Part 2: Radioactive Material Monitoring in the Water Environment in and around Fukushima Prefecture (FY2015)

1. Objective and Details

1.1 Objective

This monitoring was conducted in response to the Fukushima NPS Accident for the purpose of clarifying the distribution of the accident-derived radioactive materials in the water environment.

1.2 Details

(1) Locations

The survey was conducted mainly in the Tohoku and Kanto districts at around 600 locations for public water areas and at around 400 locations for groundwater. Specific locations are as shown in Figure 1.2-1.

(2) Targets

For public water areas (rivers, lakes, and coastal areas), water and sediments were surveyed. Additionally, radioactive concentrations in soil were measured in the surrounding environment (river beds, etc.) near the sampling locations as reference.

Radioactive concentrations in groundwater were also measured.

(3) Frequencies and periods

The monitoring for public water areas was conducted 2 to 10 times a year (varying by location).

The monitoring for groundwater was conducted 1 to 4 times a year (varying by location).

(4) Conducted analyses

Primarily, analyses targeting Cs-134 and Cs-137 were conducted.

Additionally, analyses on Sr-89, Sr-90 and other artificial radionuclides were also conducted for some of the collected samples.

(5) Compilation and evaluation of results

The results of the measurement are compiled and released sequentially as preliminary reports on the website of Ministry of the Environment.

This report is the compilation of the overall monitoring results, and the details of individual monitoring surveys are available on the following website.

http://www.env.go.jp/en/water/rmms/surveys.html

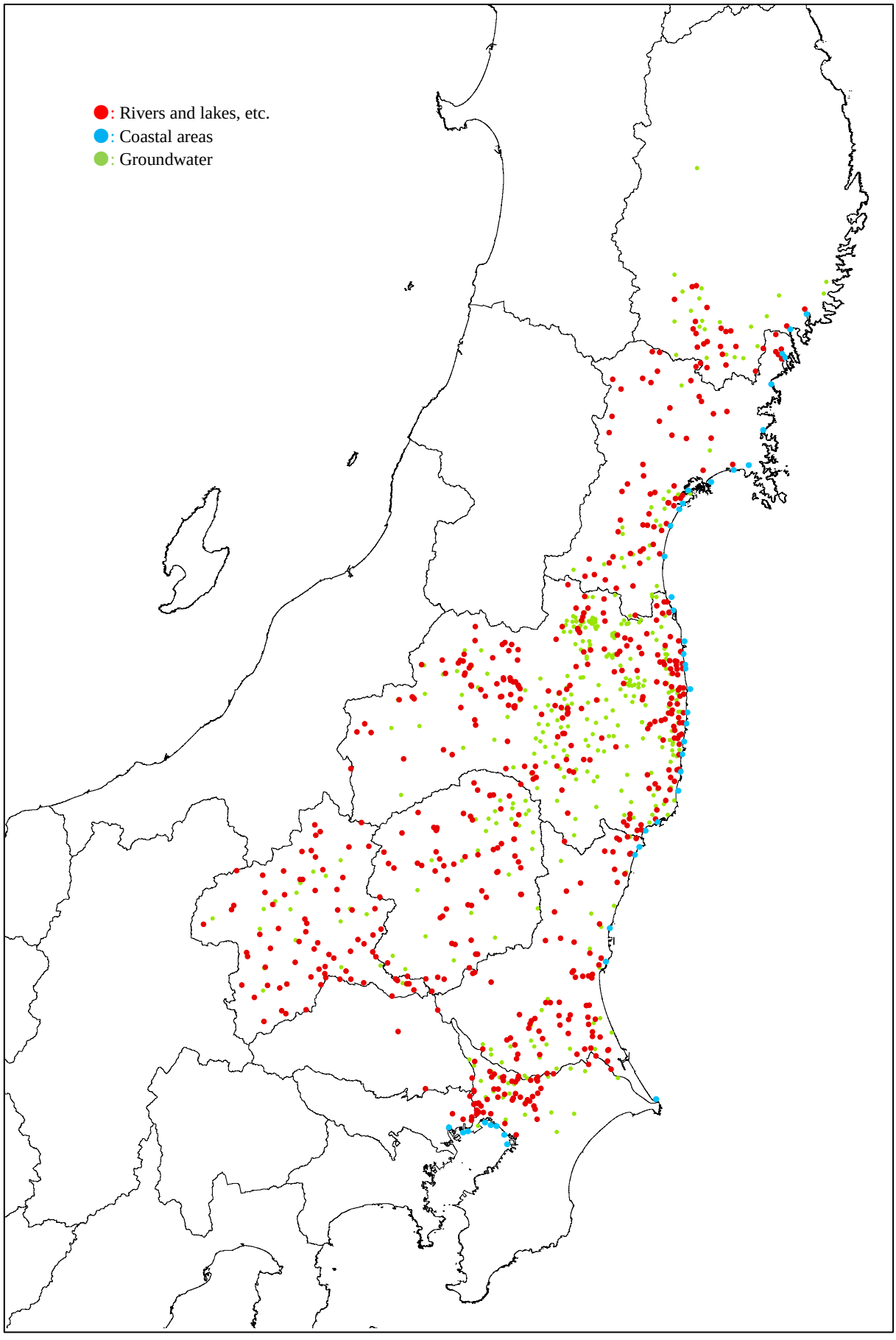


Figure 1.2-1 Map showing locations for the Post-Earthquake Monitoring

2. Survey Methods and Analysis Methods

2.1 Survey methods

Samples were collected at predetermined locations (for public water areas and groundwater) and the following analyses of radioactive materials were conducted.

Samples were collected based on the following guidelines in principle, as outlined below.

- Water Quality Survey Method (September 30, 1971; Notice Kansuikan No. 30 issued by the Director General of the Water Quality Preservation Bureau, Ministry of the Environment)
- Sediment Survey Method (August 8, 2012; Notice Kansuitaisuihatsu No. 120725002 issued by the Director General of the Environmental Management Bureau, Ministry of the Environment)
- Groundwater Quality Survey Method (September 14, 1989; Notice Kansuikan No. 189 issued by the Director General of the Water Quality Preservation Bureau, Ministry of the Environment)
- Environmental Sample Collection Method (1983, MEXT's Radioactivity Measurement Method Series)
- Sample Pretreatment for Instrumental Analysis Using Germanium Semiconductor Detectors (1982, MEXT's Radioactivity Measurement Method Series)

2.2 Analysis methods

The γ-ray spectrometry measurement using a germanium semiconductor detector was conducted for water samples and sediment samples from public water areas and for groundwater samples, primarily targeting Cs-134 and Cs-137.

Additionally, analyses on Sr-89, Sr-90 and other artificial radionuclides were also conducted for some of the collected samples. Detected values were indicated with two significant digits in the unit of "Bq/L" in the case of water samples from public water areas and groundwater samples, and in the unit of "Bq/kg (dry)" in the case of sediment samples from public water areas. The measurement results were corrected for attenuation, and reported figures were activity concentrations as of the time of completing sampling.

Adopted analysis methods were basically in line with the MEXT's Radioactivity Measurement Method Series, and detection limit targets were as shown in the table below.

Table 2.2-1 Detection limit targets for radionuclides for the Post-Earthquake Monitoring

Radionuclide		Public water areas (water)	Public water areas (sediments)	Groundwater
Radioactive cesium (Cs-134 and Cs-137)		Approx. 1 Bq/L	Approx. 10 Bq/kg (dry)	Approx. 1 Bq/L
Radioactive strontium	Sr-90	—	Approx. 1 Bq/kg (dry) (0.16 to 2.9 Bq/kg (dry))	Approx. 1 Bq/L
	Sr-89	—	—	Approx. 1 Bq/L
Other artificial radionuclides (*1)		—	Ag-110m: 7 to 180 Bq/kg (dry) Sb-125: 130 to 330 Bq/kg (dry)	—

*1: Vary by type of radionuclides; The above table shows detection limit targets for Ag-110m and Sb-125, which were detected in the monitoring (see Chapter 5.2 of the main text).

3. Outline of the Results

The results of the Post-Earthquake Monitoring conducted in Tokyo Metropolis and other nine prefectures of FY2015 were as outlined below.

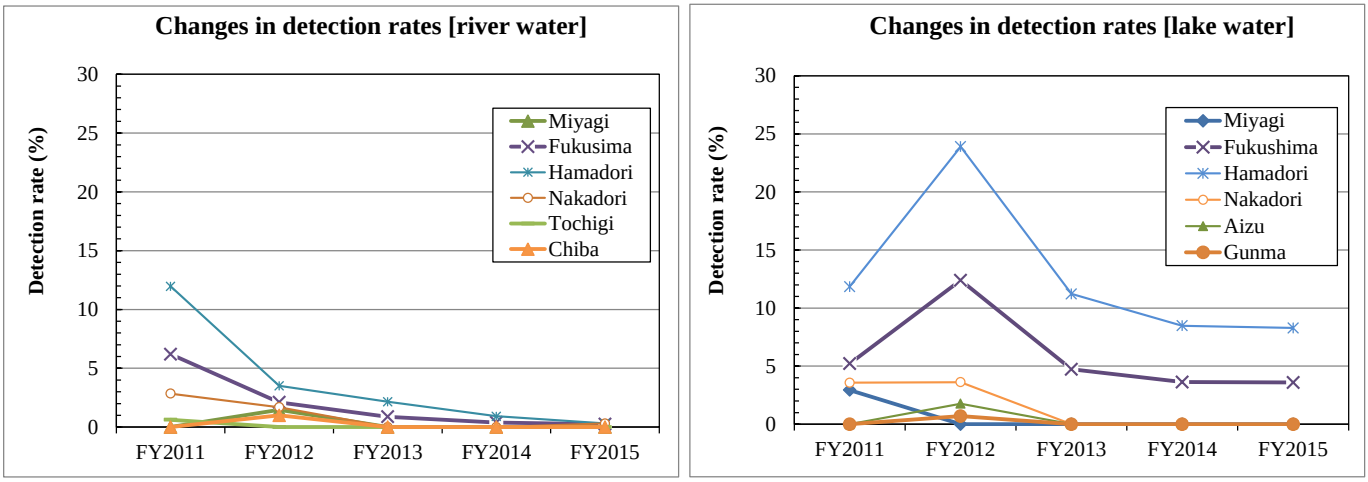
3.1 Detection of radioactive cesium

Radioactive cesium (total of Cs-134 and Cs-137) was detected as follows.

(1) Public water areas (water)

In FY2015, radioactive cesium activity concentrations ranged from not detectable to 1.3 Bq/L and had a detection rate of 0.1% in river water samples; from not detectable to 52 Bq/L and with a detection rate of 2.1% in lake water samples; and were not detectable in any coastal area water samples.

Judging from the changes over time since FY2011, all prefectures have shown decreasing trends in the detection rate for river water specimens (9,000 or more in total number of samples) and lake water specimens (5,400 or more in total number of samples). In prefectures other than Fukushima Prefecture, radioactive cesium has not been detected since FY2013 (see Figure 3.1-1). In addition, no survey detected radioactive cesium in coastal area water specimens (2,300 or more in total number of samples).



(*) Data for Fukushima Prefecture are the total of those for Hamadori, Nakadori, and Aizu. Not listed prefectures are as not detected. The same applies in other figures below.

Figure 3.1-1 Changes in detection rates of radioactive cesium in water samples from public water areas (left: rivers; right: lakes)

(2) Groundwater

Radioactive cesium was not detectable in any of the groundwater samples in FY2015.

Judging from the changes over time since FY2011, radioactive cesium has not been detected in groundwater specimens (4,700 or more in total number of samples) since FY2012, except when it was detected in two specimens from Fukushima Prefecture in FY2011 (detected values were 2 Bq/L and 1 Bq/L).

(3) Public water areas (sediments)

1) Overall trends

In FY2015, radioactive cesium activity concentrations ranged from not detectable to 20,100 Bq/kg and were detected with a detection rate of 88.1% in river sediment samples, from not detectable to 920,000 Bq/kg and with a detection rate of 99.1% in lake sediment samples, and from not detectable to 2,950 Bq/kg and at a detection rate of 82.0% in coastal area sediment samples.

2) Situation by location

As radioactive cesium was detected at many locations, the situations in respective locations were compared. Detected concentration levels and their changes were statistically compiled as shown in "4.3 Detection of radioactive materials in sediments by location."

Detected concentration levels were compiled as shown in Table 3.1-1.

Locations belonging to Categories A and B (top 10 percentile of the whole) were in Hamadori District, Fukushima Prefecture as well as in Nakadori District, Fukushima Prefecture, Ibaraki, Gunma, Chiba, and Miyagi Prefectures.

Table 3.1-1 Categorization of detected concentration levels for sediment samples from public water areas(FY2015) (rivers, lakes, and coastal areas)

<Rivers>

Category	Percentile (see Figure 4.3-1)	[River sediments] Range [Bq/kg (dry)]	Number of locations												
			Iwate	Miyagi	Fukushima			Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Total	
					Hamadori	Nakadori	Aizu							Number of locations	Percentage
A	Upper 5 percentile	1,077 or more	0	0	11	0	0	2	0	1	5	0	0	19	4.8
B	Upper 5 to 10 percentile	529 ～ 1,077	0	0	9	1	0	2	0	0	8	0	0	20	5.1
C	Upper 10 to 25 percentile	182 ～ 529	0	8	6	14	1	11	1	0	18	0	1	60	15.2
D	Upper 25 to 50 percentile	59 ～ 182	2	14	19	9	7	21	5	9	12	1	1	100	25.3
E	Lower 50 percentile	59 or less	20	21	8	20	18	17	50	38	4	1	0	197	49.7
Total			22	43	53	44	26	53	56	48	47	2	2	396	100.0

<Lakes>

Category	Percentile (see Figure 4.3-1)	Range [Lake sediments] [Bq/kg (dry)]	Number of locations									
			Miyagi	Fukushima			Ibaraki	Tochigi	Gunma	Chiba	Total	
				Hamadori	Nakadori	Aizu					Number of locations	Percentage
A	Upper 5 percentile	23,760 or more	0	8	0	0	0	0	0	0	8	4.9
B	Upper 5 to 10 percentile	12,306 ～ 23,760	0	8	0	0	0	0	0	0	8	4.9
C	Upper 10 to 25 percentile	1,969 ～ 12,306	1	11	4	6	1	0	1	1	25	15.2
D	Upper 25 to 50 percentile	624 ～ 1,969	3	10	6	3	4	4	10	1	41	25.0
E	Lower 50 percentile	624 or less	17	4	2	22	14	4	13	6	82	50.0
Total			21	41	12	31	19	8	24	8	164	100.0

<Coastal areas>

Category	Percentile (see Figure 4.3-1)	Range [coastal area sediments] [Bq/kg (dry)]	Number of locations							
			Iwate	Miyagi	Fukushima	Ibaraki	Chiba	Tokyo	Total	
									Number of location	Percentage
A	Upper 5 percentile	580 or more	0	1	1	0	0	0	2	4.8
B	Upper 5 to 10 percentile	400 ～ 580	0	1	1	0	0	0	2	4.8
C	Upper 10 to 25 percentile	248 ～ 400	0	1	4	0	0	1	6	14.3
D	Upper 25 to 50 percentile	65 ～ 248	0	5	3	0	1	2	11	26.2
E	Lower 50 percentile	65 or less	2	4	6	5	4	0	21	50.0
Total			2	12	15	5	5	3	42	100.0

Changes in detected concentration levels were compiled as shown in Figure 3.1-2, which shows Table 4.3-45 graphically.

At most monitoring locations for rivers, a decreasing trend was observed. For lakes, a decreasing or unchanged trend was generally observed with some locations showing fluctuations. For coastal areas, a decreasing trend was observed at most locations with some locations showing fluctuations.

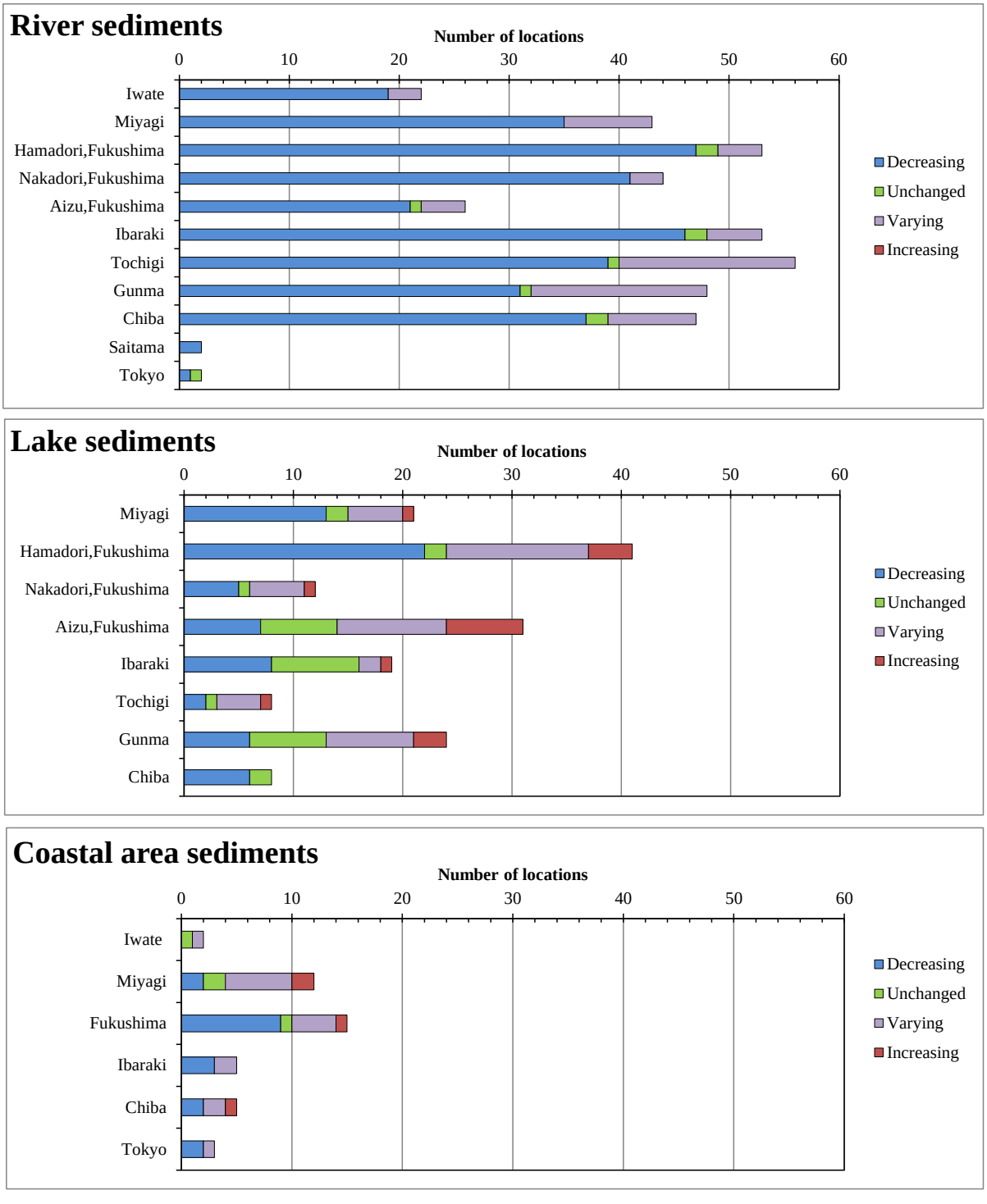


Figure 3.1-2 Changes in detected concentration levels of radioactive materials in sediment samples from public water areas (rivers, lakes, and coastal areas)

3.2 Detection of radionuclides other than radioactive cesium

(1) Sr-89 and Sr-90

As shown by the results, including the past fiscal years, Sr-90 was included in the monitoring surveys conducted from FY2011 to FY2015 for sediment samples (approximately 500 samples in total) from public water areas (rivers, lakes, and coastal areas) and for groundwater samples (approximately 240 specimens in total) (see Figure 3.2-1).

In FY2015, Sr-90 ranged in concentration from not detectable to 1.9 Bq/kg and was detected with a detection rate of 40.9% in river sedmiment samples, from not detectable to 150 Bq/kg and with a detection rate of 97.1% in lake sediment samples, and from not detectable to 0.78 Bq/kg and with a detection rate of 9.4% in coastal area sediment samples.

Sr-89 was not detectable in any of the monitoring surveys conducted for sediment samples from public water areas (a total of 22 samples collected from rivers and lakes in FY2011) and for groundwater samples (a total of approx. 240 samples surveyed from FY2011 to FY2015) (detection limit: 1 Bq/L for water and approximate 2 Bq/kg for sediments).

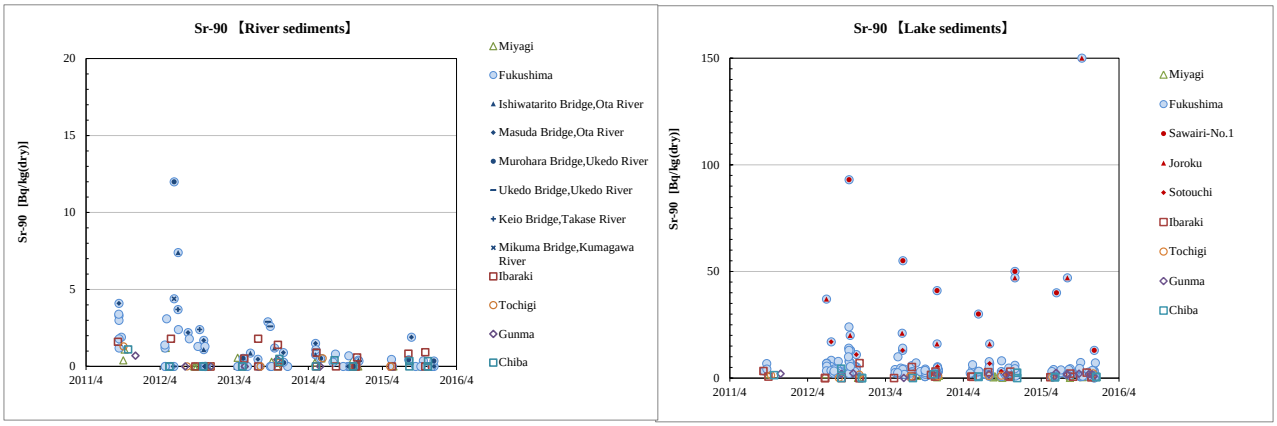


Figure 3.2-1 Detection of Sr-90 in sediment samples from public water areas (left: rivers; right: lakes)

(2) Other artificial radionuclides

None have been detected since FY 2013.

4. Results (Radioactive cesium (Cs-134 and Cs-137))

4.1 Water

(1) Public water areas

1) Rivers

Detection of radioactive cesium (Cs-134 and Cs-137) in river water samples is as shown in Table 4.1-1 and Figure 4.1-1.

According to the results, including the past fiscal years, most prefectures, have shown decreasing trends in the detection rate since FY2011. In FY2015, radioactive cesium has not been detected in any location other than the Hamadori and Nakadori Districts, Fukushima Prefecture.

Detected values (the total of Cs-134 and Cs-137) have been decreasing since FY2011. The measured values from FY2015 ranged from not detectable to 1.3 Bq/L (detection limit: 1 Bq/L for both Cs-134 and Cs-137).

2) Lakes

Detection of radioactive cesium (Cs-134 and Cs-137) in lake water samples is as shown in Table 4.1-2 and Figure 4.1-2.

According to the results, including the past fiscal years, most prefectures have shown decreasing trends in the detection rate since FY2012. Radioactive cesium has not been detected in any location other than Hamadori District, Fukushima Prefecture since FY2013.

Detected values (the total of Cs-134 and Cs-137) have been decreasing since FY2012. The measured values in FY2015 ranged from not detectable to 52 Bq/L (detection limit: 1 Bq/L for both Cs-134 and Cs-137).

3) Coastal areas

Detection of radioactive cesium (Cs-134 and Cs-137) in coastal area water samples is as shown in Table 4.1-3.

According to the results, including the past fiscal years, radioactive cesium has not been detected at any site (detection limit: 1 Bq/L for both Cs-134 and Cs-137).

(2) Groundwater

Detection of radioactive cesium (Cs-134 and Cs-137) in groundwater samples is as shown in Table 4.1-4.

According to the results, including the past fiscal years, approximately 4,700 specimens from eight prefectures were surveyed. In FY2011, radioactive cesium was detected at concentrations of 2 Bq/L and 1 Bq/L at two locations (both in Fukushima Prefecture) only, and has not been detected at any location since FY2012.

<Reference>

- Specification and Standards for Food, Food Additives, etc. in Accordance with the Food Sanitation Act (Drinking Water) (Ministry of Health, Labour and Welfare Public Notice No.130, March 15, 2012)
  Radioactive cesium (the total of Cs-134 and Cs-137): 10 Bq/kg
- Reference Values for Radioactive Materials in Tap Water (Management Target for Water Supply Facilities) (March 5, 2012; 0305 Notice No.1 from the Director of the Water Supply Division, Health Service Bureau,

Ministry of Health, Labour and Welfare)

Radioactive cesium (the total of Cs-134 and Cs-137): 10 Bq/kg

Table 4.1-1 Detection of radioactive cesium in river water samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Range of measured values (Bq/L)
Iwate	18	0	0.0	-	64	0	0.0	-	80	0	0.0	-	80	0	0.0	-	80	0	0.0	-	322	0	-
Yamagata	10	0	0.0	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	10	0	-
Miyagi	114	0	0.0	-	204	3	1.5	ND – 6.3	193	0	0.0	-	196	0	0.0	-	196	0	0.0	-	903	3	ND – 6.3
Fukushima	452	28	6.2	ND – 20	854	18	2.1	ND – 4.6	801	7	0.9	ND – 5.5	770	3	0.4	ND – 1.6	819	2	0.2	ND – 1.3	3,696	58	ND – 20
Hamadori	192	23	12.0	ND – 20	342	12	3.5	ND – 4.6	325	7	2.2	ND – 5.5	326	3	0.9	ND – 1.6	330	1	0.3	ND – 1.3	1,515	46	ND – 20
Nakadori	176	5	2.8	ND – 8.0	355	6	1.7	ND – 1.9	322	0	0.0	-	324	0	0.0	-	324	1	0.3	ND – 1.1	1,501	12	ND – 8.0
Aizu	84	0	0.0	-	157	0	0.0	-	154	0	0.0	-	120	0	0.0	-	165	0	0.0	-	680	0	-
Ibaraki	128	0	0.0	-	214	0	0.0	-	212	0	0.0	-	212	0	0.0	-	212	0	0.0	-	978	0	-
Tochigi	161	1	0.6	ND – 1.0	277	0	0.0	-	276	0	0.0	-	274	0	0.0	-	278	0	0.0	-	1,266	1	ND – 1.0
Gunma	90	0	0.0	-	216	0	0.0	-	214	0	0.0	-	210	0	0.0	-	214	0	0.0	-	944	0	-
Saitama	2	0	0.0	-	8	0	0.0	-	8	0	0.0	-	8	0	0.0	-	8	0	0.0	-	34	0	-
Chiba	82	0	0.0	-	202	2	1.0	ND – 1.3	200	0	0.0	-	200	0	0.0	-	200	0	0.0	-	884	2	ND – 1.3
Tokyo	3	0	0.0	-	12	0	0.0	-	8	0	0.0	-	8	0	0.0	-	8	0	0.0	-	39	0	-
Total	1,060	29	2.7	ND – 20	2,051	23	1.1	ND – 6.3	1,992	7	0.4	ND – 5.5	1,958	3	0.2	ND – 1.6	2,015	2	0.1	ND – 1.3	9,076	122	ND – 20

ND: Not detectable

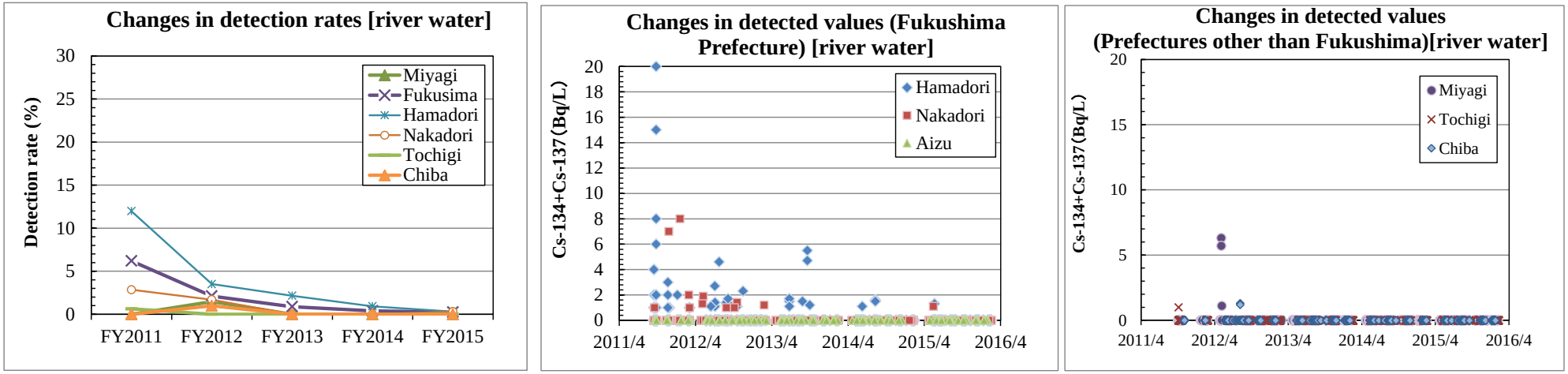


Figure 4.1-1 Detection rates of radioactive cesium in river water samples (left) and changes in detected values (center and right)

Table 4.1-2 Detection of radioactive cesium in lake water samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Range of measured values (Bq/L)
Yamagata	4	0	0.0	-	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	4	0	-
Miyagi	34	1	2.9	ND – 3.0	90	0	0.0	-	118	0	0.0	-	114	0	0.0	-	118	0	0.0	-	474	1	ND – 3.0
Fukushima	211	11	5.2	ND – 27	581	72	12.4	ND – 100	761	36	4.7	ND – 47	799	29	3.6	ND – 34	807	29	3.6	ND – 52	3,159	177	ND – 100
Hamadori	76	9	11.8	ND – 27	272	65	23.9	ND – 100	321	36	11.2	ND – 47	342	29	8.5	ND – 34	350	29	8.3	ND – 52	1,361	168	ND – 100
Nakadori	56	2	3.6	ND – 5.0	83	3	3.6	ND – 1.2	109	0	0.0	-	113	0	0.0	-	115	0	0.0	-	476	5	ND – 5.0
Aizu	79	0	0.0	-	226	4	1.8	ND – 5.1	331	0	0.0	-	344	0	0.0	-	342	0	0.0	-	1,322	4	ND – 5.1
Ibaraki	48	0	0.0	-	93	0	0.0	-	152	0	0.0	-	152	0	0.0	-	149	0	0.0	-	594	0	-
Tochigi	24	0	0.0	-	54	0	0.0	-	62	0	0.0	-	64	0	0.0	-	64	0	0.0	-	268	0	-
Gunma	51	0	0.0	-	144	1	0.7	ND – 1.0	188	0	0.0	-	187	0	0.0	-	192	0	0.0	-	762	1	ND – 1.0
Chiba	32	0	0.0	-	50	0	0.0	-	53	0	0.0	-	50	0	0.0	-	37	0	0.0	-	222	0	-
Total	404	12	3.0	ND – 27	1,012	73	7.2	ND – 100	1,334	36	2.7	ND – 47	1,366	29	2.1	ND – 34	1,367	29	2.1	ND – 52	5,483	179	ND – 100

ND: Not detectable

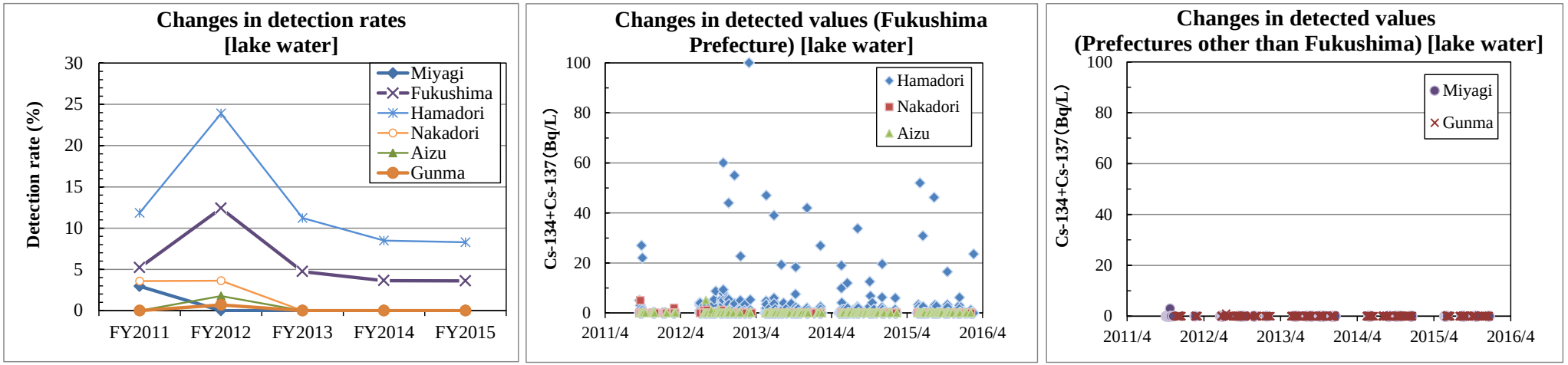


Figure 4.1-2 Detection rates of radioactive cesium in lake water samples (left) and changes in detected values (center and right)

Table 4.1-3 Detection of radioactive cesium in coastal area water samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Toal		
	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Range of measured values (Bq/L)
Iwate	5	0	0.0	-	8	0	0.0	-	8	0	0.0	-	8	0	0.0	-	8	0	0.0	-	37	0	-
Miyagi	94	0	0.0	-	96	0	0.0	-	102	0	0.0	-	104	0	0.0	-	104	0	0.0	-	500	0	-
Fukushima	116	0	0.0	-	189	0	0.0	-	300	0	0.0	-	300	0	0.0	-	300	0	0.0	-	1,205	0	-
Ibaraki	45	0	0.0	-	62	0	0.0	-	40	0	0.0	-	40	0	0.0	-	40	0	0.0	-	227	0	-
Chiba	0	0	-	-	62	0	0.0	-	46	0	0.0	-	46	0	0.0	-	46	0	0.0	-	200	0	-
Tokyo	0	0	-	-	38	0	0.0	-	36	0	0.0	-	36	0	0.0	-	36	0	0.0	-	146	0	-
Total	260	0	0.0	-	455	0	0.0	-	532	0	0.0	-	534	0	0.0	-	534	0	0.0	-	2,315	0	-

ND: Not detectable

Table 4.1-4 Detection of radioactive cesium in groundwater samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/L)	Number of samples	Number of detections	Range of measured values (Bq/L)
Iwate	42	0	0.0	-	44	0	0.0	-	44	0	0.0	-	22	0	0.0	-	22	0	0.0	-	174	0	-
Miyagi	79	0	0.0	-	44	0	0.0	-	48	0	0.0	-	24	0	0.0	-	24	0	0.0	-	219	0	-
Yamagata	79	0	0.0	-	0	0	-	-	0	0	-	-	0	0	-	-		0	-	-	79	0	-
Fukushima	540	2	0.4	ND – 2.0	543	0	0.0	-	766	0	0.0	-	771	0	0.0	-	767	0	0.0	-	3,387	2	ND – 2.0
Ibaraki	89	0	0.0	-	54	0	0.0	-	54	0	0.0	-	27	0	0.0	-	27	0	0.0	-	251	0	-
Tochigi	76	0	0.0	-	54	0	0.0	-	54	0	0.0	-	27	0	0.0	-	27	0	0.0	-	238	0	-
Gunma	40	0	0.0	-	40	0	0.0	-	42	0	0.0	-	21	0	0.0	-	21	0	0.0	-	164	0	-
Chiba	54	0	0.0	-	46	0	0.0	-	46	0	0.0	-	23	0	0.0	-	23	0	0.0	-	192	0	-
Total	999	2	0.2	ND – 2.0	825	0	0.0	-	1,054	0	0.0	-	915	0	0.0	-	911	0	0.0	-	4,704	2	ND – 2.0

ND: Not detectable

(*) Detected in FY2011. Both Cs-134 and Cs-137 were detected at one site, and only Cs-137 was detected at another site, at a level of 1 Bq/L (detection limit: 1 Bq/L) (see the main text).

4.2 Sediments

Detection of radioactive cesium in sediment samples from public water areas (rivers, lakes, and coastal areas) were as outlined below.

(1) Public water areas (rivers)

Radioactive cesium (Cs-134 and Cs-137) detected in river sediment samples was as shown in Table 4.2-1 and Figure 4.2-1.

According to the results, including the past fiscal years, the detection rate ranged between 50 and 100%, and has been slightly decreasing over time in many prefectures.

As shown in Figure 4.2-1, more locations are showing lower concentration levels (the total of Cs-134 and Cs-137) and fewer locations are showing higher concentration levels.

(2) Public water areas (lakes)

Detection of radioactive cesium (Cs-134 and Cs-137) in lake sediment samples is as shown in Table 4.2-2 and Figure 4.2-2.

According to the results, including the past fiscal years, the detection rate ranged between 83 and 100%. In FY2015, detection rates of 90% or more were observed in all prefectures.

Detected values (the total of Cs-134 and Cs-137) were generally decreasing or unchanged though some locations exhibited fluctuations. In Hamadori District, Fukushima Prefecture, however, radioactive cesium was still detected at concentrations of 100,000 Bq/kg or more in FY2015.

(3) Public water areas (coastal areas)

Detection of radioactive cesium (Cs-134 and Cs-137) in coastal area sediment samples is as shown in Table 4.2-3 and Figure 4.2-3.

According to the results, including the past fiscal years, the detection rate ranged between 40 and 100% and slightly decreased in FY2015, except for Iwate Prefecture with a small number of specimens.

Coastal area locations showed lower detected values (the total of Cs-134 and Cs-137) than those in rivers or lakes. In Fukushima Prefecture, however, radioactive cesium was still detected at concentrations of 1,000 Bq/kg or more in FY2015.

Table 4.2-1 Detection of radioactive cesium in river sediment samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate (%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Range of measured values (Bq/kg)
Iwate	18	18	100.0	62 – 990	64	63	98.4	ND – 1,040	80	71	88.8	ND – 340	80	68	85.0	ND – 301	80	60	75.0	ND – 121	322	280	ND – 1,040
Yamagata	10	6	60.0	ND – 132	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	10	6	ND – 132
Miyagi	113	111	98.2	ND – 11,100	199	191	96.0	ND – 3,700	192	182	94.8	ND – 2,450	196	187	95.4	ND – 1,620	196	176	89.8	ND – 1,860	896	847	ND – 11,100
Fukushima	441	421	95.5	ND – 92,000	847	808	95.4	ND – 165,000	795	750	94.3	ND – 45,000	770	724	94.0	ND – 24,700	845	776	91.8	ND – 20,100	3,698	3,479	ND – 165,000
Hamadori	192	191	99.5	ND – 92,000	336	329	97.9	ND – 165,000	325	321	98.8	ND – 45,000	326	318	97.5	ND – 24,700	358	354	98.9	ND – 20,100	1,537	1,513	ND – 165,000
Nakadori	176	174	98.9	ND – 30,000	354	353	99.7	ND – 20,000	316	316	100.0	10 – 8,300	324	317	97.8	ND – 3,060	324	316	97.5	ND – 3,270	1,494	1,476	ND – 30,000
Aizu	73	56	76.7	ND – 25,000	157	126	80.3	ND – 2,590	154	113	73.4	ND – 1,410	120	89	74.2	ND – 720	163	106	65.0	ND – 810	667	490	ND – 25,000
Ibaraki	128	125	97.7	ND – 5,800	214	208	97.2	ND – 4,800	212	209	98.6	ND – 4,200	212	208	98.1	ND – 1,640	212	203	95.8	ND – 2,160	978	953	ND – 5,800
Tochigi	159	150	94.3	ND – 4,900	275	267	97.1	ND – 1,780	276	245	88.8	ND – 1,540	274	231	84.3	ND – 820	278	212	76.3	ND – 1,010	1,262	1,105	ND – 4,900
Gunma	88	74	84.1	ND – 410	211	184	87.2	ND – 1,560	214	179	83.6	ND – 1,560	210	177	84.3	ND – 2,160	214	161	75.2	ND – 1,510	937	775	ND – 2,160
Saitama	2	2	100.0	35 – 530	8	8	100.0	12 – 540	8	8	100.0	10 – 67	8	7	87.5	ND – 68	8	4	50.0	ND – 291	34	29	ND – 540
Chiba	83	83	100.0	50 – 9,700	199	199	100.0	17 – 20,200	200	199	99.5	ND – 7,900	200	200	100.0	11 – 5,200	200	199	99.5	ND – 4,100	882	880	ND – 20,200
Tokyo	2	2	100.0	580 – 700	12	12	100.0	131 – 670	8	8	100.0	75 – 460	8	8	100.0	96 – 430	8	8	100.0	86 – 404	38	38	75 – 700
Total	1,044	992	95.0	ND – 92,000	2,029	1,940	95.6	ND – 165,000	1,985	1,851	93.2	ND – 45,000	1,958	1,810	92.4	ND – 24,700	2,041	1,799	88.1	ND – 20,100	9,057	8,392	ND – 165,000

ND: Not detectable

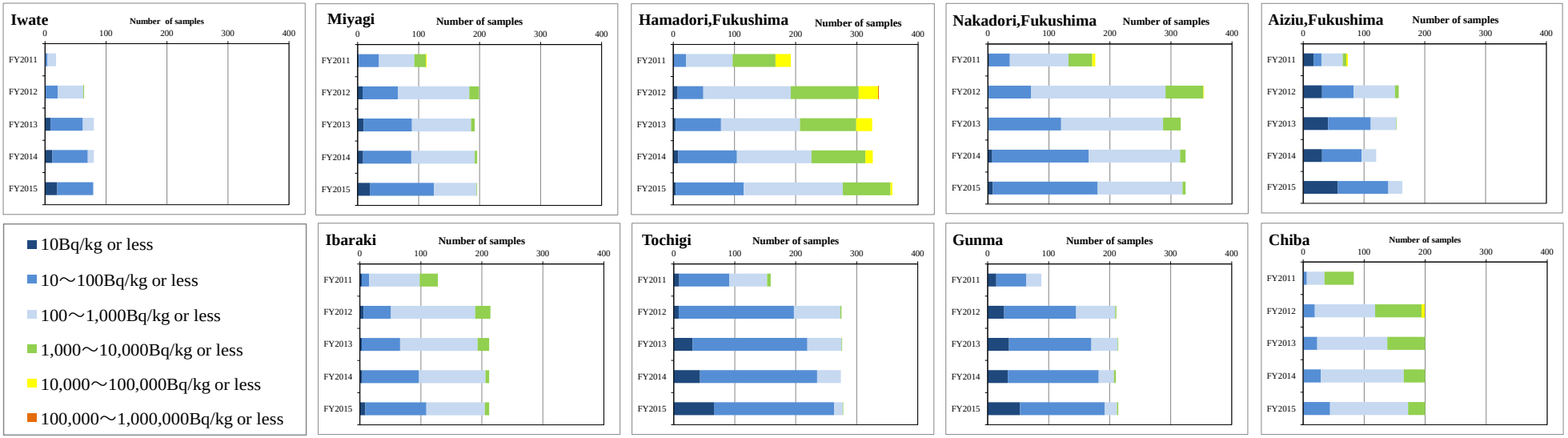


Figure 4.2-1 Detection of radioactive cesium in river sediment samples (changes) (Prefectures where only a small number of samples were collected are omitted.)

