 in wildlife (fish and birds). Their persistence is recognized in widespread areas.

As for birds, none of the three substances was detected in samples (starling) from a suburb of Morioka City, while all of them were detected in samples (black-tailed gull) from Kabushima. The persistence of toxaphens in birds is believed to be attributable to their prey and habitat because Japan has never produced or imported toxaphens.

Since toxaphenes are substances specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace their fate.

(8) Mirex

Monitoring has been carried out since FY2003 to investigate mirex persisting in each of all the media. Japan has never produced or imported mirex. In FY2003 and FY2004, however, it was detected in all the samples of wildlife (shellfish, fish, and birds) and atmospheric air from all the survey sites, as well as in samples of surface water and bottom sediment from half of the survey sites. Their persistence is recognized in widespread areas.

Since mirex is a substance specified in the POPs Treaty, and also from the standpoint of global pollution monitoring, it is necessary to continue the monitoring to trace its fate.

(9) HCHs

Surface water: The persistence of both α-HCH and β-HCH in surface water showed a decreasing tendency from FY1986, the beginning of the survey, and the persistent concentrations were below a detection limit (10,000 pg/L) at any of the survey sites from FY1994 to FY2001. The substances were detected in all the samples from all the survey sites in FY2004. Both the substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

The persistent concentrations of both γ-HCH and δ-HCH in surface were below detection limits (100,000 pg/L for both). However, the substances were detected in all the samples from all the survey sites in FY2004 as well as in FY2003, and their persistence is recognized in widespread areas.

Bottom sediment: The persistence of both α-HCH and β-HCH in bottom sediment shows great fluctuations in data obtained in FY2001 and earlier. The substances were detected in all the samples from all the survey sites in FY2004. The substances have been detected in all the samples from all the survey sites since FY2002, and their persistence is still recognized in widespread areas.

The persistent concentrations of γ-HCH and δ-HCH in bottom sediment were around detection limits (10,000 pg/g-dry both) in the Environmental Survey of Chemical Substance in FY1974. The substances were detected in most of the samples from nearly all the survey sites in FY2003 and in all the samples from all the survey sites in FY2004. Their persistence is recognized in widespread areas.

Shellfish and fish: The persistence of HCHs showed a decreasing tendency in 1980's, and the persistent concentrations of the substances were mostly below a detection limit (1,000 pg/g-wet) in FY2001. The values of γ-HCH and δ-HCH, especially, were continuously below a detection limit in any of the samples, so no monitoring surveys were conducted on γ-HCH between FY1996 and FY2001 or on δ-HCH between FY1992 and FY2001. α-HCH and β-HCH were detected in all the samples from all the survey sites in FY2004. Changes were made to survey sites and survey species in FY2002, and surveys have been using detection limits that are nearly 1/1000 as low as those used in FY2001 and earlier, resulting in great increases in detection number. Although for these reasons it is difficult to grasp the recent tendency of its persistence from detection frequency and detection number, the substance has been detected in all the samples from all the survey sites since FY2002, and its persistence is still recognized in widespread areas. γ-HCH and δ-HCH were detected in all the samples from all the survey sites in FY2004 as well as in FY2003, and their persistence is recognized in widespread areas.

Birds: α-HCH and β-HCH were detected in all the samples from all the survey sites in FY2004, and their persistence is still recognized. No monitoring surveys were conducted on γ-HCH between FY1996 and FY2001 or on δ-HCH between FY1992 and FY2001, for the same reason as described in

"shellfish and fish" above. γ-HCH and δ-HCH were detected in all the samples from all the survey sites in FY2004 as well as in FY2003, and their persistence is recognized in widespread areas.

Atmospheric air: The persistence of the substances has been monitored since as recently as FY2003, and therefore it is difficult to grasp the tendency of the persistence of the substances. The persistent concentrations of the substances in the warm season of FY2004 were comparable to those in the warm season of FY2003, while the values in the cold season of FY2004 were comparable to those in the cold season of FY2003. In FY2004, the values were higher in warm season than in cold season, as also seen in FY2003, showing differences in persistent concentrations depending on survey seasons and meteorological conditions. Each of α-HCH, β-HCH, γ-HCH and δ-HCH has been detected in all the samples from all the survey sites, and their persistence is recognized in widespread areas.

HCHs, except γ-HCH, are believed to have great persistence, and may be selected as candidate substances for the POPs Treaty. From the standpoint of global pollution monitoring, too, it is necessary to continue the monitoring to trace their fate.

(10) Hexabromobenzene (HBB)

Surface water: In the surveys conducted in FY1977, FY1981 and FY1982, the persistent concentrations of the substance were below detection limits (40-500 ng/L in FY1977, 10-100 ng/L in FY1981, 50 ng/L in FY1982). In the FY2000 survey conducted with a detection limit of 6.4 ng/L, the substance was not detected at any of the survey sites. In the FY2004 survey conducted with a lower quantification limit of 2.0 ng/L and a lower detection limit of 0.6 ng/L, the substance was not detected.