Table 4.2-2 Detection of radioactive cesium in lake sediment samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Range of measured values (Bq/kg)
Yamagata	2	2	100.0	34 – 470	0	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	2	2	34 – 470
Miyagi	24	24	100.0	31 – 3,000	58	57	98.3	ND – 9,700	76	76	100.0	18 – 4,200	75	74	98.7	ND – 2,220	76	74	97.4	ND – 4,490	309	305	ND – 9,700
Fukushima	147	141	95.9	ND – 260,000	389	386	99.2	ND – 780,000	501	499	99.6	ND – 460,000	501	496	99.0	ND – 297,000	541	535	98.9	ND – 920,000	2,079	2,057	ND – 920,000
Hamadori	62	62	100.0	45 – 260,000	201	201	100.0	42 – 780,000	239	239	100.0	68 – 460,000	243	243	100.0	18 – 297,000	278	278	100.0	16 – 920,000	1,023	1,023	16 – 920,000
Nakadori	42	41	97.6	ND – 35,000	58	58	100.0	63 – 24,900	77	77	100.0	68 – 11,100	76	74	97.4	ND – 10,900	78	78	100.0	44 – 6,200	331	328	ND – 35,000
Aizu	43	38	88.4	ND – 2,020	130	127	97.7	ND – 10,200	185	183	98.9	ND – 13,400	182	179	98.4	ND – 7,800	185	179	96.8	ND – 12,300	725	706	ND – 13,400
Ibaraki	24	24	100.0	37 – 1,840	48	48	100.0	93 – 1,300	76	75	98.7	ND – 5,400	76	75	98.7	ND – 3,170	73	73	100.0	61 – 3,070	297	295	ND – 5,400
Tochigi	12	10	83.3	ND – 6,700	27	27	100.0	11 – 4,100	31	31	100.0	106 – 5,100	32	32	100.0	134 – 8,700	32	32	100.0	103 – 1,760	134	132	ND – 8,700
Gunma	26	22	84.6	ND – 4,600	72	72	100.0	16 – 4,100	95	95	100.0	21 – 4,300	94	94	100.0	38 – 5,100	96	96	100.0	47 – 4,570	383	379	ND – 5,100
Chiba	16	16	100.0	440 – 7,400	32	32	100.0	460 – 8,200	32	32	100.0	151 – 5,700	32	32	100.0	121 – 5,700	32	32	100.0	187 – 4,240	144	144	121 – 8,200
Total	251	239	95.2	ND – 260,000	626	622	99.4	ND – 780,000	811	808	99.6	ND – 460,000	810	803	99.1	ND – 297,000	850	842	99.1	ND – 920,000	3,348	3,314	ND – 920,000

ND: Not detectable

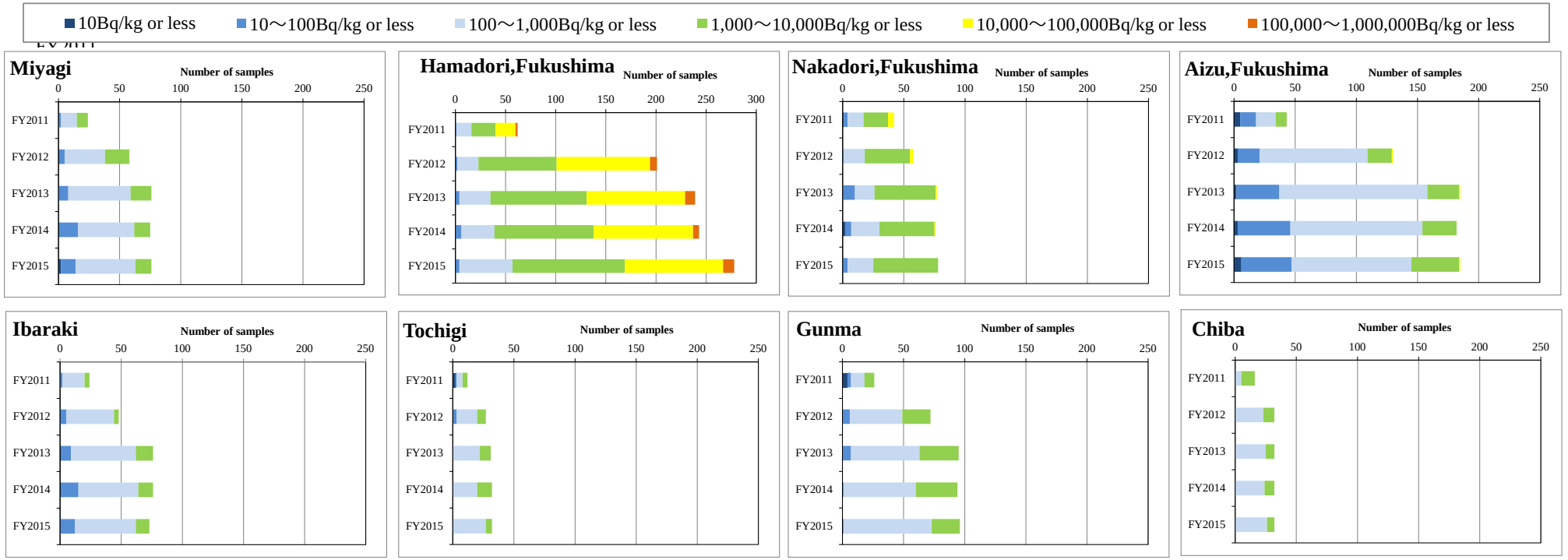


Figure 4.2-2 Detection of radioactive cesium in lake sediment samples (changes) (Yamagata Prefecture where only a small number of samples were collected was omitted.)

Table 4.2-3 Detection of radioactive cesium in coastal area sediment samples (by fiscal year)

Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Detection rate(%)	Range of measured values (Bq/kg)	Number of samples	Number of detections	Range of measured values (Bq/kg)
Iwate	3	0	0.0	ND – 0	4	2	50.0	ND – 39	4	2	50.0	ND – 46	4	2	50.0	ND – 16	4	1	25.0	ND – 10	19	7	ND – 46
Miyagi	52	34	65.4	ND – 830	48	38	79.2	ND – 1,530	51	47	92.2	ND – 2,040	52	42	80.8	ND – 1,090	52	41	78.8	ND – 910	255	202	ND – 2,040
Fukushima	80	77	96.3	ND – 1,240	97	93	95.9	ND – 1,110	150	145	96.7	ND – 1,600	150	139	92.7	ND – 830	150	140	93.3	ND – 2,950	627	594	ND – 2,950
Ibaraki	28	27	96.4	ND – 230	31	17	54.8	ND – 69	20	11	55.0	ND – 67	20	11	55.0	ND – 67	20	8	40.0	ND – 178	119	74	ND – 230
Chiba	0	0	-	-	31	20	64.5	ND – 134	23	14	60.9	ND – 54	23	14	60.9	ND – 21	23	11	47.8	ND – 315	100	59	ND – 315
Tokyo	0	0	-	-	19	17	89.5	ND – 780	18	18	100.0	12 – 780	18	17	94.4	ND – 630	18	18	100.0	83 – 410	73	70	ND – 780
Total	163	138	84.7	ND – 1,240	230	187	81.3	ND – 1,530	266	237	89.1	ND – 2,040	267	225	84.3	ND – 1,090	267	219	82.0	ND – 2,950	1,193	1,006	ND – 2,950

ND: Not detectable

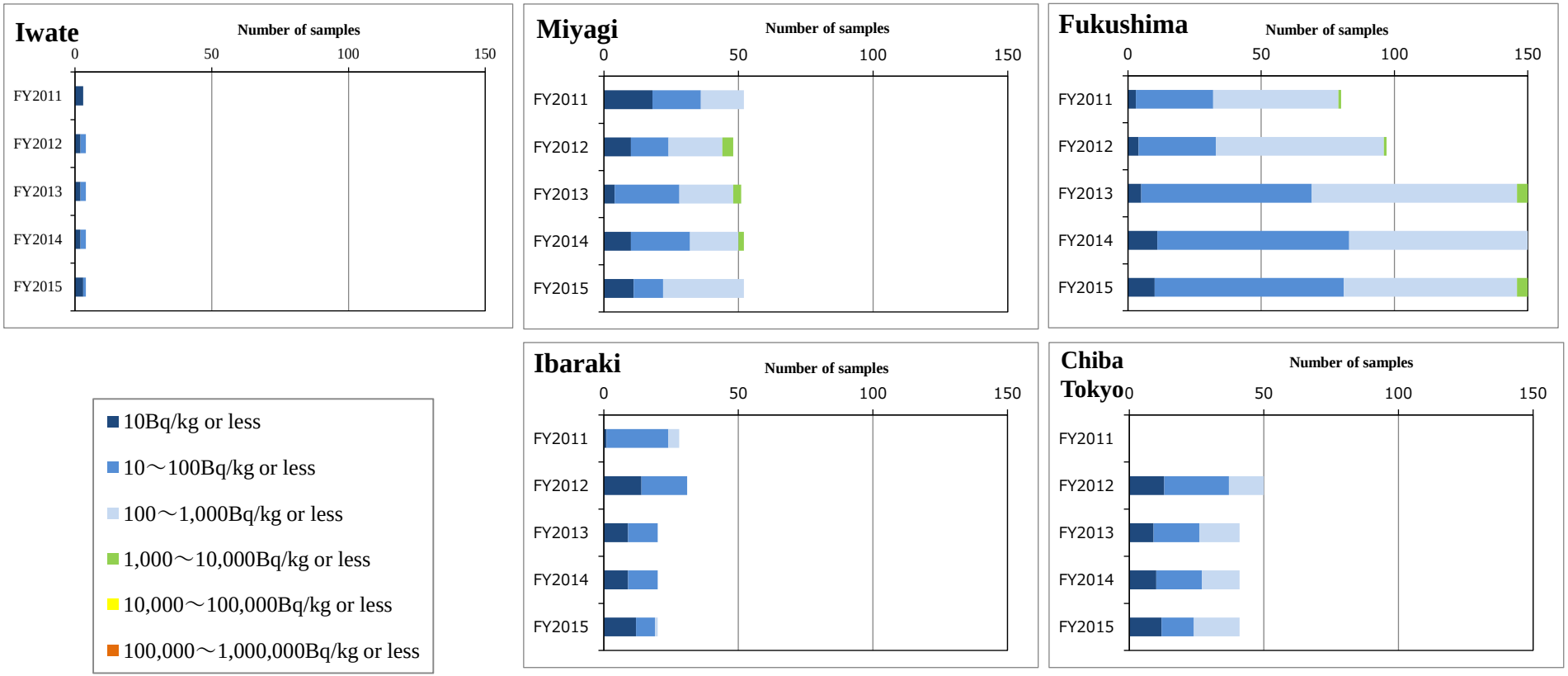


Figure 4.2-3 Detection of radioactive cesium in coastal area sediment samples (changes)

4.3 Detection of radioactive materials in sediments by location

(1) Evaluation policy

Circumstances where radioactive materials were detected were compiled more in detail by sampling location, while separately considering the property such as rivers, lakes and coastal areas.

Circumstances for each location were statistically analyzed from the following two perspectives by using all available data for each location. The evaluation excluded if no longer required after surveyed and Yamagata prefecture, where surveys have not been conducted since FY2012.

1) Detected concentration levels

i. Obtain the average for each location for FY2015 by using all survey results concerning concentrations of radioactive cesium (the total of Cs-134 and Cs-137) (arithmetic average calculated by assuming not detectable to be zero; hereinafter referred to as the "average for each location").

ii. Arrange all such averages (separately for samples from rivers, lakes, and coastal areas) in descending order and set the following five categories depending on upper percentile ranges (see Figure 4.3-1).

- Category A: Upper 5 percentile of the entirety
- Category B: Upper 5 to 10 percentile of the entirety
- Category C: Upper 10 to 25 percentile of the entirety
- Category D: Upper 25 to 50 percentile of the entirety
- Category E: Upper 50 to 100 percentile of the entirety (lower 50 percentile)

(Incidentally, a comparison between the average and the maximum value for each location for FY2015 revealed a good correlation (see right below of Figure 4.3-1). Therefore, considering that the evaluation of the average for each location covers that of large detected values (maximum values) that emerge occasionally, the evaluation was conducted by using only the average for each location.)

2) Changes in detected values

i. Changes in detected values were categorized based on the following thinking in order to evaluate their changes over the years.

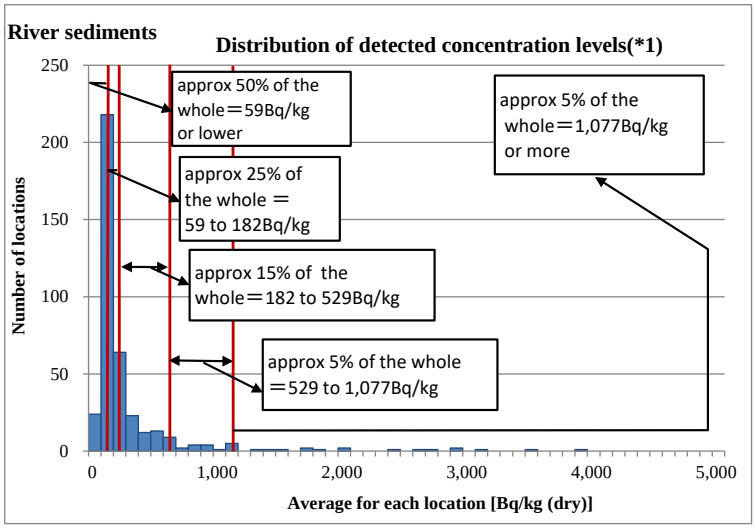
(i) Based on visual judgment of graphs that show changes in detected values over the years for each location, those negatively sloped are judged as "decreasing" and those positively sloped are judged as "increasing."

(ii) When visual judgment is difficult, a regression analysis is conducted to check the trend. Specifically, when the lower and upper 95% of the slope are both negative, it is judged as "decreasing," and when the lower and upper 95% of the slope are both positive, it is judged as "increasing."

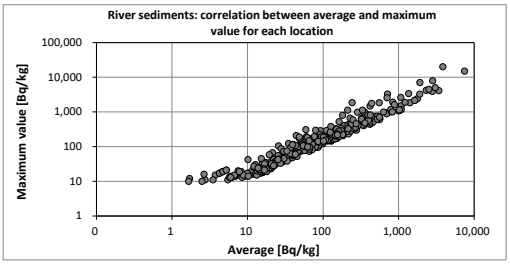
(iii) When neither a decreasing nor an increasing trend is clear (either the lower or upper 95% of the slope is negative and the other is positive), coefficient of variation of 0.5 was used as a reference. When a coefficient of variation is less than 0.5, it is judged as "unchanged," and when a coefficient of variation is 0.5 or higher, it is judged as "varying."

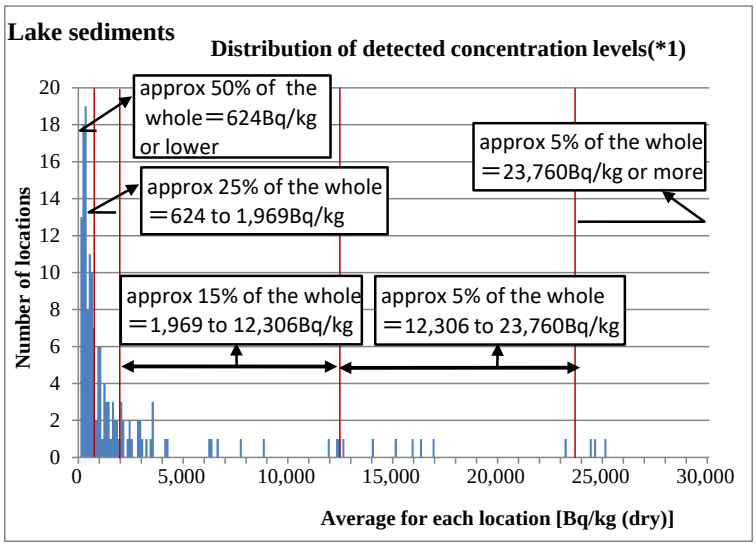
ii. However, data may show fluctuations, depending on minor differences in sampling points or properties of

samples, and it is considered to be too early to make judgments on changes in detected values at this point in time. Even if a certain location is judged to show an increasing trend based on the abovementioned thinking, it is necessary to accumulate further data and conduct careful examination for making a judgment on whether the increasing trend will be continuously observed in the relevant location.

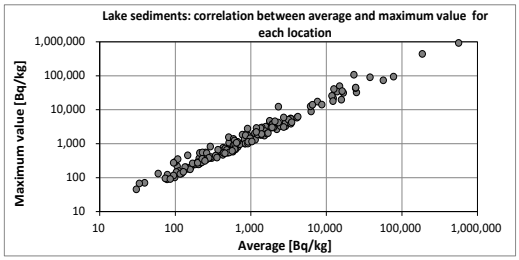


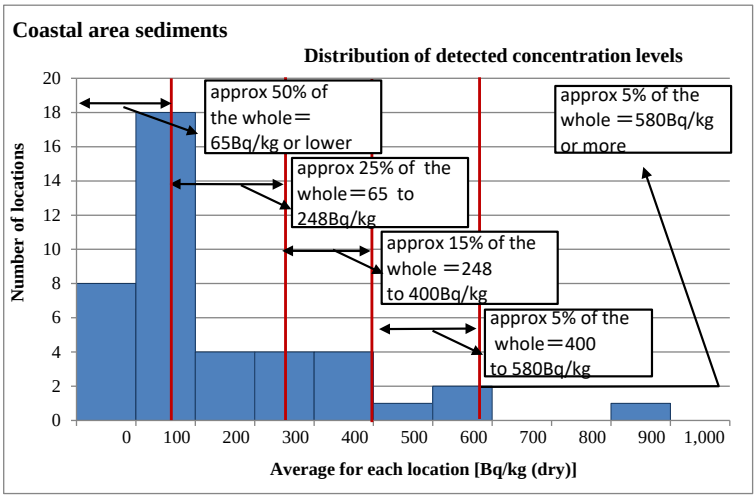
Category	Percentile	Range [River sediments] [Bq/kg (dry)]	Number of locations	Same as on the left. [%]
A	Upper 5 percentile	1,077 or more	19	4.8
B	Upper 5 to 10 percentile	529 － 1,077	20	5.1
C	Upper 10 to 25 percentile	182 － 529	60	15.2
D	Upper 25 to 50 percentile	59 － 182	100	25.3
E	Lower 50 percentile	59 or less	197	49.7
Total			396	100.0





Category	Percentile	Range [Lake sediments] [Bq/kg (dry)]	Number of locations	Same as on the left. [%]
A	Upper 5 percentile	23,760 or more	8	4.9
B	Upper 5 to 10 percentile	12,306 － 23,760	8	4.9
C	Upper 10 to 25 percentile	1,969 － 12,306	25	15.2
D	Upper 25 to 50 percentile	624 － 1,969	41	25.0
E	Lower 50 percentile	624 or less	82	50.0
Total			164	100.0





Category	Percentile	Range [River sediments] [Bq/kg (dry)]	Number of locations	Same as on the left. [%]
A	Upper 5 percentile	580 or more	2	4.8
B	Upper 5 to 10 percentile	400 － 580	2	4.8
C	Upper 10 to 25 percentile	248 － 400	6	14.3
D	Upper 25 to 50 percentile	65 － 248	11	26.2
E	Lower 50 percentile	65 or less	21	50.0
Total			42	100.0

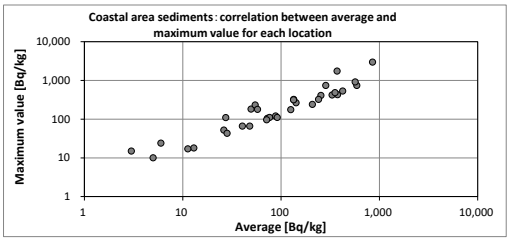


Figure 4.3-1 Categories based on the average for each location (left: picture showing means of categorization; upper right: results of categorization[11]; lower right correlation between average and maximum value for each location)

*1: locations with values exceeding the maximum one of the horizontal axis are not shown.

[11]How to set categorization boundary value: The boundary value of the categorization to be in contact is the average value of the minimum value of the upper categorization and the maximum value of the lower categorization.

(2) Concentration levels in sediment samples from rivers, lakes, and coastal areas and their changes by prefecture

(2)-1 Rivers

1) Iwate Prefecture

In Iwate Prefecture, surveys were conducted 9 to 17 times from December 2011 to February 2016 for river sediment samples collected at 22 locations (this analysis excludes the survey results at one location where the survey was conducted only in 2011).

Regarding concentration levels of detected values, two locations were categorized into Category D and 20 locations were categorized into Category E (see Table 4.3-1 and Table 4.3-2).

Concentration levels were generally decreasing at 19 locations and were varying at three locations.

Table 4.3-1 Categorization of detected values at respective locations (Iwate Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	0	(None)
D	Upper 25 to 50 percentile	2	No.4、No.19
E	Upper 50 to 100 percentile(lower 50%)	20	No.1、No.2、No.3、No.5、No.6、No.7、No.8、No.9、No.10、No.11、No.12、No.13、No.14、No.15、No.16、No.17、No.18、No.20、No.21、No.22

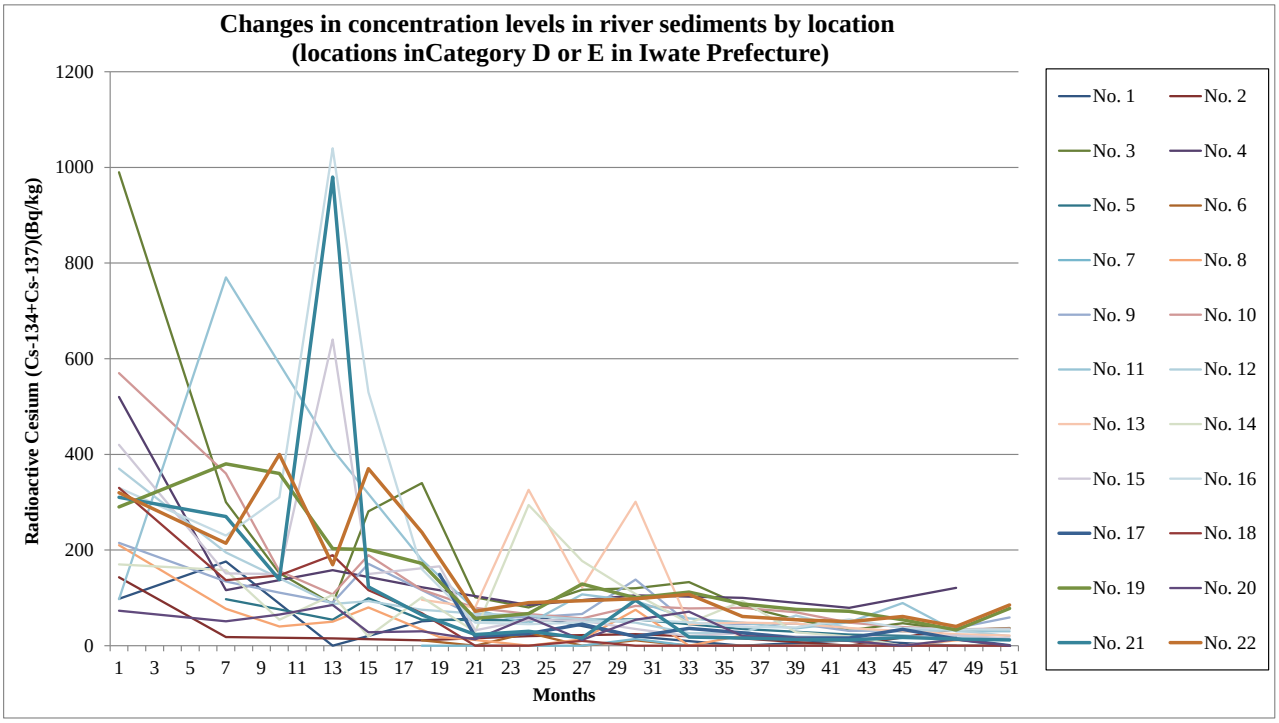


Figure 4.3-2 Changes in concentration levels over the years at respective locations (Iwate Prefecture: river sediments)

Table 4.3-2 Detection of radioactive cesium at respective locations (Iwate Prefecture: river sediments)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																				
No.	Water area	Location	Municipality	FY2011								FY2012												FY2013															
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3				
1	Sakari River Lower Reaches	Sano Bridge	Ofunato City					98						176						0					51						63								
2	Kesen River	Aneha Bridge	Rikuzentakada City					143						18						15					11						20								
3	Okawa River	Prefectural border with Miyagi	Ichinoseki City					990						300			152			87		281			340			101			80			117					
4	Tsuyagawa River	Chiyogahara Bridge	Ichinoseki City					520						116						158					122						85								
5	Kurosawa River	Kawarada Bridge	Kanegasaki Town											97			76			54		99			54						53								
6	Isawa River	Oago Bridge	Oshu City																						11			0			27			0					
7		Saijin Bridge	Oshu City																						0			0			0			0					
8	Kitakami River	Fuji Bridge	Oshu City					210						77			40			50		80				18		12			0			13					
9	Shiratori River	Shiratori Bridge	Oshu City					215						134			111			90		171				98		61			59			66					
10	Koromo River	Koromogawa Bridge	Hiraizumi Town					570						360			156			107		189			117			79			66			57					
11	Ota River	Hitosuji Bridge	Hiraizumi Town					97						770						410					179			76			46			107					
12	Iwai River Middle Reaches	Kamino Bridge	Ichinoseki City					370						195			141			87		93			75			67			63			55					
13	Iwai River Lower Reaches	Kozenji Bridge	Ichinoseki City																						96			80			326			122					
14	Kitakami River	Chitose Bridge(Kozenji)	Ichinoseki City					170						158			54			106		19			101			29			294			177					
15	Sokei River	Unada Bridge	Ichinoseki City					420						151			150			640		150				166		32			54			52					
16	Sarusawa River	Kannon Bridge	Ichinoseki City					330						230			310			1,040		530			160			48			45			48					
17	Satetsu River	Oide Bridge	Ichinoseki City																							149		19			25			45					
18		Kanzaki Bridge	Ichinoseki City					330						137			147			189		116			68			0			0			10					
19	Senmaya River Upper Reaches	Miyata Bridge	Ichinoseki City					290						380			360			203		201			172			57			67			129					
20	Kitakami River	Kitakamigawa Bridge	Ichinoseki City					73						51			65			85		28			30			13			59			12					
21	Kinomi River	Higuchi Bridge	Ichinoseki City					310						270			138			980		123			64			23			30			16					
22	Kinryu River	Tenjin Bridge	Ichinoseki City					320						214			400			169		370			237			72			90			94					
				Total number of samples		321		Detection times		279																															

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																														Changes	Average of FY2015 (*2)	No.	Coefficient of variation	Trends (*3)
No.	Water area	Location	Municipality	FY2014												FY2015																							
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3												
1	Sakari River Lower Reaches	Sano Bridge	Ofunato City		19						0						11						0							5.5	1	1.28	
2	Kesen River	Aneha Bridge	Rikuzentakada City		24						15						0						35							18	2	1.38	
3	Okawa River	Prefectural border with Miyagi	Ichinoseki City		120			133			83			55			32			47			32			37				37	3	1.31	
4	Tsuyagawa River	Chiyogahara Bridge	Ichinoseki City		105						100						79						121							100	4	0.89	
5	Kurosawa River	Kawarada Bridge	Kanegasaki Town		55						35						23						18							21	5	0.49	
6	Isawa River	Oago Bridge	Oshu City		11			0			0			0			0			0			0			0				0	6	2.05	
7		Saijin Bridge	Oshu City		14			0			0			0			0			0			0			0				0	7	3.46	
8	Kitakami River	Fuji Bridge	Oshu City		75			0			21			13			10			0			11			13				8.5	8	1.38	
9	Shiratori River	Shiratori Bridge	Oshu City		138			46			45			46			31			32			37			59				40	9	0.63	
10	Koromo River	Koromogawa Bridge	Hiraizumi Town		83			78			79			70			48			39			34			36				39	10	1.09	
11	Ota River	Hitosuji Bridge	Hiraizumi Town		93			57			48			36			49			89			30			30				50	11	1.41	
12	Iwai River Middle Reaches	Kamino Bridge	Ichinoseki City		48			26			27			63			36			29			32			20				29	12	1.03	
13	Iwai River Lower Reaches	Kozenji Bridge	Ichinoseki City		301			45			48			46			37			30			24			21				28	13	1.07	
14	Kitakami River	Chitose Bridge(Kozenji)	Ichinoseki City		108			47			93			28			19			0			14			0				8.3	14	0.96	
15	Sokei River	Unada Bridge	Ichinoseki City		35			20			26			19			18			18			21			15				18	15	1.45	
16	Sarusawa River	Kannon Bridge	Ichinoseki City		54			49			39			38			55			37			34			34				40	16	1.45	
17	Satetsu River	Oide Bridge	Ichinoseki City		19			36			27			16			16			34			14			0				16	17	1.15	
18		Kanzaki Bridge	Ichinoseki City		0			0			0			0			0			0			0			0				0	18	1.62	
19	Senmaya River Upper Reaches	Miyata Bridge	Ichinoseki City		100			112			87			76			72			54			33			78				59	19	0.74	
20	Kitakami River	Kitakamigawa Bridge	Ichinoseki City		54			71			20			16			10			0			13			0				5.8	20	0.79	
21	Kinomi River	Higuchi Bridge	Ichinoseki City		95			18			16			13			12			17			14			12				14	21	1.88	
22	Kinryu River	Tenjin Bridge	Ichinoseki City		98			107			61			54			50			61			40			85				59	22	0.79	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2)

A	B	C	D	E

27 Average

Decreasing Increasing Unchanged Varying

2) Miyagi Prefecture

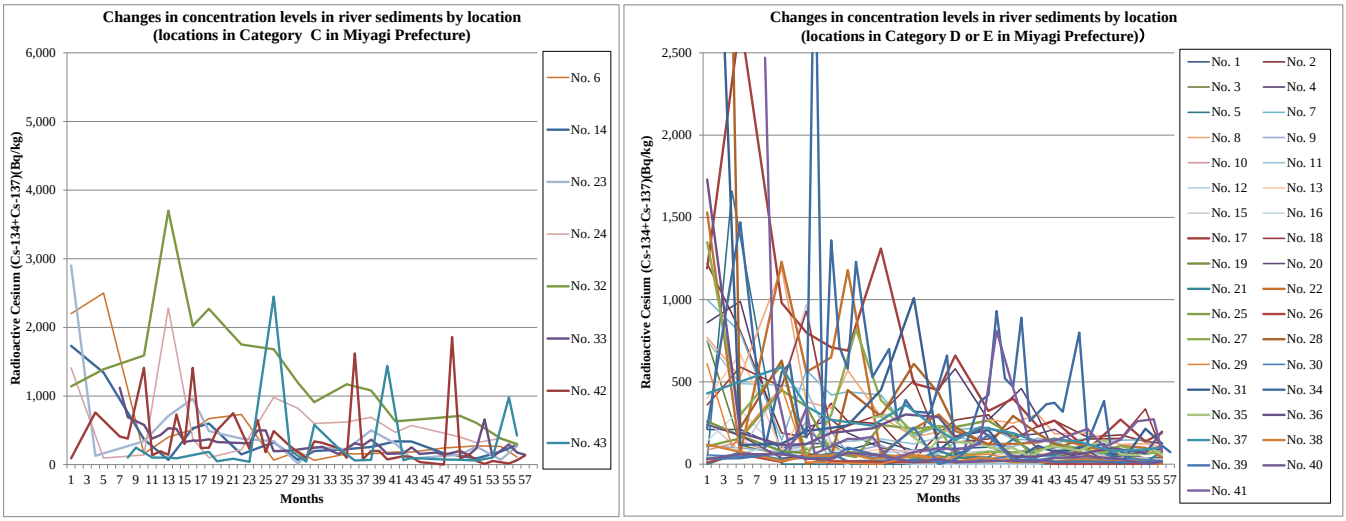
In Miyagi Prefecture, surveys were conducted 16 to 43 times from October 2011 to February 2016 for river sediment samples collected at 43 locations (this analysis excludes the survey results at 37 locations where the survey was conducted only in 2011).

Regarding concentration levels of detected values, eight locations ware categorized into Category C, 14 locations into Category D, 21 locations into Category E (see Table 4.3-3 and Table 4.3-4).

Concentration levels were generally decreasing at 35 locations and were varying at eight locations.

Table 4.3-3 Categorization of detected values at respective locations (Miyagi Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	8	No.6、No.14、No.23、No.24、No.32、No.33、No.42、No.43
D	Upper 25 to 50 percentile	14	No.1、No.2、No.7、No.8、No.17、No.18、No.22、No.27、No.31、No.34、No.35、No.36、No.37、No.41
E	Upper 50 to 100 percentile(lower 50%)	21	No.3、No.4、No.5、No.9、No.10、No.11、No.12、No.13、No.15、No.16、No.19、No.20、No.21、No.25、No.26、No.28、No.29、No.30、No.38、No.39、No.40



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-3 Changes in concentration levels over the years at respective locations (Miyagi Prefecture: river sediments)

Table 4.3-4 Detection of radioactive cesium at respective locations

(Miyagi Prefecture: river sediments) (No.1)

Location						River sediments/Radioactive Cesium (Cs-134＋Cs-137)/Concentration(Bq/kg)(*1)																																		
No.	Water area			Location	Municipality	FY2011								FY2012														FY2013												
						8	9	10	11	12	1	2	3	4	5		6	7	8	9	10		11	12	1	2	3	4	5	6		7	8	9	10	11	12	1	2	3
1	Shishiori River			Kinzan Bridge	Kesennuma City			210				211					100			124			128		86				139				83			99		96		
2				Namiita Bridge				1,220				810					189			165			370		262				245				28			186		268		
3	Okawa River			Tateyama-ohashi Bridge				750				115					56			91			121		56				39				43			51		35		
4				Kamiyama Bridge				860				990					59			222			271		190				99				65			460		580		
5				Okawa River Estuary				23			1,660						0			0			0		0				0				0			0		0		
6	Omose River			Ozaki Bridge				2,200				2,500					159			400			510		670				730				64			194		63		
7	Kitakami River System	Arima River		Unanda Bridge	Kurihara City			1,000				800					146			570			420		440				420				173			229		210		
8		Kinryu River		Obata Bridge				770				530					1,190			380			340		570				289				165			196		221		
9		Kitakami River		Tome-ohashi Bridge (Tome)				113				98					74			118			199		71				115				22			63		133		
10		Hasama River Area	Sanhasama River	Doman Bridge (Kurikoma Dam)				85				137					55			260			24		20				25				13			38		45		
11			Nihasama River	Kajiya Bridge				750				490					480			450			131						153				123			161		167		
12			Hasama River	Hanayama Dam, inflow area				44				60					135			56			0		14				17				0			0		0		
13				Wakayanagi				400				670					84			340			104		65				90				71			33		52		
14				Yamayoshida Bridge	Tome City			1,730				1,340					370			69			530		600				150				327			68		197		
15		Eai River Area	Eai River	Todoroki Bridge (Todoroki)	Osaki City			260				77					470			970			89			66			67				85			66				
16				Shinborisaihon, entrance				141				330					63			104			18		0				59				37			17		17		
17			In Furukawa District,Osaki City	Shinborisaihon, entrance				1,190				2,700					980			800			710		690				1,310				490			450		660		
18			Dekigawa River	Kogota Bridge	Misato Town			360				590					470			930			195		233				305				510			134		133		
19			Eai River	Oikawa Bridge (Tandai)	Wakuya Town /Ishinomaki Town			260				172					79			66			37		73				56				41			21		79		
20		Kyu-Kitakami River		Kadonowaki	Ishinomaki City			240				175					36			49			0		10				0				27			18		26		
21	Naruse River			Onobashi Bridge (Ono)	Higashi-Matsushima City			0				74					28			41			65		17				19				19			82		44		
22	Sunaoshi River			Tagajozeki Weir	Tagajo City			1,530				62					1,230			560			650		1,180				61				215			302		202		
23				Nenbutsu Bridge				2,900			129						340			710			960		490				380				340			17		255		
24	Teizan-unga Canal (Kyu-sunaoshi River)			Teizan Bridge	Shiogama City/Shichigahama Town/Tagajo City			1,410				95					141			2,280			380		101				218				980			820		600		
25	Nanakita River System	Nanakita River		Nanakita Bridge	Sendai City			109				157					450			350			71			43			238				215			230		226		
26				Fukuda-ohashi Bridge				10				60					14			60			17			17			13				12			16		13		
27		Umeda River		Fukuda Bridge				1,350				300					600			53			300			820			390				186			233		47		
28		Nanakita River		Takasago Bridge				11,100				220					630			0			42		450				291				610			430		225		
29	Natori River System	Natori River		Yuriage-ohashi Bridge	Sendai City /Natori City			610			108						470			14									0				52			11		47		
30		Masuda River		Yakushi Bridge	Natori City			56				47					68			220			73						35			23				17		20		
31				Koyama Bridge				5,200				116					124			202			221		236				450				1,010			81		168		
32				Bishamon Bridge				1,140				1,390					1,590			3,700			2,020		2,270				1,750				1,680			1,190		910		
33	Abukuma River System	Abukuma River		Hadeniwa Bridge	Marumori Town									1,120	690		580	380	430	530	520	330	350	350	370	330		320		310	500	500	196		203		236	247	259	
34				Marumori Bridge	Marumori Town			220				1,470		570	101		560	610	280	162	3,400	90	1,360	710	580	1,230		530		700	253	390	320		312		660	59	75	
35				Higashine Bridge	Kakuda City																							283		301			161		96		212	138		
36		Shiroishi River Aarea	Shiroishi River	Before the confluence with Kawaragosawa River (Sunaoshi Bridge)	Shiroishi City			1,730				191					116			123			190					218				302				286		165		
37			Saikawa River	Etsubo Bridge	Shiroishi City			430									590			350			270					234				360				206		146		
38			Matsukawa River	Miya-ohashi Bridge	Zao Town			119									19			47			54		66			31				58				39		10		
39			Arakawa River	Niragami Bridge	Murata Town/Ogawara Town			33				36					68			38			32		101				47				222			0		27		
40			Shiroishi River	Shirahata Bridge	Shibata Town			32				61					60			32			31		68				52				12			31		12		
41		Abukuma River		Tsukinoki-ohashi Bridge	Kakuda City/Shibata Town										2,470	540		88		340	63				154	152		166		24			74		88		94	84		
42				Abukuma-ohashi Bridge(Iwanuma)	Iwanuma City/Watari Town			91			760			410	380		1,410	136	196	143	730	300	1,410	243	247	500		750		231	650	181	490		270		91	338	318	
43				Abukuma River Estuary (Watariohashi Bridge)	Iwanuma City/Watari Town										103	249		104		102	91				187	49		85		41			2,450		209		45	580		

Total number of samples	852	Detection times	804

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-4 Detection of radioactive cesium at respective locations
(Miyagi Prefecture: river sediments) (No.2)

No.	Water area	Location	Municipality	River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
				FY2014												FY2015																
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Shishiori River	Kinzan Bridge	Kesennuma City		103			71			93		85				61			68			62		73				66	1	0.42	Decreasing
2	Shishiori River	Namiita Bridge	Kesennuma City		300			150			231		265				164			178			138		127				152	2	0.96	Decreasing
3	Okawa River	Tateyama-ohashi Bridge	Kesennuma City		33			54			60		61				27			30			22		46				31	3	1.77	Decreasing
4	Okawa River	Kamiyama Bridge	Kesennuma City		269				460		288		76				34			62			38		35				42	4	1.02	Decreasing
5	Okawa River	Okawa River Estuary	Kesennuma City		0			0			0		0				0			0			0		0				0	5	4.18	Decreasing
6	Omose River	Ozaki Bridge	Kesennuma City		158			158			185		182				242			273			266		111				223	6	1.39	Decreasing
7	Kitakami River System / Arima River	Unanda Bridge	Kurihara City		225			152			145		131				156			146			149		45				124	7	0.83	Decreasing
8	Kitakami River System / Kinryu River	Obata Bridge	Kurihara City		271			250			304		184				188			119			125		103				134	8	0.80	Decreasing
9	Kitakami River System / Kitakami River	Tome-ohashi Bridge (Tome)	Kurihara City		119			106			158		139				60			27			31		33				38	9	0.53	Varying
10	Kitakami River System / Hasama River Area / Sanhasama River	Doman Bridge (Kurikoma Dam)	Kurihara City		40			33			26		22				20			27			19		22				22	10	1.19	Decreasing
11	Kitakami River System / Hasama River Area / Nihasama River	Kajiya Bridge	Kurihara City		124			54			98		91				71			44			38		26				45	11	1.02	Decreasing
12	Kitakami River System / Hasama River Area / Hasama River	Hanayama Dam, inflow area	Kurihara City		0			0			0		10					0		0			15		0				3.8	12	1.80	Decreasing
13	Kitakami River System / Hasama River Area / Hasama River	Wakayanagi	Kurihara City		62			55			61		72				59			36			36		26				39	13	1.32	Decreasing
14	Kitakami River System / Hasama River Area / Hasama River	Yamayoshida Bridge	Tome City		225			258			339		337				165			89			191		288				183	14	1.09	Decreasing
15	Kitakami River System / Eai River Area / Eai River	Todoroki Bridge (Todoroki)	Osaki City		80			67			49		46				37			21			26		0				21	15	1.65	Decreasing
16	Kitakami River System / Eai River Area / Eai River	Shinborisaihon, entrance	Osaki City		16			18			11		0				13			0			0		12				6.3	16	1.69	Decreasing
17	Kitakami River System / Eai River Area / In Furukawa District,Osaki City	Shinborisaihon, entrance	Osaki City		324			398			229		265				88			271			138		191				172	17	0.94	Decreasing
18	Kitakami River System / Eai River Area / Dekigawa River	Kogota Bridge	Misato Town		153			232			95		101				153			157			336		78				181	18	0.77	Decreasing
19	Kitakami River System / Eai River Area / Eai River	Oikawa Bridge (Tandai)	Wakuya Town /Ishinomaki Town		20			19			13		18				33			17			16		13				20	19	1.12	Decreasing
20	Kitakami River System / Kyu-Kitakami River	Kadonowaki	Ishinomaki City		221			171			184		212					21		50			70		92				58	20	0.96	Varying
21	Naruse River	Onobashi Bridge (Ono)	Higashi-Matsushima City		40			153			53		54				122			17			13		74				57	21	0.78	Varying
22	Sunaoshi River	Tagajozeki Weir	Tagajo City		122			123			132		156					82		110			100		42				84	22	1.22	Decreasing
23	Sunaoshi River	Nenbutsu Bridge	Tagajo City		225			500			307		87					145		264			71		267				187	23	1.40	Decreasing
24	Teizan-unga Canal (Kyu-sunaoshi River)	Teizan Bridge	Shiogama City/Shichigahama Town/Tagajo City		620			690			470		570					403		319			384		283				347	24	0.90	Varying
25	Nanakita River System / Nanakita River	Nanakita Bridge	Sendai City		264			173			20		18					26		63			13		14				29	25	0.86	Decreasing
26	Nanakita River System / Nanakita River	Fukuda-ohashi Bridge	Sendai City		18			22			16		0					0		0			0		0				0	26	1.10	Decreasing
27	Nanakita River System / Umeda River	Fukuda Bridge	Sendai City		76			71			84		124					69		113			64		76				81	27	1.24	Decreasing
28	Nanakita River System / Nanakita River	Takasago Bridge	Sendai City		114			293			185		124					21		30			0		0				13	28	3.14	Decreasing
29	Natori River System / Natori River	Yuriage-ohashi Bridge	Sendai City /Natori City		61			26			23		18					17		14			11		0				11	29	1.93	Decreasing
30	Natori River System / Masuda River	Yakushi Bridge	Natori City		28			52			27		43					26		35			29		21				28	30	0.98	Decreasing
31	Natori River System / Masuda River	Koyama Bridge	Natori City		208			21			112		74					123		0			215		125				116	31	2.48	Decreasing
32	Natori River System / Masuda River	Bishamon Bridge	Natori City		1,170			1,080			630		650					710		608			381		300				500	32	0.64	Decreasing
33	Abukuma River System / Abukuma River	Hadeniwa Bridge	Marumori Town	153	236	312	280	363	272	157		165	251	155		176	144	199	137	238	660	113		294	177	143			228	33	0.59	Decreasing
34	Abukuma River System / Abukuma River	Marumori Bridge	Marumori Town	380	420	930	520	470	890	262		364	373	318		800	130	384	27	84	42	69		87	113	73			181	34	1.16	Varying
35	Abukuma River System / Abukuma River	Higashine Bridge	Kakuda City	122		91		98		46		98	108			83		146		60		55		87	58				82	35	0.59	Decreasing
36	Abukuma River System / Shiroishi River Aarea / Shiroishi River	Before the confluence with Kawaragosawa River (Sunaoshi Bridge)	Shiroishi City	212				45			46		71			61			97				67		198				106	36	1.62	Decreasing
37	Abukuma River System / Shiroishi River Aarea / Saikawa River	Etsubo Bridge	Shiroishi City	225				188			137		153			136			80				89		102				102	37	0.61	Decreasing
38	Abukuma River System / Shiroishi River Aarea / Matsukawa River	Miya-ohashi Bridge	Zao Town	39				13			15		14			28			19				15		11				18	38	0.80	Decreasing
39	Abukuma River System / Shiroishi River Aarea / Arakawa River	Niragami Bridge	Murata Town/Ogawara Town		178			26			26		14				16			12			15		17				15	39	1.18	Varying
40	Abukuma River System / Shiroishi River Aarea / Shiroishi River	Shirahata Bridge	Shibata Town		19			20			16		37				48			31			0		14				23	40	0.60	Decreasing
41	Abukuma River System / Abukuma River	Tsukinoki-ohashi Bridge	Kakuda City/Shibata Town	123		810		463		137		145	143				214	105		149		261		273	76				180	41	1.68	Decreasing
42	Abukuma River System / Abukuma River	Abukuma-ohashi Bridge(Iwanuma)	Iwanuma City/Watari Town	240	101	1,620	82	197	200	77		123	111	37			0 / 1,860	85	151	53	10	54		17	64	134			243	42	1.23	Varying
43	Abukuma River System / Abukuma River	Abukuma River Estuary (Watariohashi Bridge)	Iwanuma City/Watari Town	237		60		70		1,440		65	98				75	71		60		103		980	424				286	43	1.73	Varying
																													104	Average		

Color categories: A, B, C, D, E

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) — Decreasing, Increasing, Unchanged, Varying

3) Fukushima Prefecture

(i) Hamadori

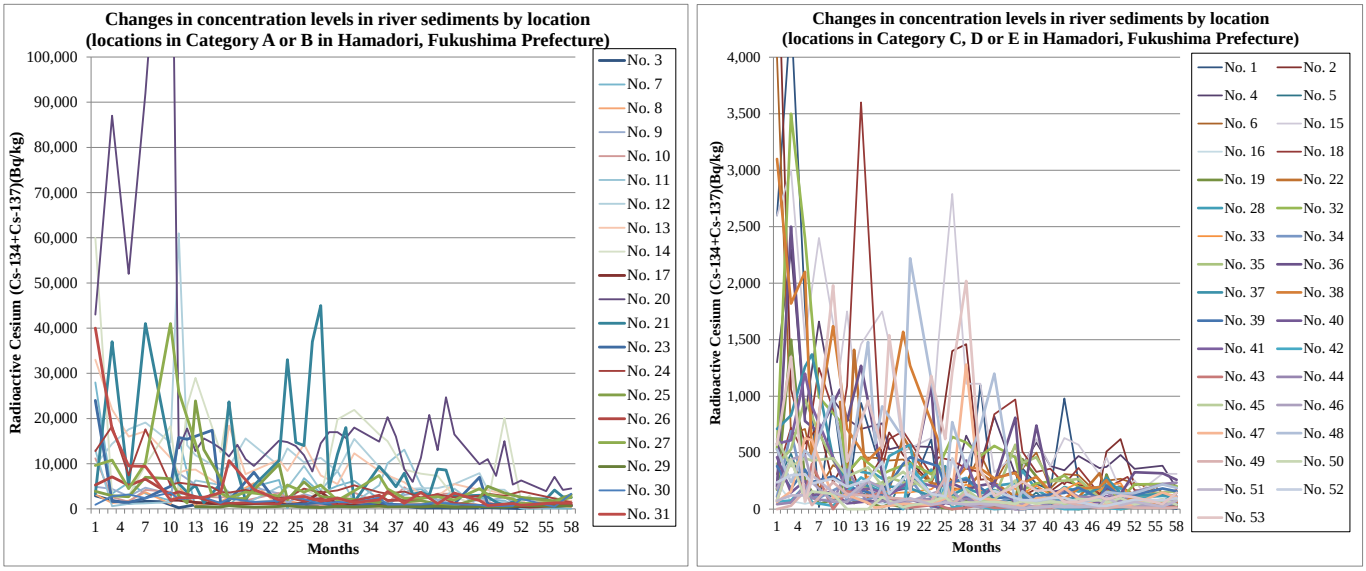
In Hamadori, Fukushima Prefecture, surveys were conducted 23 to 45 times from September 2011 to February 2016 for river sediment samples collected at 53 locations.