Bottom sediment: In the FY1977 survey, the persistent concentrations of the substance were below detection limits (10-170 ng/g-dry). In the FY1981 survey conducted with detection limits of 0.5-2.5 ng/g-dry, the substance was detected at three of the 18 survey sites with a detection range between 2.2-6.9 ng/g-dry. In the FY1982 survey conducted with detection limits of 0.9-5 ng/g-dry, the substance was detected at three of the 126 survey sites with a detection range between 3.1-4.3 ng/g-dry. In the FY2000 survey conducted with a detection limit of 4.8 ng/g-dry, the substance was detected at two of the 11 survey sites with a detection range between 8.4-43 ng/g-dry. In the FY2004 survey conducted with a lower quantification limit of 2.7 ng/g-dry and a lower detection limit of 0.9 ng/g-dry, the substance was detected at 13 of the 63 survey sites with a detection range between ND and 34 ng/g-dry.

Fish: In the FY2000 survey conducted with a detection limit of 3,200 ng/g-wet, the substance was not detected. In the FY2004 survey conducted with a quantification limit of 0.3 ng/g-wet and a detection limit of 0.1 ng/g-wet, the substance was detected at one of the seven survey sites with a detection range between ND and TR (0.12) ng/g-wet. The substance was not detected in shellfish or birds.

Atmospheric air: In the FY2000 survey conducted with a detection limit of 30 pg/m^3, the substance was detected at eight of the 11 survey sites with a detection range between 31 and 100 pg/m^3. In the FY2004 survey conducted with a quantification limit of 29 pg/m^3 and a detection limit of 9.7 pg/m^3, the substance was detected at 27 of the 37 survey sites in the warm season with a detection range between ND and 610 pg/m^3, and in 29 of the 37 samples in the cold season with a detection range between ND and 380 pg/m^3.

Since FY2000, no monitoring surveys have been conducted on HBB persisting in each of all the media. Although for this reason it is difficult to grasp the tendency of its persistence, it seems that HBB is detected more frequently in bottom sediment and atmospheric air than in wildlife including fish.

(11) Organotin compounds (dioctyltin compounds [DOT])

Surface water: The persistent concentrations of the substances were below detection limits (0.5-1 μg/L) in FY1984. In the FY2000 survey conducted with a detection limit of 5.9 ng/L, the substances were detected at two of the 49 survey sites with a detection range between 7.3-72 ng/L. In the 2004 survey conducted with a quantitation limit of 5.5μg/L and a detection limit of 1.9 ng/L, the substances were not detected at any of the 38 survey sites.

Bottom sediment: The persistent concentrations of the substances were below a detection limit (30-140 ng/g-dry) in FY1984. In the FY2000 survey conducted with a detection limit of 10 ng/g-dry,

the substances were detected at 13 of the 49 survey sites with a detection range between 11-100 ng/g-dry. In the FY2004 survey conducted with a quantification limit of 6.0 ng/g-dry and a detection limit of 2.0 ng/g-dry, the substances were detected at 33 of the 63 survey sites with a detection range between ND and 88 pg/g-dry.

Fish: In the FY2000 survey conducted with a detection limit of 0.64 ng/g-wet, the substances were detected at 12 of the 39 survey sites with a detection range between ND and 6.5 ng/g-wet. In the FY 2004 survey conducted with a quantitation limit of 3 ng/g-wet and a detection limit of 1 ng/g-wet, the substances were detected at one of the seven survey sites with a detection range between ND and TR (2.5) ng/g-wet.

This survey detected DOT less frequently in surface water and fish and more frequently in bottom sediment.

(12) Survey of Preserved Samples

The outline of the surveillance results for preserved samples conducted in FY2004 were shown as follows.

The preserved samples which were collected and analyzed at the Environmental Survey and Monioring Chemicals conducted in the past stored under freezing for the long-term preservation were utilized as the target survey samples.

Specifically, the sea bass captured at Tokyo Bay for the survey in FY1994, FY1995 and FY1997 to FY2001, at Osaka Bay for the survey in FY1994 and FY2001, and the hard-shell mussel captured at Tokushima Prefecture for the survey in FY1993 were used. The target samples whose PCBs concentrations gave median values were selected among five groups in each fiscal year, then analyses were conducted.

These samples in which the target substances were not detected at the time of collection were re-analyzed by high sensitivity method introduced from FY2002, and the actual concentration levels for most of each target compound were revealed. And the information of concentration levels of toxaphenes and mirex, which have not been registerd as agricultural chemicals in Japan and whose concentration levels have not been estimated, were acquired.

The POPs concentrations in the sea bass collected to Tokyo Bay were not changed so much in the past ten years. And the apparent tendencies of annual variations were hardly found.

The character of composition of POPs in the wildlife samples at each sampling area were revealed by the survey conducted from FY2002, for example, relatively high concentration of *o,p'*-DDE among DDTs in sea bass collected at Tokyo Bay, high contribution of β-HCH concentration among HCHs in sea bass collected at Osaka Bay, and relatively high concentration of *cis*-chlordane among chlordanes in hard-shell mussel collected at Tokushima Prefecture. And these characters were observed in the samples which were collected ten years ago, then these were considered as the feature of each sampling area.