Regarding concentration levels of detected values, 11 locations were categorized into Category A, nine locations into Category B, six locations into Category C, 19 locations into Category D, and eight locations into Category E (see Table 4.3-5 and Table 4.3-6).

Concentration levels were generally decreasing at 47 locations, were unchanged at two locations, and varying at four locations.

Table 4.3-5 Categorization of detected values at respective locations
(Hamadori, Fukushima Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	11	No.12、No.13、No.14、No.20、No.21、No.23、No.24、No.25、No.27、No.30、No.31
B	Upper 5 to 10 percentile	9	No.3、No.7、No.8、No.9、No.10、No.11、No.17、No.26、No.29
C	Upper 10 to 25 percentile	6	No.2、No.4、No.6、No.15、No.32、No.36
D	Upper 25 to 50 percentile	19	No.1、No.5、No.18、No.19、No.22、No.28、No.33、No.35、No.37、No.38、No.39、No.41、No.44、No.45、No.47、No.48、No.50、No.52、No.53
E	Upper 50 to 100 percentile(lower 50%)	8	No.16、No.34、No.40、No.42、No.43、No.46、No.49、No.51



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-4 Changes in concentration levels over the years at respective locations
(Hamadori, Fukushima Prefecture: river sediments)

Table 4.3-6 Detection of radioactive cesium at respective locations

(Hamadori, Fukushima Prefecture: river sediments) (No.1)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Water area	Location	Municipality	FY2011								FY2012												FY2013											
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Jizogawa River	Hamahata Bridge	Shinchi Town		2,600		4,400		1,790		18		980		54	940			320	0	0				620	95		151		0		1,100		24	
2	Koizumi River	Koizumi Bridge	Soma City		5,300		1,060		580		740		231		460	142			470	680	480				235	540		1,400		1,460		261		273	
3		Hyakken Bridge			2,900		1,880		1,280		1,700		1,570		240	920			1,350	1,070	1,330				1,490	1,200		1,040		510		750		840	
4	Udagawa River	Horisaka Bridge			1,300		2,300		820		1,660		970		800	710			760	530	560				550	370		165		650		390		820	
5		Hyakken Bridge			240		490		155	155			109		55	143			84	23	290	0			100	70		84		60		64		65	
6	Manogawa River	Ochiai Bridge	Minamisoma City		4,000		660		710		180		390		310	460			450	430	440				224	380		250		236		490		225	
7		Majima Bridge			28,000		3,400		5,800		3,400			1,820	15,900	280			500	750	4,400				6,400	161		6,800		3,500		5,100		6,200	
8	Niida River	Kusano	Iitate Village		3,200		1,290		1,800		3,700			1,090	4,800	770			1,580	2,670		5,700			630	1,870		1,010		960		510		400	
9		Komiya			4,900		4,400		2,800		4,700			3,300	7,900	5,400			4,300	2,900		4,800			3,400	1,370		3,300		2,280		1,810		2,050	
10		Kidouchi Bridge	Minamisoma City		11,200		2,600		1,570		4,200			3,800	2,250 / 2,600	2,800			2,520	2,800	1,850				3,500	2,500		3,040		760		1,560		3,600	
11		Sakekawa Bridge			13,000		610		1,140		1,230			1,530	3,300 / 3,400	6,300			5,300	3,700	1,070				4,900	4,700		9,500		4,100		8,400		1,420	
12	Ota River	Ishiwatado Bridge			9,700		14,400		17,600		19,100			14,700	61,000 / 14,100	11,900			8,700	9,300	15,600				9,500	13,400		10,300		11,300		8,300		15,500	
13		Kaminouchi Bridge			33,000		22,000		16,000		17,200			11,300	8,000 / 8,600	8,700			5,200	18,400	7,700				10,900	8,400		14,300		7,400		5,500		12,300	
14		Masuda Bridge			60,000		2,900		2,900		9,700			18,300	3,800 / 22,800	29,000			12,500	23,400	1,270				2,090	2,520		4,500		2,400		19,800		21,900	
15		JR Tetsudo Bridge			2,600		3,000		1,510		2,400			1,280	1,750 / 1,210	1,460			1,750	1,470	510				630	1,460		2,790		1,110		1,110		327	
16		Maruyama Bridge			230		71		48		72			121	180 / 123	92			48	53	45				53	60		84		50		16		36	
17	Odaka River	Shimokawara Bridge												1,940	1,950	1,430			1,080	1,020	1,140				1,270	890		1,310		3,800		940		860	
18		Zencho Bridge			310		720		470		1,250			700	1,090	3,600			360	620	690				307	460		430		359		325		840	
19		Hatsukara Bridge			173		1,500		260		44			108	410 / 54	78			18	42	17				48	19		0		71		52		20	
20	Ukedo River	Murohara Bridge	Namie Town		43,000		87,000		52,000		92,000			165,000	13,400 / 17,800	12,800	15,600	14,600	13,400	11,600 / 14,200	11,000	9,500			15,100	14,800	13,900	11,900	8,300	14,500	17,000	17,000	15,700	18,000	
21		Ukedo Bridge			3,300		37,000		5,000		41,000			12,400	5,600 / 3,700	5,200	1,370		5,600	23,700 / 8,400	1,870	5,200			10,700	33,000	14,700	14,000	37,000	45,000	4,700	12,100	18,000	1,510	
22	Furumichi River	Before the confluence with Takasegawa River(Kodoshimohira,Miyakoji Town)	Tamura City											950	162 / 1,410		80		165	176	640				231	220		182		171		316			
23	Takase River	Keio Bridge	Namie Town		24,000		1,650		1,460		2,400			5,000	15,800 / 15,400			17,400	1,370	1,830		8,100			770	860		1,140		1,370		510		520	
24	Maeda River	National Route 6, west	Futaba Town		12,800		18,300		7,400		17,600			5,300	5,800			4,800	3,700	3,600	4,200				2,500	2,510		4,500		3,600		4,100		5,200	
25		Nakahama Bridge	Namie Town		3,900		2,900		2,700		7,000			6,700	2,900 / 1,310	23,900	13,100		6,800	2,260	2,310				9,900	2,040		6,000		2,740		2,380		2,060	
26	Kumagawa River	National Route 6, west	Okuma Town		5,300		7,100		5,200		6,600			3,200	3,800			1,610	1,070	1,200	1,380				1,070	2,640		1,740		2,280		830		1,780	
27		Mikuma Bridge			9,600		10,800		4,500		10,200			41,000	26,000			2,900	3,500	2,460	3,700				2,850	5,300		3,700		5,300		1,870		4,000	
28	Tomioka River	Nabekura Bridge	Kawauchi Village													330		310	270	470		570	242		350	235		239		276		144		205	
29		Sakaigawa Bridge														490			440	710 / 560		400			550	690		400		340		580		430	
30		National Route 6, west	Tomioka Town		930		2,800		3,200		2,400			3,600	2,150		2,530		1,300	2,330		1,540			1,780	2,580		2,170		1,150		1,540		1,400	
31		Kobama Bridge			40,000		17,600		9,500		9,400			1,940	2,470		2,530		3,600	10,700		4,300			1,970	2,460		2,730		1,720		2,390		1,390	
32	Idegawa River	Motogama Bridge	Naraha Town		530		3,500		2,400		990			780	320	460			310	340		410			310	370		640		590		470		560	
33	Kawauchi River	Before the confluence with Kidogawa River(Futamata Bridge)	Kawauchi Village													181	290	83	194	142		149			177	224		154		217		170		148	
34	Kidogawa River	Nishiyama Bridge			111		690		139		99			198	81		86		137	130		271			16	38		108		111		67		49	
35		Nagatoro Bridge	Naraha Town		400		530		970		670			320	121	178			236	280		217			259	390		110		58		117		94	
36		Kidokawa Bridge			200		2,500		780		680			1,060	780	1,270			320	154		192			1,100	218		226		174		210		230	
37	Asami River	Boda Bridge	Hirono Town		710		830		1,260	1,370			450		240	230			153	200		183				93	380	128		187		138		169	
38	Ohisa River	Kageiso Bridge	Iwaki City		3,100		1,820		2,100	450			1,620		710		430		560		1,570	1,270				610	260	235		370		360		273	
39	Kohisa River	Rengo Bridge			380		184		350	240			290		202		149		127		400	460				380	204	243		262		191		96	
40	Niida River	Kasumida Bridge			460		148		250	123			156		52		68		75	92		85				14	57	41		100		17		47	
41		Matsuba Bridge			580		610		1,200	910			460		161		181		151	122		250				195	228	211		430		80		224	
42	Natsui River	Kitanouchi Bridge	Ono Town		66		76		206	61			29		155	280			172		0	400				31	219	12		42		21		0	
43		Kyudayu Bridge	Iwaki City		80		440		117	400			0		159		116		149		22	14				42	13	0		14		36		10	
44		Rokujumai Bridge			43		58		210	96			66		350		47		72		63	72				99	94	65		91		59		45	
45	Yoshima River	Iwaanatsuri Bridge			620		380		450	430			450		290		370		206		330	276				79	164	47		175		80		85	
46		Before the confluence with Natsui River			182		440		480	237			69		63		246		191	34	48					157	63	163		37		17		38	
47	Fujiwara River	Shima Bridge			64		157		630	610			102		126		55	13			46				38		96	144		1,280		100		78	
48		Minato-ohashi Bridge			530		239		520	450			1,000		214		1,480	580	910		630	2,220				790	139	770		369		730		1,200	
49	Samegawa River	Idosawa Bridge			0		30		161	36			238		134										68		278	41		148		48		45	
50		Samegawa Bridge			78		440		91	157			136		0		0		106		16	33			64		109	46		59		58		65	
51	Shitoki River	Komuro Bridge			74		121		122	300			149		103		265	78	208	48		96			40		59	52		41		48		41	
52	Binda River	Kobana Bridge			237		300		310	226			270		198		259		420	137		330			134		113	450		132		83		161	
53		Binda Bridge			570		1,350		66	260			1,980		420		960		540	1,540		156			1,180		620	1,210		2,020		349		117	

Total number of samples	1,537	Detection times	1,513

*1: Blank cells are locations where samples were not collected. The result “Not detectable” is indicated as “0.”

Table 4.3-6 Detection of radioactive cesium at respective locations

(Hamadori, Fukushima Prefecture: river sediments) (No.2)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																									Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
No.	Water area	Location	Municipality	FY2014												FY2015												Changes				
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Jizogawa River	Hamahata Bridge	Shinchi Town		13	361		224		170		980		245			75	70		181		26		20		0			62	1	1.77	Decreasing
2	Koizumi River	Koizumi Bridge	Soma City		333	114		181		158		247		214			184	509		620		212		221		202			325	2	1.57	Decreasing
3		Hyakken Bridge			970	500		560		209		206		194			237	301		189		77		1,840		684			555	3	0.73	Decreasing
4	Udagawa River	Horisaka Bridge			308	390		590		382		344		470			364	374		480		357		385		185			358	4	0.72	Decreasing
5		Hyakken Bridge			83	46		149		24		28		60			77	116		64		47		72		141			86	5	0.91	Decreasing
6	Manogawa River	Ochiai Bridge	Minamisoma City		560	360		500		183		309		300			123	251		268		227 223 155	197	143	113	138			184	6	1.54	Decreasing
7		Majima Bridge			2,140	740		3,650		4,400		1,940		3,240			2,560	2,010		1,840		86 63 67	103	169	67	84			705	7	1.52	Decreasing
8	Niida River	Kusano	Iitate Village		530	420		1,260		1,130		1,230		980			580	600		1,170		940 1,010 720		810		467			787	8	0.89	Decreasing
9		Komiya			1,270	1,620		3,070		3,680		2,050		990			2,010	1,760		2,610		430 266 368		362		750			1,070	9	0.66	Decreasing
10		Kidouchi Bridge	Minamisoma City		1,320	1,270		4,800		2,240		3,360		3,350			1,900	1,530		580		440 299 297		585		1,100			841	10	0.82	Decreasing
11		Sakekawa Bridge			5,200	10,100		13,100		5,300		1,080		4,480			296	820		1,610		790 800 640		790		1,320			883	11	0.94	Varying
12	Ota River	Ishiwatado Bridge			9,300	7,700		4,300		4,600		4,600		5,500			7,900	4,280		4,230		1,080 890 1,360		1,450		1,450			2,830	12	1.03	Decreasing
13		Kaminouchi Bridge			8,400	7,400		5,900		3,150		2,860		5,500			4,200	4,170		3,220		1,280 2,590 1,850		1,830		1,830			2,621	13	0.80	Decreasing
14		Masuda Bridge			16,500	15,000		8,700		7,800		7,300		2,590			760	1,190		20,100		1,630 2,950 620		2,560		980			3,849	14	1.18	Decreasing
15		JR Tetsudo Bridge			480	368		620		381		630		570			307	455		167		254 170 218		314		312			275	15	0.81	Decreasing
16		Maruyama Bridge			27	68		46		53		21		16			29	23		0		75 107 63		39		12			44	16	0.77	Decreasing
17	Odaka River	Shimokawara Bridge			900	1,020		760		830		790		970			580	990			503	540 436 511		740		750			631	17	0.63	Decreasing
18		Zencho Bridge			970	510		329		358		220		365			135	185			286	167 166 158		138		169			176	18	1.16	Decreasing
19		Hatsukara Bridge			65	443		289		133		21		0			31	307		0		23 36 31		13		33			59	19	2.00	Decreasing
20	Ukedo River	Murohara Bridge	Namie Town		14,900	20,300	16,000	8,800	6,000	11,300	20,800	13,000	24,700	16,500			9,900	11,000	7,300	15,000	5,400	6,300	3,910	7,100	4,220	4,530			7,466	20	1.35	Decreasing
21		Ukedo Bridge			9,400	7,300	4,900	7,900	3,190	3,690	3,020	8,800	8,600	2,810			3,030	2,660	1,520	730	1,570	2,230	2,210	4,160	2,660	2,530			2,330	21	1.17	Decreasing
22	Furumichi River	Before the confluence with Takasegawa River(Kodoshimohira,Miyakoji Town)	Tamura City		111	175		95		54		80		103			317	169		199		123		32		69			152	22	1.22	Decreasing
23	Takase River	Keio Bridge	Namie Town		1,370	1,100		800		660		1,110		1,140			7,000	1,100		790		1,260		550		800			1,917	23	1.52	Decreasing
24	Maeda River	National Route 6, west	Futaba Town		3,690	3,350		3,860		2,510		3,210		2,560			2,880	3,380		2,890		3,900		2,320		1,460			2,805	24	0.83	Decreasing
25		Nakahama Bridge	Namie Town		1,360	3,770		1,560		1,830		1,110		690			2,430	5,000		3,540		2,550		1,750		3,140			3,068	25	1.07	Decreasing
26	Kumagawa River	National Route 6, west	Okuma Town		3,010	1,880		1,970		2,360		3,120		1,230			780	580		1,000		740		960		910			828	26	0.77	Decreasing
27		Mikuma Bridge			7,400	4,400		2,400		2,340		2,690		1,960			4,480	3,200			2,230	1,150		1,470		2,600			2,522	27	1.35	Decreasing
28	Tomioka River	Nabekura Bridge	Kawauchi Village		230	339		172		100		196		156			198	217		184		102		117		107			154	28	0.48	Decreasing
29		Sakaigawa Bridge			600	500		570		430		610		366			499	462		393		700		618		690			560	29	0.22	Unchanged
30		National Route 6, west	Tomioka Town		2,450	970		990		1,020		1,430		980			870	600			660	2,200		471		3,370			1,362	30	0.50	Varying
31		Kobama Bridge			2,020	3,870		1,220		3,660		1,180		3,520			1,880	760			1,190	830		1,330		1,350			1,223	31	1.60	Decreasing
32	Idegawa River	Motogama Bridge	Naraha Town		460	168		228		244		297		197			169	188		94		218		222		204			183	32	1.29	Decreasing
33	Kawauchi River	Before the confluence with Kidogawa River(Futamata Bridge)	Kawauchi Village		182	137		208		126		171		235			162	212		231		39		68		59			129	33	0.37	Unchanged
34	Kidogawa River	Nishiyama Bridge			113	78		82		100		64		62			25	42		60		50		24		57			43	34	1.14	Decreasing
35		Nagatoro Bridge	Naraha Town		570	410		460		249		252		267			96	84		57		109		150		155			109	35	0.76	Decreasing
36		Kidokawa Bridge			810	74		740		150		167		83			68	190		132		327		317		259			216	36	1.10	Decreasing
37	Asami River	Boda Bridge	Hirono Town		77	124		87		95		93		93			191	279		139		119		134		109			162	37	1.15	Decreasing
38	Ohisa River	Kageiso Bridge	Iwaki City		321	229		286		159		92		182			194	257		84		93		62		58			125	38	1.19	Decreasing
39	Kohisa River	Rengo Bridge			112	98		113		130		144		191			92	210		112		126		183		158			147	39	0.50	Decreasing
40	Niida River	Kasumida Bridge			0	0		12		29		71		56			16	20		26		28		24		19			22	40	1.26	Decreasing
41		Matsuba Bridge			61	54		71		58		41		66			61	117		72		56		82		46			72	41	1.16	Decreasing
42	Natsui River	Kitanouchi Bridge	Ono Town		10	0		15		29		0		0			21	12		0		22		17		17			15	42	1.47	Decreasing
43		Kyudayu Bridge	Iwaki City		12	11		23		12		42		20			15	14		17		21		14		20			17	43	1.67	Decreasing
44		Rokujumai Bridge			21	26		17		56		182		109			108	154		63		152		223		235			156	44	0.75	Varying
45	Yoshima River	Iwaanatsuri Bridge			254	53		63		59		34		49			84	66		28		69		75		78			67	45	0.86	Decreasing
46		Before the confluence with Natsui River			0	50		15		20		16		18			27	26		21		25		26		113			40	46	1.23	Decreasing
47	Fujiwara River	Shima Bridge			37	22		97		102		187		92			22	47		24		46		148		106			66	47	1.62	Varying
48		Minato-ohashi Bridge			41	159		54		83		20		53			96	151		137		142		219		188			156	48	1.04	Decreasing
49	Samegawa River	Idosawa Bridge			19	0		26		18		70		36			12	11		24		13		11		12			14	49	1.22	Decreasing
50		Samegawa Bridge			48	71		48		68		55		91			78	58		97		42		87		40			67	50	0.99	Decreasing
51	Shitoki River	Komuro Bridge			14	11		12		25		21		20			25	106		36		65		22		75			55	51	0.93	Decreasing
52	Binda River	Kobana Bridge			98	81		77		99		100		60			29	29		57		85		79		98			63	52	0.70	Decreasing
53		Binda Bridge			201	246		162		174		63		64			112	85		120		105		45		145			102	53	1.13	Decreasing
																													807	Average		

A B C D E

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2)

Decreasing Increasing Unchanged Varying

(ii) Nakadori

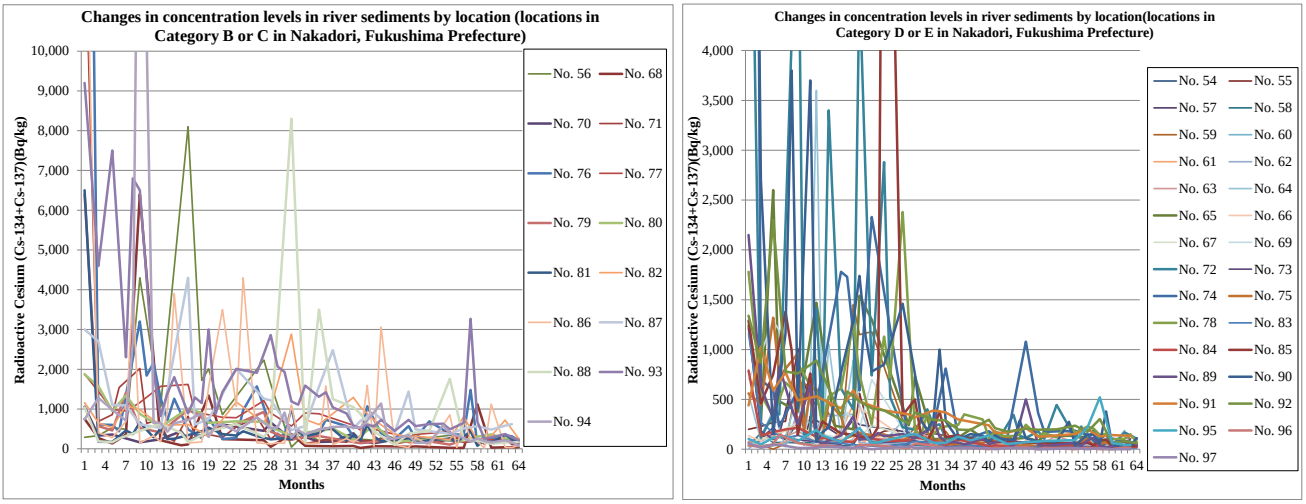
In Nakadori, Fukushima Prefecture, surveys were conducted 27 to 47 times from September 2011 to February 2016 for river sediment samples collected at 44 locations.

Regarding concentration levels of detected values, one location was categorized into Category B, 14 locations into Category C, nine locations into Category D, and 20 locations into Category E (see Table 4.3-7 and Table 4.3-8).

Concentration levels were generally decreasing at 41 locations and were vary at three locations.

Table 4.3-7 Categorization of detected values at respective locations
(Nakadori, Fukushima Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	1	No.93
C	Upper 10 to 25 percentile	14	No.56、No.68、No.70、No.71、No.76、No.77、No.79、No.80、No.81、No.82、No.86、No.87、No.88、No.94
D	Upper 25 to 50 percentile	9	No.59、No.65、No.72、No.74、No.78、No.90、No.91、No.92、No.95
E	Upper 50 to 100 percentile(lower 50%)	20	No.54、No.55、No.57、No.58、No.60、No.61、No.62、No.63、No.64、No.66、No.67、No.69、No.73、No.75、No.83、No.84、No.85、No.89、No.96、No.97



(*) Scales of the vertical axes differ in the left and right figures

Figure 4.3-5 Changes in concentration levels over the years at respective locations
(Nakadori, Fukushima Prefecture: river sediments)

Table 4.3-8 Detection of radioactive cesium at respective locations (Nakadori, Fukushima Prefecture: river sediments) (No.1)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																					
No.	Water area	Location	Municipality	FY2011								FY2012												FY2013																
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3						
54	Abukuma River	Habuto Bridge	Nishigo Village		66		81		155		96		262		44			31	49	144	89					51	135		80		14		53		25							
55		Tamachi-ohashi Bridge	Shirakawa City		200		228		270		280		1,010	46	330	184	56	107	60	85	560	125	180	203	77		113	57	51	46	59	39		33	53	22						
56	Yanta River	Before the confluence with Abukuma River			290		330		530		490		4,300		1,050			8,100	1,720	2,010	860					2,230	1,630		43		380		212		234						
57	Yashiro River	Yashirogawa Bridge	Tanagura Town		77		108		218	150			870		290			129	300	246						170	132		159		135		66		71						
58	Kitasu River	Yanagi Bridge	Hirata Village		27		165		66		70		64		65			14	57	19	72					37	40		29		40		11		21						
59	Imade River	Nekonaki Bridge	Ishikawa Town		45		47		0		55		680		610			105	1,450	1,150	1,180					116	248		42		179		15		120						
60	Yashiro River	Oji Bridge			35		36		51		52		145		50			55	98	100	98					71	80		46		127		64		54						
61	Abukuma River	Kawanome Bridge	Tamakawa Village		71		34		37		77		330	105	213	84	53	73	180	450	49	120	130	138	108		57	63	40	31	38	50		72	69	69						
62		Emochi Bridge	Sukagawa City		0		124		390		24		380		193	330			350	72	48					68	19		13		35		13		17						
63	Shakado River	Sukagawa City water intake point			72		97		138		126		182		77			83	168	94	108					109	175		113		47		63		51						
64		Before the confluence with Abukuma River			550		89		124		129		540	41	600	3,600	93	1,050	117	890	440	96	85	75	282		107	80	88	51	59	58		18	73	67						
65	Sasahara River	Shinbashi Bridge	Koriyama City		1,240		260		2,600	480			380		1,470			237	200	1,540	1,300					240	730		102		106		114		199						
66	Yatagawa River	Yatagawa Bridge			137		79		184	160			236		140			99	81	400	340					85	57		49		66		39		61						
67	Otakine River	Funehiki Bridge	Tamura City		27		119		87	173			270		52			96	133	120	239					132	98		35		69		110		75						
68		Before the confluence with Abukuma River	Koriyama City		750		270		134		360		6,400		215			89	108		1,340	242				213	49		370		73		66		64						
69	Ouse River	Before the confluence with Babagawa River			700		960		1,290	1,190			183		164			110	370		199	700				106	96		60		50		56		87						
70		Makunouchi Bridge			1,060		330		360	310			163		240			440	209		420	610				450	660		241		298		174		178						
71		Before the confluence with Abukuma River			13,500		690		860	1,540			2,020	640	690	610	290	189	820	330		360	290	420	550	800		241	390	232	224	295	129		194	233	187					
72	Abukuma River	Akutsu Bridge			7,800		116		350	350			6,000	148	169	1,410	269	3,400	610	400	4,700	740	2,880	520	220		197	280	400	233	251	113		114	90	103					
73	Gohyaku River	After the confluence with Ishimuro River	Motomiya City		1,210		184		99	122			96		74			50	116		158	63				83	85		42		21		40		39						
74		Kamisekishita Bridge			22,000		700		590	230			590		450			1,780	1,730		590	2,330				67	130		222		810		134		116						
75		Before the confluence with Abukuma River			560		450		1,320	730			960	201	580	89	111	470	330	114		167	137	150	99	88		157	310	179	59	101	49		51	18	97					
76	Abukuma River	Takada Bridge	Nihonmatsu City		30,000		610		600	440			3,200	1,840	2,160	1,280	720	1,260	490	268	770	250	268	970	1,570		540	285	360	1,020	256	380		400	730						
77	Kuchibuto River	Kuchibutogawa Bridge			1,880		1,440		990		950		1,160		1,570			1,620	920			790		780		1,210		900		570		900		880						
78	Utsushi River	Osegawa Bridge			1,780		550		330		670	610	860		640	580	234	530	610	1,260	750	250	1,130	720	2,380		191	144	360	154	212	229		244	350						
79	Abukuma River	Mizuhara River Bridge	Fukushima City		6,400		570		460		1,410		520		410			980	800	450			620			930	430		229		302		321								
80		Megami River	Tsurumaki Bridge		1,870		1,570		950		1,340		880		550			1,010	900	650			690			680	540		330		410		440		510						
81		Horai Bridge			6,500		176		171		460	370	660		290	500	242	255	340	440	530	370	330	440	320		235	250	259	242	440	318		390	520	490						
82	Nigori River	Before the confluence with Omori River			1,160		650		530		1,090		980		590			610	410	300			1,180			650	1,030		2,880		740		610								
83	Arakawa River	Hinokura Bridge			1,160		270		167		114		139		77	79			45	42			22			61	77		72		22		29		38						
84	Sukawa River	Sukawa Bridge			790		137		173		199		216		125			82	74	132			84			87	119		87		44		99								
85	Arakawa River	Before the confluence with Abukuma River			1,290		460		750		1,380	990	142		760	119	280	237	161	145	117	119	220	9,500	340		500	135	85	200	380	122		143	112						
86	Matsukawa River				15,200		400		280		690	4,000	144		330	175	920	3,900	145	173	1,560	3,500	1,070	4,300	149		119	152	137	1,100	277	129		137	1,580	105					
87	Hattanda River	Hattanda Bridge			3,000		2,700		1,100		1,090		620		520			4,300	610		750		2,010			1,260	1,220		470		570		1,560		2,480						
88	Surikami River	Totsuna Bridge			1,040		186		167	260					630			400	170		430		620			300	510		8,300		176		3,500		1,250						
89		Before the confluence with Abukuma River			2,150		630		310	830		410	250	640	92	50	86		140	330	96	110	163	131	154		108	157	179	300	124	76		66	50	63						
90	Abukuma River	Taisho Bridge	Date City		14,200		2,700		153		1,160	3,800	410	3,700	73	172	219		770	1,280	1,740	1,130	780	850	1,460		750	285	193	297	1,000	280		98	123	152						
91	Hirose River	Tatenokoshi Bridge	Kawamata Town		440		1,030		590		770		490		530				410	590	480		390			350	319		390		370		300								
92		Jizogawara Bridge	Date City		1,340		870		2,300		780		760		890			330	580		480	410	390			257	370		296		289		197		193						
93	Oguni River	Before the confluence with Hirose River			9,200		4,600		7,500		2,300	6,800	6,500	2,000	820	1,390	1,800		890	1,290	1,150	3,000	880	1,430	2,010	1,910		2,860	2,070	1,930	1,190	1,110	1,590		1,310	1,420	1,040					
94	Hirose River	Before the confluence with Abukuma River			740		1,280		980		710	2,700	20,000	650	650	430	640		720	890	300	590	610	440	790		520	540	910	278	470	360		490	510	550						
95	Kurokawa River	Tochigisakai	Shirakawa City		105		50		114		133		82		194	138			73		213	56				143	153		65		64		127		89						
96	Kujigawa River	Matsuoka Bridge	Tanagura Town		39		23		48	150			63		31	42				12	39	43				11	55		40		12		12		18						
97		Takachihara Bridge	Yamatsuri Town		63		14		41	44			13		14	24				16	18	0				27	13		14		10		15		11						

Total number of samples	1,494	Detection times	1,476

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-8 Detection of radioactive cesium at respective locations

(Nakadori, Fukushima Prefecture: river sediments) (No.2)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																									Average of FY2015 (*2)	No.	Coeffi cient of variation	Trends(*3)
				FY2014													FY2015												Changes				
No.	Water area	Location	Municipality	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
54	Abukuma River	Habuto Bridge	Nishigo Village		36	28		17		23		33	52				29	73		14		22		25	19				30	54	0.89	
55		Tamachi-ohashi Bridge	Shirakawa City	40	47	17	54	30	53	24		22	12 36			91	62	79	35	34	61	55		19	18	56			51	55	1.47	
56	Yanta River	Before the confluence with Abukuma River			243	244		215		279		240	241				339	269		219		271		171	197				244	56	1.71	
57	Yashiro River	Yashirogawa Bridge	Tanagura Town		81	52		71		51		45	51				73	42		36		33		39	107				55	57	1.17	
58	Kitasu River	Yanagi Bridge	Hirata Village		21	17		19		16		0	17				17	16		21		0		18	17				15	58	0.95	
59	Imade River	Nekonaki Bridge	Ishikawa Town		78	0		139		14		63	203				167	21		11		17		22	154				65	59	1.59	
60	Yashiro River	Oji Bridge			16	24		24		22		23	78				94	31		31		22		33	13				37	60	0.62	
61	Abukuma River	Kawanome Bridge	Tamakawa Village	15	57	78	18	49	24	58		33	64	58		44	17	24	36	25	22	19		34	19	20			26	61	1.08	
62		Emochi Bridge	Sukagawa City		39	12		10		11		12		27			14	12		15		16		32		12			17	62	1.51	
63	Shakado River	Sukagawa City water intake point			37	58		28		11		27		138			59	52		24		72		33		40			47	63	0.59	
64		Before the confluence with Abukuma River		80	66	57	42	18	31	51		26	52	80		62	21	21	65	20	42	35		189	15	15			49	64	2.46	
65	Sasahara River	Shinbashi Bridge	Koriyama City		75	148		99		114		85	131				135	116		88		66		77	74				93	65	1.40	
66	Yatagawa River	Yatagawa Bridge			49	61		25		17		25	19				19	25		31		25		27	14				24	66	1.06	
67	Otakine River	Funehiki Bridge	Tamura City		38	65		53		42		25		112			33	22		25		28		29		27			27	67	0.77	
68		Before the confluence with Abukuma River	Koriyama City		69	21		64		60		51	60				24	20		1,120		27		40		40			212	68	2.75	
69	Ouse River	Before the confluence with Babagawa River			90	71		64		66		49	18				93	36		71		24		30		22			46	69	1.47	
70		Makunouchi Bridge			390	206		139		237		202	264				210	183		203		270		224		151			207	70	0.62	
71		Before the confluence with Abukuma River		165	263	194	208	186	272	126		180	154	199		191	274	229	430	259	117	194		241	106	102			214	71	2.94	
72	Abukuma River	Akutsu Bridge		101	145	177	146		344 136	114		179	107	444			116 228		78	195	97	150	25		169	138	105			130	72	2.12	
73	Gohyaku River	After the confluence with Ishimuro River			24	38		24		32		33	28				22	29		18		21		20	42				25	73	2.21	
74		Kamisekishita Bridge	Motomiya City		181	134		124		1,080		362	174				186	146		18		107		79	73				102	74	3.27	
75		Before the confluence with Abukuma River		58	102	86	91	129	19	48		25	36	30		22	59	101	36	55	67	36		18	29	51			47	75	1.41	
76	Abukuma River	Takada Bridge	Nihonmatsu City	570	305	229	1,070		387 305	250		570	264	690		480	355	364	1,480	99	332	230		337	315	211			420	76	3.34	
77	Kuchibuto River	Kuchibutogawa Bridge			590	470		490		365		283	363				431	158		209		236		199	143				229	77	0.64	
78	Utsushi River	Osegawa Bridge		300	118	179	134		132 149	246		130	162	122		268	164	228	207	142	156	102		105	144	76			159	78	1.09	
79	Mizuhara River	Getouchi Bridge	Fukushima City		169	141		171		268		165		187			106	224		246		167		187		165			183	79	1.89	
80	Megami River	Tsurumaki Bridge			233	317		600		169		200		238			222	204		307		360		259		249			267	80	0.73	
81	Abukuma River	Horai Bridge		198	341	219	600	310	185	220		278	166	216			256 176	305	442	73	221	146		365	232	173			239	81	2.05	
82	Nigori River	Before the confluence with Omori River			1,290	1,050		720		370		299	322				228	810		208		322		720		251			423	82	0.73	
83	Arakawa River	Hinokura Bridge			24	15		16		17		23	18				23	16		15		19		13		13			17	83	2.31	
84	Sukawa River	Sukawa Bridge			33	38		31		75		60	40				40	74		14		22		25		25			33	84	1.35	
85	Arakawa River	Before the confluence with Abukuma River		96	85	70	71	79	76	66		67	67	61			62 51	67	38	87	99	30		79	35	34			58	85	3.19	
86	Matsukawa River			257	167	305	1,590	71	3,060	98		25	287	75			850 34	720	259	183	16	1,120		39	31	84			334	86	2.23	
87	Hattanda River	Hattanda Bridge			510	700		910		420		1,440	490				378	510		569		483		580	620				523	87	0.84	
88	Surikami River	Totsuna Bridge			1,050	880		440		94		381		450			1,760	229		206		125		158		169			441	88	1.86	
89		Before the confluence with Abukuma River		112	52	68	99	58	33	500		44	33	44			64 35	88	117	35	21	29		39	74	38			54	89	1.71	
90	Abukuma River	Taisho Bridge	Date City	135	78	132	100		95 287	110		77	85	71		276	39	148	148	55	380	49		26	39	112			127	90	2.51	
91	Hirose River	Tatenokoshi Bridge	Kawamata Town		241	165		168		213		125	130				152	200		129		143		137	135				149	91	0.64	
92		Juzogawara Bridge	Date City		297	211		177		207		196		200			237	175		304		59		81		61			153	92	1.04	
93	Oguni River	Before the confluence with Hirose River		890	580	520	610	560	730	450		730	570	620		630	490	650	3,270	680	251	285		368	288	216			713	93	1.13	
94	Hirose River	Before the confluence with Abukuma River		560	530	530	710		1,140 246	254		344	153	152		590	394	272	186	258	193	158		210	164	67			249	94	2.97	
95	Kurokawa River	Tochigisakai	Shirakawa City		138	109		52		71		78	82				92	217		522		63		46	42				164	95	0.79	
96	Kujigawa River	Matsuoka Bridge	Tanagura Town		0	13		12		22		0	14				0	16		0		0		19	12				7.8	96	1.13	
97		Takachihara Bridge	Yamatsuri Town		11	0		13		11		0	0				11	0		10		0		0	0				3.5	97	1.06	

A	B	C	D	E	152 Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2) Decreasing Increasing Unchanged Varying

(iii) Aizu

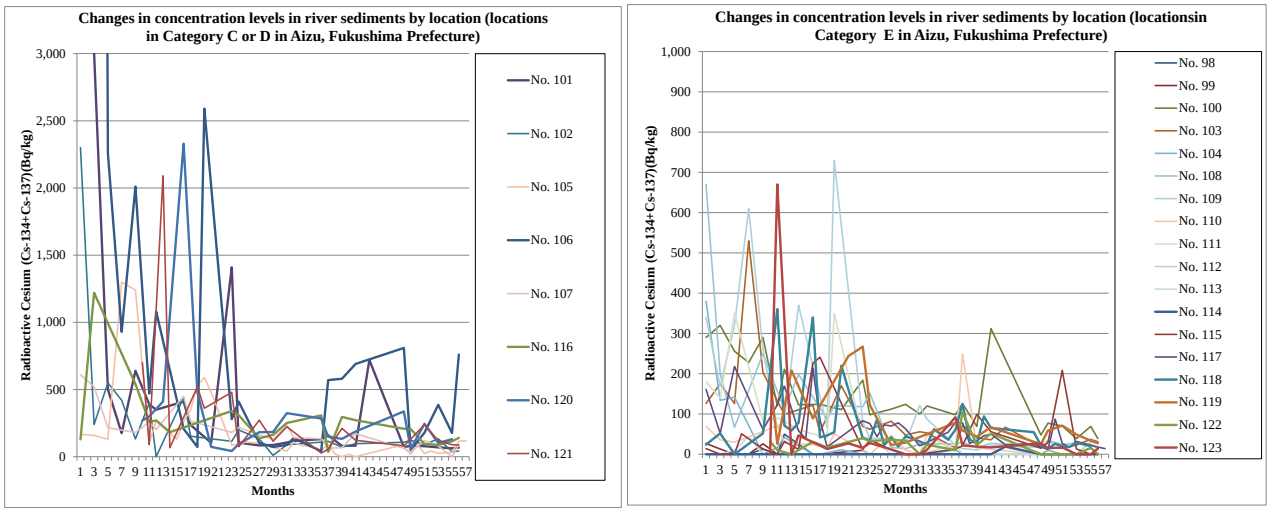
In Aizu, Fukushima Prefecture, surveys were conducted 19 to 41 times from September 2011 to February 2016 for river sediment samples collected at 26 locations.

Regarding concentration levels of detected values, one location was categorized into Category C, seven locations into Category D, and 18 locations into Category E (see Table 4.3-9 and Table 4.3-10).

Concentration levels were generally decreasing at 21 locations, were unchanged at one location and fluctuating at four locations.

Table 4.3-9 Categorization of detected values at respective locations
(Aizu, Fukushima Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.106
D	Upper 25 to 50 percentile	7	No.101、No.102、No.105、No.107、No.116、No.120、No.121
E	Upper 50 to 100 percentile(lower 50%)	18	No.98、No.99、No.100、No.103、No.104、No.108、No.109、No.110、No.111、No.112、No.113、No.114、No.115、No.117、No.118、No.119、No.122、No.123



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-6 Changes in concentration levels over the years at respective locations
(Aizu, Fukushima Prefecture: river sediments)

Table 4.3-10 Detection of radioactive cesium at respective locations

(Aizu, Fukushima Prefecture: river sediments)

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Water area	Location	Municipality	FY2011								FY2012												FY2013											
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
98	Agano River	Tajima Bridge	Minamiaizu Town		0		0		0		0		13		0	50			0						0	0		0		0		0			
99	Agano River	Okawa Bridge	Aizuwakamatsu City		27		13		0		0		26		0	0			0	0					10	0		0		0		0			
100	Yukawa River	Takimi Bridge	Aizuwakamatsu City		290		320		256		228		290		120	211		123		124		111			184	98		112		124		100	120		
101	Yukawa River	Shinyukawa Bridge	Aizuwakamatsu City		8,700		3,000		500		175		640		390	350			410	236		104			1,410	105		84		87		106	117		
102	Yukawa River	Before the confluence with Agano River	Aizuwakamatsu City		2,300		240		550		420		132		400	0			440	153					114	199		132		10		89			
103	Miyakawa River	Saikuna Bridge	Aizubange Town		126		175		126		530		203		133	99			122	55		170			69	62		82		48		56	53		
104	Agano River	Miyako Bridge	Aizubange Town		380		134		142				0		17	42			0	0		11			0	0		0		0		0	0		
105	Nippashi River	Minami-ohashi Bridge	Kitakata City		167		158		130		1,300		1,240		101	270		173 / 132	263	350	530 / 590	480			88	92	108 / 105	103	87	70		41	109	85	
106	Kyu-yukawa River	Awanomiya Bridge	Yugawa Village		13,000		25,000		2,260		930		2,010		470	1,080			207		72 / 2,590				279	410		103		72		88	139		
107	Kyu-miyakawa River	Josuke Bridge	Aizubange Town		610		520		216				181		257	202			450	265					181	219		161		131		236	142		
108	Tatsuki River	Ohashi	Kitakata City		670		199		67				250		157	112		198			86 / 121				118	152		17		14		25	26		
109	Tatsuki River	Shimokawara Bridge	Kitakata City		340		169		320		610		260		66	87		370			67 / 730				80	40		39		28		121	87		
110	Nigori River	Nigorigawa Bridge	Kitakata City		69		36		30				57		71	28			24		16 / 51				11	0		47		10		0	48		
111	Nigori River	Yamazaki Bridge	Kitakata City		180		139		350				82		90	82		61			40 / 350				41	43		0		0		0			
112	Inagawa River	Aoyagi Bridge	Minamiaizu Town		0		0		0		0		0		0	0			0	0		0			0	0		0		0		0			
113	Inagawa River	Kurosawa Bridge	Tadami Town		0		0		10		44		0		0	0			0		0				0	0		0		0		0			
114	Tadami River	Nishitani Bridge	Kaneyama Town		0		0						0		0	0		0			0 / 0				0	0		0		0		0	0		
115	Tadami River	Fuji Bridge	Aizubange Town		14		0		0	51			13		0	32		12	226	241					12	36		11		0		0			
116	Agano River	Shingo Dam	Kitakata City		129		1,220						540		260	270		183							340	309		137		163		251			
117	Sukawa River	Sukawano	Inawashiro Town		161		52		218				61		123	169		58 / 39	213	86	18				83	76	44 / 73	70	78	63		21			
118	Nagase River	Kogane Bridge	Inawashiro Town		24		52		0				52		360	71	59	78	340	42	47 / 55	220			40	35	87 / 23	42	19	45		32	24	62	
119	Takahashi River	Shinbashi Bridge	Inawashiro Town											190	26		208		89				244		267	122		23		29					
120	Koguro River	Umeno Bridge	Inawashiro Town											270	300		410		2,330		480	73			42	94		183		184		324			
121	Hishinuma River	Sekido District	Inawashiro Town											700	90		2,090	67			520 / 360				480	74		272		115		223			
122	Funatsu River	Funatsu Bridge	Koriyama City											32	10		0		31		17 / 21				40	33		36		34		0	24		
123	Haragawa River	Estuary, front	Aizuwakamatsu City											0	670		0	47			13		27		16	28		12		0		0	11		

Total number of samples	667	Detection times	490

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location				River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																									Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
No.	Water area	Location	Municipality	FY2014												FY2015												Changes				
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
98	Agano River	Tajima Bridge	Minamiaizu Town		0	0		0		0		0					0	0		0		0		0	0				0	98	3.97	Decreasing
99	Agano River	Okawa Bridge	Aizuwakamatsu City		0	0		0		0		0					0	0		0		0		0	0				0	99	2.55	Decreasing
100	Yukawa River	Takimi Bridge	Aizuwakamatsu City		98	126		69		312							48	77		70		39		69	39				57	100	0.60	Decreasing
101	Yukawa River	Shinyukawa Bridge	Aizuwakamatsu City		131	159		80		82		720					71	81		78		70		63	68				72	101	2.57	Decreasing
102	Yukawa River	Before the confluence with Agano River	Aizuwakamatsu City		109	114		72		97							108	122		89		134		37	42				89	102	1.80	Decreasing
103	Miyakawa River	Saikuna Bridge	Aizubange Town		16	72		41		36		67					19	15		15		23		37	31				23	103	1.11	Decreasing
104	Agano River	Miyako Bridge	Aizubange Town		11	0		0		0		0					0	10		0		0		0	0				1.7	104	2.81	Decreasing
105	Nippashi River	Minami-ohashi Bridge	Kitakata City	71	46	92	20	0	18	0						77	70	19	89	24	42	27		31	115	119			61	105	1.52	Decreasing
106	Kyu-yukawa River	Awanomiya Bridge	Yugawa Village		40	570		580		690							810	51		179		386		177	760				394	106	2.61	Decreasing
107	Kyu-miyakawa River	Josuke Bridge	Aizubange Town		134	64		68		172							63	33		119		79		0	88				64	107	0.78	Decreasing
108	Tatsuki River	Ohashi	Kitakata City		26	29		16		27							18	35		24		28		24	14				24	108	1.41	Decreasing
109	Tatsuki River	Shimokawara Bridge	Kitakata City		23	14		11		21							17	32		19		0		31	26				21	109	1.37	Decreasing
110	Nigori River	Nigorigawa Bridge	Kitakata City		10	249		16		12							0	0		0		0		0	0				0	110	1.62	Varying
111	Nigori River	Yamazaki Bridge	Kitakata City		25	0		0		0							0	0		0		0		0	0				0	111	1.64	Decreasing
112	Inagawa River	Aoyagi Bridge	Minamiaizu Town		0	0		0		0							0	0		0		0		0	0				0	112	-	Unchanged
113	Inagawa River	Kurosawa Bridge	Tadami Town		0	0		0		0							0	0		0		0		0					0	113	3.97	Decreasing
114	Tadami River	Nishitani Bridge	Kaneyama Town		0	0		0		0		19					0	0		0		0		0	0				0	114	5.00	Varying
115	Tadami River	Fuji Bridge	Aizubange Town		13	21		99		56							15	29		208		13		0	0				44	115	1.63	Varying
116	Agano River	Shingo Dam	Kitakata City		308	36		296		272							208	206		95		87		114	141				142	116	0.93	Decreasing
117	Sukawa River	Sukawano	Inawashiro Town	55	79	78	27	34	46	50		24				26	18	12	87	27	17	32			18	14			28	117	0.81	Decreasing
118	Nagase River	Kogane Bridge	Inawashiro Town	36	61	125	37	26	94	65						55	22	14	26	20	18	29		20					26	118	1.21	Decreasing
119	Takahashi River	Shinbashi Bridge	Inawashiro Town		78	59		44		67							25	59		71		49		34	28				44	119	0.87	Decreasing
120	Koguro River	Umeno Bridge	Inawashiro Town		284	149		133		188							337	58		245		103		130					175	120	1.55	Decreasing
121	Hishinuma River	Sekido District	Inawashiro Town		28	56		211		122							81	130		238		119		89	87				124	121	1.53	Decreasing
122	Funatsu River	Funatsu Bridge	Koriyama City		10	104		23		52							0	0		0		0		16	0				2.7	122	1.10	Varying
123	Haragawa River	Estuary, front	Aizuwakamatsu City		92	22		19		17							27	15		17		0		0	14				12	123	2.95	Decreasing
																													54	Average		

Color categories: A | B | C | D | E

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2) ↘ Decreasing ↗ Increasing ⤳ Unchanged ⩘ Varying

4) Ibaraki Prefecture

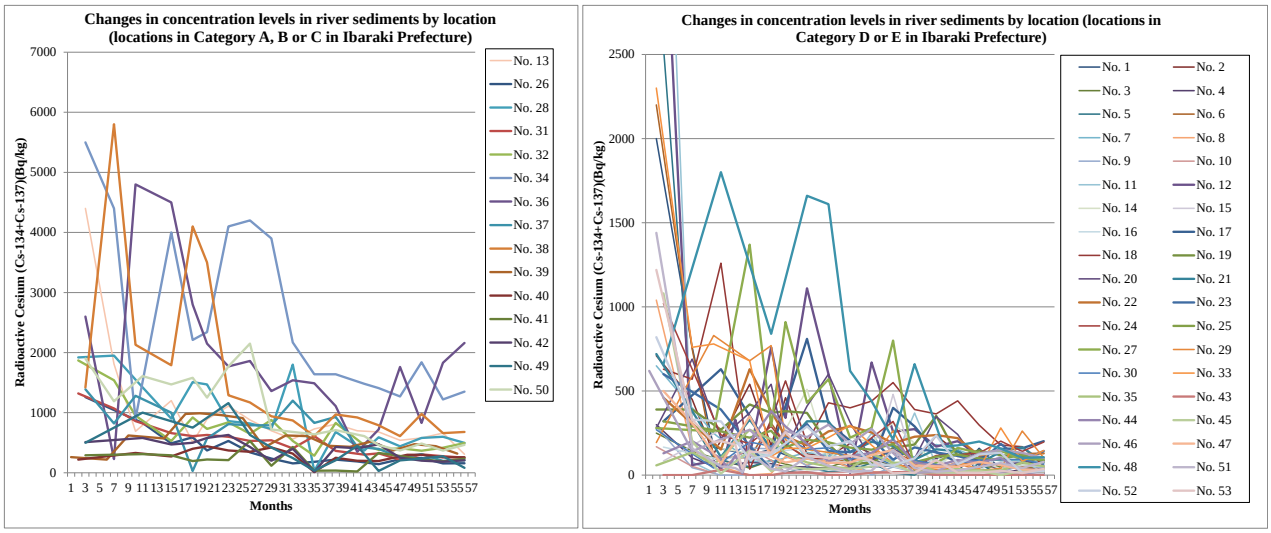
In Ibaraki Prefecture, surveys were conducted 15 to 21 times from August 2011 to February 2016 for river sediment samples collected at 53 locations (this analysis excludes the survey results at 39 locations where the survey was conducted only in 2011).

Regarding concentration levels of detected values, two locations ware categorized into Category A, two locations into Category B, 11 locations into Category C, 21 locations into Category D, and 17 locations into Category E (see Table 4.3-11 and Table 4.3-12).

Concentration levels were generally decreasing at 46 locations, were unchanged at two locations and fluctuating at five locations.

Table 4.3-11 Categorization of detected values at respective locations
(Ibaraki Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	2	No.34、No.36
B	Upper 5 to 10 percentile	2	No.28、No.38
C	Upper 10 to 25 percentile	11	No.13、No.26、No.31、No.32、No.37、No.39、No.40、No.41、No.42、No.49、No.50
D	Upper 25 to 50 percentile	21	No.1、No.2、No.7、No.14、No.17、No.18、No.19、No.20、No.21、No.22、No.23、No.24、No.25、No.27、No.29、No.30、No.33、No.46、No.48、No.51、No.52
E	Upper 50 to 100 percentile(lower 50%)	17	No.3、No.4、No.5、No.6、No.8、No.9、No.10、No.11、No12、No.15、No.16、No.35、No.43、No.44、No.45、No.47、No.53



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-7 Changes in concentration levels over the years at respective locations
(Ibaraki Prefecture: river sediments)

Table 4.3-12 Detection of radioactive cesium at respective locations (Ibaraki Prefecture: river sediments) (No.1)

Location					River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																					
No.	Water area		Location	Municipality	FY2011							FY2012														FY2013														
					8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Tagagawa River System	Satone River	Yamagoya Bridge	Kitaibaraki City		2,000					760			166				121			153			105		97			81			52			49	
2			Murayama Bridge			710					450			125				540			176		460			126			116			187			128	
3		Hanazono River	Kurabeishi			250					144			102				42			88		66			36			45			91			94	
4			Isonare Bridge			300					103			53				76			68		50			50			38			47			89	
5		Okita River	Sakae Bridge	Takahagi City		3,100					310			101				50			87		14			42			21			30			73	
6			Sakai Bridge	Kitaibaraki City		2,200					750			109				103			310		186			101			68			98			83	
7		Hananuki River	Shinhananuki Bridge	Takahagi City		650					400			248				82			82		102			135			115			140			101	
8	Kujigawa River System	Kujigawa River	Yamagata	Hitachiomiya City		1,040					157			62				0			10		111			60			94			45			20	
9			Sakaki Bridge	Hitachi City/Tokai Village		290					44			11	0	0	0	161			156		135			55			111			92			0	
10	Nakagawa River System	Nakagawa River Area	Nakagawa River	Noguchi	Hitachiomiya City/Shirosato Town		169					52			13				163			88		13			11			15			18			12	
11				Shimokunii	Mito City		5,500					78			16				128			116		246			101			131			76			249	
12				Katsuta Bridge	Mito City/Hitachinaka City		4,400					60			86	34	330	176	114			760		340			1,110			600			13			670	
13			Nakamaru River	Yanagisawa Bridge	Hitachinaka City			4,400				1,810			690				1,200			510		890			1,110			880			700			560	
14		Hinumagawa River Area	Hinumamae River	Nagaoka Bridge	Ibaraki Town			460								158						109					510			90			226			193	
15			Hinuma River	Takahashi				84								270						57					19			39			16			18	
16			Kansei River	Kansei Bridge				167								92						139					159			82			79			86	
17			Daiya River	Oya Bridge	Hokota City			320								630						143					810			310			204			68	
18			Hinuma River	Hinuma Bridge	Mito City/Oarai Town			630				570				1,260			36			330		560			190			430			400			440	
19	Tonegawa River System	Kitaura River Area	Hokota River	Asahi Bridge	Hokota City		390					390				270			420			370		380			370			182			68			73	
20			Tomoe River	Shintomoegawa Bridge			280					690				220			370			540		159			410			600			314			87	
21			Taiyo River	Tazuka Bridge			720									108			330			159		172			320			320			136			198	
22			Takeda River	Uchijuku-ohashi Bridge	Namegata City			460								152			630			380		230			177			260			291			254	
23			Yamada River	Nioroshi Bridge				600								390			174			35		190			304			143			137			217	
24			Kurakawa River	Kurakawa Bridge				1,020								239			187			290		183			98			100			105			222	
25			Gantsu River	JA Yokohashi Bridge				320								260			223			264		166			211			195			164			151	
26			Nagare River	Suhoi Bridge	Kashima City			1,260								830			490			590		370			530			340			236			156	
27		Kasumigaura River Area	Sonobe River	Sonobeshin Bridge	Omitama City		280							260				1,370			290		910			430			570			223			281	
28			Sanno River	Tokoro Bridge			1,920					1,950		1,550				900			1,510		1,470			860			820			730			1,800	
29			Koise River	Heiwa Bridge	Ishioka City		194							830				680			770		210			153			135			116			101	
30			Kajinashi River	Kamishuku Bridge	Namegata City		270							42				197			172		226			154			163			97			120	
31			Hishiki River	Hishiki Bridge	Kasumigaura City		1,320					1,070		860				660			610		630			600			530			540			405	
32			Ichinose River	Kawanaka Bridge			1,870					1,540		950				530			920		730			840			650			880			530	
33			Sakai River	Sakai Bridge/National Route 354	Tsuchiura City		2,300					760		780				680			112		160			160			224			296			178	
34			Shinkawa River	Shinten Bridge				5,500				4,400		900				4,000			2,210		2,340			4,100			4,200			3,900			2,170	
35			Sakura River	Eiri Bridge	Tsuchiura City/Tsukuba City		58					136		62				270			213		128			76			52			39			126	
36			Bizen River	Bizengawa Bridge	Tsuchiura City			2,600				228		4,800				4,500			2,800		2,150			1,770			1,860			1,360			1,540	
37			Hanamuro River	Shinwa Bridge				1,390				820		1,280				1,000			29		570			810			790			790			1,200	
38			Seimei River	Katsuhashi Bridge	Ami Town			1,420				5,800		2,130				1,790			4,100		3,500			1,290			1,170			940			870	
39			Onogawa River	Okuhara-ohashi Bridge	Ryugasaki City/Ushiku City		260					220		620				570			980		990			960			910			420			620	
40			Shintone River	Shintone Bridge	Inashiki City		220							330				270			400		440			370			350			420			318	
41		Hitachitonegawa River Area	Yorokoshi River	Horinouchi Bridge	Itako City			290							310			290			196		222			210			530			117			430	
42			Maekawa River	Ayame Bridge				510							580			470			500		580			630			430			200			400	
43		Kinugawa River Area	Kinugawa River	Kawashima Bridge	Chikusei City			0				0			32			0			0		14			18			0			0			16	
44				Takishita Bridge	Moriya City			130				202			100	40	119	11	196			380		289			187			83			113			133	
45			Tagawa River	Tagawa Bridge	Chikusei City			1,080				201			10				146			24		54			35			40			36			52	
46		Kokaigawa River Area	Kokai River	Kuroko Bridge		620						142			213				269			153		262			226			300			186			275	
47				Fumimaki Bridge	Toride City			500				310			68				350			112		75			98			73			75			120	
48			Yatagawa River	Maruyama Bridge	Tsukuba City			660							1,800							840					1,660			1,610			620			440	
49			Nishiyata River	Sakaimatsu Bridge				500							1,000							750					1,160			630			420			244	
50			Inari River	Oguki Bridge				1,900				1,190			1,610				1,470			1,580		1,250			1,770			2,150			720			680	
51		Tonegawa River Area	Tonegawa River	Kurihashi Bridge	Koga City		1,440					159			52	48	42	18	123			39		22			109			55			23			26	
52				Fukawa	Tone Town		820					330			320				95			122					290			171			202			62	
53				Sawara	Inashiki City		1,220					330		195	202		181	39	140			133		256			117			101			115			88	
					Total number of samples		938		Detection times		914																											

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-12 Detection of radioactive cesium at respective locations (Ibaraki Prefecture: river sediments) (No.2)

Location					River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Average of FY2015 (※2)	No.	Coefficient of variation	Trends(*3)
No.	Water area		Location	Municipality	FY2014												FY2015												Changes				
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Tagagawa River System	Satone River	Yamagoya Bridge	Kitaibaraki City		55			44			66			23			160			36			67			83			87	1	2.06	
2			Murayama Bridge			137			81			234			137			96			88			87			43			79	2	0.87	
3		Hanazono River	Kurabeishi			56			89			60			21			45			52			44			41			46	3	0.70	
4			Isonare Bridge			54			57				112		155			20			12			34			41			27	4	0.87	
5		Okita River	Sakae Bridge	Takahagi City		12			0			92			11			67			0			0			19			22	5	3.22	
6			Sakai Bridge	Kitaibaraki City		50			50				24		61			81			34			49			52			54	6	2.11	
7		Hananuki River	Shinhananuki Bridge	Takahagi City		141			108			182			151			101			86			88			75			88	7	0.87	
8	Kujigawa River System	Kujigawa River	Yamagata	Hitachiomiya City		16			24			12			15			20			15			18			18			18	8	2.48	
9			Sakaki Bridge	Hitachi City/Tokai Village		49			18			14			14			23			15			63			42			36	9	1.20	
10	Nakagawa River System	Nakagawa River Area	Nakagawa River	Noguchi	Hitachiomiya City/Shirosato Town	15			11			12			0			0			13			14			11			10	10	1.48	
11				Shimokunii	Mito City	73			369			62			142			33			31			91			12			42	11	3.07	
12				Katsuta Bridge	Mito City/Hitachinaka City	258			274			170			202			116			17			16			12			40	12	2.04	
13			Nakamaru River	Yanagisawa Bridge	Hitachinaka City	730			810			700			680			540			580			660			308			522	13	0.93	
14		Hinumagawa River Area	Hinumamae River	Nagaoka Bridge	Ibaraki Town	312			188			61			126			88			37			62			51			60	14	0.82	
15			Hinuma River	Takahashi		480			55			16			13			17			13			0			12			11	15	1.76	
16			Kansei River	Kansei Bridge		51			24			113			31			25			118			35			25			51	16	0.61	
17			Daiya River	Oya Bridge	Hokota City	400			290			137			77			99			156			160			202			154	17	0.79	
18			Hinuma River	Hinuma Bridge	Mito City/Oarai Town	550			390			364			442			298			179			169			56			176	18	0.68	
19	Tonegawa River System	Kitaura River Area	Hokota River	Asahi Bridge	Hokota City	163			182			352			113			147			118			113			89			117	19	0.56	
20			Tomoe River	Shintomoegawa Bridge		156			99			348			242			57			67			73			106			76	20	0.72	
21			Taiyo River	Tazuka Bridge		174			93			154			141			69			140			166			75			113	21	0.76	
22			Takeda River	Uchijuku-ohashi Bridge	Namegata City	190			228			238			220			116			143			124			130			128	22	0.54	
23			Yamada River	Nioroshi Bridge		92			165			135			114			77			186			85			144			123	23	0.73	
24			Kurakawa River	Kurakawa Bridge		319			58			117			121			131			202			141			197			168	24	0.99	
25			Gantsu River	JA Yokohashi Bridge		185			77			110			122				93		95			122			83			98	25	0.43	
26			Nagare River	Suhoi Bridge	Kashima City	182			219			188			144			225			248			157			158			197	26	0.80	
27		Kasumigaura River Area	Sonobe River	Sonobeshin Bridge	Omitama City	800			11				97		162			132			146			90			97			116	27	1.00	
28			Sanno River	Tokoro Bridge		31			680				368		590			441			580			600			497			530	28	0.61	
29			Koise River	Heiwa Bridge	Ishioka City	263			34				31		70			27			40			262			103			108	29	1.11	
30			Kajinashi River	Kamishuku Bridge	Namegata City	57			88				55		68			90			92			94			65			85	30	0.55	
31			Hshiki River	Hshiki Bridge	Kasumigaura City	610			364				301		324			214			305			275			252			262	31	0.54	
32			Ichinose River	Kawanaka Bridge		284			830				460		382			409			367			416			495			422	32	0.57	
33			Sakai River	Sakai Bridge/National Route 354	Tsuchiura City	70			37				46		80			35			281			82			147			136	33	1.52	
34			Shinkawa River	Shinten Bridge		1,640			1,640				1,480		1,410			1,270			1,840			1,220			1,350			1,420	34	0.56	
35			Sakura River	Eiri Bridge	Tsuchiura City/Tsukuba City	73			79			21			37			28			28			75			53			46	35	0.77	
36			Bizen River	Bizengawa Bridge	Tsuchiura City	1,490			1,110			350			720			1,760			830			1,830			2,160			1,645	36	0.65	
37			Hanamuro River	Shinwa Bridge		830			930			432			396			256			311			197			208			243	37	0.59	
38			Seimei River	Katsuhashi Bridge	Ami Town	610			970			920			790			610			980			660			680			733	38	0.88	
39			Onogawa River	Okuhara-ohashi Bridge	Ryugasaki City/Ushiku City	610			450			432			520			371			476			443			319			402	39	0.43	
40			Shintone River	Shintone Bridge	Inashiki City	11			249			199			194				300		299			255			258			278	40	0.36	
41		Hitachitonegawa River Area	Yorokoshi River	Horinouchi Bridge	Itako City	34			36			22			329				262		219			190			234			226	41	0.58	
42			Maekawa River	Ayame Bridge		16			430			409			473			251			202			185			209			212	42	0.45	
43		Kinugawa River Area	Kinugawa River	Kawashima Bridge	Chikusei City	17			20			0			0			0			0			0			0			0	43	1.55	
44				Takishita Bridge	Moriya City	213			75			56			90			74			103			18			29			56	44	0.73	
45			Tagawa River	Tagawa Bridge	Chikusei City	65			16			17			16			26			0			26			22			19	45	2.40	
46		Kokaigawa River Area	Kokai River	Kuroko Bridge	Toride City	131			13			23			76			128			150			132			103			128	46	0.72	
47				Fumimaki Bridge		150			57			53			50			79			60			34			32			51	47	1.00	
48			Yatagawa River	Maruyama Bridge	Tsukuba City	212			660				171		177			200			158			103			107			142	48	0.95	
49			Nishiyata River	Sakaimatsu Bridge		37			208			450			30			206			237			275			82			200	49	0.82	
50			Inari River	Oguki Bridge		640			710				610		460			370			486			368			464			422	50	0.58	
51		Tonegawa River Area	Tonegawa River	Kurihashi Bridge	Koga City	149			42			20			29			50			72			43			79			61	51	2.42	
52				Fukawa	Tone Town	57			100			236			65			123			134			14			26			74	52	1.02	
53			Sawara	Inashiki City		11			14			90			15			14			26			13			37			23	53	1.63	

A	B	C	D	E	200	Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2) Decreasing Increasing Unchanged Varying

5) Tochigi Prefecture

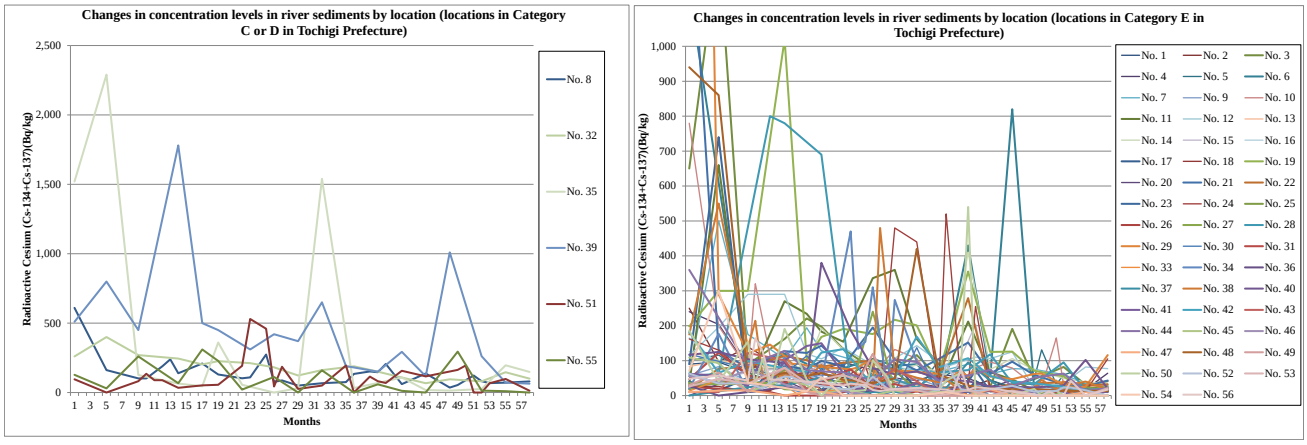
In Tochigi Prefecture, surveys were conducted 15 to 30 times from October 2011 to February 2016 at 56 locations (rivers) in public water areas (this analysis excludes the survey results at 49 locations where the survey was conducted only in 2011).

Regarding concentration levels of detected values, one location was categorized into Category C, five locations were categorized into Category D and 50 locations were categorized into Category E (see Table 4.3-13 and Table 4.3-14).

Concentration levels were generally decreasing at 39 locations, were unchanged at one location and fluctuating at 16 locations.

Table 4.3-13 Categorization of detected values at respective locations
(Tochigi Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.39
D	Upper 25 to 50 percentile	5	No8、No.32、No.35、No.51、No.55
E	Upper 50 to 100 percentile(lower 50%)	50	No.1、No.2、No.3、No.4、No.5、No.6、No.7、No.9、No.10、No.11、No.12、No.13、No.14、No.15、No.16、No.17、No.18、No.19、No.20、No.21、No.22、No.23、No.24、No.25、No.26、No.27、No.28、No.29、No.30、No.31、No.33、No.34、No.36、No.37、No.38、No.40、No.41、No.42、No.43、No.44、No.45、No.46、No.47、No.48、No.49、No.50、No.52、No.53、No.54、No.56



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-8 Changes in concentration levels over the years at respective locations
(Tochigi Prefecture: river sediments)

Table 4.3-14 Detection of radioactive cesium at respective locations

(Tochigi Prefecture: river sediments) (No.1)

Location							River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Water area				Location	Municipality	FY2011								FY2012												FY2013											
							8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Nakagawa River System			Nakagawa River	Ikuyobashishita	Nasushiobara City			90				96						42	93			19		15			13			12			14			23	
2	Nakagawa River System			Nakagawa River	Komei Bridge	Nasushiobara City			250				97				139			78			43		64			51			97			38			36	
3	Nakagawa River System			Takaomata River	Takaomata Bridge	Nasu Town			650				1,290				89			162			221		197			133			76			79			116	
4	Nakagawa River System			Yukawa River	Yukawa Bridge	Nasu Town			240				204				79			75			54		73			95			73			50			43	
5	Nakagawa River System			Nakagawa River	Kamikuroiso	Nasushiobara City/Nasumachi			101				116				64 87		44 72	109			59		16			91	49	28	73	42		74			11	
6	Nakagawa River System			Yosasa River	Yosasa Bridge	Nasu Town			1,160				610				73			120			91		79			78			105			85			90	
7	Nakagawa River System			Kurokawa River	Shinden Bridge	Nasu Town			64				500				175			105			194		128				104		90			80			74	
8	Nakagawa River System			Yosasa River	Kawada Bridge	Otawara City			610				162				102 102		189 239	139			209		130			103	109	274	77	87		50			67	
9	Nakagawa River System			Nakagawa River	Kurobane	Otawara City			57				83				40 35		54 34	102			53		58			59	61	42	31	16		33			49	
10	Nakagawa River System			Matsuba River	Tributary	Otawara City			780				199				75 320		114 115	62			82		69			68	36	80	119	84		132			106	
11	Nakagawa River System			Sabigawa River	Udagawa Bridge	Otawara City			32				660				34			270			234		183			154			336			360			162	
12	Nakagawa River System			Momura River	Momuranaka Bridge	Otawara City			114				196				290			290			120		105			137			87			107			143	
13	Nakagawa River System			Hokigawa River	Yunohara	Nasushiobara City			83				100						84	98			58		36				72	56				42				
14	Nakagawa River System			Hokigawa River	Sekiba Bridge	Nasushiobara City			126				101				76			81			82		193				111		64			67			88	
15	Nakagawa River System			Hokigawa River	Iwai Bridge	Otawara City			16				50				66			79			62		93			55			53			51			19	
16	Nakagawa River System			Hokigawa River	Hokigawa Bridge	Otawara City			165				89				30 72		54 34	52			52		53			17	21	46	18	11		36			25	
17	Nakagawa River System			Nakagawa River	Shinnaka Bridge	Nakagawa Town			40				14				51 31		30 107	38			56		16			33	19	14	57	0		94			18	
18	Nakagawa River System			Mumogawa River	Kosei Bridge	Nakagawa Town			28				26				12 12	14	14	34			43		30			31	22	20	19	16		14			15	
19	Nakagawa River System			Arakawa River	Saikachi Bridge	Shioya Town			198				300				300			1,020			102		168			191			176			217			201	
20	Nakagawa River System			Arakawa River	Renjo Bridge	Sakura City			0				33				32			44			15		33			63			0			12			14	
21	Nakagawa River System			Uchikawa River	Tanaka Bridge	Yaita City			1,440				130				78			127			122		143			85			195			103			72	
22	Nakagawa River System			Uchikawa River	Asahi Bridge	Sakura City			18				77				82			114			101		82			94			100			72			68	
23	Nakagawa River System			Arakawa River	Mukada Bridge	Nasu Karasuyama City			90				740				11 12	49	30	84			75		99			84	27	30	85	58		19			35	
24	Nakagawa River System			Egawa River	Tributary	Nasu Karasuyama City			162				130				58 85	52	51	58			66		63			45	18	84	24	20		480			440	
25	Tonegawa River System	Kinugawa River System		Kinugawa River	Kawaji Daiichi Power Station, front	Nikko City			19				40						36	75			19		45				38		33			71			17	
26	Tonegawa River System	Kinugawa River System		Yunishi River	Maesawa Bridge	Nikko City			25										10	0					0				13		0			0			12	
27	Tonegawa River System	Kinugawa River System		Ojika River	Tributary	Nikko City			37				32						36	18			16		15				14		240			17			35	
28	Tonegawa River System	Kinugawa River System		Kinugawa River	Kosagoe	Nikko City			55				63						800	780					690				35		59			47			23	
29	Tonegawa River System	Kinugawa River System		Itaana River	Tributary	Nikko City			4,900				290				120		146	113	91	91	86						75 81	94	86	43		73				
30	Tonegawa River System	Kinugawa River System		Yukawa River	Tributary	Nikko City			118										63	60			114		72				0		0			11			137	
31	Tonegawa River System	Kinugawa River System		Daiya River	Shinkyo Bridge	Nikko City			47				123				58			37			54		38				75		21			33			15	
32	Tonegawa River System	Kinugawa River System		Shidobuchi River	Sujichigai Bridge	Nikko City			260				400				270			245			203		226				212		182			123			162	
33	Tonegawa River System	Kinugawa River System		Daiya River	Kaishin Bridge (Harigai)	Nikko City			13				45				45		24	69	15	0	57		13				16 15	0	15	11		18			12	
34	Tonegawa River System	Kinugawa River System		Kinugawa River	Sanuki	Shioya Town			20				177				11		29	109	18	12	74		42				470 134	154	310		17	274			97	
35	Tonegawa River System	Kinugawa River System		Nishi-Kinugawa River	Nishi-Kinugawa Bridge	Utsunomiya City			1,520				2,290				126			65			45		360			56			0			31			1,540	
36	Tonegawa River System	Kinugawa River System		Kinugawa River	Kinugawabashi Bridge(Hoshakuji Temple)	Utsunomiya City			28				0				10			24			20		14			31			0			0			0	
37	Tonegawa River System	Kinugawa River System		Kinugawa River	Daidoizumi Bridge	Mooka City			0				12				24			30			42		51			0			10			11			0	
38	Tonegawa River System	Kinugawa River System		Egawa River	Tributary	Shimotsuke City			175				550				137 214	56	62	58			49		88			41	30	34	17	480		70			51	
39	Tonegawa River System	Kinugawa River System		Akabori River	Nikko City Hall, front	Nikko City			510				800				450			1,780			500		450				310		420			370			650	
40	Tonegawa River System	Kinugawa River System		Akabori River	Kiwadajima	Nikko City			117				125				104			93			40		380				187		78			61			69	
41	Tonegawa River System	Kinugawa River System		Tagawa River	Ozobashi Bridge	Utsunomiya City			62				57				28 69	104	28	101			142		150			64	23	18	13	36		17			35	
42	Tonegawa River System	Kinugawa River System		Kamagawa River	Tsukushi Bridge	Utsunomiya City			182				65				99			78			68		123			133			27			50			169	
43	Tonegawa River System	Kinugawa River System		Tagawa River	Meiji Bridge	Kaminokawa Town			10				10				122			101			18		29			32			31			76			41	
44	Tonegawa River System	Kinugawa River System		Tagawa River	Yanabashi Bridge	Oyama City			360				223				86			128			73		69			66			43			104			96	
45	Tonegawa River System	Watarase River Area	Omoi River Area	Kurokawa River	Kaijima Bridge	Kanuma City			109				93				11			46			30		0			19			0			15			0	
46	Tonegawa River System	Watarase River Area	Omoi River Area	Kurokawa River	Onari Bridge	Mibu Town			56				38				75			32			15		0			13			0			0			17	
47	Tonegawa River System	Watarase River Area	Omoi River Area	Oashi River	Akaishi Bridge	Kanuma City			10				14				15			0			11		11			0			0			0			0	
48	Tonegawa River System	Watarase River Area	Omoi River Area	Koyabu River	Koyabu Bridge	Kanuma City			940				860				42			65			56		65			46			36			49			420	
49	Tonegawa River System	Watarase River Area	Omoi River Area	Omoi River	Tamotsu Bridge	Tochigi City			30				66				12			79			10		0				0		119			0			0	
50	Tonegawa River System	Watarase River Area	Omoi River Area	Omoi River	Otome-ohashi Bridge	Oyama City			186				40				154 34	106	27	191			46		0			62	13	15	101		53	0			0	
51	Tonegawa River System	Watarase River Area	Uzuma River Area	Uzuma River	Uzuma Bridge	Tochigi City			95				0				82 135	89	89	34			52		56			192	530	460	44	186		26			50	
52	Tonegawa River System	Watarase River Area	Watarase River Area	Watarase River	Watarasegawa River intake weir at Sori Power Station	Nikko City			63				34				36	20	38	55	53		34		27			18	19	32	54		20	15			21	
53	Tonegawa River System	Watarase River Area	Watarase River Area	Watarase River	Hajika Bridge	Ashikaga City			26				48				34			80			36		46			59			28			16			15	
54	Tonegawa River System	Watarase River Area	Watarase River Area	Watarase River	Nakabashi Bridge	Ashikaga City			71				300				37			22			12		53			0			0			0			0	
55	Tonegawa River System	Watarase River Area	Watarase River Area	Watarase River	Watarase-ohashi Bridge	Tatebayashi City			128				30				260			67			310		228			21			112			0			160	
56	Tonegawa River System	Watarase River Area	Watarase River Area	Watarase River	Shinkai Bridge	Tochigi City			48				57				43 164	127	46	45			40		36			29	34	30	16	13		19			22	

Total number of samples	1,213	Detection times	1,061

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-14 Detection of radioactive cesium at respective locations
(Tochigi Prefecture: river sediments) (No.2)

No.	Water area				Location	Municipality	FY2014 4	5	6	7	8	9	10	11	12	1	2	3	FY2015 4	5	6	7	8	9	10	11	12	1	2	3	Changes	Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
1				Nakagawa River	Ikuyobashishita	Nasushiobara City			18		26			12						11			15			0			21			12	1	1.01	Decreasing
2					Komei Bridge			24			24			45			19			17			21			11			16			16	2	0.99	Decreasing
3				Takaomata River	Takaomata Bridge	Nasu Town		52			20			25			191			47			82			31			41			50	3	1.59	Decreasing
4				Yukawa River	Yukawa Bridge			62			49			25			43			30			15			17			64			32	4	0.83	Decreasing
5				Nakagawa River	Kamikuroiso	Nasushiobara City/Nasumachi		102	58	83	45	90		44			24			47	131	32	59	66		24			29			55	5	0.50	Unchanged
6				Yosasa River	Yosasa Bridge	Nasu Town		24			430			55			820			19			17			19			17			18	6	1.51	Varying
7				Kurokawa River	Shinden Bridge			68			90			62			77			75			60			35			30			50	7	0.95	Decreasing
8				Yosasa River	Kawada Bridge	Otawara City		75	134	152	146	206		61			137			36	54	123	82	68		71			80			73	8	0.79	Decreasing
9				Nakagawa River	Kurobane			26	38	63	23	31		19			25			23	15	18	21	29		23			19			21	9	0.53	Decreasing
10				Matsuba River	Tributary			19	73	61	59	80		96			79			30	24	165	29	40		30			27			49	10	1.30	Decreasing
11				Sabigawa River	Udagawa Bridge				66		212			67			46			14			30			23			24			23	11	1.04	Decreasing
12	Nakagawa River System			Momura River	Momuranaka Bridge				83			110		106			125			21			35			82			77			54	12	0.58	Decreasing
13				Hokigawa River	Yunohara	Nasushiobara City			12		16			11							0		32			24			32			22	13	0.69	Decreasing
14					Sekiba Bridge				60		410			75			106			74			49			39			34			49	14	0.83	Varying
15					Iwai Bridge	Otawara City			14			204		12			15			18			23			13			17			18	15	0.98	Varying
16					Hokigawa Bridge			11	17	22	15	24		11			17			0	13	45	12	10		13			14			15	16	0.97	Decreasing
17				Nakagawa River	Shinnaka Bridge	Nakagawa Town		19	17	19	15	42		15			12			12	15	16	13	11		12			10			13	17	0.87	Decreasing
18				Mumogawa River	Kosei Bridge			16	11	18	0	20		16			15			13	0	17	0	14		14			12			10	18	0.55	Decreasing
19				Arakawa River	Saikachi Bridge	Shioya Town		65			355			125			126			71			55			14			26			42	19	1.09	Decreasing
20					Renjo Bridge	Sakura City		13			0			13			11			0			17			0			0			4.3	20	1.07	Decreasing
21				Uchikawa River	Tanaka Bridge	Yaita City		105			152			63			97			59			32			26			43			40	21	1.87	Decreasing
22					Asahi Bridge	Sakura City		54			279			19			33			35			38			29			32			34	22	0.81	Varying
23				Arakawa River	Mukada Bridge	Nasu Karasuyama City		16	10	20	39	73		12			21			0	15	12	12	12		11			0			8.9	23	2.22	Decreasing
24				Egawa River	Tributary			21	520	36	28	255		20			18			14	16	12	21	0		12			105			26	24	1.45	Varying
25				Kinugawa River	Kawaji Daiichi Power Station, front	Nikko City		21			13			17			13			18			0			24			16			15	25	0.69	Decreasing
26				Yunishi River	Maesawa Bridge			0			11			21						0			14			0			13			6.8	26	1.08	Varying
27				Ojika River	Tributary			11			14			20			11			0			21			0			0			5.3	27	1.80	Varying
28				Kinugawa River	Kosagoe			66			73			118			36			33			95			14			16			40	28	1.58	Varying
29				Itaana River	Tributary			62	41	72	53	75		55			47			62	63	41	34	23		25			116			52	29	3.62	Decreasing
30				Yukawa River	Tributary			0			10			0							0		0			17			0			4.3	30	1.31	Decreasing
31				Daiya River	Shinkyo Bridge			12			20			17			20			14			15			11			13			13	31	0.83	Decreasing
32				Shidobuchi River	Sujichigai Bridge				189		150			108			67			95			81			146			100			106	32	0.47	Decreasing
33				Daiya River	Kaishin Bridge (Harigai)				24 / 11	13	0	12		0			0			19	11	18	15	11		0			20			13	33	0.95	Decreasing
34				Kinugawa River	Sanuki	Shioya Town			14 / 0	0	0	20		0			19			13	0	25	12	0		17			19			12	34	1.59	Varying
35		Kinugawa River System		Nishi-Kinugawa River	Nishi-Kinugawa Bridge	Utsunomiya City			32		69			108			18			14			25			196			149			96	35	1.82	Decreasing
36				Kinugawa River	Kinugawabashi Bridge(Hoshakuji Temple)				0		13			0			0				0		0			12			15			6.8	36	1.17	Varying
37					Daidoizumi Bridge	Mooka City			22		95			43			0				0		0			11			13			6.0	37	1.23	Varying
38				Egawa River	Tributary	Shimotsuke City		38	46	13	20	0		19			11			21	45	18	40	31		40			17			30	38	1.54	Decreasing
39				Akabori River	Nikko City Hall, front	Nikko City		191			150			293			117			1,010			262			72			64			352	39	0.88	Decreasing
40	Tonegawa River System				Kiwadajima			48			41			26			25			23			29			102			20			44	40	0.99	Decreasing
41				Tagawa River	Ozobashi Bridge	Utsunomiya City		20	12	27	12	13		14			16			10	14	14	12	0		11			11			10	41	1.04	Decreasing
42				Kamagawa River	Tsukushi Bridge			81			107			56			40			35			25			14			18			23	42	0.66	Decreasing
43				Tagawa River	Meiji Bridge	Kaminokawa Town		0			17			14			0			0			0			0			19			4.8	43	1.24	Decreasing
44					Yanabashi Bridge	Oyama City		42			57			74			27			51			63			12			22			37	44	0.93	Decreasing
45				Kurokawa River	Kaijima Bridge	Kanuma City		10			14			0			0			0			0			0			0			0	45	1.68	Decreasing
46					Onari Bridge	Mibu Town			0		0			0			0			0			0			0			0			0	46	1.64	Decreasing
47			Omoi River Area	Oashi River	Akaishi Bridge	Kanuma City		0			0			18			0			0			0			10			0			2.5	47	1.34	Varying
48				Koyabu River	Koyabu Bridge			60			29			19			18			19			13			14			13			15	48	1.87	Decreasing
49				Omoi River	Tamotsu Bridge	Tochigi City			0		0			0			0			0			0			0			0			0	49	1.97	Varying
50					Otome-ohashi Bridge	Oyama City		15	43	65	540	0		0			0			19	0	14	0	0		0			0			4.7	50	1.85	Varying
51		Watarase River Area	Uzuma River Area	Uzuma River	Uzuma Bridge	Tochigi City		195	0	115	82	69		157			116				163 / 195	0	0	67		98			13			77	51	1.07	Varying
52					Watarasegawa River intake weir at Sori Power Station	Nikko City		15	90	18	15	13		18			28			11	13	13	23	23		15			0			14	52	0.68	Decreasing
53					Hajika Bridge	Ashikaga City		0			15			0			14				0		0			0			21			5.3	53	0.94	Decreasing
54			Watarase River Area	Watarase River	Nakabashi Bridge				10		0			0			0				0		0			0			0			0	54	2.53	Decreasing
55					Watarase-ohashi Bridge	Tatebayashi City			0		59			12			0				295		14			10			0			80	55	1.16	Varying
56					Shinkai Bridge	Tochigi City			17 / 11	77	16	24			18		11				0 / 12	0	0	42		0			17			10	56	1.06	Decreasing
																										A	B	C	D	E		32	Average		

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2) — Decreasing / Increasing / Unchanged / Varying

6) Gunma Prefecture

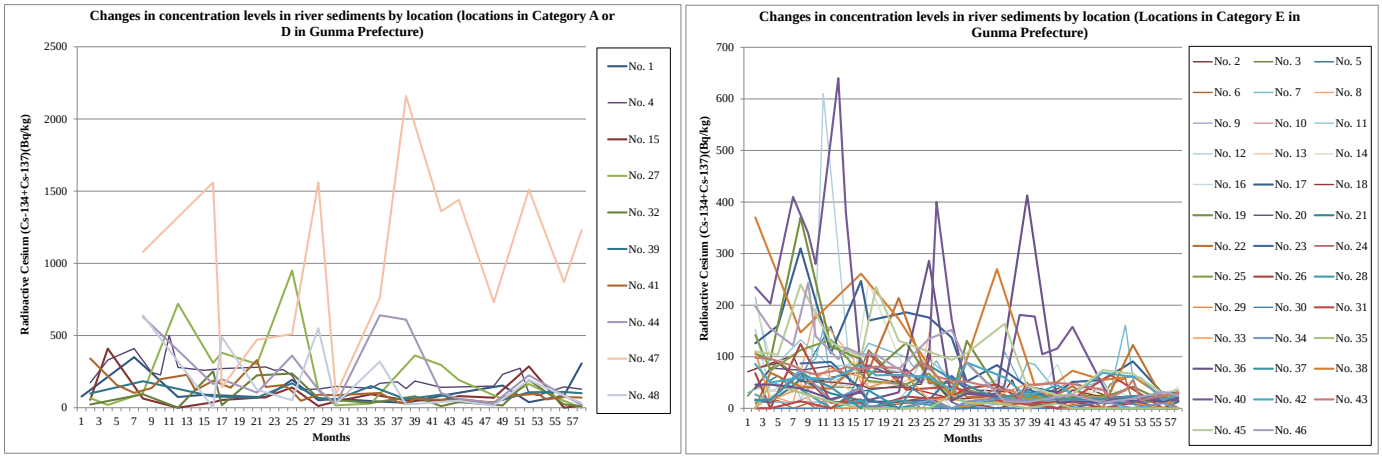
In Gunma Prefecture, surveys were conducted 10 to 30 times from November 2011 to January 2016 at 48 locations (rivers) in public water areas (this analysis excludes the survey results at eight locations where the survey was conducted only in 2011).

Regarding concentration levels of detected values, one location was categorized into Category A, nine locations into Category D, and 38 locations into Category E (see Table 4.3-15 and Table 4.3-16).

Concentration levels were generally decreasing at 31 locations, were unchanged at one location and fluctuating at 16 locations.

Table 4.3-15 Categorization of detected values at respective locations
(Gunma Prefecture: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	1	No.47
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	0	(None)
D	Upper 25 to 50 percentile	9	No.1、No.4、No.15、No.27、No.32、No.39、No.41、No.44、No.48
E	Upper 50 to 100 percentile(lower 50%)	38	No.2、No.3、No.5、No.6、No.7、No.8、No.9、No.10、No.11、No.12、No.13、No.14、No.16、No.17、No.18、No.19、No.20、No.21、No.22、No.23、No.24、No.25、No.26、No.28、No.29、No.30、No.31、No.33、No.34、No.35、No.36、No.37、No.38、No.40、No.42、No.43、No.45、No.46



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-9 Changes in concentration levels over the years at respective locations
(Gunma Prefecture: river sediments)

Table 4.3-16 Detection of radioactive cesium at respective locations

(Gunma Prefecture: river sediments) (No.1)

Location						River sediments/Radioactive Cesium (Cs-134＋Cs-137)/Concentration(Bq/kg)(*1)																																			
No.	Water area			Location	Municipality	FY2011								FY2012														FY2013												
						8	9	10	11	12	1	2	3	4	5	6	7	8		9	10		11	12	1	2	3	4	5	6		7	8	9	10	11	12	1	2	3
1	Tonegawa River System	Tonegawa River Area	Tonegawa River	Hirose Bridge	Minakami Town				77						350					74			90							72			194			52		61		
2				Tsukiyono Bridge					71			87			102		37	55	54	60			68		71					70	46	47	115	40		60		36		
3			Akaya River	Kosode Bridge					24				92		68					42			40		113					39			60			13		90		
4			Sakura River	In Ooaza Yachi	Kawaba Village					173		330			410		244	227	500	279			259		271					282	260	263	222	126		129		147		
5			Katashina River	Kirinoki Bridge	Katashina Village					38			63		38					159			31							46			17			17		34		
6				Tonemachitakatoya	Numata City					10			15		0		10	0	15	0			0							10	10	0	0	0		0		0		
7				Futae Bridge					30			51			39		86	96	154	47			74		126					99	80	95	74	92		39		34		
8			Agatsuma River	Shinto Bridge	Naganohara Town					0		24			11			187					95		0					0			0			0		0		
9			Shirasuna River	Shuttatsu Bridge	Nakanojo Town					12										12										0			12			0		0		
10			Agatsuma River	Downstream of Azuma Bridge	Higashi-Agatsuma Town					0		0			11		22	0	14	14			10		0				0	0		0	12	0		0		0		
11			Nakuta River	Tonoda Bridge	Takayama Village					215		73				133				81			85		83					68			93			60		38		
12			Agatsuma River	Agatsuma Bridge	Shibukawa City					153		33			53	19	37	170	610				0		11				16	34		95	51	56		46		10		
13			Tonegawa River	Taisho Bridge						39		34			31	49	15	56	69				30		50				46	54		65	147	16		15		20		
14			Takizawa River	Shintakizawa Bridge	Shibukawa City/Yoshioka Town					206		97				80				50			48		245					65			48			24		39		
15			Tonegawa River	Gunma-ohashi Bridge	Maebashi City					55		410				64				0				37	53					73			140			12		43		
16				Fukushima Bridge	Tamamura Town					112		23				44				43				46	39					64			56			0		0		
17		Karasu River Area	Nagai River	Kamigonda Bridge	Takasaki City					126			160			310				107				247	170					186			176			137		52		
18			Karasu River	Karasugawa Bridge						77			88			52				51				45	39					41			30			19		19		
19			Usui River	Nakase Bridge	Annaka City					106		94				370				120				95	63					127			57			19		131		
20				Hanataka Bridge	Takasaki City					38		78				74				82				40	61					47			68			12		0		
21			Kabura River	Tadakawa Bridge	Shimonita Town					17		11				56				29				15	17				0				13			0		0		
22				Kaburagawa Bridge	Takasaki City/Fujioka City					0		69				42				38				91	73				214				49			50		22		
23			Ogawa River	Kinzan Bridge	Kanra Town											87				90				36	13				13				16			63		36		
24			Nanmoku River	Ozawa Bridge	Nanmoku Village											68				10				18	0				13				21			0		11		
25			Someya River	Yakushi Bridge	Shinto Village					142		73				113				133				67	53					47			67			24		35		
26			Inogawa River	Kamakura Bridge	Takasaki City					68		0				125				12				11	0					23			19			23		39		
27			Karasu River	Iwakura Bridge	Takasaki City/Tamamura Town					67		19				101				720				310	380				302				950			122		16		
28			Kanna River	Shinkaname Bridge	Ueno Village											37				0				16	0				16							0				
29			Kanna River	Morito Bridge	Kanna Town					0		0				0				0				0	0				0							0				
30			Kanna River	Tobukyo Bridge	Fujioka City/Kamikawa Town					0		0				0				0				43	0				0							0				
31			Kanna River	Kannagawa Bridge	Kamisato Town					0		0				14				0				36	107					36						42				
32		Tonegawa River Area	Tonegawa River	Bando-ohashi Bridge	Honjo City					22		46				93				0				252	17				224				237			66		53		
33			Akagishirakawa River	In Shimohosoi Town	Maebashi City					108		15				40				78				61	41					63			17			18		13		
34			Momonoki River	Utsuboi Bridge						27		15				75				14				41	0					0			16			0		13		
35			Arato River	Okuhara Bridge						0		48								13				0	0					0			0			26		10		
36			Kasukawa River	Hozumi Bridge	Isesaki City					46		46				39				18				31	16				31				286			15		29		
37			Hirose River	Nakajima Bridge						15		17				68				41				0	35				0				83			57		45		
38			Hayakawa River	Hayakawa Bridge						370						147								261					173				82			25		95		
39				Maejima Bridge	Ota City					99						183								77					70				169			67		56		
40			Tonegawa River	Tone-ozeki Weir	Chiyoda Town /Gyoda City					235		203			410		340	280			640	380		72	83				59	75		50	95	400		172		28		
41		Watarase River Area	Koguro River	Kayano Bridge	Kiryu City					340			158		103		136	198			228	120		187		139			330	143		157	113	48		90		87		
42			Watarase River	Takatsudo	Midori City					86		50				60				56				84		64			65				61			36		89		
43				Intake for Akaiwayosui water channel	Kiryu City					98		96			82		69	66			74	80		76		81			78	65		90	78	62		53		52		
44			Tatara River	Ejiri Bridge	Oura Town											630								164	197				104				360			126		26		
45			Kiryu River	Kannon Bridge	Kiryu City					110			104			240				128				100		235			131				110			94		107		
46				Sakai Bridge	Kiryu City/Ashikaga City					198		155			122		243	140			95	118		105		104			76				135			152		88		
47			Tsuruuda River	Lake Jonuma	Tatebayashi City											1080								1560	141				470				510			1560		92		
48			Yatagawa River	Togoda Bridge	Meiwa Town/Itakura Town											640								0	490				124				52			550		28		

Total number of samples	214	Detection times	161

*1: Blank cells are locations where samples were not collected. The result “Not detectable” is indicated as “0.”

Table 4.3-16 Detection of radioactive cesium at respective locations

(Gunma Prefecture: river sediments) (No.2)

Location					River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																									Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
No.	Water area		Location	Municipality	FY2014												FY2015												Changes				
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Tonegawa River System	Tonegawa River Area	Tonegawa River	Hirose Bridge			42		34			83							154		38			84		307				146	1	0.85	
2				Tsukiyono Bridge	Minakami Town			33	55	25	50	23		38		51			27	15	18	18	15		19		22				19	2	0.54	
3			Akaya River	Kosode Bridge				16		17				19		24			25			11			13		13				16	3	0.79	
4			Sakura River	In Ooaza Yachi	Kawaba Village		135	169	179	132	185		141						150	231	273	100	85		144		128				159	4	0.44	
5			Katashina River	Kirinoki Bridge	Katashina Village		15			13			17						18			15			14		17				16	5	1.05	
6				Tonemachitakatoya	Numata City		42	0	0	0	0		0						21	47	58	10	0		0		0				19	6	1.76	
7				Futae Bridge			54	110	53	89	85		30		36				53	31	161	59	19		18		24				52	7	0.56	
8			Agatsuma River	Shinto Bridge	Naganohara Town			38		27			0		10				0			10			0		20				7.5	8	2.01	
9			Shirasuna River	Shuttatsu Bridge	Nakanojo Town			10		0			0		0				0			0			0		19				4.8	9	1.45	
10			Agatsuma River	Downstream of Azuma Bridge	Higashi-Agatsuma Town		0	0	0	0	11		0		0				0	0	0	0	0		0		0				0	10	1.94	
11			Nakuta River	Tonoda Bridge	Takayama Village			19		15			17		21				19			17			20		25				20	11	0.87	
12			Agatsuma River	Agatsuma Bridge	Shibukawa City		0	26	11	11	0		13		17				0	0	0	0	12		0		0				1.7	12	2.30	
13			Tonegawa River	Taisho Bridge			25	20	14	12	15		35		53				12	11	15	14	0		12		16				11	13	0.86	
14			Takizawa River	Shintakizawa Bridge	Shibukawa City/Yoshioka Town		23			15			24		22				42			20			18		42				31	14	1.04	
15			Tonegawa River	Gunma-ohashi Bridge	Maebashi City		93			52			50		80				69			286			0		14				92	15	1.22	
16				Fukushima Bridge	Tamamura Town		57			0			85		16				37			11			0		35				21	16	0.84	
17		Karasu River Area	Nagai River	Kamigonda Bridge	Takasaki City		84			42			31		51				55			91			28		31				51	17	0.70	
18			Karasu River	Karasugawa Bridge				26		13			11		35				22			23			11		0				14	18	0.69	
19			Usui River	Nakase Bridge	Annaka City			17		27			26		22				20			42			14		13				22	19	1.12	
20				Hanataka Bridge	Takasaki City		0			0			13		0				13			15			0		12				10	20	0.99	
21			Kabura River	Tadakawa Bridge	Shimonita Town		17			12			0		0				0			0			0		0				0	21	1.39	
22				Kaburagawa Bridge	Takasaki City/Fujioka City		24			23			27		43				0			123			17		0				35	22	1.04	
23			Ogawa River	Kinzan Bridge	Kanra Town			13		37			18		18				10			11			23		13				14	23	0.85	
24			Nanmoku River	Ozawa Bridge	Nanmoku Village		0			13			0		0				0			0			0		0				0	24	1.79	
25			Someya River	Yakushi Bridge	Shinto Village		23			20			20		17				23			19			29		21				23	25	0.79	
26			Inogawa River	Kamakura Bridge	Takasaki City		46			10			12		14				0			11			0		0				2.8	26	1.36	
27			Karasu River	Iwakura Bridge	Takasaki City/Tamamura Town		29				362		296		192					60		164			48		0				68	27	1.12	
28			Kanna River	Shinkaname Bridge	Ueno Village		17						0						0						0						0	28	1.47	
29			Kanna River	Morito Bridge	Kanna Town		13						0						0						0						0	29	3.46	
30			Kanna River	Tobukyo Bridge	Fujioka City/Kamikawa Town		0						0							14					0						7.0	30	2.67	
31			Kanna River	Kannagawa Bridge	Kamisato Town		16						0							65					0						33	31	1.26	
32		Tonegawa River Area	Tonegawa River	Bando-ohashi Bridge	Honjo City		33				79		11		39					16		192			23		10				60	32	1.09	
33			Akagishirakawa River	In Shimohosoi Town	Maebashi City		25			47			15		10				20			11			0		32				16	33	0.83	
34			Momonoki River	Utsuboi Bridge			19			16			17		15				14			0			10		0				6.0	34	1.12	
35			Arato River	Okuhara Bridge			10			0			10		0				0			0			0		0				0	35	1.87	
36			Kasukawa River	Hozumi Bridge	Isesaki City		28			413			11		13				12			23			13		20				17	36	1.78	
37			Hirose River	Nakajima Bridge			19			32			17		18				18			24			21		15				20	37	0.76	
38			Hayakawa River	Hayakawa Bridge			270				45		51		73				55			62			22		30				42	38	0.90	
39				Maejima Bridge	Ota City		150			58			91		44				36			107			109		100				88	39	0.47	
40			Tonegawa River	Tone-ozeki Weir	Chiyoda Town /Gyoda City		23	45	181		178	105	116		158					16	18	16	11	18	19		16				16	40	1.05	
41		Watarase River Area	Koguro River	Kayano Bridge	Kiryu City			102	72	41	26	61		56		57			36	76	87		97	57	74		70				71	41	0.67	
42			Watarase River	Takatsudo	Midori City			60			23			45		27			69				59		16		27				43	42	0.40	
43				Intake for Akaiwayosui water channel	Kiryu City			35	35	20	46	46		49		47			36	22	35	55	15		26		29				31	43	0.42	
44			Tatara River	Ejiri Bridge	Oura Town			640		610			101		64				31			225			86		19				90	44	1.00	
45			Kiryu River	Kannon Bridge	Kiryu City			164		43			25		27				74			67			29		36				52	45	0.63	
46				Sakai Bridge	Kiryu City/Ashikaga City			14		12			22		26				11			19			32		25				22	46	0.74	
47			Tsuruuda River	Lake Jonuma	Tatebayashi City			760		2160			1360		1440				730			1510			870		1230				1,085	47	0.57	
48			Yatagawa River	Togoda Bridge	Meiwa Town/Itakura Town			320		22			40		48				14			192			82		33				80	48	1.24	

A	B	C	D	E

55 Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2)

Decreasing Increasing Unchanged Varying

7) Chiba and Saitama Prefectures and Tokyo Metropolis

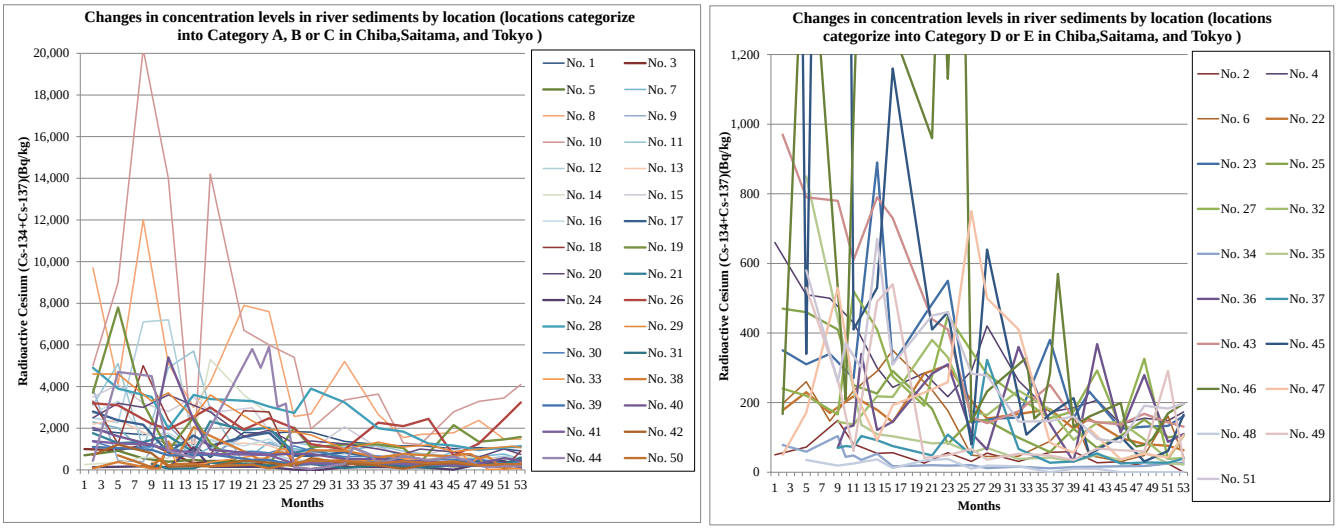
In Chiba and Saitama Prefectures and Tokyo Metropolis, surveys were conducted 16 to 29 times from October 2011 to January 2016 at 51 locations (rivers) in public water areas (47 locations in Chiba Prefecture, two locations in Saitama Prefecture, and two locations in Tokyo Metropolis).

Regarding concentration levels of detected values, five locations were categorized into Category A, eight locations into Category B, 19 locations into Category C, 14 locations into Category D, and five locations into Category E (see Table 4.3-17 and Table 4.3-18).

Concentration levels were generally decreasing at 40 locations, were unchanged at three locations and fluctuating at eight locations.

Table 4.3-17 Categorization of detected values at respective locations
(Chiba and Saitama Prefectures and Tokyo Metropolis: river sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	5	No.8、No.10、No.19、No.26、No.28
B	Upper 5 to 10 percentile	8	No.1、No.7、No.11、No.12、No.13、No.15、No.20、No.29
C	Upper 10 to 25 percentile	19	No.3、No.5、No.9、No.14、No.16、No.17、No.18、No.21、No.24、No.30、No.31、No.33、No.38、No.39、No.40、No.41、No.42、No.44、No.50
D	Upper 25 to 50 percentile	14	No.4、No.6、No.22、No.23、No.25、No.27、No.32、No.36、No.43、No.45、No.46、No.47、No.49、No.51
E	Upper 50 to 100 percentile(lower 50%)	5	No.2、No.34、No.35、No.37、No.48



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-10 Changes in concentration levels over the years at respective locations
(Chiba and Saitama Prefectures and Tokyo Metropolis: river sediments)

Table 4.3-18 Detection of radioactive cesium at respective locations

(Chiba and Saitama Prefectures and Tokyo Metropolis: river sediments) (No.1)

Location						River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																													
No.	Prefecture	Water area		Location	Municipality	FY2011									FY2012												FY2013								
						8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Chiba Prefecture	Tonegawa River System	Shogen River	Fukama-ohashi Bridge	Inzai City /Sakae Town				1,910			1,780				1,660		1,190			1,200		590				1,800			1,750			1,840		1,810		
2				Shinbei Bridge				50				72				149		81			54		56				26			56			31		55		
3			Nagato River	Intake at Maeshinden Water Purification Plant	Sakae Town			1,000				950				1,230		850			310		430				420			210			320		420		
4				Nagato Bridge				660				510			500			430			300		244				285			217			291		420		
5				Fujimi Bridge				700				920			550			390			480		410				390			370			340		370		
6			Ryudai River	Ryumatsuno Bridge	Narita City				197			260			147			234			290		350					236		177			49		45		
7			Nekona River	Shinkawa Floodgate					2,300			2,010			910			1,620			640		1,080					720		1,330			1,020		910		
8		Feeder rivers of Lake Teganuma	Ohori River	Kitakashiwa Bridge	Kashiwa City				9,700			4,100			12,000			5,100			3,000		4,200				7,900			7,600			2,560		2,690		
9			Otsu River	Sanno Bridge, under	Kamagaya City				3,900			440			390			2,140			900		710				1,600			1,250			930		820		
10				Kaminuma Bridge	Kashiwa City				5,000			9,000			20,200			14,000			380		14,200				6,700			6,000			5,400		1,970		
11			Someiriotoshi	Someishinbashi Bridge					3,100			5,100			990			4,900			5,700		2,900				305			430			1,310		1,190		
12			Kanayamaotoshi	Downstream of Karuizawasakai Bridge	Kamagaya City /Shiroi City				2,500			2,260			7,100			7,200			1,300		1,430				920			820			460		460		
13				Nauchi Bridge	Shiroi City				2,200			2,400			1,800			1,270			1,330		1,210				1,280			1,170			750		710		
14			Kamenari River	Kamenari Bridge	Inzai City			256				360			600			560			1,620		5,300				3,600			2,680			162		222		
15		Feeder rivers of Lake Inbanuma	Igusasuiro Channel	Downstream of Igusasuiro Channel	Kamagaya City				3,500			4,100			3,200			2,800			3,500		2,750					2,980		1,890			800		970		
16			Futae River	Tomigaya Bridge	Funabashi City /Shiroi City				2,700			3,300			1,640			1,760			1,150		1,460				1,150			1,480			760		760		
17			Kanzaki River	Kanzaki Bridge	Yachiyo City /Inzai City				2,800			2,380			2,170			830			1,650		1,150				1,590			1,790			680		670		
18			Kanno River	Kanno Bridge	Yachiyo City				3,300			1,250			5,000			2,410			880		730				2,840			2,780			126		58		
19			Inba Discharge Channel(Upper reaches)	Yachiyo Bridge					3,700			7,800			3,200			910			2,530		1,280				202			231			2,030		1,080		
20			Teguri River	Mumei Bridge	Sakura City				2,500			3,200			3,000			3,600			3,100		2,780				1,620			1,900			1,280		1,390		
21			Moroto River	Moroto Bridge	Inzai City				1,760			1,290			1,340			1,640			850		2,330				1,910			2,020			810		1,010		
22			Kashima River	Iwatomi Bridge	Sakura City				178			230			170			218			179		144				284			307			205		154		
23			Takasaki River	Ryuto Bridge					350			310			340			270			890		310				450			550			143			154	
24			Kashima River	Kashima Bridge					130			149			173			126			1,080		143					149		127			12			0	
25			Inbasuiro Channel	Tsurumaki Bridge	Inzai City				470			460				410		250			226		291					182		81			150		149		
26		Edogawa River System	Toneunga Canal	Unga Bridge	Nagareyama City/Noda City				3,200			3,100				2,210		1,950			2,550		3,000				1,940			2,480			2,000		1,240		
27			Edogawa River	Nagareyama Bridge	Nagareyama City/Misato City				240			220				166		520			410		275				191			450			348		282		
28			Sakagawa River	Benten Bridge	Matsudo City				4,900			3,900				3,500		1,990			3,600		3,400					3,300		3,040			2,730		3,900		
29			Shinsaka River	Sakane Bridge					4,600			4,600				3,300		3,700			2,520		3,600					2,350		1,950			1,820		1,680		
30			Edogawa River	Shinkatsushika Bridge	Matsudo City/Katsushika City				1,360			1,010				1,120		1,110			740		700					890		820			1,150		920		
31				Ichikawa Bridge	Ichikawa City/Edogawa City											290		64			73		350					258		206			250		287		
32				Vicinity of Keiyo Road												145		137			218		216					380		330			175		164		
33				Gyotokukadozeki Weir (upperreaches)	Ichikawa City											350	420	1,140	300		190		370					660	550	580	960	1,020	420		330		
34				Shingyotokubashi Bridge					78			59				104	44	48	35		53		17					20		19			20		12		
35		Edogawa River System	Kyu-Edogawa River	Edogawa Floodgate, down	Ichikawa City/Edogawa City							850							136		109		103					83		84			56		70		
36				8 km Point to the estuary												71	128	134	340		121		145					283		310			112		65		
37				Imai Bridge												70	75	73	104		92		75					48		108			50		323		
38				Urayasu Bridge	Urayasu City/Edogawa City				75			380				70	71	1,360	580		2,050		1,640					700	380	700	850	810	440		940		
39			Mamagawa River	Nemoto Floodgate	Ichikawa City				1,100			1,050				960		700			700		750					480		480			222		295		
40			Kokubu River	Suwada Bridge					2,020			1,610				1,200		5,400			2,390		970					790		730			770		770		
41			Haruki River	Before the confluence with Kokubu River					1,380			1,270				1,210		930			840		760					730		710			304		309		
42			Hasen-okashiwa River	Downstream of Nakazawashinbashi Bridge	Kamagaya City/Ichikawa City				710			1,220				800		153			189		166				440			350			178		560		
43			Okashiwa River	Sengen Bridge	Ichikawa City				970			790				780		610			790		730					440		410			158		141		
44			Mamagawa River	Mitomae Bridge					430			4,700				4,500		920			580		2,020					5,800	4,900	5,900	3,010	3,180	138		34		
45		Ebigawa River		Yachiyo Bridge	Funabashi City				6,400			340				6,000		410			530		1,160					410		460			80		640		
46		Inba Discharge Channel (lower reaches)		Shinhanamigawa Bridge	Chiba City				167			1,770				530	208	1,020	1,730		2,900		1,270					960	1,640	1,130	1,680	1,590	146		232		
47		Miyako River		Miyako Bridge					50			171				530		241			91		193					238		259			750		500		
48	Saitama Prefecture	Arakawa River System	Arakawa River Middle Reaches	Onari Bridge	Konosu City							35				19		25			37		12				34			38			10		19		
49			Arakawa River Lower Reaches	Sasame Bridge	Toda City							530				266		61			490		540				41			49			67		36		
50	Tokyo Metropolis			Kasai Bridge	Koto City /Edogawa City							700				131	520	217	280		300		175					248		75			316		450		
51			Sumida River	Ryogoku Bridge	Chuo City							580				260	370		300	470	670		310					450		460			283		278		
						Total number of samples		954	Detection times			947																									

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-18 Detection of radioactive cesium at respective locations

(Chiba and Saitama Prefectures and Tokyo Metropolis: river sediments) (No.2)

Location						River sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Average of FY2015 (*2)	No.	Coefficient of variation	Trends(*3)
						FY2014												FY2015												Changes				
No.	Prefecture	Water area		Location	Municipality	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Chiba Prefecture	Tonegawa River System	Shogen River	Fukama-ohashi Bridge	Inzai City /Sakae Town		1,370			1,210			1,150		1,170				1,010			1,070			1,000		910				998	1	0.29	
2				Shinbei Bridge			31			57			59			27			30			18			25		0				18	2	0.66	
3			Nagato River	Intake at Maeshinden Water Purification Plant	Sakae Town		171			229			369			178			431			438			389		411				417	3	0.63	
4				Nagato Bridge			263			173			185			207			138			155			148		173				154	4	0.51	
5				Fujimi Bridge			283			248			255			258			167			206			182		183				185	5	0.52	
6			Ryudai River	Ryumatsuno Bridge	Narita City		46			89			161		48				31			48			161		44				71	6	0.69	
7			Nekona River	Shinkawa Floodgate			920			1,160			580		221				880			640			760		508				697	7	0.52	
8		Feeder rivers of Lake Teganuma	Ohori River	Kitakashiwa Bridge	Kashiwa City		5,200			2,660			1,550		1,700				1,780			2,380			1,480		1,470				1,778	8	0.73	
9			Otsu River	Sanno Bridge, under	Kamagaya City			1,120		610			680		470				385			471			460		432				437	9	0.88	
10				Kaminuma Bridge	Kashiwa City		3,360			3,640			1,290		1,220				2,790			3,290			3,450		4,100				3,408	10	0.90	
11			Someiriotoshi	Someishinbashi Bridge			1,100			1,160			900		790				640			510			510		605				566	11	0.99	
12			Kanayamaotoshi	Downstream of Karuizawasakai Bridge	Kamagaya City /Shiroi City		440			440			440		305				510			469			660		560				550	12	1.35	
13				Nauchi Bridge	Shiroi City		129			510			510		392				590			600			518		534				561	13	0.64	
14			Kamenari River	Kamenari Bridge	Inzai City		265			390			410		419				750			519			363		302				484	14	1.35	
15		Feeder rivers of Lake Inbanuma	Igusasuiro Channel	Downstream of Igusasuiro Channel	Kamagaya City		2,070			1,060			740			750			1,110			920			1,080		1,060				1,043	15	0.59	
16			Futae River	Tomigaya Bridge	Funabashi City /Shiroi City			730		640			600		456				459			510			439		447				464	16	0.72	
17			Kanzaki River	Kanzaki Bridge	Yachiyo City /Inzai City		850			550			458		309				403			411			416		97				332	17	0.75	
18			Kanno River	Kanno Bridge	Yachiyo City		265			620			640		540				198			262			105		900				366	18	1.10	
19			Inba Discharge Channel(Upper reaches)	Yachiyo Bridge			1,220			1,220			1,050		352				2,150			1,350			1,460		1,580				1,635	19	0.95	
20			Teguri River	Mumei Bridge	Sakura City		1,250			1,000			760		1,000				860			610			1,010		740				805	20	0.57	
21			Moroto River	Moroto Bridge	Inzai City		540			420			234		408				354			300			208		511				343	21	0.69	
22			Kashima River	Iwatomi Bridge			167			181			126		153				98			81			76		63				80	22	0.40	
23			Takasaki River	Ryuto Bridge	Sakura City		157			380			155		232				125			131			133		161				138	23	0.67	
24			Kashima River	Kashima Bridge			132			139			120		126				13			266			404		79				191	24	1.29	
25			Inbasuiro Channel	Tsurumaki Bridge	Inzai City		99			58			125			70			104			151			100		107				116	25	0.68	
26		Edogawa River System	Tonenga Canal	Unga Bridge	Nagareyama City/Noda City		980			2,270			2,100			2,450			690			1,260			2,440		3,240				1,908	26	0.35	
27			Edogawa River	Nagareyama Bridge	Nagareyama City/Misato City		216			155			175			292			127			326			38		105				149	27	0.50	
28			Sakagawa River	Benten Bridge	Matsudo City		3,240			2,000			1,840			1,260			1,170			970			1,070		1,140				1,088	28	0.46	
29			Shinsaka River	Sakane Bridge			990			1,330			1,100			1,200			880			1,000				1,140	1,070				1,023	29	0.59	
30			Edogawa River	Shinkatsushika Bridge	Matsudo City/Katsushika City		630			670			570			490			508			510			306		340				416	30	0.39	
31				Ichikawa Bridge	Ichikawa City/Edogawa City		92			219			171			114			231			242			278		580				333	31	0.54	
32				Vicinity of Keiyo Road			235			180			93			142			144			95			38		41				80	32	0.54	
33				Gyotokukadozeki Weir (upperreaches)	Ichikawa City		520	390	500	400	680		540			490			630	790	289	610	21		43		67				350	33	0.56	
34				Shingyotokubashi Bridge			16			11			15			16			17			18			25		27				22	34	0.76	
35			Kyu-Edogawa River	Edogawa Floodgate, down	Ichikawa City/Edogawa City		38			42			31			50			35			57			26		22				35	35	1.78	
36				8 km Point to the estuary			360			139			30			368			114			279			87		110				148	36	0.63	
37				Imai Bridge			67			27			31			54			25			28			27		39				30	37	0.93	
38				Urayasu Bridge	Urayasu City/Edogawa City		920	840	680	590	650		760			700			650	740	760	539	660		29		322				529	38	0.64	
39			Mamagawa River	Nemoto Floodgate	Ichikawa City		279			335			260			255			214			207			232		214				217	39	0.64	
40			Kokubu River	Suwada Bridge			520			530			406			430			304			293			570		437				401	40	1.09	
41			Haruki River	Before the confluence with Kokubu River			306			321			286			277			210			242			198		281				233	41	0.68	
42			Hasen-okashiwa River	Downstream of Nakazawashinbashi Bridge	Kamagaya City/Ichikawa City		323			215			56			277			328			196			261		267				263	42	0.78	
43			Okashiwa River	Sengen Bridge	Ichikawa City		175						156			144			137			168			143		131				145	43	0.75	
44			Mamagawa River	Mitomae Bridge			295	1,060	730	314	411		670			460			640	487	440	196	137		178		176				322	44	1.23	
45		Ebigawa River		Yachiyo Bridge	Funabashi City			108		167			213		52				102			31			61		165				90	45	2.00	
46		Inba Discharge Channel (lower reaches)		Shinhanamigawa Bridge	Chiba City			329 154	174	284	570		131		160				199	96	74	79	95		169		197				130	46	1.09	
47		Miyako River		Miyako Bridge			410			85			56		125				37			53			42		107				60	47	0.93	
48	Saitama Prefecture	Arakawa River System	Arakawa River Middle Reaches	Onari Bridge	Konosu City		17			0			10			10			0			0			0		0				0	48	0.89	
49			Arakawa River Lower Reaches	Sasame Bridge	Toda City		53			48			35			68			63			60			291		31				111	49	1.17	
50	Tokyo Metropolis			Kasai Bridge	Koto City /Edogawa City		430			317			410			330			404			210			279		272				291	50	0.45	
51			Sumida River	Ryogoku Bridge	Chuo City		145			147			160			96			86			191			183		197				164	51	0.56	

A	B	C	D	E	478 Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2)

Decreasing Increasing Unchanged Varying

(2)-2 Lakes

1) Miyagi Prefecture

In Miyagi Prefecture, surveys were conducted 9 to 17 times from October 2011 to December 2015 for lake sediment samples collected at 21 locations.

Regarding concentration levels of detected values, one location was categorized into Category C, three locations were categorized into Category D and 17 locations were categorized into Category E (see Table 4.3-19 and Table 4.3-20).

Concentration levels were generally decreasing at 13 locations, were unchanged at two locations, were fluctuating at five locations, and generally increasing at one location.

Table 4.3-19 Categorization of detected values at respective locations
(Miyagi Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.16
D	Upper 25 to 50 percentile	3	No.9、No.13、No.17
E	Upper 50 to 100 percentile(lower 50%)	17	No.1、No.2、No.3、No.4、No.5、No.6、No.7、No.8、No.10、No.11、No.12、No.14、No.15、No.18、No.19、No.20、No.21

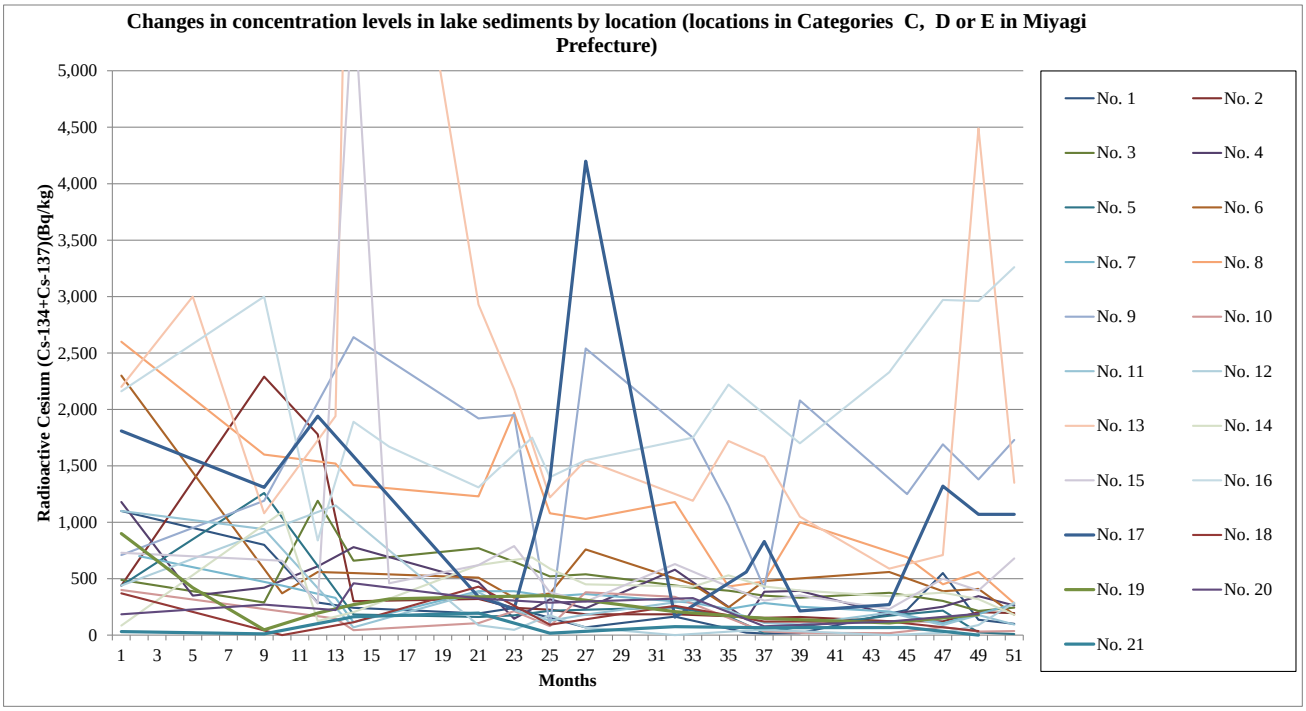


Figure 4.3-11 Changes in concentration levels over the years at respective locations
(Miyagi Prefecture: lake sediments)

Table 4.3-20 Detection of radioactive cesium at respective locations (Miyagi Prefecture: lake sediments)

No.	Water area		Location	Municipality	Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
					FY2011									FY2012												FY2013										
					8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Kitakami River System	Kurikoma Dam	Dam site	Kurihara City			1,100								800			290		242							193		241		154		69			
2		Hanayama Dam	Dam site				440								2,290			1,780		300							320		243		225		184			
3		Narugo Dam	Dam site	Osaki City			490								290			1,190		660							770		650		520		540			
4		Lake Naganuma	Dam site				1,180				350				420			610		780							470		146		318		238			
5		Shukunosawatameike Pond	Pond exit	Kurihara City			440								1,260					183							161		176		216		225			
6	Naruse River System	Futatsuishi Dam	Dam site	Kami Town			2,300									370		560		550							510		331		369		760			
7		Urushizawa Dam	Dam site					700								440			330	115							390		390		343		364			
8		Minamikawa Dam	Dam site	Taiwa Town			2,600								1,600				1,520	1,330							1,230		1,970		1,080		1,030			
9	Sunaoshi River System	Sonoseki Dam	Dam site	Rifu Town			710								1,190					2,640							1,920		1,950		88		2,540			
10	Nanakita River System	Nanakita Dam	Dam site	Sendai City			400								232				148	44							107		213		80		380			
11	Marutazawatameike Pond		Pond exit				1,100								940					69							380		222		129		181			
12	Natori River System	Okura Dam	Dam site				440												1,150								88		47		175		68			
13	Lake Amanuma		Lake exit				2,200				3,000				1,080				1,940	9,700							2,930		2,180		1,220		1,550			
14	Natori River System	Kamafusa Dam	Dam site	Kawasaki Town			85									1,090		126		204							620			690	590		450			
15	Abukuma River System	Kawarago Dam	Dam site	Shiroishi City			730									660		280		5,700		460					620		790		380		297			
16		Shichikashuku Dam	Dam site	Shichikashuku Town			2,160								3,000			840		1,890		1,670					1,310			1,750	1,400		1,550			
17	Lake Bagyunuma		Lake exit	Shiroishi City			1,810								1,310			1,940									340		231		1,380		4,200			
18	Abukuma River System	Murata Dam	Dam site	Murata Town			370									0				115							430				92					
19	Kitakami River System	Lake Izunuma	Lake exit	Tome City			900				420				48			195		270		320					340				350					
20	Natori River System	Tarumizu Dam	Dam site	Natori City			185								270				222	460							326				288					
21	Naruse River System	Miyatoko Dam	Dam site	Taiwa Town			31								12					163							195				18					

Total number of samples	309	Detection times	305

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

No.	Water area		Location	Municipality	Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																						Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
					FY2014										FY2015																
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3						
1	Kitakami River System	Kurikoma Dam	Dam site	Kurihara City		164				23	14		18						224		550		137		100					253	1	1.12	
2		Hanayama Dam	Dam site			185			168		153		161					124			123		204		196					162	2	1.43	
3		Narugo Dam	Dam site	Osaki City			420		394		350		331					375			304		214		244					284	3	0.51	
4		Lake Naganuma	Dam site			580				141	384		392					185			252		346		263					262	4	0.63	
5		Shukunosawatameike Pond	Pond exit	Kurihara City		246			164		19		76					173			218		24		10					106	5	1.26	
6	Naruse River System	Futatsuishi Dam	Dam site	Kami Town			450		245		480							560			390		410		182					386	6	0.89	
7		Urushizawa Dam	Dam site				286		231		284		252					209			105		188		276					195	7	0.46	
8		Minamikawa Dam	Dam site	Taiwa Town		1,180			432		476		1,000						690		451		560		282					496	8	0.58	
9	Sunaoshi River System	Sonoseki Dam	Dam site	Rifu Town			1,750		1,150		415		2,080						1,250		1,690		1,380		1,730					1,513	9	0.48	
10	Nanakita River System	Nanakita Dam	Dam site	Sendai City		340				91	33		20					18			70		32		37					39	10	0.94	
11	Marutazawatameike Pond		Pond exit				313			165	109		94					199			90		179		94					141	11	1.10	
12	Natori River System	Okura Dam	Dam site			0				41	46		35					0			20		89		288					99	12	1.72	
13	Lake Amanuma		Lake exit				1,190		1,720		1,580		1,050					590			710		4,490		1,350					1,785	13	0.95	
14	Natori River System	Kamafusa Dam	Dam site	Kawasaki Town			430		530		431		395					345			377		319		180					305	14	0.58	
15	Abukuma River System	Kawarago Dam	Dam site	Shiroishi City		630			430		306		352					231			500		396		680					452	15	1.61	
16		Shichikashuku Dam	Dam site	Shichikashuku Town			1,750		2,220		1,960		1,700					2,330			2,970		2,960		3,260					2,880	16	0.33	
17	Lake Bagyunuma		Lake exit	Shiroishi City		160				560	830		215					270			1,320		1,070		1,070					933	17	0.93	
18	Abukuma River System	Murata Dam	Dam site	Murata Town		259					121							121					36							79	18	0.87	
19	Kitakami River System	Lake Izunuma	Lake exit	Tome City		208					149							108					181							145	19	0.76	
20	Natori River System	Tarumizu Dam	Dam site	Natori City			329				79							121					190							156	20	0.45	
21	Naruse River System	Miyatoko Dam	Dam site	Taiwa Town		75					66								67				0							34	21	0.97	

A	B	C	D	E

510	Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

2) Fukushima Prefecture

(i) Hamadori

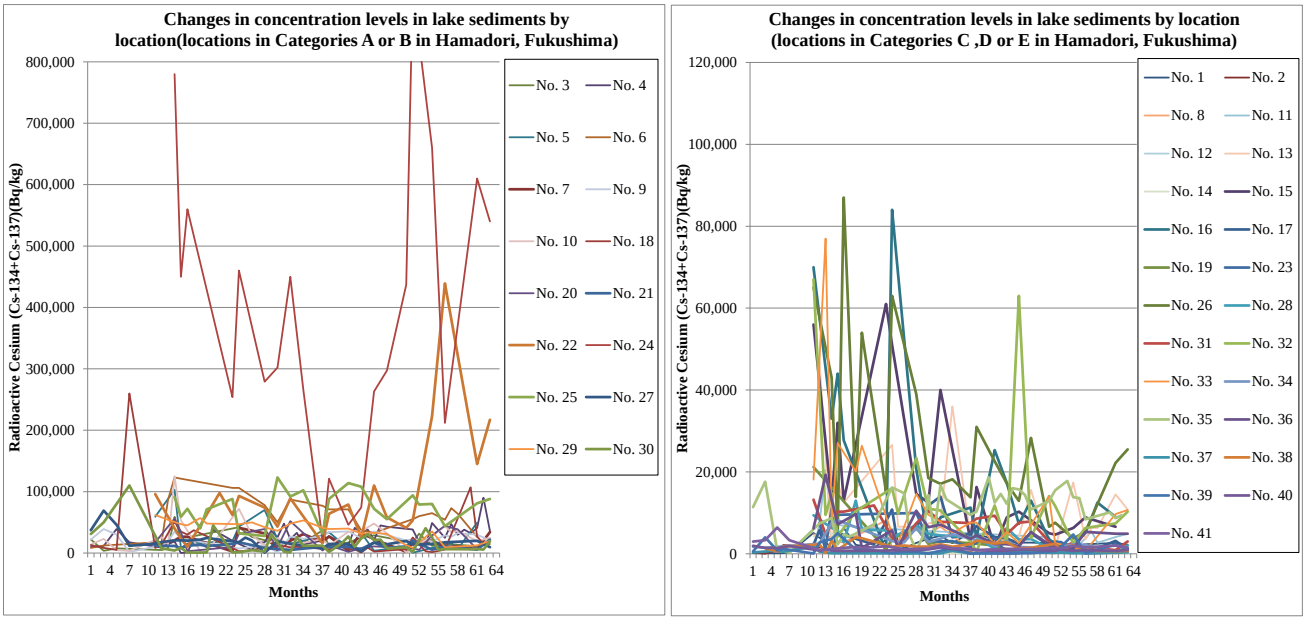
In Hamadori, Fukushima Prefecture, surveys were conducted 13 to 44 times from September 2011 to February 2016 for lake sediment samples collected at 41 locations.

Regarding concentration levels of detected values, eight locations were categorized into Category A, eight locations into Category B, 11 locations into Category C, 10 locations into Category D, and four locations into Category E (see Table 4.3-21 and Table 4.3-22).

Concentration levels were generally decreasing at 22 locations, were unchanged at two locations, fluctuating at 13 locations, and generally increasing at four locations.

Table 4.3-21 Categorization of detected values at respective locations
(Hamadori, Fukushima Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	8	No.4、No.6、No.9、No.10、No.20、No.22、No.24、No.25
B	Upper 5 to 10 percentile	8	No.3、No.5、No.7、No.18、No.21、No.27、No.29、No.30
C	Upper 10 to 25 percentile	11	No.1、No.11、No.13、No.15、No.16、No.26、No.31、No.32、No.33、No.35、No.36
D	Upper 25 to 50 percentile	10	No.8、No.14、No.17、No.23、No.28、No.34、No.38、No.39、No.40、No.41
E	Upper 50 to 100 percentile(lower 50%)	4	No.2、No.12、No.19、No.37



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-12 Changes in concentration levels over the years at respective locations
(Hamadori, Fukushima Prefecture: lake sediments)

Table 4.3-22 Detection of radioactive cesium at respective locations (Hamadori, Fukushima Prefecture: lake sediments) (No.1)

No.	Location: Water area		Location	Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																		
				FY2011								FY2012													FY2013												
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
1	Soso (farm pond)	Takei	Shinchi Town		140		129		154		209				5,100			1,580	4,400	6,300	2,180		1,560			4,300	1,280	2,650		3,700		4,400		2,580		
2		Uchizawa	Soma City		250		45		830	2,140																350	370	530		340		277		254		
3	Matsugabo Dam (Lake Utagawa)				22,000		3,600		7,500							4,900	7,800	59,000	23,400							42,000	26,200	20,900		10,800		15,400		16,800		
4	Mano Dam		Iitate Village		9,900		11,500		39,000		17,400					8,800	14,400	19,000	42	1,270	21,800		9,400	38,000		19,800		5,000	17,500	17,200	36,000	25,500	48,000	22,600	32,800	13,900		
5	Soso (farm pond)	Ainosawa													59,000			103,000	8,100	15,500					19,400	43,000		70,000		22,700		14,200				
6	Ganbe Dam Reservoir				8,200		12,200									18,000	87,000	123,000	121,000						106,000	106,000		78,000		50,000		87,000				
7	Soso (farm pond)	Fugane Dam													12,000			20,500	26,600	26,500					2,540	41,000		32,000		4,100		19,900		30,900		
8		Sasatoge													4,700			4,000	2,900	2,760					8,200	1,030		7,500		5,100		6,600				
9	Takanokura Dam Reservoir		Minamisoma City		22,000		39,000		30,000		1,560					12,400	19,100	35,000	23,600							7,300	9,800	13,200		960		26,800		23,400		
10	Yokokawa Dam Reservoir				13,800		23,000		4,500		3,500					25,900	14,200	125,000	53,000		2,900	2,020				72,000	29,300	12,500		24,300		12,300				
11	Soso (farm pond)	Tarayachi													420	7,600	20,500	7,200				6,400														
12		Takeshiyachi																1,180	1,340	1,240	790					550	1,180		600		410		520		600	
13		Ryugasaku														47,000		1,080	17,400	12,500						26,600	6,600		6,600		7,400		8,000		36,000	
14		Uwatashiro	Kawamata Town												4,200			5,100	690	820					380	1,060			780		311		140			
15		Koakuto	Namie Town												56,000			13,000	32,000	13,000					61,000	51,000			14,600		12,500		40,000			
16		Yosouchi	Iitate Village												70,000			33,000	44,000	27,700					520	84,000			20,700		3,030		8,900			
17		Myobusaku No. 2	Minamisoma City												2,240	5,800	1,180	830	5,100				2,250			10,800	1,750		6,400		11,800		14,000		4,000	
18	Ogaki Dam		Namie Town		13,100		8,400		5,100		260,000				8,200	13,600		51,000	35,000	30,000	37,000				8,100	2,800	4,500	9,300	8,300	13,100	11,000	9,300	10,000			
19	Soso (farm pond)	Uenokawa	Katsurao Village												21,200										1,100	3,600		6,400		2,420		3,050				
20		Heigoiri	Iitate Village												17,600			56,000	34,000	2,790					9,900	31,000		39,000		9,400		52,000				
21		Mekurasawa No. 2	Namie Town												11,700			11,400	7,900	12,100	13,200	11,500			14,800	17,400		8,300		6,300		5,200				
22		Joroku													96,000			40,000	23,800	10,000			98,000		62,000	93,000		74,000		43,000		89,000				
23	Furumichigawa Power Plant Dam		Tamura City													7,600	1,580	11,000	9,500						9,800		9,900	10,000		3,200		2,980		3,100		
24	Soso(farm pond)	Sawairi No. 1	Futaba Town															780,000	450,000	560,000					254,000	460,000		279,000		302,000		450,000		266,000		
25		Suzunai No. 4	Okuma Town															91,000	59,000	72,000	40,000	71,000			88,000	32,000		27,700		123,000		92,000		102,000		
26		Nishihaguro	Futaba Town												65,000			43,000	5,200	87,000	13,900	54,000			15,100	63,000		39,000		18,500		17,100		18,200		
27	Sakashita Dam		Okuma Town		37,000		69,000		46,000		11,800				15,100	17,600		20,600	20,700	20,100	21,900	24,600			17,700	25,000	20,700	350		18,800		15,300				
28	Soso (farm pond)	Atamamori 2													9,400			6,300	5,700	2,790	13,000	5,900			5,700	3,900		7,000		4,900		4,500				
29		Yonomori	Tomioka Town												62,000		54,000		47,000	45,000	57,000	48,000				47,000	50,000	42,000		36,000		48,000		53,000		
30	Takikawa Dam		Kawauchi Village		31,000		50,000		80,000		110,000				28,000	7,600		4,100	8,600	760	630	690	850	45,000	990	1,320	4,700	2,320	30,400	17,300	2,130	930	25,500	11,800		
31	Soso(farm pond)	Takinosawa	Tomioka Town												13,200		4,700		10,300	10,300			11,800			4,100	2,060		7,400		10,500		7,800			
32		Kamisigeoka No. 1	Naraha Town												67,000		9,500	14,800	4,200		10,400					16,000	9,800		23,400		11,000		10,600			
33		Shimoshigeoka													18,100		77,000	8,400	27,000		20,100	26,400				4,900	2,660		14,600		9,500		7,900		5,100	
34	Komachi Dam		Ono Town		1,730		1,460									2,480		7,500	8,200							3,100	2,790	6,300		2,860		3,700		4,800		
35	Kido Dam		Naraha Town		11,400		17,600		810		290					7,400		8,700	2,290	4,700	4,200			7,200		16,200	14,800	4,200	820	3,900	14,300	5,400	16,800	13,300		
36	Soso(farm pond)	Otsutsumi													6,200			19,300	13,200	7,200		9,700	1,450			5,700	1,470		10,500		6,500		7,100			
37	Iwaki(farm pond)	Shinike	Iwaki City		310		540		830	510					1,780	500		132								89	78	112		68		111		750		
38	Kodama Dam Reservoir (Lake Kodama)						1,360		600	1,710						2,280	213	3,200	960		4,000	3,800				1,740	2,020	1,730		1,770		2,300		1,740		
39	Iwaki (farm pond)	Kanoritsutsumishita			600		4,000		820	1,200					48	2,800		3,600	5,000		990	1,240				170	500	510		82		730		1,310		
40	Takashiba Dam Reservoir (Lake Takashiba)				1,940		1,430		1,410		1,920					800	1,070	790	690		700	710			790		870	880		1,050		1,530		1,140		
41	Shitoki Dam Reservoir				3,000		3,300		6,400		3,300					930	980	1,120	1,310		1,690	1,400			1,820		1,120	1,200		1,270		2,000		1,340		

Total number of samples	278	Detection times	278

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-22 Detection of radioactive cesium at respective locations (Hamadori, Fukushima Prefecture: lake sediments) (No.2)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area		Location	FY2014												FY2015																
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Soso (farm pond)	Takei	Shinchi Town		5,200	4,800		3,530		2,830		2,740		2,730				2,530 / 1,750		1,810		2,330		2,650		2,190			2,210	1	0.60	Varying
2	Soso (farm pond)	Uchizawa	Soma City		390	222		307		213		282		239				139 / 540		250		1,060		446		650			514	2	0.96	Decreasing
3	Matsugabo Dam (Lake Utagawa)		Soma City		36,900	10,400		17,200		25,100		28,800						16,900 / 31,400		11,700		15,000		11,100		14,800			16,817	3	0.64	Varying
4	Mano Dam		Iitate Village		20,400	27,200	17,600	12,400	41,000	31,700	38,300	21,100	45,000	42,700				38,400 / 17,800	12,000	49,000		24,900 / 47,200 / 29,700 / 38,100	32,100	40,800	90,000	35,600			37,967	4	0.61	Increasing
5	Soso (farm pond)	Ainosawa	Iitate Village		28,700	33,900		7,200		33,000		3,530					10,400	334		8,400		13,600 / 16,200 / 6,700		49,500					15,019	5	0.95	Varying
6	Ganbe Dam Reservoir		Iitate Village		77,000	71,000		71,000		36,800		32,800						55,000 / 60,000		65,000		54,000 / 73,000 / 64,000		26,100					56,729	6	0.51	Varying
7	Soso (farm pond)	Fugane Dam	Iitate Village		17,800	26,900		3,610		33,000		22,400		14,100			1,930	17,500		20,100		10,300 / 10,100 / 11,200		6,100		34,200			13,929	7	0.60	Varying
8	Soso (farm pond)	Sasatoge	Iitate Village		1,090	2,960		3,090		3,390		980					1,920	670		384		650 / 1,610 / 455		477					881	8	0.83	Decreasing
9	Takanokura Dam Reservoir		Minamisoma City		27,200	33,900		35,100		24,200		35,200					20,400	22,800		19,200		28,700 / 26,400 / 32,400		29,800		20,800			25,063	9	0.44	Increasing
10	Yokokawa Dam Reservoir		Minamisoma City		22,900	11,900		34,700		35,700		48,000		32,200			1,240	8,500		27,500		43,400 / 34,300 / 35,900		19,500		24,500			24,355	10	0.91	Varying
11	Soso (farm pond)	Tarayachi	Minamisoma City														4,040	1,180		770		3,760 / 5,500 / 2,700		4,100		4,860			3,364	11	0.96	Decreasing
12	Soso (farm pond)	Takeshiyachi	Minamisoma City		1,240	294		293		1,080		265		225			820	466		247		49 / 343 / 34		258		111			291	12	0.71	Decreasing
13	Soso (farm pond)	Ryugasaku	Minamisoma City		3,670	16,300		1,590		2,410		4,140		15,600			900	1,390		17,400		3,550 / 6,300 / 6,300		14,500		10,800			7,643	13	1.00	Varying
14	Soso (farm pond)	Uwatashiro	Kawamata Town		165	193		190		226		660						402 / 1,270		1,840		349		16					775	14	1.39	Decreasing
15	Soso (farm pond)	Koakuto	Namie Town		3,260	16,300		1,530		8,900		10,300					5,000	4,690		6,300		8,900		6,600					6,298	15	0.99	Decreasing
16	Soso (farm pond)	Yosouchi	Iitate Village		11,300	4,000		25,300		17,300		7,300		13,000			3,430	2,660		2,010		5,070 / 8,600 / 12,500		9,000					6,181	16	1.17	Decreasing
17	Soso (farm pond)	Myobusaku No. 2	Minamisoma City		4,900	6,800		4,080		3,760		2,460		5,000			2,010	1,510		1,840		1,360 / 294 / 1,360		3,150		1,060			1,573	17	0.87	Varying
18	Ogaki Dam		Namie Town			6,000	10,100	6,800	6,100	740	8,900	2,440	3,090				6,300	25,300	2,890	1,400		5,500	107,000	26,900	14,700	18,500			23,166	18	2.06	Decreasing
19	Soso (farm pond)	Uenokawa	Katsurao Village		2,580	2,450		2,030		1,070		810		710				500 / 620		252		525		335		690			487	19	1.73	Decreasing
20	Soso (farm pond)	Heigoiri	Iitate Village		4,200	12,600		1,910		7,700		10,800						7,600 / 5,000		28,700		44,500 / 41,300 / 38,700		6,000					24,543	20	0.81	Varying
21	Soso (farm pond)	Mekurasawa No. 2	Namie Town		10,000	9,700		9,700		6,500		16,800		8,300			10,800	20,100		5,300		10,700		5,500		21,800			12,367	21	0.41	Unchanged
22	Soso (farm pond)	Joroku	Namie Town		16,000	64,000		79,000		25,600		110,000		58,000			41,100	53,000		223,000		439,000		145,000		217,000			186,350	22	1.00	Increasing
23	Furumichigawa Power Plant Dam		Tamura City		1,620	2,830		3,750		87		161						2,980 / 2,830		860		98		336		1,320			1,404	23	0.94	Decreasing
24	Soso(farm pond)	Sawairi No. 1	Futaba Town		20,500	121,000		46,000		74,000		263,000		297,000			437,000	920,000		660,000		212,000		610,000		540,000			563,167	24	0.63	Varying
25		Suzunai No. 4	Okuma Town		31,600	88,000		114,000		108,000		72,000		55,000				94,000 / 79,000		80,000		43,800		81,000		88,000			77,633	25	0.36	Unchanged
26		Nishihaguro	Futaba Town		13,800	31,000		22,600		17,200		12,900		28,300			6,600	7,600		3,730		5,400		22,200		25,500			11,838	26	0.82	Decreasing
27	Sakashita Dam		Okuma Town		7,200	14,800		14,700		2,600		17,100		14,300			19,600	13,800		14,800		17,500		19,800		9,500			15,833	27	0.66	Decreasing
28	Soso (farm pond)	Atamamori 2	Okuma Town		4,100	4,200		1,160		6,300		3,470		3,620			1,280	730		910		1,610		202		2,030			1,127	28	0.70	Decreasing
29	Soso (farm pond)	Yonomori	Tomioka Town		41,000	39,000		39,900		31,600		32,800		30,900			12,700	8,200		35,200		9,200		12,400		19,600			16,217	29	0.41	Decreasing
30	Takikawa Dam		Kawauchi Village		11,900	1,740	16,300	27,100	10,200	23,900	30,400	21,000	21,900	7,400			9,400	1,790	40,400	25,600	4,760	6,300	6,200	6,300	5,700	19,500			12,595	30	1.23	Decreasing
31	Soso(farm pond)	Takinosawa	Tomioka Town		7,500	8,600		9,300		4,800		7,600		7,900			2,930	680		2,760		1,780		870		3,010			2,005	31	0.59	Decreasing
32	Soso(farm pond)	Kamisigeoka No. 1	Naraha Town		2,940	590		11,800		2,370		63,000		3,890			14,100	11,700		2,520		6,300		7,400		10,300			8,720	32	1.21	Varying
33	Soso(farm pond)	Shimoshigeoka	Naraha Town		7,600	7,600		2,410		5,300		2,600		7,100			14,000	2,600		1,600		650		9,700		10,700			6,542	33	1.28	Decreasing
34	Komachi Dam		Ono Town			3,320 / 3,650		1,880		3,100		1,690						1,200 / 1,600		2,320		2,160		448					1,546	34	0.64	Decreasing
35	Kido Dam		Naraha Town		9,500	10,300	18,700	12,500	14,600	12,200	16,000	15,700	14,400	10,800			12,900	15,500	17,800	13,800	13,600	8,400	10,100	8,700	9,400				12,244	35	0.50	Increasing
36	Soso(farm pond)	Otsutsumi	Naraha Town		3,650	4,500		2,390		2,370		1,840		5,300			2,280	1,870		1,200		5,340		4,890		4,890			3,412	36	0.77	Decreasing
37	Iwaki(farm pond)	Shinike	Iwaki City		18	141		380		610				304				241 / 288		139		187		257		377			248	37	1.03	Decreasing
38	Kodama Dam Reservoir (Lake Kodama)		Iwaki City		2,340	3,190		2,520		2,790		1,290		1,480				2,430 / 1,040		2,120		750		670		679			1,282	38	0.52	Varying
39	Iwaki (farm pond)	Kanoritsutsumishita	Iwaki City		32	92		53		80		150		140				640 / 1,730		4,700		172		2,240		1,200			1,780	39	1.18	Varying
40	Takashiba Dam Reservoir (Lake Takashiba)		Iwaki City		1,050	860		720		780		950		990				780 / 1,010		700		900		710		900			833	40	0.34	Decreasing
41	Shitoki Dam Reservoir		Iwaki City		1,230	900		1,110		1,200		1,220		1,130				1,460 / 1,310		1,960		1,590		1,980		1,510			1,635	41	0.64	Decreasing
																							A	B	C	D	E		29,429	Average		

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1)2)

Trend symbols: Decreasing, Increasing, Unchanged, Varying

(ii) Nakadori

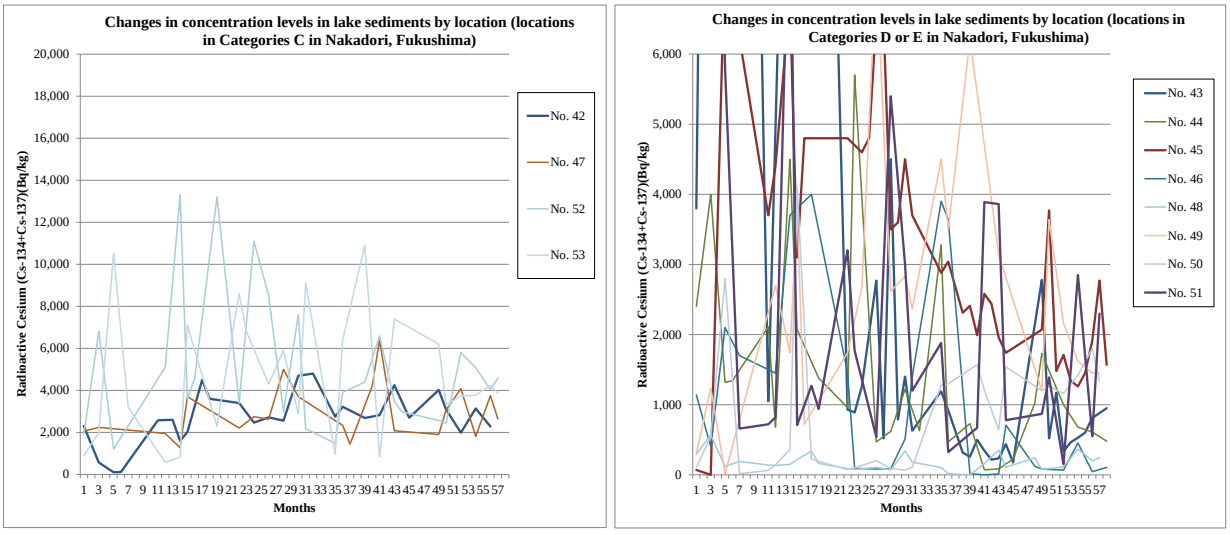
In Nakadori, Fukushima Prefecture, surveys were conducted 21 to 36 times from September 2011 to February 2016 for lake sediment samples collected at 12 locations.

Regarding concentration levels of detected values, four locations were categorized into Category C, six locations into Category D, and two locations into Category E (see Table 4.3-23 and Table 4.3-24).

Concentration levels were generally decreasing at five locations, were unchanged at one location, fluctuating at five locations, and generally increasing at one location.

Table 4.3-23 Categorization of detected values at respective locations
(Nakadori, Fukushima Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	4	No.42、No.47、No.52、No.53
D	Upper 25 to 50 percentile	6	No.43、No.44、No.45、No.49、No.50、No.51
E	Upper 50 to 100 percentile(lower 50%)	2	No.46、No.48



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-13 Changes in concentration levels over the years at respective locations
(Nakadori, Fukushima Prefecture: lake sediments)

Table 4.3-24 Detection of radioactive cesium at respective locations

(Nakadori, Fukushima Prefecture: lake sediments)

Location			Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																														
No.	Water area	Location	FY2011								FY2012												FY2013											
			8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6		7		8	9	10	11	12	1	2	3
42	Surikamigawa Dam Reservoir	Fukushima City		2,300		570		104	116					2,580		2,600	1,600	2,020		4,500	3,600				3,400		2,470		2,720		2,560		4,700		4,800	
43	Lake Handanuma (farm pond)	Kori Town		3,800		21,900		35,000						1,050		8,800	7,400	6,900	24,900						930	890	1,260		2,770	520	4,500	790	1,400	630		
44	Oike Pond (farm pond)	Motomiya City		2,400		4,000		1,320	1,340					2,110	680		4,500	2,070	1,840		1,380				960	5,700			470		620		1,220		630	
45	Miharu Dam	Miharu Town		69		0		7,500						3,700	4,400		6,800	3,100	4,800						4,800		4,600	4,800	6,500	6,500	3,500	3,600	4,500	3,700		
46	Hounokusa (farm pond)	Koriyama City		1,140		400		2,100		1,700					1,450		3,700			4,000					1,460	92			83		88		510	1,400		
47	Lake Hatori	Tenei Village		2,060		2,240									1,950		1,270	3,700							2,210		2,750		2,630		5,000		3,700			
48	Hirodaira (farm pond)	Sukagawa City		290		570		119		191				139	133		148	217		340	163				88	75			106		69		340	179		
49	Sengosawa Dam Reservoir	Ishikawa Town		300		1,240		17							2,700		1,740	3,800	720						1,740		2,670		7,300		2,620		2,830	2,370		
50	Watariike Pond (farm pond)	Yabuki Town		102		550		2,800		17				63	144		360	4,100		222					75	99			202		88		68	107		
51	Izumikawa (farm pond)	Shirakawa City		11,300		14,200		5,800		660				720	820		8,900	710		1,270	940				3,200	1,770			540		5,400		3,000	1,200		
52	Hokkawa Dam	Nishigo Village		1,920		6,800		1,210							5,100		13,300	3,600	4,600			13,200			3,400		11,100		8,500		2,970		7,600	2,180		
53	Lake Nanko	Shirakawa City		900		1,980		10,500		3,200					580		820	7,100				2,300			8,600	6,800			4,300		5,900		2,870	9,100		
			total number of samples		78	Detection times		78																												

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location			Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																										Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area	Location	FY2014												FY2015																		
			4	5	6	7	8	9	10	11	12	1	2	3	4	5	6		7	8	9	10	11	12	1	2	3						
42	Surikamigawa Dam Reservoir	Fukushima City		2,750	3,220		2,690		2,820		4,250		2,700				4,020	3,090		1,990		3,140		2,280					2,904	42	0.45	
43	Lake Handanuma (farm pond)	Kori Town		1,190	920	317	257	500	346	216	233	437	176				2,780	520	1,170	335	464	529	600	810		950			906	43	2.03	
44	Oike Pond (farm pond)	Motomiya City		3,280	470		730		71		85		226			1,020	1,730			1,000		680		610		479			920	44	0.93	
45	Miharu Dam	Miharu Town		2,880	3,040	2,310	2,410	1,990	2,580	2,440	1,960	1,740					2,070	3,770	1,480	1,710	1,340	1,260	1,450	1,910	2,770	1,570			1,933	45	0.58	
46	Hounokusa (farm pond)	Koriyama City		3,900	3,640		18		0		13	710				123	81			68		454		44		107			146	46	1.25	
47	Lake Hatori	Tenei Village			2,340	1,440		4,200	6,400		2,080						1,900	3,070		4,080		1,810		3,750	2,640				2,875	47	0.44	
48	Hirodaira (farm pond)	Sukagawa City		104	16		0		159		351	107				244	75			113		368		201	245				208	48	0.68	
49	Sengosawa Dam Reservoir	Ishikawa Town		4,500	3,500		6,200		4,700		3,140						1,200	3,640		2,160		1,620		1,450	1,450				1,920	49	0.66	
50	Watariike Pond (farm pond)	Yabuki Town		1,280	1,300			1,570	1,210		640	1,540					1,200	1,260		1,160		1,420		1,800	1,330				1,362	50	1.05	
51	Izumikawa (farm pond)	Shirakawa City		1,880	326			670	3,890		3,860	780					870	1,390		153		2,850		552	2,300				1,353	51	1.21	
52	Hokkawa Dam	Nishigo Village		1,480	3,900		4,400		6,600		3,480	2,990					2,570	2,450		5,800		5,080		4,050	4,580				4,088	52	0.65	
53	Lake Nanko	Shirakawa City		970	6,400		10,900		840		7,400						6,200	3,320		3,730		3,770		4,250	3,870				4,190	53	0.66	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

A	B	C	D	E

1,900 Average

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

(iii) Aizu

In Aizu, Fukushima Prefecture, surveys were conducted 14 to 40 times from September 2011 to February 2016 for lake sediment samples collected at 31 locations.

Regarding concentration levels of detected values, six locations were categorized into Category C, three locations were categorized into Category D and 22 locations were categorized into Category E (see Table 4.3-25 and Table 4.3-26).

Concentration levels were generally decreasing at seven locations, unchanged at seven locations, fluctuating at 10 locations, and generally increasing at seven locations.

Table 4.3-25 Categorization of detected values at respective locations
(Aizu, Fukushima Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	6	No.55、No.56、No.58、No.59、No.60、No.78
D	Upper 25 to 50 percentile	3	No.54、No.57、No.74
E	Upper 50 to 100 percentile(lower 50%)	22	No.61、No.62、No.63、No.64、No.65、No.66、No.67、No.68、No.69、No.70、No.71、No.72、No.73、No.75、No.76、No.77、No.79、No.80、No.81、No.82、No.83、No.84

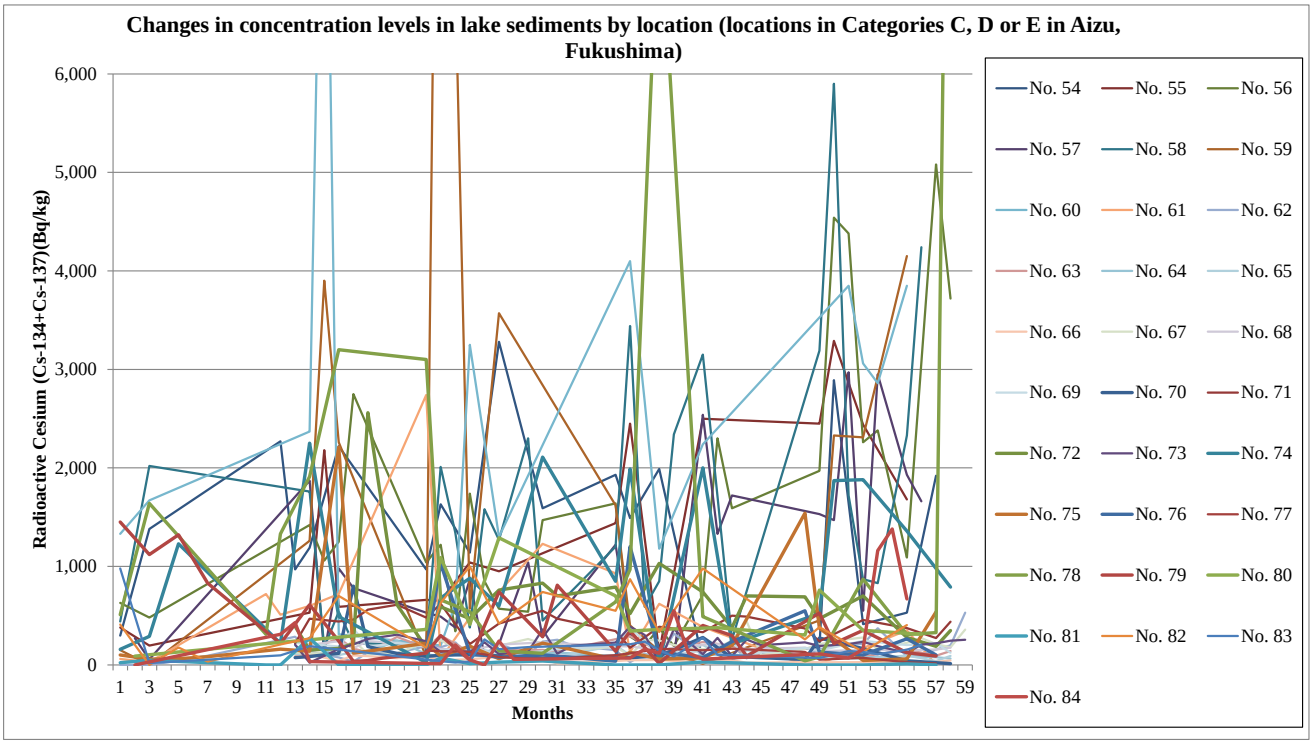


Figure 4.3-14 Changes in concentration levels over the years at respective locations
(Aizu, Fukushima Prefecture: lake sediments)

Table 4.3-26 Detection of radioactive cesium at respective locations

(Aizu, Fukushima Prefecture: lake sediments) (No.1)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Water area		Location	FY2011								FY2012												FY2013											
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
54	Nicchu Dam		Kitakata City		298		1,380									2,270	970	1,190	2,220						970	1,630		1,140		3,280		1,590			
55	Lake Sohara		Kitashiobara Village		380		196											530	2,180	590						660	650		1,040		950					
56	Lake Hibara				630		480											1,420	1,060	1,250	2,750					1,040	1,220	342	1,740	850	570	540	1,470			
57	Lake Onogawa					270	57											1,870	111	980	780					530	490	380	870	86	210	1,040	282			
58	Lake Akimoto		Inawashiro Town		440		2,020											1,760	177	540	219					214	2,010	1,340	380	1,580	1,270	2,300	450			
59	Lake Bishamonnuma		Kitashiobara Village		150		0											1,260	3,900	2,260						82	13,400		570		3,570					
60	Lake Oguninuma				1,330		1,670											2,370	10,200	310							198	620	3,250		1,300					
61	Aizu(farm pond)	Lake Onuma	Nishiaizu Town		61		28								720	510		600	720						2,740	59		480		740		1,230			
62	Lake Inawashiro	Center	Aizuwakamatsu City		0		0		44		93						286	133	76	33	126		122		190	178	229	86	103	215	99	237	256	199	
63		Takahashi River Estuary	Inawashiro Town														86	154	270	166	128		284		171	300		130		147		153	139		
64		Oguro River Estuary															200	76	179	114	127		245		110	84		163		130		114	126		
65		Tenjinhama Beach															111	110	99	132	135				208	122		80		157		105	83		
66		Hishinuma River Estuary															83	108	39	96	89		68		85	50		57		82		60	15		
67		Intake of Asakasosui															126	118	115	251	108		116		236	249	172	123	241	194	263	216	222	152	
68		Hamajihama Beach	Koriyama City														235	203	240	169	242		221		194	162		151		205		228			
69		Funatsu Port															223	213	186	370	182		223		186	141		187		107		138	160		
70		Offshore of Funatsu River Estuary															74	86	118	800	186		116		88	97		107		92		70			
71		Seishogahama Beach															220	470	440	460	560		610		480	620		211		420		550	470		
72		Haragawa River Estuary	Aizuwakamatsu City														390	151	168	215	2,560		610		176	590		470		760		830	700		
73		Koishigahama Floodgate	Inawashiro Town														206	22	161	209	263		306		241	133	144	134	228	111	133	361	114	195	
74	Higashiyama Dam Reservoir		Aizuwakamatsu City		157		290		1,230							220		2,250	490						24	680		880		600		2,110			
75	Lake Numazawa	Center	Kaneyama Town		100		59		63		84					160		138	2,210	120					219	90		191		62		221			
76		Midpoint between the center of the lake and off the estuary																							146	1,030		118		77		103			
77		Offshore of Maenosawa River Estuary																							144	139		134		79		54			
78	Aizu (farm pond)		Aizumisato Town		510		1,640								310	1,330		1,910	3,200						3,100	660		540		142		117			
79	Okawa Dam Reservoir		Aizuwakamatsu City		1,450		1,120		1,320		830					218		610	242	35	44	69			120	297		49		740		286	810		
80	Tagokura Reservoir		Tadami Town			90										229								360	1,090		410		1,290					
81	Minamiaizu (farm pond)	Fukui			22		47								0	0		270	0						0	70		12		28		39			
82	Tajima Dam Reservoir (Lake Funehana)		Minamiaizu Town		410		0		177		34					207		270	700						175	630		1,000		420		740			
83	Okutadami Reservoir		Tadami Town		980		18									97		190								38	24	34	259	160	180					
84	Lake Ozenuma		Hinoemata Village			0										310	430	34								13	202	51	0	242	57					
				total number of samples	725		Detection times		706																												

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Table 4.3-26 Detection of radioactive cesium at respective locations

(Aizu, Fukushima Prefecture: lake sediments) (No.2)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																												Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area		Location	FY2014													FY2015																			
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6		7	8	9	10	11	12	1	2	3							
54	Nicchu Dam		Kitakata City		1,930	1,490		1,990		43								180	2,890		413		530		1,920					1,187	54	0.63	
55	Lake Sohara		Kitashiobara Village		1,440	2,450		130		2,500								2,450	3,290		2,440		1,680							2,465	55	0.72	
56	Lake Hibara				1,640	287	196	373	192	710	2,300	1,590						1,970	4,540	4,380	2,260	2,380	1,090	3,070	5,080	3,720				3,166	56	0.81	
57	Lake Onogawa				1,220	309	168	97	62	2,540	1,330	1,720						1,530	1,470	2,970	550	2,950	1,930	1,660						1,866	57	0.89	
58	Lake Akimoto		Inawashiro Town		1,200	3,440	590	850	2,340	3,150	1,710	257						3,190	5,900	1,720	870	830	2,330	4,240						2,726	58	0.83	
59	Lake Bishamonnuma		Kitashiobara Village		1,620	400		140		11								452	2,330		2,310		4,150							2,311	59	1.50	
60	Lake Oguninuma					4,100	2,670	1,180		2,240										3,850	3,060	2,860	3,850							3,405	60	0.87	
61	Aizu(farm pond)	Lake Onuma	Nishiaizu Town		930	129		620		385								0	17		172		351		0					108	61	1.20	
62	Lake Inawashiro	Center	Aizuwakamatsu City		149	29	114	63	319	97	119	194	67	193				81	159	214	212	372	87	102	156	198	530			211	62	0.68	
63		Takahashi River Estuary	Inawashiro Town		261	291		142		233		195	98					97	99		86		155		93	141				112	63	0.41	
64		Oguro River Estuary			90	99		95		96		110	88					75	85		75		89		78	65				78	64	0.39	
65		Tenjinhama Beach			198	99		106		201		47	148					83	71		62		95		39	92				74	65	0.41	
66		Hishinuma River Estuary			39	47		49		25		47	23					28	27		28		25		30	45				31	66	0.51	
67		Intake of Asakasosui			182	91	255	247	201	160	170	248	440	103				162	211	262	278	156	225	272	211	178	359			231	67	0.36	
68		Hamajihama Beach	Koriyama City		189	189		151		206		213	161					175	138		152		149		156	176				158	68	0.17	
69		Funatsu Port			192	382		101		141		224	109					174	146		244		202		221	123				185	69	0.37	
70		Offshore of Funatsu River Estuary			87	74		91		278		73	79					54	273		166		42		22	13				95	70	1.19	
71		Seishogahama Beach			344	174		387		331		500	490					370	241		455		374		272	438				358	71	0.30	
72		Haragawa River Estuary	Aizuwakamatsu City		790	520		1,030		740		379	700					690	469		700		279		188	348				446	72	0.80	
73		Koishigahama Floodgate	Inawashiro Town		226	389	303	30	363	109	274	89	257	200				229	193	211	235	190	121	205	219	246	256			211	73	0.42	
74	Higashiyama Dam Reservoir		Aizuwakamatsu City		850	1,990		18		2,000		214							520	1,870		1,880		1,360			790			1,284	74	0.79	
75	Lake Numazawa	Center	Kaneyama Town		57	127		58		70		197						1,540	372			45		60		537					511	75	1.77	
76		Midpoint between the center of the lake and off the estuary			37	1,200		129		74		237						550	130			101		265		100					229	76	1.26	
77		Offshore of Maenosawa River Estuary			98	118		163		148		163						131	53			72		26		15					59	77	0.48	
78	Aizu (farm pond)		Aizumisato Town		640	970		7,800		490								41	79			870		308		327	12,300				2,321	78	1.68	
79	Okawa Dam Reservoir		Aizuwakamatsu City		139	344		14		400		298	90						526	218		350		124		89					261	79	1.00	
80	Tagokura Reservoir		Tadami Town		700	343		360			378							303	760			351			310						431	80	0.68	
81	Minamiaizu (farm pond)	Fukui			0	0		0		30								0	0			0		10		0					2	81	2.30	
82	Tajima Dam Reservoir (Lake Funehana)		Minamiaizu Town		550	870		333		980								260	384			134		404							296	82	0.69	
83	Okutadami Reservoir		Tadami Town			209	236	148	86	277	103								71	140	131	109	154	203						135	83	1.11	
84	Lake Ozenuma		Hinoemata Village			70	160	117	550	122	59								112	70	160	1,160	1,380	670							592	84	1.36	

A	B	C	D	E

824 Average

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on4.3(1) 2) ↘ Decreasing ↗ Increasing ⇝ Unchanged ∧∨∧ Varying

3) Ibaraki Prefecture

In Ibaraki Prefecture, surveys were conducted 9 to 18 times from September 2011 to February 2016 for lake sediment samples collected at 19 locations.

Regarding concentration levels of detected values, one location was categorized into Category C, four locations into Category D, and 14 locations into Category E (see Table 4.3-27 and Table 4.3-28).

Concentration levels were generally decreasing at eight locations, were unchanged at eight locations, fluctuating at two locations, and generally increasing at one location.

Table 4.3-27 Categorization of detected values at respective locations
(Ibaraki Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.13
D	Upper 25 to 50 percentile	4	No.12、No.14、No.15、No.16
E	Upper 50 to 100 percentile(lower 50%)	14	No.1、No.2、No.3、No.4、No.5、No.6、No.7、No.8、No.9、No.10、No.11、No.17、No.18、No.19

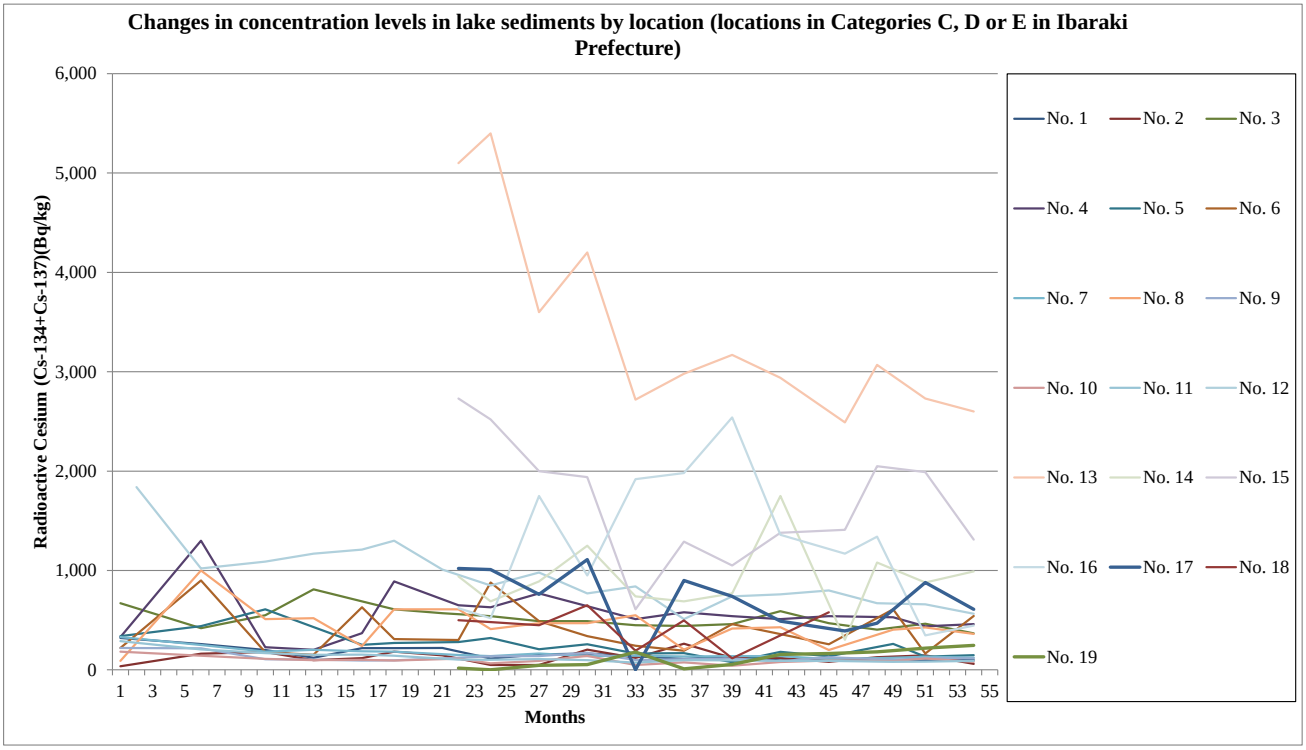


Figure 4.3-15 Changes in concentration levels over the years at respective locations
(Ibaraki Prefecture: lake sediments)

Table 4.3-28 Detection of radioactive cesium at respective locations (Ibaraki Prefecture: lake sediments) (No.1)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Water area		Location	FY2011								FY2012												FY2013											
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Hinuma	Hiroura	Ibaraki Town		320					260				200			122			219		219			221			114			155			165	
2		Miyamae			37					162				179			98			118		184			146			49			49			204	
3		Oyazawa			670					420				550			810			690		610			570			540			490			490	
4	Lake Kasumigaura	Offshore of Tamatsukuri	Namegata City		330					1,300				228			201			370		890				650		630			770			640	
5		Offshore of Kakeuma	Ami Town		340					440				610			430			252		270				280		320			208			257	
6		Center	Miho Village		221					900				178			151			630		310				300		880			490			340	
7		Offshore of Aso	Inashiki City		330					250				183			202			186		183				150		139			164			138	
8	Lake Kitaura	Offshore of Kamaya	Namegata City		90					1,000				510			520			239		610				610		410			470			470	
9		Jingu Bridge	Itako City		220					217				106			103			93		95				121		136			139			172	
10	Hitachitone River	Lake Sotonasakaura			184					143				110			97			102		93				113		66			91			141	
11		Ikisu	Kamisu City		290					205				168			152			154		142				104		102			108			98	
12	Lake Ushikunuma	Center of Lake Ushikunuma	Ryugasaki City			1,840				1,020				1,090			1,170			1,210		1,300			1,010			850			980			770	
13	Mizunuma Dam	Center	Kitaibaraki City																							5,100		5,400			3,600			4,200	
14	Koyama Dam		Takahagi City																							940		690			890			1,250	
15	Hananuki Dam																									2,730		2,520			2,000			1,940	
16	Jyuou Dam		Hitachi City																							620		520			1,750			950	
17	Ryuji Dam		Hitachiota City																							1,020		1,010			760			1,110	
18	Fujiigawa Dam		Shirosato Town																							500		480			450			650	
19	Iida Dam		Kasama City																							18		0			45			53	

total number of samples	297	Detection times	295

*1: Blank cells are locations where samples were not collected. The result “Not detectable” is indicated as “0.”

Table 4.3-28 Detection of radioactive cesium at respective locations (Ibaraki Prefecture: lake sediments) (No.2)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area		Location	FY2014												FY2015												Changes				
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Hinuma	Hiroura	Ibaraki Town		136			111			136			94			101			99			95			99			99	1	0.42	
2		Miyamae			119			264			120			119			80			128			146			61			104	2	0.47	
3		Oyazawa			450			442			460			590			470			405			465			367			427	3	0.22	
4	Lake Kasumigaura	Offshore of Tamatsukuri	Namegata City		510			580			540			510			540				530		439			461			493	4	0.45	
5		Offshore of Kakeuma	Ami Town		165			168			78			182			137				261		132			147			169	5	0.51	
6		Center	Miho Village		242			192			460			360			257				610		165			543			394	6	0.58	
7		Offshore of Aso	Inashiki City		143			134			139			138			108				121		133			124			122	7	0.33	
8	Lake Kitaura	Offshore of Kamaya	Namegata City		550			203			416			429			200				405		427			361			348	8	0.46	
9		Jingu Bridge	Itako City		99			107			115			86			128				102		118			117			116	9	0.31	
10	Hitachitone River	Lake Sotonasakaura			49			76			42			79			94				89		115			81			95	10	0.35	
11		Ikisu	Kamisu City		74			97			95			91			91				80		82			91			86	11	0.44	
12	Lake Ushikunuma	Center of Lake Ushikunuma	Ryugasaki City		840			510			740			760			800			670			660			565			674	12	0.34	
13	Mizunuma Dam	Center	Kitaibaraki City		2,720			2,980			3,170			2940				2490		3070			2730			2600			2,723	13	0.29	
14	Koyama Dam		Takahagi City		740			690			770			1750				302		1080			880			990			813	14	0.39	
15	Hananuki Dam				610			1,290			1,050			1380				1410		2050			1990			1310			1,690	15	0.37	
16	Jyuou Dam		Hitachi City		1,920			1,980			2,540			1360				1170		1340			346			445			825	16	0.56	
17	Ryuji Dam		Hitachiota City		0			900			740			490				391		469			880			610			588	17	0.46	
18	Fujigawa Dam		Shirosato Town		193			498			117			346			580												580	18	0.41	
19	Iida Dam		Kasama City		180			11			55			156			165			182			218			246			203	19	0.80	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

A	B	C	D	E

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

4) Tochigi Prefecture

In Tochigi Prefecture, surveys were conducted 14 to 18 times from October 2011 to December 2015 for lake sediment samples collected at eight locations.

Regarding concentration levels of detected values, four locations ware categorized into Category D, and four locations into Category E (see Table 4.3-29 and Table 4.3-30).

Concentration levels were generally decreasing at two locations, were unchanged at one location, fluctuating at four locations, and generally increasing at one location.

Table 4.3-29 Categorization of detected values at respective locations

(Tochigi Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	0	(None)
D	Upper 25 to 50 percentile	4	No.1、No.2、No.4、No.7
E	Upper 50 to 100 percentile(lower 50%)	4	No.3、No.5、No.6、No.8

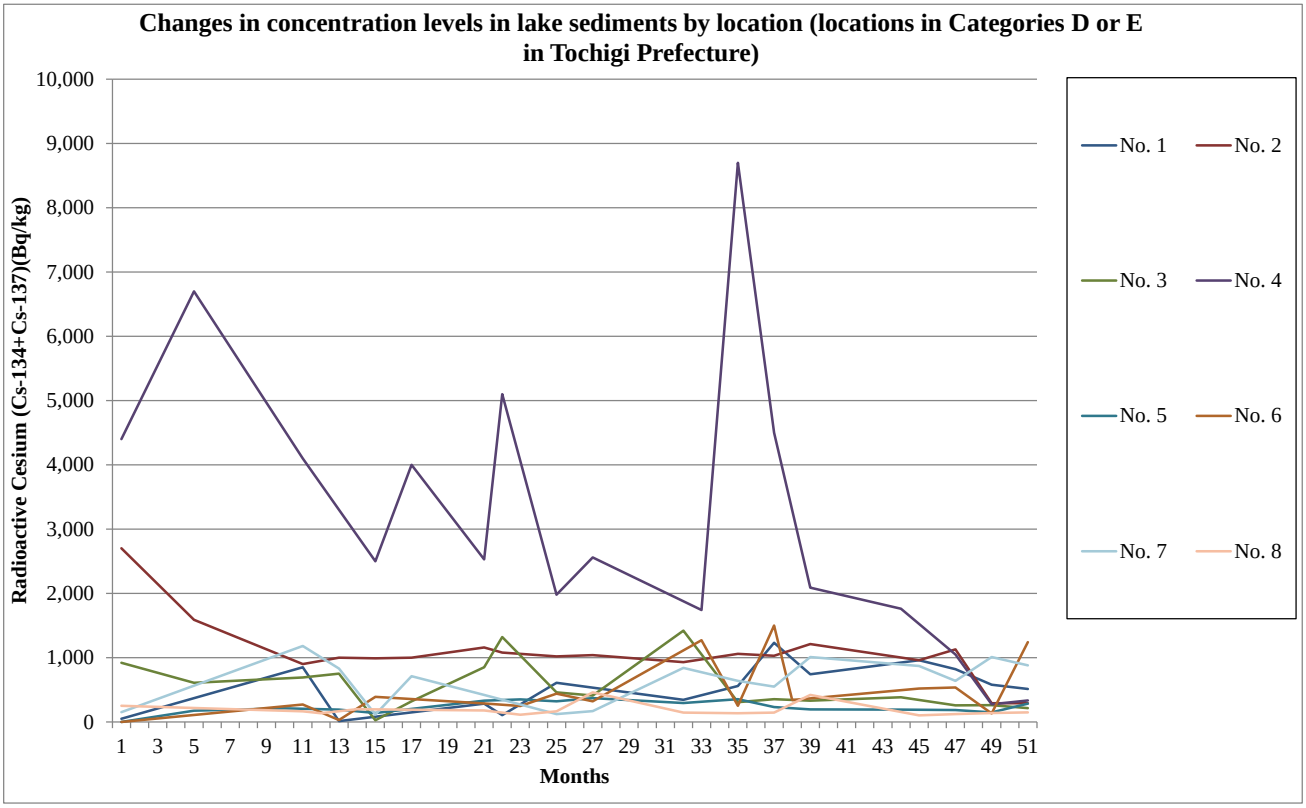


Figure 4.3-16 Changes in concentration levels over the years at respective locations

(Tochigi Prefecture: lake sediments)

Table 4.3-30 Detection of radioactive cesium at respective locations (Tochigi Prefecture: lake sediments)

Location					Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																														
No.	Water area	Location		Municipality	FY2011								FY2012												FY2013									
					8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Nakagawa River System	Miyama Dam Reservoir	Center	Nasushiobara City			48										850		11								284	106			610					
2		Shiobara Dam Reservoir	Center				2,700				1,590						900		1,000		990		1,000				1,160	1,080			1,020		1,040			
3	Kinugawa River System	Kawaji Dam Reservoir	Center	Nikko City			920				610						690		750		25		320				850	1,320			460		410			
4		Ikari Dam Reservoir	Center				4,400				6,700						4,100		3,300		2,500		4,000				2,530	5,100			1,980		2,560			
5		Kawamata Dam Reservoir	Center				0				176					212			190		140						330		350		321		370			
6		Lake Yuno	Center				0										270		28		390						286		248		440		320			
7		Lake Chuzenji	Center				153										1,180		830		115		710				420		270		122		168			
8	Watarase River System	Watarase Reservoir	Center	Tochigi City			251										165	134		197							177		113		164		460			
					total number of samples		134	Detection times		132																										

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location					Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area	Location		Municipality	FY2014												FY2015															
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Nakagawa River System	Miyama Dam Reservoir	Center	Nasushiobara City		343			560		1,230		740						960		820		580		514					719	1	0.66	
2		Shiobara Dam Reservoir	Center			930			1,060		1,030		1,210						960		1,130		290		290					668	2	0.46	
3	Kinugawa River System	Kawaji Dam Reservoir	Center			1,420			307		355		330					382			257		261		215					279	3	0.69	
4		Ikari Dam Reservoir	Center				1,740		8,700		4,500		2,090					1,760			1,050		275		333					855	4	0.68	
5		Kawamata Dam Reservoir	Center	Nikko City		293			354		232		196					191			185		147		285					202	5	0.42	
6		Lake Yuno	Center				1,270		250		1,500	339							520		535		132		1,240					607	6	0.93	
7		Lake Chuzenji	Center			840			640		550		1,010						870		640		1,010		880					850	7	0.57	
8	Watarase River System	Watarase Reservoir	Center	Tochigi City		146			134		144		421						103		123		137		148					128	8	0.56	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

A	B	C	D	E

538 Average

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

5) Gunma Prefecture

In Gunma Prefecture, surveys were conducted 12 to 18 times from November 2011 to December 2015 for lake sediment samples collected at 24 locations.

Regarding concentration levels of detected values, one location was categorized into Category C, 10 locations were categorized into Category D and 13 locations were categorized into Category E (see Table 4.3-31 and Table 4.3-32).

Concentration levels were generally decreasing at six locations, were unchanged at seven locations, fluctuating at eight locations, and generally increasing at three locations.

Table 4.3-31 Categorization of detected values at respective locations
(Gunma Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.10
D	Upper 25 to 50 percentile	10	No.1、No.2、No.5、No.6、No.7、No.9、No.14、No.15、No.22、No.24
E	Upper 50 to 100 percentile(lower 50%)	13	No.3、No.4、No.8、No.11、No.12、No.13、No.16、No.17、No.18、No.19、No.20、No.21、No.23

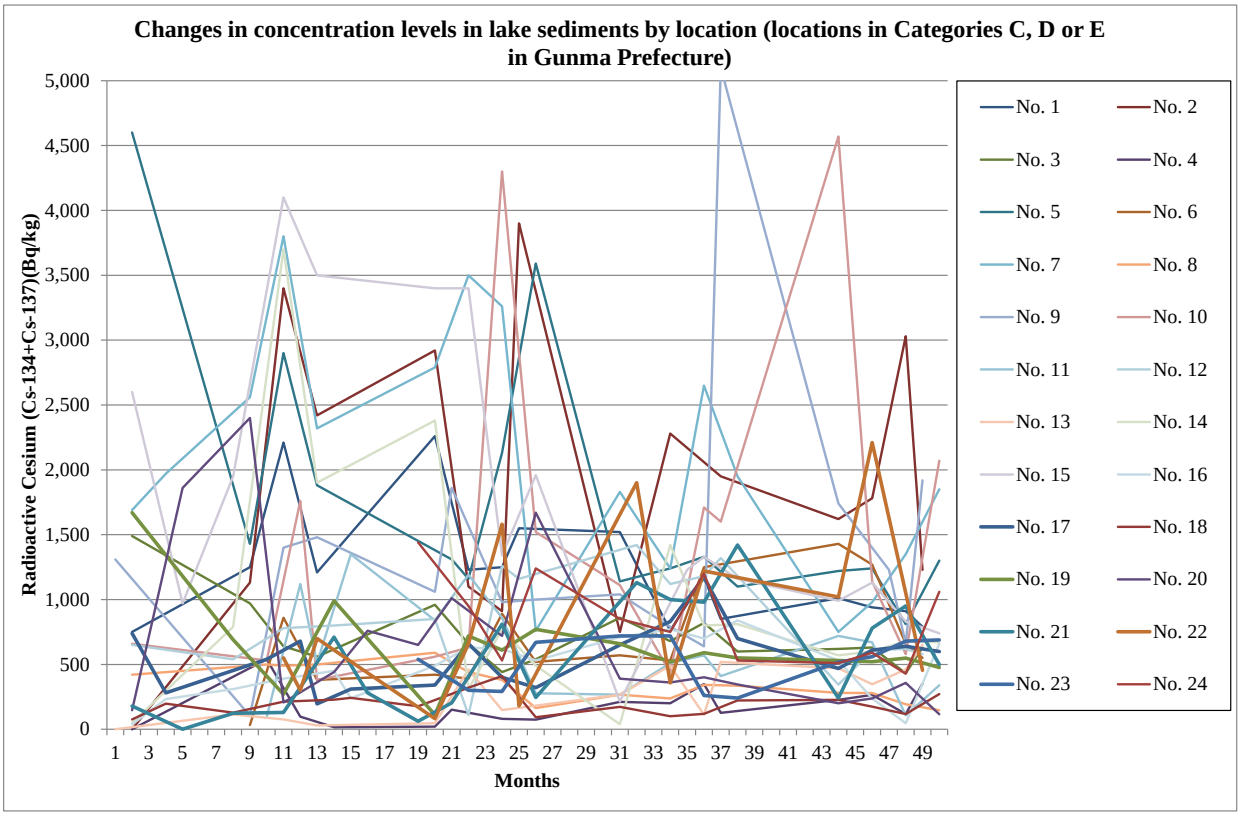


Figure 4.3-17 Changes in concentration levels over the years at respective locations
(Gunma Prefecture: lake sediments)

Table 4.3-32 Detection of radioactive cesium at respective locations (Gunma Prefecture: lake sediments)

Location					Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																
No.	Water area	Location		Municipality	FY2011								FY2012												FY2013											
					8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Tonegawa River	Lake Okutone (Yagisawa Dam)	Center	Minakami Town					750							1,250		2,210		1,210							2,260		1,230		1,250	1,550				
2		Lake Naramata (Naramata Dam)	Center						0							1,130		3,400		2,420							2,920		1,100		910	3,900				
3		Lake Dogen (Sudagai Dam)	Center						1,490							970		640		560							960		660		440		540				
4		Lake Marunuma (Marunuma Dam)	Center	Katashina Village					0								540		98		16						21	151			81		74				
5		Lake Fujiwara (Fujiwara Dam)	Center	Minakami Town					4,600							1,430		2,900		1,880								1,310	1,160		2,130		3,590				
6		Lake Tanbara (Tanbara Dam)	Center	Numata City												33		860		380							420		390		890		520				
7		Lake Akaya (Aimata Dam)	Center	Minakami Town					1,690		1,970					2,560		3,800		2,320							2,790		3,500		3,260		760				
8		Lake Sonohara (Sonohara Dam)	Center	Numata City					420								500	490		500							590		440		380		164				
9		Lake Akagionuma	Center	Maebashi City				1,310								104		1,400		1,480							1,060	1,860			980		1,000				
10	Agatsuma River Area	Lake Okushima (Shimagawa Dam)	Center	Nakanojo Town					660								530		1,760	380							560		630		4,300		1,520				
11		Lake Shimako (Nakanojo Dam)	Center														94		1,120	510		1,350					840		1,190		860		278				
12		Lake Tashiro (Kazawa Dam)	Center	Tsumagoi Village					650						540			780			800						850		110		1,260	1,160					
13	Karasu River	Lake Haruna	Center	Takasaki City/Higashi-Agatsuma Town				0							114			76		30							47		460		148						
14		Lake Kirizumi (Kirizumi Dam)	Center	Annaka City					49						790			3,700		1,900							2,380		310		770		490				
15		Lake Usui (Sakamoto Dam)	Center						2,600			970			1,950			4,100		3,500							3,400		3,400		1,340		1,960				
16		Lake Arafune (Dodairagawa Dam)	Center	Shimonita Town					37		233				310			390			450	239					490		630		620		530				
17		Lake Oshio (Oshio Dam)	Center	Tomioka City					740		280						540		680	196		310					340		660		400		320				
18		Lake Kanna (Shimokubo Dam)	Center	Fujioka City/Kamikawa Town					75		197				128			213			228	242				178			320		410		93				
19		Lake Hebikami (Shiozawa Dam)	Center	Kanna Town					1,670						690			270			990						111		720		610		770				
20	Watarase River Area	Lake Kusaki (Kusaki Dam)	Center	Midori City					147			1,860				2,400		207			440		760			650		1,010		720		1,670				
21		Lake Umeda (Kiryugawa Dam)	Center	Kiryu City					179			0			123			129			710		280			62		203		810		245				
22	Nakatsu River	Lake Nozori (Nozori Dam)	Center	Nakanojo Town														550	300	700							82		660		1,580	181					
23	Watarase River Area	Lake Jonuma	Center	Tatebayashi City																						540			301		291		670				
24		Lake Tataranuma	Center																							1,440			950		530		1,240				
					total number of sample		383		Detection times		379																											

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location					Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																						Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Water area	Location		Municipality	FY2014											FY2015														
					4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Tonegawa River	Lake Okutone (Yagisawa Dam)	Center	Minakami Town		1,520			760		1,170	850							1,010		940		910	790						913	1	0.38	
2		Lake Naramata (Naramata Dam)	Center			750			2,280		2,060	1,950							1,620		1,780		3,030	1,230						1,915	2	0.55	
3		Lake Dogen (Sudagai Dam)	Center			860			680		820		600						620		630		431	630						578	3	0.36	
4		Lake Marunuma (Marunuma Dam)	Center	Katashina Village		211			201		349	127							227		265		118	352						241	4	0.82	
5		Lake Fujiwara (Fujiwara Dam)	Center	Minakami Town		1,140			1,240		1,330		1,100						1,220		1,240		810		1,300					1,143	5	0.59	
6		Lake Tanbara (Tanbara Dam)	Center	Numata City		570			530		1,250								1,430		1,270		660	550						978	6	0.57	
7		Lake Akaya (Aimata Dam)	Center	Minakami Town		1,830			1,240		2,650		1,950						750		980		1,350		1,850					1,233	7	0.45	
8		Lake Sonohara (Sonohara Dam)	Center	Numata City		266			237		342		336						281		279		193		146					225	8	0.38	
9		Lake Akagionuma	Center	Maebashi City		1,040			790		640	5,100							1,740			1,230	660	1,920						1,388	9	0.79	
10	Agatsuma River Area	Lake Okushima (Shimagawa Dam)	Center	Nakanojo Town		1,110			438		1,710	1,600							4,570		1,140		580		2,070					2,090	10	0.87	
11		Lake Shimako (Nakanojo Dam)	Center			266			510		570	410							720		670		107		339					459	11	0.62	
12		Lake Tashiro (Kazawa Dam)	Center	Tsumagoi Village			1,420		1,120		1,180	1,320							343		610		620	580						538	12	0.45	
13	Karasu River	Lake Haruna	Center	Takasaki City/Higashi-Agatsuma Town		266			490		112	520							470		346		460	650						482	13	0.77	
14		Lake Kirizumi (Kirizumi Dam)	Center	Annaka City		38			1,420		800		810						570		600		680		670					630	14	0.95	
15		Lake Usui (Sakamoto Dam)	Center			215				1,230	1,330		1,160						990		1,130		830		740					923	15	0.64	
16		Lake Arafune (Dodairagawa Dam)	Center	Shimonita Town		710			770		700		840						530		237		47		660					369	16	0.52	
17		Lake Oshio (Oshio Dam)	Center	Tomioka City		650			830		1,170		700						468		610		640		600					580	17	0.42	
18		Lake Kanna (Shimokubo Dam)	Center	Fujioka City/Kamikawa Town		173			100		119		222						226		175		118		272					198	18	0.44	
19		Lake Hebikami (Shiozawa Dam)	Center	Kanna Town		660			520		590		550						530		521		548		476					519	19	0.53	
20	Watarase River Area	Lake Kusaki (Kusaki Dam)	Center	Midori City		390			361		400		345						200		237		357		115					227	20	0.96	
21		Lake Umeda (Kiryugawa Dam)	Center	Kiryu City			1,130		1,000		980		1,420						240		780		950		500					618	21	0.80	
22	Nakatsu River	Lake Nozori (Nozori Dam)	Center	Nakanojo Town			1,900		358		1,220								1,020		2,210		1,050	454						1,184	22	0.75	
23	Watarase River Area	Lake Jonuma	Center	Tatebayashi City		720			720		260		241						518		560		680		688					612	23	0.37	
24		Lake Tataranuma	Center			850			750		1,200		530						510		590		429		1,060					647	24	0.40	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2)

A	B	C	D	E

778 Average

Decreasing Increasing Unchanged Varying

6) Chiba Prefecture

In Chiba Prefecture, surveys were conducted 18 times from November 2011 to February 2016 for lake sediment samples collected at eight locations.

Regarding concentration levels of detected values, one location was categorized into Category C, one location into Category D, and six locations into Category E (see Table 4.3-33 and Table 4.3-34).

Concentration levels were generally decreasing at six locations and were unchanged at two locations.

Table 4.3-33 Categorization of detected values at respective locations
(Chiba Prefecture: lake sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.4
D	Upper 25 to 50 percentile	1	No.3
E	Upper 50 to 100 percentile(lower 50%)	6	No.1、No.2、No.5、No.6、No.7、No.8

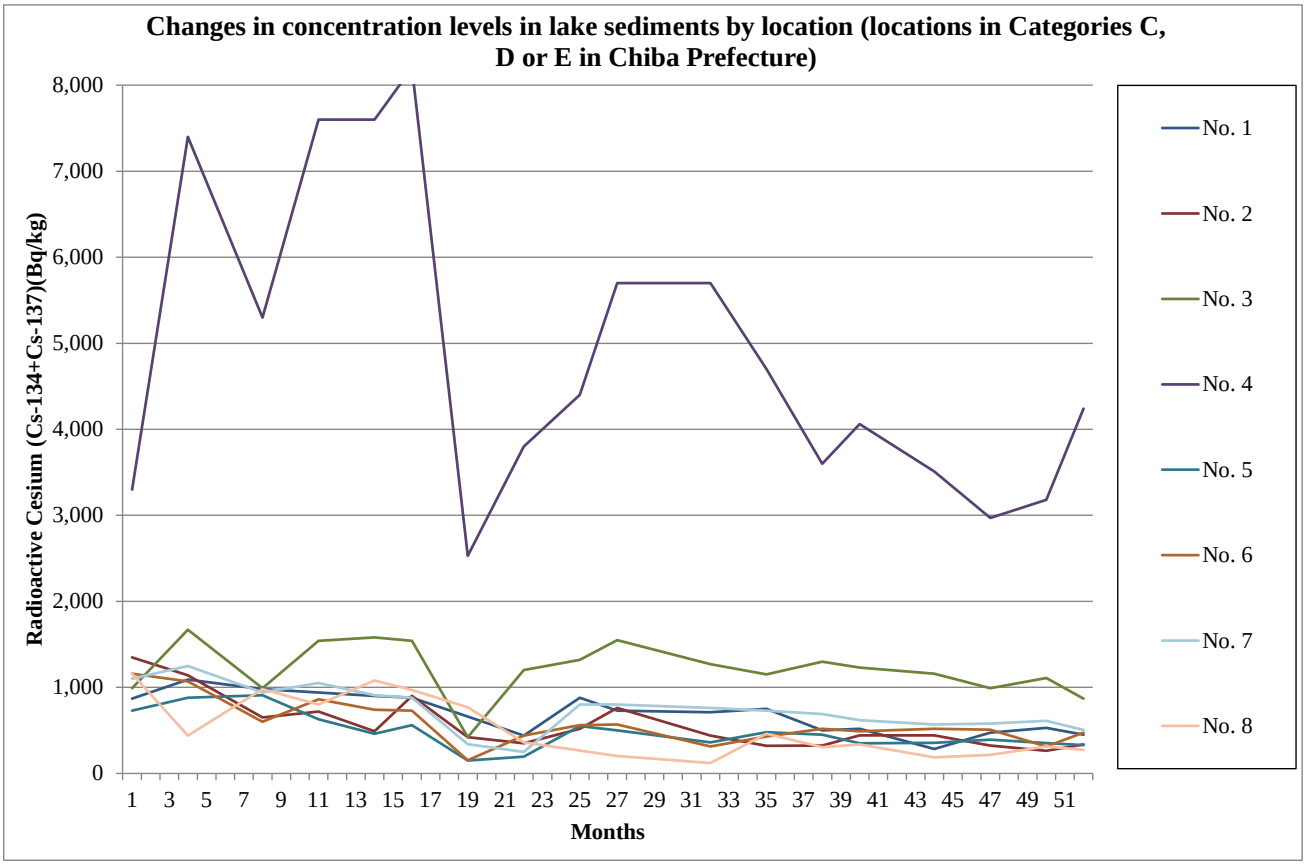


Figure 4.3-18 Changes in concentration levels over the years at respective locations

(Chiba Prefecture: lake sediments)

Table 4.3-34 Detection of radioactive cesium at respective locations (Chiba Prefecture: lake sediments)

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																															
No.	Location		Municipality	FY2011								FY2012												FY2013											
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Lake Teganuma	Fusashita	Inzai City				870			1,090				980			940			900		880			660			440			880		730		
2		Shimoteganuma Chuo					1,350			1,140				650			720			490		900			420			349			520		760		
3		Teganuma Chuo	Abiko City/Kashiwa City				990			1,670				990			1,540			1,580		1,540			420			1,200			1,320		1,550		
4		Nedoshita					3,300			7,400				5,300			7,600			7,600		8,200			2,530			3,800			4,400		5,700		
5	Lake Inbanuma	Kita-Inbanuma Chuo	Inzai City/Narita City				730			880				910			630			460		560			151			195			550		500		
6		Ipponmatsushita	Inzai City				1,160			1,070				600			860			740		730			152			440			560		570		
7		Lower area of Josuido water intake	Sakura City				1,100			1,250				940			1,050			910		880			340			251			800		800		
8		Asobashi Bridge	Yachiyo City				1,160			440				980			800			1,080		970			770			360			266		202		
				total number of samples		144	Detection times		144																											

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location				Lake Sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Location		Municipality	FY2014												FY2015															
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Lake Teganuma	Fusashita	Inzai City			710			750			500		520				283			474			530		451			435	1	0.33	
2		Shimoteganuma Chuo				440			320			325		443				441			324			264		338			342	2	0.54	
3		Teganuma Chuo	Abiko City/Kashiwa City			1,270			1,150			1,300		1,230				1,160			990			1,110		870			1,033	3	0.25	
4		Nedoshita				5,700			4,700			3,600		4,060				3,510			2,970			3,180		4,240			3,475	4	0.37	
5	Lake Inbanuma	Kita-Inbanuma Chuo	Inzai City/Narita City			360			480			450		350				355			391			354		328			357	5	0.43	
6		Ipponmatsushita	Inzai City			313			430			520		490				520			509			313		473			454	6	0.44	
7		Lower area of Josuido water intake	Sakura City			760			730			690		620				570			580			610		505			566	7	0.35	
8		Asobashi Bridge	Yachiyo City			121			460			304		338				187			216			312		273			247	8	0.67	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

A	B	C	D	E	863	Average

(2)-3 Coastal areas

1) Iwate Prefecture

In Iwate Prefecture, surveys were conducted 9 times from January 2012 to November 2015 for coastal area sediment samples collected at two locations.

Regarding concentration levels of detected values, both two locations were categorized into Category E (see Table 4.3-35 and Table 4.3-36).

Concentration levels were generally unchanged at one location and fluctuating at one location.

Table 4.3-35 Categorization of detected values at respective locations

(Iwate Prefecture: coastal area sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	0	(None)
D	Upper 25 to 50 percentile	0	(None)
E	Upper 50 to 100 percentile(lower 50%)	2	No.1、No.2

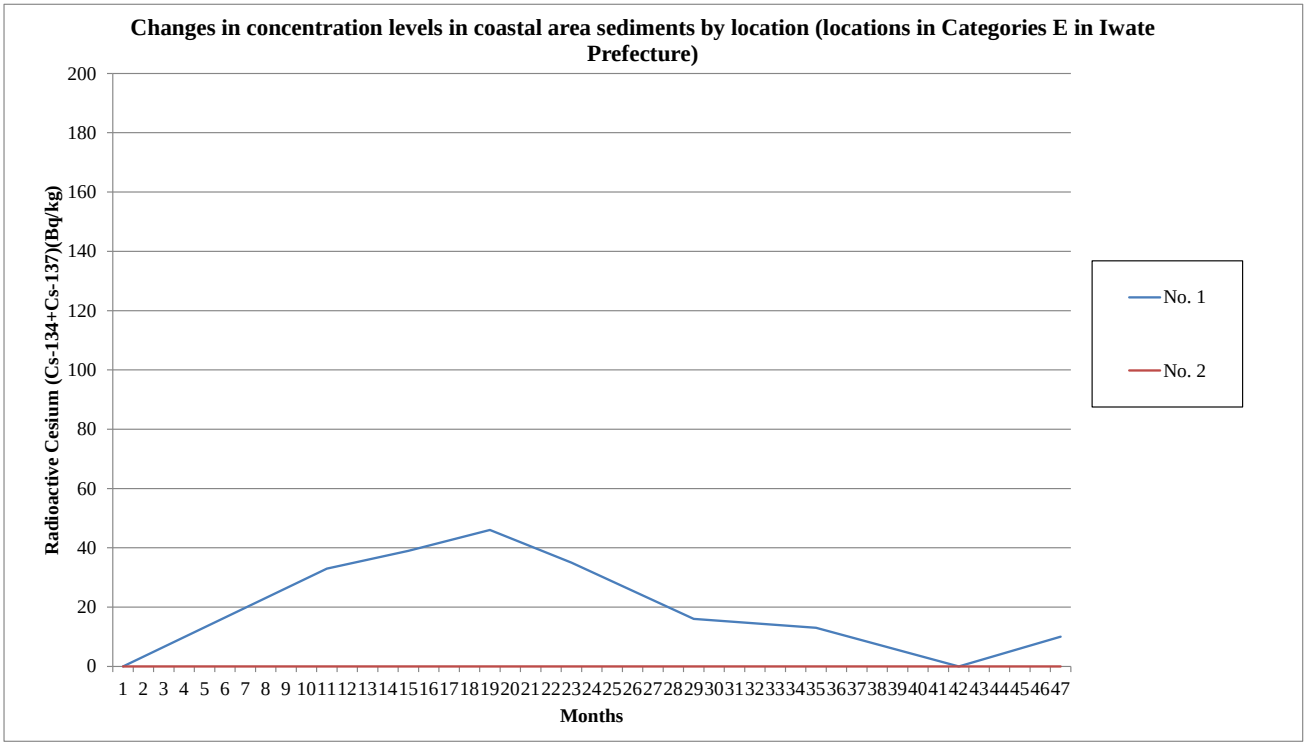


Figure 4.3-19 Changes in concentration levels over the years at respective locations

(Iwate Prefecture: coastal area sediments)

Table 4.3-36 Detection of radioactive cesium at respective locations

(Iwate Prefecture: coastal area sediments)

Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																													
No.	Location	FY2011								FY2012												Fy2013									
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Ofunato Bay (A)						0										33				39				46				35				
2	Hirota Bay						0										0			0					0				0				
		total number of samples		18	Detection times		7																										

*1: Blank cells are locations where samples were not collected. The result “Not detectable” is indicated as “0.”

Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																							Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Location	Fy2014												FY2015															
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Ofunato Bay (A)		16						13							0					10						5.0	1	0.81	
2	Hirota Bay		0						0							0					0						0	2	-	

*1: Blank cells are locations where samples were not collected. The result “Not detectable” is indicated as “0.”

A	B	C	D	E

3 Average

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

2) Miyagi Prefecture

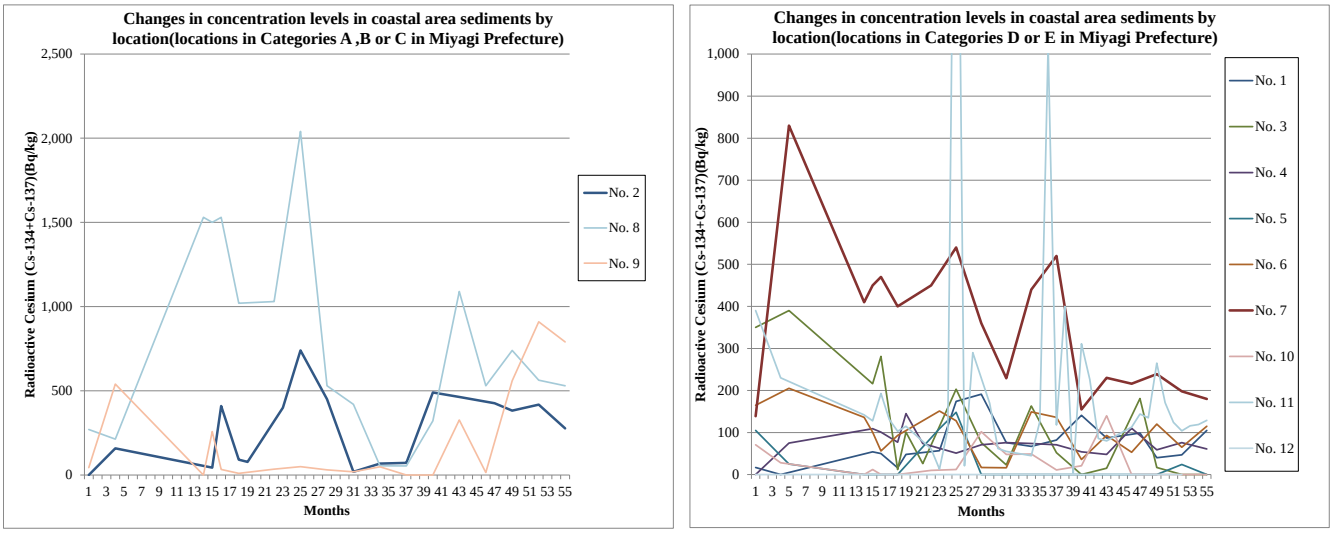
In Miyagi Prefecture, surveys were conducted 9 to 37 times from October 2011 to February 2016 for coastal area sediment samples collected at 12 locations (excluding the 28 locations surveyed only in 2011 from the analysis herein).

Regarding concentration levels of detected values, one location was categorized into Category A, one location into Category B , one location into Category C, five locations into Category D, and four locations into Category E (see Table 4.3-37 and Table 4.3-38).

Concentration levels were generally decreasing at two locations, were unchanged at two locations, fluctuating at six locations, and generally increasing at two locations.

Table 4.3-37 Categorization of detected values at respective locations
(Miyagi Prefecture: coastal area sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	1	No.8
B	Upper 5 to 10 percentile	1	No.9
C	Upper 10 to 25 percentile	1	No.2
D	Upper 25 to 50 percentile	5	No.1、No.4、No.6、No.7、No.11
E	Upper 50 to 100 percentile(lower 50%)	4	No.3、No.5、No.10、No.12



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-20 Changes in concentration levels over the years at respective locations
(Miyagi Prefecture: coastal area sediments)

Table 4.3-38 Detection of radioactive cesium at respective locations

(Miyagi Prefecture: coastal area sediments)

No.	Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																														
			FY2011							FY2012													FY2013										
			8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Kesennuma Bay (B)	Offshore of Hachigasaki			17			0											54	50	16	48				57	174			191			76	
2	Kesennuma Bay (C)	Offshore of Oshimakita			0			158											44	410	91	78				400	740			450			19	
3	All other neighboring sea areas	Oppa Bay (Jyusanhama Beach)			350				390										216	281	12	101		26			203			76			23	
4	Neighboring sea area of Ishinomaki (C)	Lake Mangokuura, M-6 (center)			0				75										109	101	77	145		74			51			71			76	
5	Neighboring sea area of Ishinomaki (B-3)	Offshore of Kitakami River Estuary			105				25									0	0	0	0					109	148			0			0	
6	Neighboring sea area of Ishinomaki (C)	Offshore of Naruse			165				205									136	101	56	93					151	128			17			16	
7	Matsushima Bay (B)	Nishihama Beach			139				830									410	450	470	400				450		540			360			229	
8	Neighboring sea area of Sendai Port(A)	Naiko Inner Port, 4-Nai			270			213										1,530	1,500	1,530	1,020				1,030		2,040			530			420	
9	Neighboring sea area of Sendai Port (B)	Gamo-3			44			540										0	258	33	10				35		50			31			19	
10	All other neighboring sea areas	Ido-5			71			28										0	12	0	0				10		12			102			48	
11	Offshore of Abukuma River Estuary				390			230										142	128	193	131	103	115			61	13	108	2,030	21	290		170	62	55	
12	Offshore of Tsuyagawa River Estuary				0														0			0					0				0				
			total number of samples		226	Detection times		187																											

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

No.	Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
			FY2014												FY2015																	
			4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3						
1	Kesennuma Bay (B)	Offshore of Hachigasaki		67			82			141			87				99		40			47			105			73	1	0.69	
2	Kesennuma Bay (C)	Offshore of Oshimakita		68			72			490			464				426		382			418			277			376	2	0.77	
3	All other neighboring sea areas	Oppa Bay (Jyusanhama Beach)		163			52			0			15				181		17			0			0			50	3	1.09	
4	Neighboring sea area of Ishinomaki (C)	Lake Mangokuura, M-6 (center)		74			71			54			48			110			59			76			61			77	4	0.41	
5	Neighboring sea area of Ishinomaki (B-3)	Offshore of Kitakami River Estuary		0			0			0			0			0			0			24			0			6.0	5	2.03	
6	Neighboring sea area of Ishinomaki (C)	Offshore of Naruse		149			136			36			93			53			120			65			115			88	6	0.52	
7	Matsushima Bay (B)	Nishihama Beach		440			520			155			230			216			239			198			180			208	7	0.50	
8	Neighboring sea area of Sendai Port(A)	Naiko Inner Port, 4-Nai		55			54			322			1,090			530			740			563			530			591	8	0.74	
9	Neighboring sea area of Sendai Port (B)	Gamo-3		49			0			0			327			15			560			910			790			569	9	1.45	
10	All other neighboring sea areas	Ido-5		49			11			21			140			0			0			0			0			0	10	1.43	
11	Offshore of Abukuma River Estuary			45	126	1,020	118	400	0	311	226	86	80			113	144	135	265	171	124	104	116	119	129			142	11	1.61	
12	Offshore of Tsuyagawa River Estuary			0						0							0					0						0	12		

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

A	B	C	D	E

182 Average

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) Decreasing Increasing Unchanged Varying

3) Fukushima Prefecture

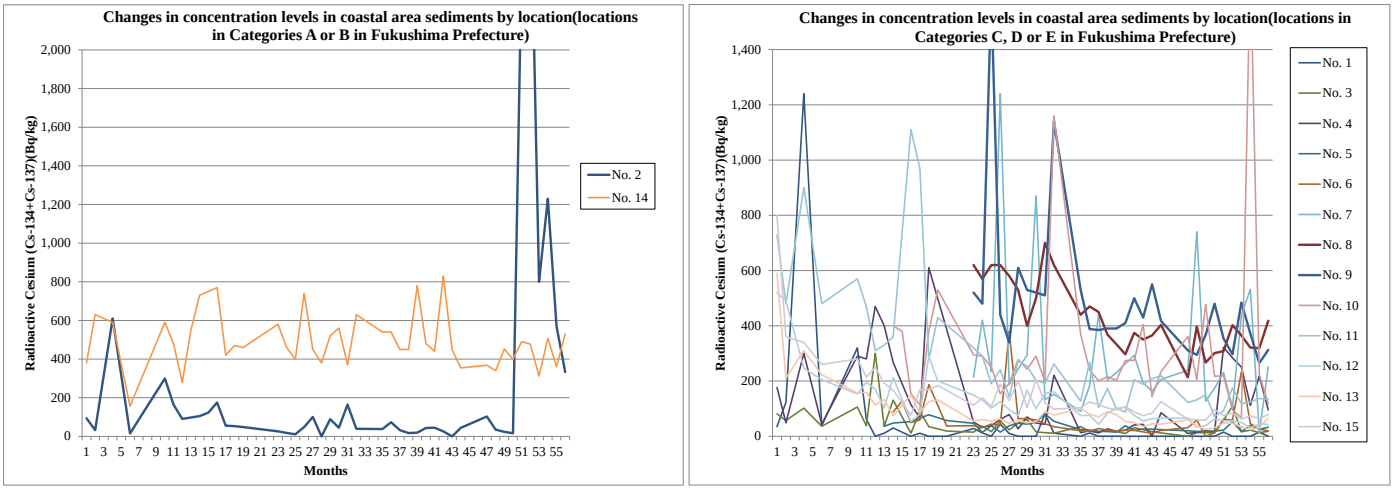
In Fukushima Prefecture, surveys were conducted 30 to 43 times from October 2011 to February 2016 for coastal area sediment samples collected at 15 locations (this analysis excludes the survey results at eight locations where the survey was conducted only once in 2011).

Regarding concentration levels of detected values, one location was categorized into Category A, one location into Category B, four locations into Category C, three locations into Category D, and six locations into Category E (see Table 4.3-39 and Table 4.3-40).

Concentration levels were generally decreasing at nine locations, were generally unchanged at one location, were fluctuating at four locations, and generally increasing at one location.

Table 4.3-39 Categorization of detected values at respective locations
(Fukushima Prefecture: coastal area sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	1	No.2
B	Upper 5 to 10 percentile	1	No.14
C	Upper 10 to 25 percentile	4	No.7、No.8、No.9、No.10
D	Upper 25 to 50 percentile	3	No.4、No.11、No.15
E	Upper 50 to 100 percentile(lower 50%)	6	No.1、No.3、No.5、No.6、No.12、No.13



(*) Scales of the vertical axes differ in the left and right figures.

Figure 4.3-21 Changes in concentration levels over the years at respective locations
(Fukushima Prefecture: coastal area sediments)

Table 4.3-40 Detection of radioactive cesium at respective locations

(Fukushima Prefecture: coastal area sediments)

No.	Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																	
			FY2011								FY2012														FY2013												
			8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11		12	1	2		3	4	5	6	7		8	9	10	11	12	1	2	3
1	Neighboring sea area of Soso	Approx. 2,000 m offshore of Tsurushihama Fishing Port			35	123		1,240		38				320	62	0	11	30		0	11	0		0			28	12	0	44	10	0	0	0	81	11	
2	Matsukawaura sea area	Around center of Fishing Right Area-1 in Matsukawaura sea area			94	32		610		15				300	164	90		105	123	175	55	53	48					26	18	11	48	101	0	89	45	164	39	
3	Neighboring sea area of Soso	Approx. 2,000 m offshore of Manogawa River			81	57		102		36				106	38	300	36	131		11	91	35		19				15	36	17	55	23	48	61	16	13	11	
4	Neighboring sea area of Haramachi City	Approx. 1,000 m offshore of Niida River			177	49		300		44				290	280	470	400	268		114	67	610						51	33	38	61	79	27	70	48	43	221	
5		Approx. 1,000 m offshore of Ota River															36	48		53		78		57				47	14	38	15	38	47	44	51	81	54	
6	Neighboring sea area of Soso District	Approx. 1,000 m offshore of Odaka River																88	127	50	59	187		37				38	31	44	39	380	64	64	59	45	35	
7		Approx. 2,000 m offshore of Ukedo River																										214	420	234	1,240	187	243	294	870	133	152	
8		Approx. 1,000 m offshore of Kumagawa River																										620	570	620	620	580	530	400	500	700	620	
9		Approx. 1,000 m offshore of Tomioka River																										520	480	1,600	440	340	610	530	520	510	1,140	
10	Neighboring sea area of Naraha Town	Approx. 1,000 m offshore of Kidogawa River																400	380	154	113	380	530					295	290	251	154	191	278	243	290	198	1,160	
11	Approx. 1,000 m offshore of Asami River Estuary				730	480		900		480				570	470	310	330	360		1,110	970	277	430					320	290	190	241	143	272	254	202	192	262	
12	Approx. 1,000 m offshore of Ohisa River Estuary				520	490		246		205				153	196	170	102	213		54	80	290	200					149	131	102	125	96	75	167	100	155	161	
13	Neighboring sea area of Iwaki City	Approx. 1,500 m offshore of Natsui River			590	211		310		223				156	159	113	133	74		150	86	125	132					55	60	55	63	47	57	49	53	90	76	
14	Onahama Port	Approx. 400 m north of Nishibouhatei No. 2			380	630		590		156				590	480	280	550	730		770	420	470	460					580	460	400	740	450	380	520	560	370	630	
15	Joban coastal sea area	Approx. 1,000 m offshore of Binda River			800	360		340		260				280	214	249	193	167		77	168	169	184					112	139	108	189	129	200	104	205	122	98	
			total number of samples	583	Detection times	553																																

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

No.	Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																								Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
			FY2014												FY2015																
			4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Neighboring sea area of Soso	Approx. 2,000 m offshore of Tsurushihama Fishing Port		0	12	0	0	0	0	0	0	0	0			0	0	0	0	15	0	0	0	15	0			3.0	1	3.96	
2	Matsukawaura sea area	Around center of Fishing Right Area-1 in Matsukawaura sea area		38	73	32	17	19	43	45	26	0	44			103	35	23	16	2,460	2,950	800	1,230	570	333			852	2	2.29	
3	Neighboring sea area of Soso	Approx. 2,000 m offshore of Manogawa River		35	18	17	20	17	10	31	24	17	12			0	13	13	12	58	109	16	22	13	18			27	3	1.21	
4	Neighboring sea area of Haramachi City	Approx. 1,000 m offshore of Niida River		13	20	12	27	18	22	41	43	0	85			10	15	20	17	322	284	251	112	218	95			134	4	1.13	
5		Approx. 1,000 m offshore of Ota River		24	22	18	17	15	38	21	26	26	24			20	18	17	19	22	52	17	39	25	33			26	5	0.52	
6	Neighboring sea area of Soso District	Approx. 1,000 m offshore of Odaka River		20	18	28	22	18	22	21	16	10	21			31	59	0	12	62	58	232	46	26	20			55	6	1.25	
7		Approx. 2,000 m offshore of Ukedo River		90	182	440	205	230	263	293	194	163	206			239	740	127	174	231	104	440	532	13	251			285	7	0.84	
8		Approx. 1,000 m offshore of Kumagawa River		440	470	450	368	333	297	374	350	365	403			213	397	267	301	308	402	365	321	319	418			331	8	0.29	
9		Approx. 1,000 m offshore of Tomioka River		530	388	385	390	390	410	500	430	550	417			311	295	367	480	354	297	484	372	265	313			354	9	0.54	
10	Neighboring sea area of Naraha Town	Approx. 1,000 m offshore of Kidogawa River		370	240	201	215	203	274	275	404	144	234			361	206	477	217	219	95	67	1,740	224	118			372	10	0.95	
11	Approx. 1,000 m offshore of Asami River Estuary			127	268	105	173	100	88	205	188	209	219			123	132	150	72	92	175	118	124	137	134			126	11	0.81	
12	Approx. 1,000 m offshore of Ohisa River Estuary			75	76	43	84	101	105	76	55	64	65			66	33	38	63	56	55	50	31	45	43			48	12	0.84	
13	Neighboring sea area of Iwaki City	Approx. 1,500 m offshore of Natsui River		101	80	70	89	78	54	50	35	45	44			60	37	25	31	48	47	35	24	32	66			41	13	1.01	
14	Onahama Port	Approx. 400 m north of Nishibouhatei No. 2		540	540	450	450	780	480	440	830	449	354			368	340	452	399	490	477	312	508	361	530			424	14	0.28	
15	Joban coastal sea area	Approx. 1,000 m offshore of Binda River		104	124	114	102	96	108	88	75	84	125			62	60	58	96	75	84	62	74	64	79			71	15	0.82	
																						A	B	C	D	E		210	Average		

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) ↘ Decreasing ↗ Increasing ⇝ Unchanged ∿ Varying

4) Ibaraki Prefecture

In Ibaraki Prefecture, surveys were conducted 19 to 21 times from October 2011 to February 2016 for coastal area sediment samples collected at five locations.

Regarding concentration levels of detected values, all five locations were categorized into Category E (see Table 4.3-41 and Table 4.3-42).

Concentration levels were generally decreasing at three locations and were generally varying at two locations.

Table 4.3-41 Categorization of detected values at respective locations
(Ibaraki Prefecture: coastal area sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	0	(None)
D	Upper 25 to 50 percentile	0	(None)
E	Upper 50 to 100 percentile(lower 50%)	5	No.1、No.2、No.3、No.4、No.5

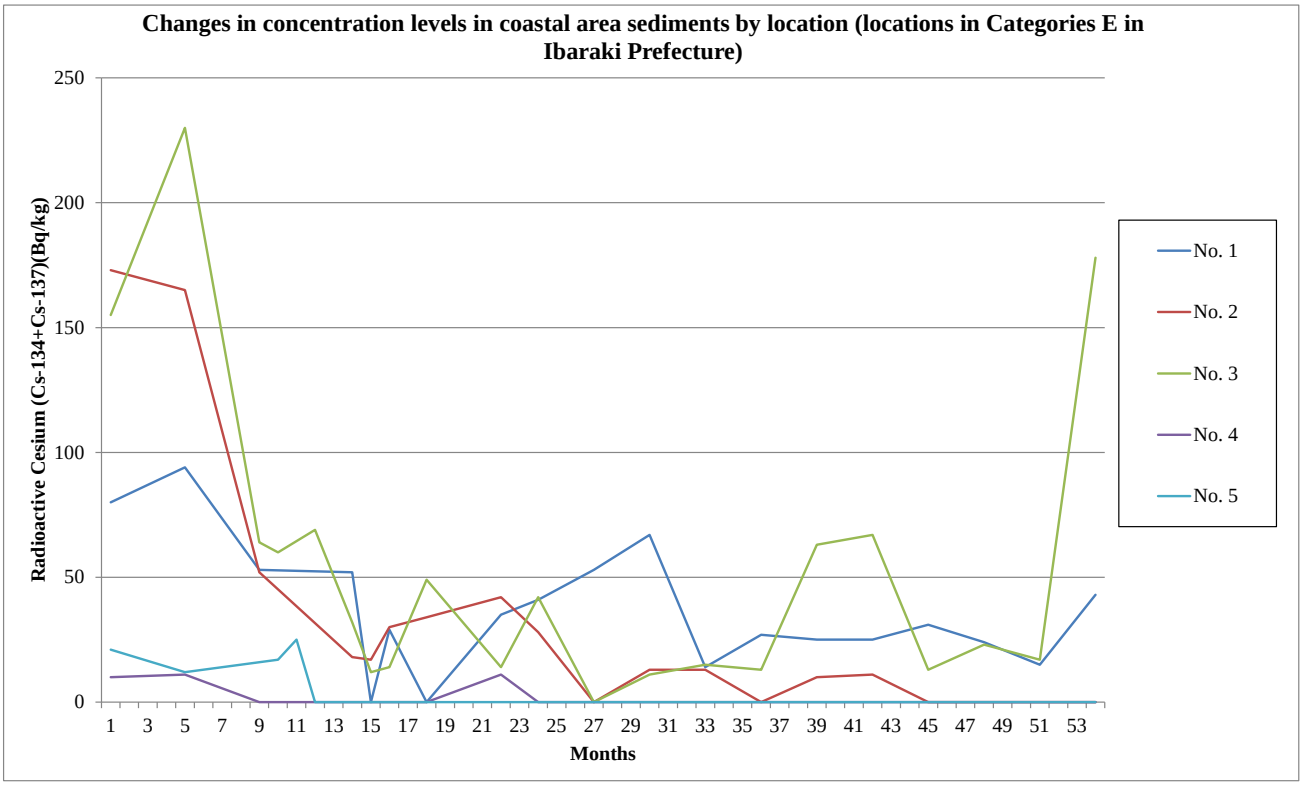


Figure 4.3-22 Changes in concentration levels over the years at respective locations
(Ibaraki Prefecture: coastal area sediments)

Table 4.3-42 Detection of radioactive cesium at respective locations

(Ibaraki Prefecture: coastal area sediments)

Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																																
No.	Location	FY2011								FY2012												FY2013											
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Offshore of Satone River Estuary			80				94				53				52	0	29		0				35		41			53			67	
2	Offshore of Okita River Estuary			173				165				52				18	17	30		34				42		28			0			13	
3	Offshore of Momiya River/Kujigawa River Estuaries			155				230				64	60	69		32	12	14		49				14		42			0			11	
4	Neighboring water body of Ken-o Offshore of Nakagawa River			10				11				0	0	0		0	0	0		0				11		0			0			0	
5	Offshore of Tonegawa River Estuary			21				12					17	25	0		0	0	0			0			0		0			0			0	

total number of samples	101	Detection times	57

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location		Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)																							Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
No.	Location	FY2014												FY2015															
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3					
1	Offshore of Satone River Estuary		14			27			25			25			31			24			15			43			28	1	0.67	
2	Offshore of Okita River Estuary		13			0			10			11			0			0			0			0			0	2	1.59	
3	Offshore of Momiya River/Kujigawa River Estuaries		15			13			63			67			13			23			17			178			58	3	1.13	
4	Neighboring water body of Ken-o Offshore of Nakagawa River		0			0			0			0			0			0			0			0			0	4	2.51	
5	Offshore of Tonegawa River Estuary		0			0			0			0				0			0		0			0			0	5	2.20	

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

A	B	C	D	E

17 | Average

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) ↘ Decreasing ↗ Increasing ~→ Unchanged ∧∨ Varying

5) Chiba Prefecture and Tokyo Metropolis

In Chiba Prefecture and Tokyo Metropolis, surveys were conducted 17 to 29 times from May 2012 to February 2016 for coastal area sediment samples collected at eight locations in total.

Regarding concentration levels of detected values, one location was categorized into Category C, three locations were categorized into Category D and four locations were categorized into Category E (see Table 4.3-43 and Table 4.3-44).

Concentration levels were generally decreasing at four locations, were fluctuating at three locations, and increasing at one location.

Table 4.3-43 Categorization of detected values at respective locations
(Chiba Prefecture and Tokyo Metropolis: coastal area sediments)

Category	Percentile (percentile in all detected values)	Number of locations	Locations
A	Upper 5 percentile	0	(None)
B	Upper 5 to 10 percentile	0	(None)
C	Upper 10 to 25 percentile	1	No.6
D	Upper 25 to 50 percentile	3	No.5、No.7、No.8
E	Upper 50 to 100 percentile(lower 50%)	4	No.1、No.2、No.3、No.4

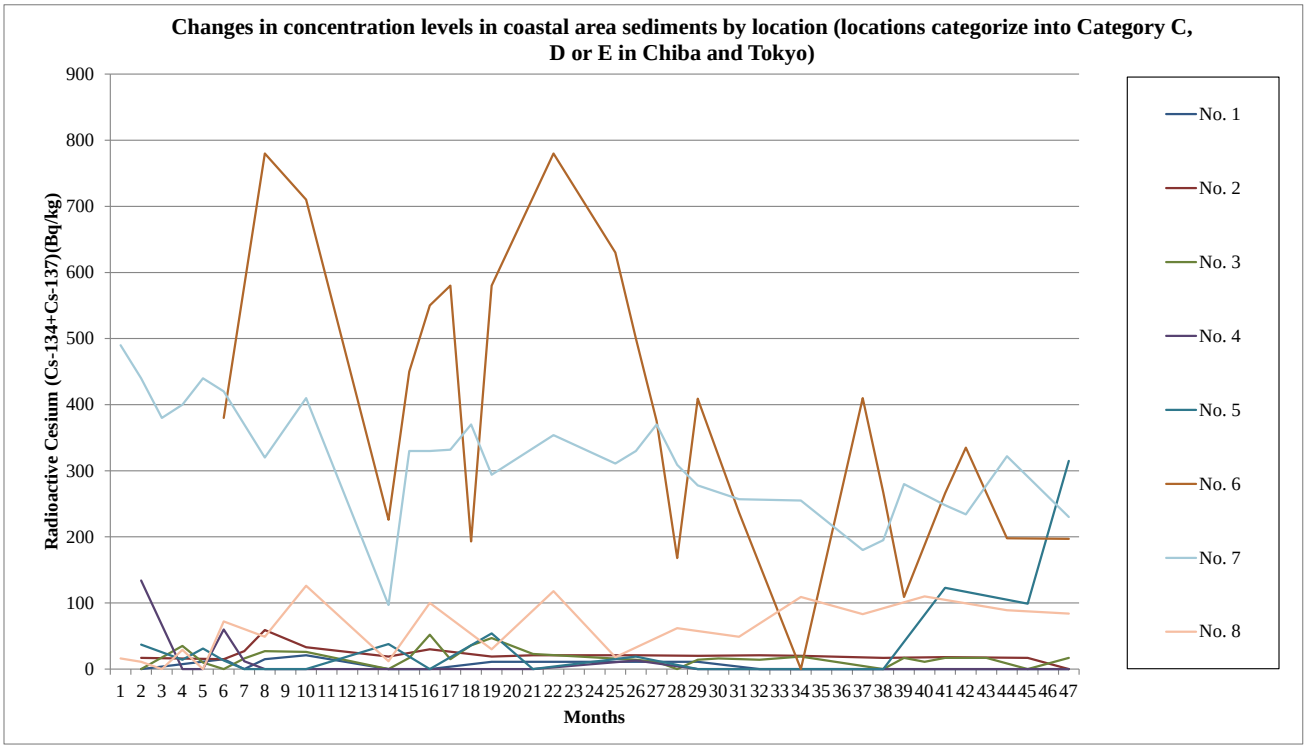


Figure 4.3-23 Changes in concentration levels over the years at respective locations
(Chiba Prefecture and Tokyo Metropolis: coastal area sediments)

Table 4.3-44 Detection of radioactive cesium at respective locations (Chiba Prefecture and Tokyo Metropolis: coastal area sediments)

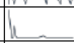
Location / Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)

No.	Prefecture	Location		FY2011 8	9	10	11	12	1	2	3	FY2012 4	5	6	7	8	9	10	11	12	1	2	3	FY2013 4	5	6	7	8	9	10	11	12	1	2	3
1	Chiba Prefecture	Tokyo Bay 7	Offshore of Yorogawa River Estuary											0				15	0	15		21				0		0			11		11		
2	Chiba Prefecture	Tokyo Bay 5	Offshore of Miyako River Estuary											17				15	27	59		33				19		30			19		21		
3	Chiba Prefecture	Coastal sea area of Makuhari	Offshore of Inbanuma Discharge Channel											0		35	10	0	16	27		26				0	17	52	15	36	47		23		
4	Chiba Prefecture	Approx. 1 km offshore of Ebigawa River Estuary	Coastal area of Keiyo Port (Ebigawa River Estuary)											134		0	0	60	12	0		0				0		0			0		0		
5	Chiba Prefecture	Approx. 1 km offshore of Edogawa River Estuary	Coastal area of Keiyo Port (Ebigawa River Estuary)											37		14	31	13	0	0		0				38		0			54		0		
6	Tokyo Metropolis	Approx. 1 km offshore of Kyu-Edogawa River Estuary	Offshore of Kyu-Edogawa River Estuary															380		780		710				226	450	550	580	193	580			780	
7	Tokyo Metropolis	St-8	Offshore of Arakawa River/Kyu-Edogawa River Estuaries										490	440	380	400	440	420		320		410				97	330	330	332	370	294			354	
8	Tokyo Metropolis	Southwestern area of Toyosu Wharf	Offshore of Sumida River Estuary										16	11	0	29	0	72		49		126				12		100			30			118	

total number of samples	173	Detection times	129

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

Location / Coastal area sediments/Radioactive Cesium (Cs-134+Cs-137)/Concentration(Bq/kg)(*1)

No.	Prefecture	Location		FY2014 4	5	6	7	8	9	10	11	12	1	2	3	FY2014 4	5	6	7	8	9	10	11	12	1	2	3	Changes	Average of FY2015 (*2)	No.	coefficient of variation	Trends (*3)
1	Chiba Prefecture	Tokyo Bay 7	Offshore of Yorogawa River Estuary			11			11			0		0				0			0			0		0			0	1	1.30	Varying
2	Chiba Prefecture	Tokyo Bay 5	Offshore of Miyako River Estuary			21			20			21		20				17			18			17		0			13	2	0.54	Decreasing
3	Chiba Prefecture	Coastal sea area of Makuhari	Offshore of Inbanuma Discharge Channel			14	11	0	14	16		14		19				0	17	11	17	17		0		17			11	3	0.80	Varying
4	Chiba Prefecture	Approx. 1 km offshore of Ebigawa River Estuary	Coastal area of Keiyo Port (Ebigawa River Estuary)			13			0			0		0				0			0			0		0			0	4	2.84	Decreasing
5	Chiba Prefecture	Approx. 1 km offshore of Edogawa River Estuary	Coastal area of Keiyo Port (Ebigawa River Estuary)			19			0			0		0				0			123			99		315			134	5	1.93	Increasing
6	Tokyo Metropolis	Approx. 1 km offshore of Kyu-Edogawa River Estuary	Offshore of Kyu-Edogawa River Estuary		630	500	375	168	409		237			0			410	267	109		266 335		198			197			255	6	0.55	Decreasing
7	Tokyo Metropolis	St-8	Offshore of Arakawa River/Kyu-Edogawa River Estuaries		311	330	370	309	278		257			255			180	195	280		248 234		322			230			241	7	0.27	Decreasing
8	Tokyo Metropolis	Southwestern area of Toyosu Wharf	Offshore of Sumida River Estuary		18			62			49			109			83			110			89			84			92	8	0.72	Varying
																													93	Average		

*1: Blank cells are locations where samples were not collected. The result "Not detectable" is indicated as "0."

A | B | C | D | E

*2: Arithmetic Average; calculated by assuming ND=0; Color codes show categories (see the right).

*3: Results of the analysis of trends at respective locations using the method explained on 4.3(1) 2) ↘ Decreasing ↗ Increasing ⤳ Unchanged ⩘ Varying

(3) Conclusion

Concentration levels of detected values for sediment samples from public water areas (rivers, lakes, and coastal areas) from FY2011 to FY2015 and their changes shown so far are summarized as follows (see Figure 4.3-24 and Table 4.3-45).

1) Concentration levels of detected values

・Rivers

Within all surveyed locations (396 locations in total), the number of locations categorized into Category A or B, which fall under the upper 10%, was the largest in Hamadori in Fukushima Prefecture (20 locations). Such locations were also found in Nakadori, Fukushima Prefecture, Ibaraki Prefecture, Gunma Prefecture and Chiba Prefecture.

• Lakes

Among all the locations (164 locations), locations categorized into Category A or B were found in Hamadori in Fukushima Prefecture.

• Coastal areas

Among all locations (42 locations), locations categorized into Category A or B were found in Miyagi and Fukushima Prefectures.

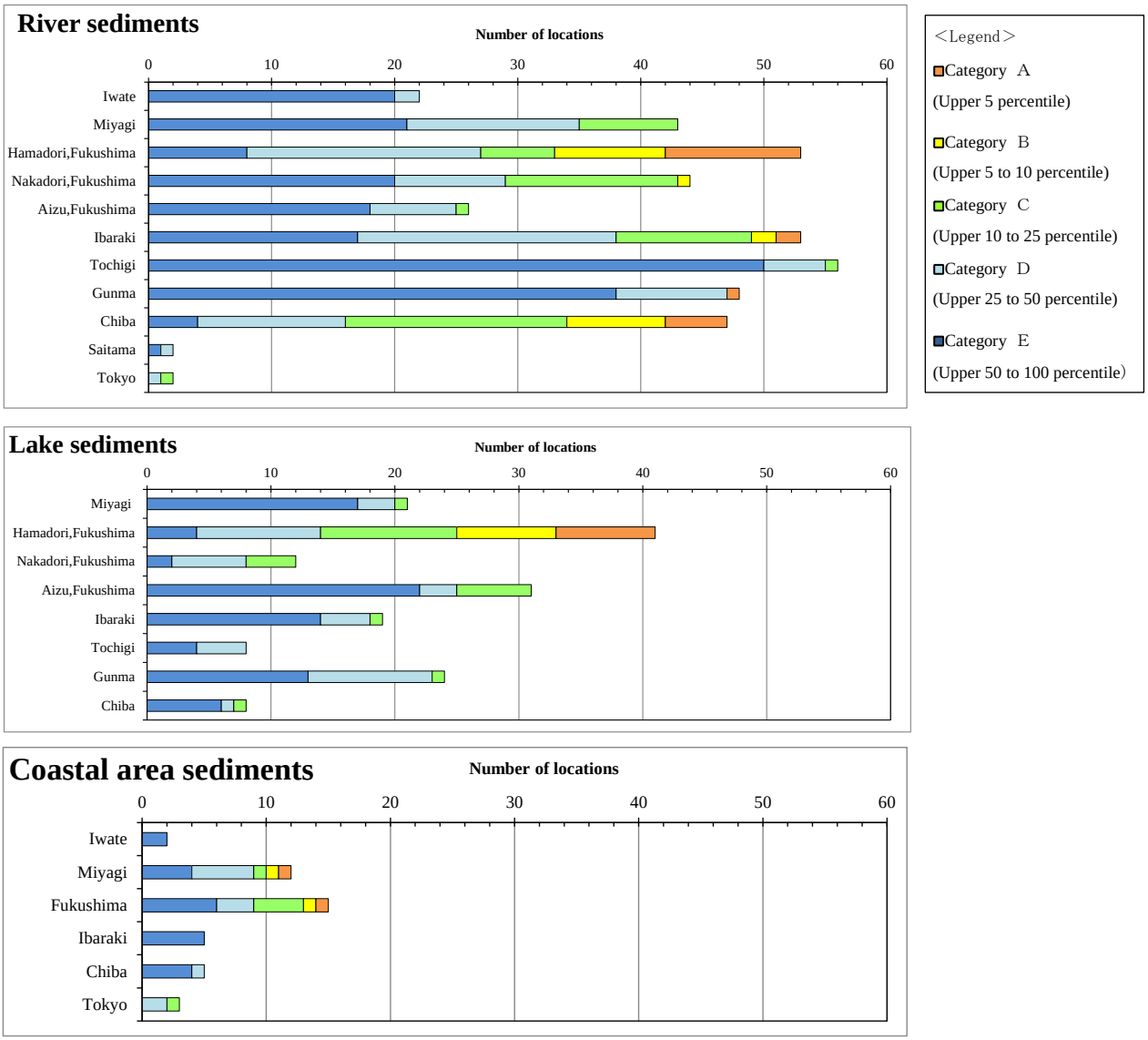


Figure 4.3-24 Categorization by concentration levels of detected values for sediment samples

(upper: rivers; middle: lakes; lower: coastal areas)

(* Figure 4.3-24 shows the aforementioned Table 3.1-1 graphically.)

2) Changes in detected values

・Rivers

A decreasing trend was observed at most locations.

・Lakes

Detected values were generally decreasing or unchanged at most locations but some locations showed fluctuations.

• Coastal areas

A decreasing trend was observed at most locations except for some locations showing fluctuations.

Table 4.3-45 Changes in detected values for sediment samples from public water areas (rivers, lakes, and coastal areas)

<Rivers>

Trends	Number of locations												
	Iwate	Miyagi	Fukushima			Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Total	
			Hamadori	Nakadori	Aizu							Number of locations	Percentage
Decreasing	19	35	47	41	21	46	39	31	37	2	1	319	80.6
Unchanged	0	0	2	0	1	2	1	1	2	0	1	10	2.5
Varying	3	8	4	3	4	5	16	16	8	0	0	67	16.9
Increasing	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total	22	43	53	44	26	53	56	48	47	2	2	396	100.0

<Lakes>

Trends	Number of locations									
	Miyagi	Fukushima			Ibaraki	Tochigi	Gunma	Chiba	Total	
		Hamadori	Nakadori	Aizu					Number of locations	Percentage
Decreasing	13	22	5	7	8	2	6	6	69	42.1
Unchanged	2	2	1	7	8	1	7	2	30	18.3
Varying	5	13	5	10	2	4	8	0	47	28.7
Increasing	1	4	1	7	1	1	3	0	18	11.0
Total	21	41	12	31	19	8	24	8	164	100.0

<Coastal areas>

Trends	Number of locations							
	Iwate	Miyagi	Fukushima	Ibaraki	Chiba	Tokyo	Total	
							Number of locations	Percentage
Decreasing	0	2	9	3	2	2	18	42.9
Unchanged	1	2	1	0	0	0	4	9.5
Varying	1	6	4	2	2	1	16	38.1
Increasing	0	2	1	0	1	0	4	9.5
Total	2	12	15	5	5	3	42	100.0

3) Summary by prefecture

Concentration levels of detected values and their changes are summarized by prefecture as follows (see Figures 4.3-25 to 4.3-27).

(i) Iwate Prefecture

- Surveyed locations for rivers were the 22 locations categorized into Category D or E. A decreasing trend was observed at most locations.
- Surveyed locations for coastal areas were all two locations categorized into Category E. An unchanged trend was observed at most locations except for several locations showing fluctuations.

(ii) Miyagi Prefecture

- Surveyed locations for rivers were over 80% categorized into Category D or E, among the 43 locations, some locations in the lower reaches were Category C. A decreasing trend was observed at most locations.
- Surveyed locations for lakes were almost all categorized into Category D or E, among the 21 locations, only one location categorized into Category C. Concentration levels were generally decreasing or unchanged at most locations.
- Surveyed locations for coastal areas were three-quarters of all locations categorized into Category D or E, among the 12 locations, one categorized into Category A, another into Category B, and yet another into Category C. There was a location categorized into Category A in the Sendai Port. Concentration levels were fluctuating at many locations and the other locations shown mixture of each trend.

(iii) Hamadori, Fukushima Prefecture

- Approximately 50% of the 53 surveyed locations for rivers were categorized into Category A, B or C. Many of the locations categorized into Category A or B were found near or northwest to Fukushima Daiichi NPS, while the locations categorized into Category C were seen in the northern and southern parts of the district. A decreasing trend was observed at most locations.
- Approximately 70% of the 41 surveyed locations for lakes were categorized into Category A, B or C. Many of the locations categorized into Category A or B were found northwest to Fukushima Daiichi NPS. A decreasing or unchanged trend was observed generally at most locations except for several locations showing fluctuations.
- 60% of the 15 surveyed locations for coastal areas were categorized into Category D or E and the rest were categorized into Category A, B, or C. The one location categorized into Category A was seen in the Matsukawaura. A decreasing trend was observed generally at most locations except for several locations showing fluctuations.

(iv) Nakadori, Fukushima Prefecture

- Approximately 70% of the 44 surveyed locations for rivers were categorized into Category D or E and the rest were categorized into Category B or C. The locations categorized into Category B or C were found from the center of the Abukuma River to the northern part. A decreasing trend was observed at most locations.
- Eight of the 12 surveyed locations for lakes were categorized into Category D or E and the rest four locations were categorized into Category C. The locations categorized into Category C were seen in the upper and

lower reaches of the Abukuma River basin. A decreasing trend was observed at most locations except for several locations showing fluctuations.

(v) Aizu, Fukushima Prefecture

- One of the 26 surveyed location for rivers was categorized into Category C and all the remaining locations were categorized into Category D or E. A decreasing trend was observed at most locations.
- Six of the 31 surveyed locations for lakes were categorized into Category C and over 80% of the locations were categorized into Category D or E. Concentration levels were fluctuations at many locations and the other locations showed mixture of each trend.

(vi) Ibaraki Prefecture

- Over 70% of the 53 surveyed locations for rivers were categorized into Category D or E and the rest were categorized into Category A, B, or C. The locations categorized into Category A or B were found in rivers flowing into Lake Kasumigaura. A decreasing trend was observed at most locations.
- One of the 19 surveyed location for lakes was categorized into Category C in the northern part of the prefecture and the remaining locations were categorized into Category D or E. A decreasing or unchanged trend was observed at most locations.
- Surveyed locations for coastal areas were all the categorized into Category E. A decreasing trend was observed generally at most locations except for several locations showing fluctuations.

(vii) Tochigi Prefecture

- One of the 56 surveyed locations for rivers was categorized into Category C and the remaining locations were categorized into Category D or E. A decreasing trend was observed generally at most locations except for several locations showing fluctuations.
- All eight locations for lakes were categorized into Category D or E. Concentration levels were fluctuating at many locations and the other locations showing mixture of each trend.

(viii) Gunma Prefecture

- One of the 48 surveyed locations for rivers was categorized into Category A in the lower reach of the Watarase River basin and all remaining locations were categorized into Category D or E. A decreasing trend was observed generally at most locations except for several locations showing fluctuations.
- One of the 24 surveyed locations for lakes was categorized into Category C and all remaining locations were categorized into Category D or E. Concentration levels were fluctuating at many locations and other locations showing mixture of each trend.

(ix) Chiba and Saitama Prefectures and Tokyo Metropolis

- Over 60% of the 51 surveyed locations for rivers were categorized into Category A, B, or C. The locations categorized into Category A or B were found in rivers flowing into Lake Teganuma or Lake Inbanuma, the Edogawa River system, and a part of the Tonegawa River system. A decreasing trend was observed at most locations.
- One of the eight surveyed locations for lakes was categorized into Category C in Lake Teganuma and all the remaining locations were categorized into Category D or E. A decreasing trend was observed at most locations.

• One of the eight surveyed location for lake was categorized into Category C at the mouth of the Kyuedogawa River and all remaining locations were categorized into Category D or E. A decreasing trend was observed at most locations except for several locations showing fluctuations.

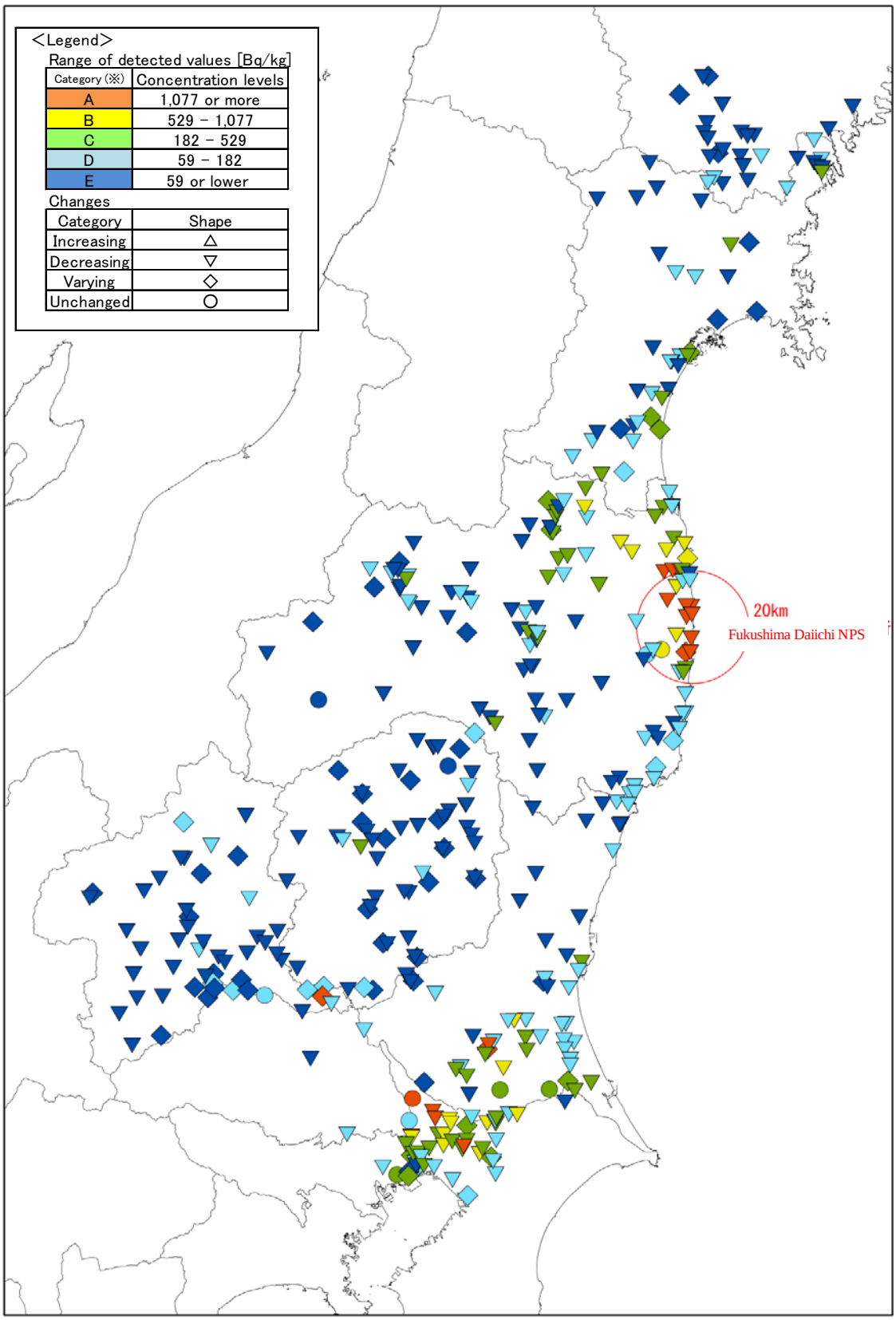


Figure 4.3-25 Categorization of and changes in concentration levels for river sediment samples from public water areas

(*) Categories A to E show relative concentration levels for river sediment samples and cannot be compared with those for lake sediment samples or coastal area sediment samples.

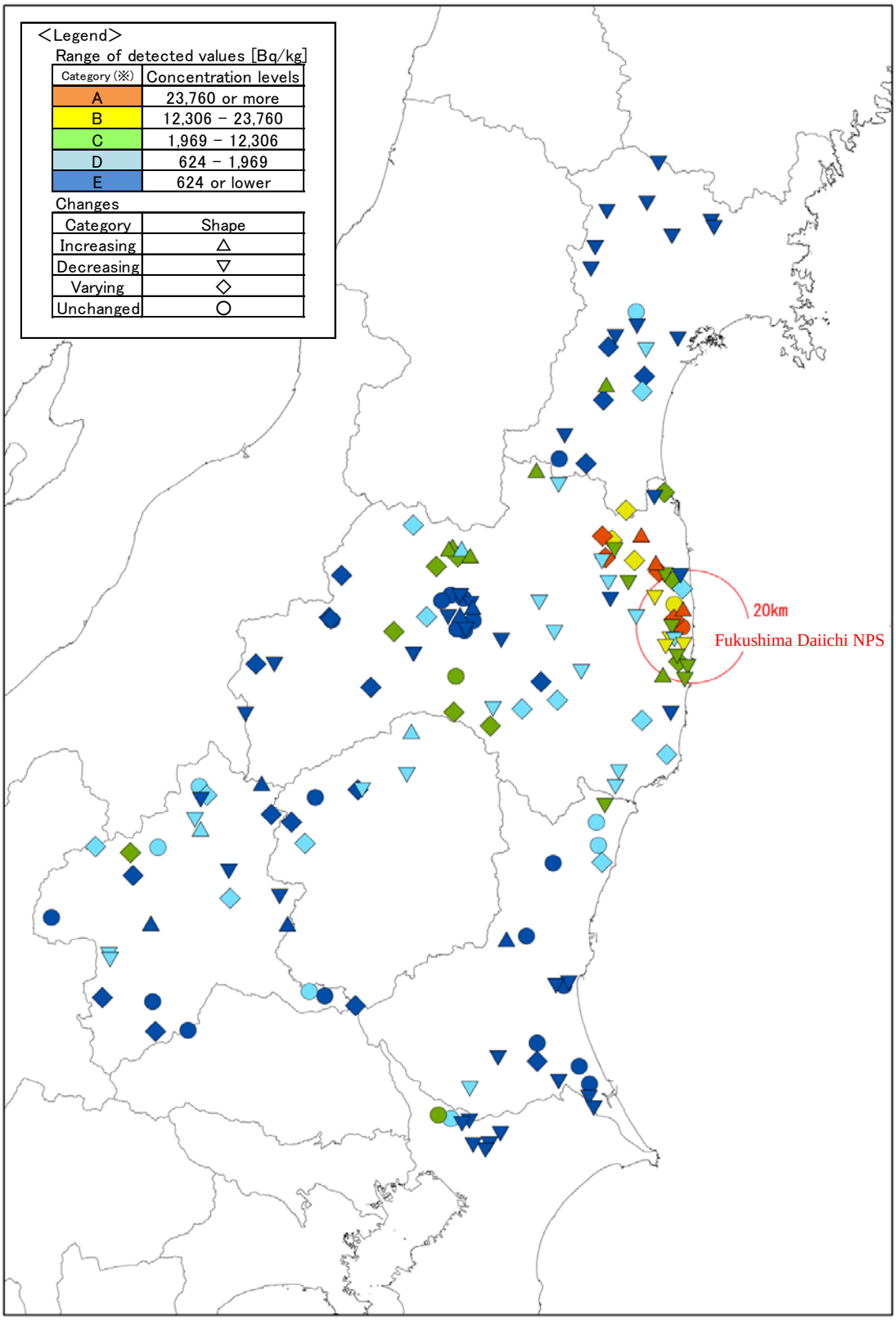


Figure 4.3-26 Categorization of and changes in concentration levels for lake sediment samples from public water areas

(*) Categories A to E show relative concentration levels for lake sediment samples and cannot be compared with those for river sediment samples or coastal area sediment samples.

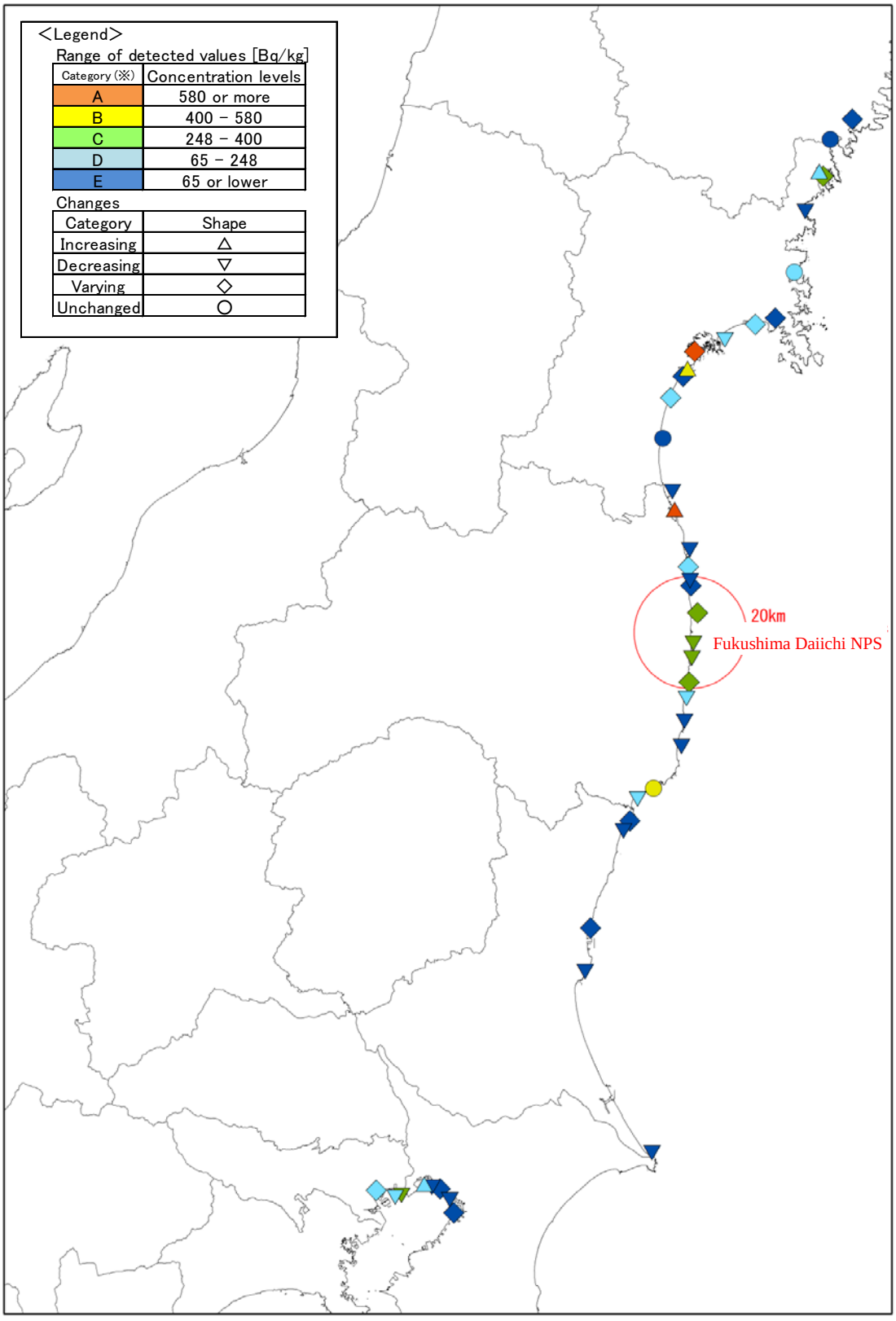


Figure 4.3-27 Categorization of and changes in concentration levels for coastal area sediment samples from public water areas

(*) Categories A to E show relative concentration levels for coastal area sediment samples and cannot be compared withthose for river sediment samples or lake sediment samples.

5. Results (Radionuclides Other than Radioactive Cesium)

5.1 Radioactive strontium (Sr-90 and Sr-89)

(1) Public water areas

1) Outline

In principle, radioactive strontium was measured at locations with where the radioactive cesium concentrations in sediments were high. Sediment samples from public water areas (rivers, lakes, and coastal areas) were surveyed for Sr-90 from FY2011 to FY2015, and those from public water areas (rivers and lakes) for Sr-89 in FY2011, respectively. The status of the survey and the summary of the results are as shown in Table 5.1-1 (detection limits: approx. 1 Bq/kg (dry) for Sr-90 and approx. 2 Bq/kg (dry) for Sr-89).

Sr-90 was detected as detailed are as shown in 2).

A survey of Sr-89 was conducted with regard to 22 samples (13 river sediment samples and nine lake sediment samples) only in FY2011 but Sr-89 was not detectable in any of these samples.

2) Detection of Sr-90 in sediment samples

(i) River sediments

Sr-90 was detected in nine of the 22 river sediments specimens surveyed in FY2015 (detection rate: 40.9%). Except for Fukushima Prefecture, detected values were less than 1 Bq/kg (dry) (see Table 5.1-1).

Sr-90 was continuously detected since FY2011 at some locations in the Ota River and the Ukedo River in Fukushima Prefecture, but detected values gradually decreased to fall below 2 Bq/kg (dry) in FY2014 (see Figure 5.1-1).

(ii) Lake sediments

In FY2015, the 68 lake sediments specimens were surveyed for Sr-90; from the 66 of these specimens, Sr-90 was detected (detection rate: 97.1%) (see Table 5.1-1). Sr-90 has been detected until FY2015 in each prefecture surveyed. When reviewed site by site, detected values have been at relatively low levels and within the range of FY2015 measured values from not detectable to 150 Bq/kg (dry) (see Figure 5.1-1).

(iii) Coastal area sediments

In FY2015, the 32 coastal area sediment specimens were surveyed; from three specimens from Fukushima Prefecture, Sr-90 was detected (detection rate: 9.4%) (see Table 5.1-1). Measured values ranged from not detectable to 0.78 Bq/kg (dry), which were lower than those obtained from rivers and lakes.

Table 5.1-1 Detection of Sr-90 and Sr-89 in sediment samples from public water areas (rivers, lakes, and coastal areas)

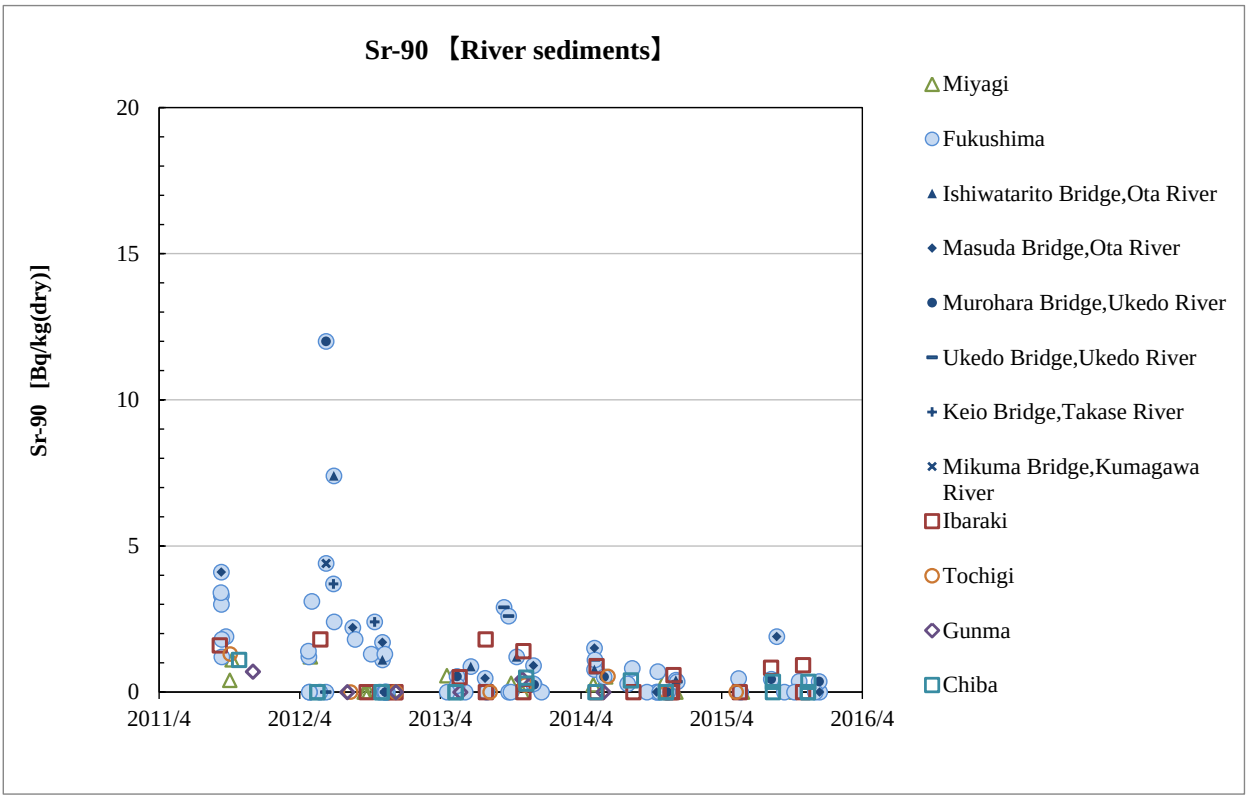
○ Sr-90

Property	Prefecture	FY2011				FY2012				FY2013				FY2014				FY2015				Total		
		Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/kg(dry)]	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/kg(dry)]	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/kg(dry)]	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/kg(dry)]	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/kg(dry)]	Number of samples	Number of detections	Range of measured values [Bq/kg(dry)]
Rivers	Miyagi	2	2	100.0	0.40 – 1.1	7	1	14.3	ND – 1.2	5	3	60.0	ND – 0.56	4	3	75.0	ND – 0.52	2	0	-	-	20	9	ND – 1.2
	Fukushima	7	7	100.0	1.2 – 4.1	25	15	60.0	ND – 12	16	10	62.5	ND – 2.9	14	9	64.3	ND – 1.5	10	5	50.0	ND – 1.9	72	46	ND – 12
	Ibaraki	1	1	100.0	1.6 – 1.6	4	1	25.0	ND – 1.8	6	4	66.7	ND – 1.8	6	2	33.3	ND – 0.89	4	2	50.0	ND – 0.92	21	10	ND – 1.8
	Tochigi	1	1	100.0	1.3 – 1.3	2	0	-	-	2	1	50.0	ND – 0.23	2	1	50.0	ND – 0.53	1	0	-	-	8	3	ND – 1.3
	Gunma	1	1	100.0	0.70 – 0.70	2	0	-	-	2	1	50.0	ND – 0.44	1	0	-	-	0	0	-	-	6	2	ND – 0.70
	Chiba	1	1	100.0	1.1 – 1.1	4	0	-	-	4	2	50.0	ND – 0.49	4	1	25.0	ND – 0.40	5	2	40.0	ND – 0.35	18	6	ND – 1.1
	Total	13	13	100.0	0.40 – 4.1	44	17	38.6	ND – 12	35	21	60.0	ND – 2.9	31	16	51.6	ND – 1.5	22	9	40.9	ND – 1.9	145	76	ND – 12
Lakes	Miyagi	1	1	100.0	1.6 – 1.6	3	2	66.7	ND – 2.1	5	5	100.0	0.3 – 2.2	6	5	83.3	ND – 0.96	8	7	87.5	ND – 1.4	23	20	ND – 2.2
	Fukushima	3	3	100.0	3.3 – 6.8	41	41	100.0	2.1 – 93	40	40	100.0	0.7 – 55	39	39	100.0	0.70 – 50	40	39	97.5	ND – 150	163	162	ND – 150
	Ibaraki	2	2	100.0	0.70 – 3.3	6	1	16.7	ND – 7.0	6	5	83.3	ND – 5.2	6	6	100.0	0.57 – 3.0	6	6	100.0	0.34 – 2.6	26	20	ND – 7.0
	Tochigi	1	1	100.0	1.3 – 1.3	2	1	50.0	ND – 1.6	2	2	100.0	0.74 – 0.93	2	2	100.0	1.0 – 1.1	2	2	100.0	0.47 – 2.2	9	8	ND – 2.2
	Gunma	1	1	100.0	2.0 – 2.0	2	2	100.0	1.9 – 2.2	2	1	50.0	ND – 1.7	2	2	100.0	1.5 – 1.7	8	8	100.0	0.67 – 2.4	15	14	ND – 2.4
	Chiba	1	1	100.0	1.4 – 1.4	4	1	25.0	ND – 4.4	2	1	50.0	ND – 1.8	4	3	75.0	ND – 2.5	4	4	100.0	0.36 – 0.61	15	10	ND – 4.4
	Total	9	9	100.0	0.70 – 6.8	58	48	82.8	ND – 93	57	54	94.7	ND – 55	59	57	96.6	ND – 50	68	66	97.1	ND – 150	251	234	ND – 150
Coastal areas	Miyagi	0	0	-	-	2	0	-	-	4	0	-	-	2	0	-	-	2	0	-	-	10	0	-
	Fukushima	0	0	-	-	21	0	-	-	30	1	3.3	ND – 0.33	30	2	6.7	ND – 0.58	30	3	10.0	ND – 0.78	111	6	ND – 0.78
	Tokyo Metropolis	0	0	-	-	2	0	-	-	0	0	-	-	0	0	-	-	0	0	-	-	2	0	-
	Total	0	0	-	-	25	0	-	-	34	1	2.9	ND – 0.33	32	2	6.3	ND – 0.58	32	3	9.4	ND – 0.78	123	6	ND – 0.78

ND: Not detectable

○ Sr-89 (FY2011)

Prefecture	River		Lake	
	Number of samples	Number of detections	Number of samples	Number of detections
Miyagi	2	0	1	0
Fukushima	7	0	3	0
Ibaraki	1	0	2	0
Tochigi	1	0	1	0
Gunma	1	0	1	0
Chiba	1	0	1	0
Total	13	0	9	0



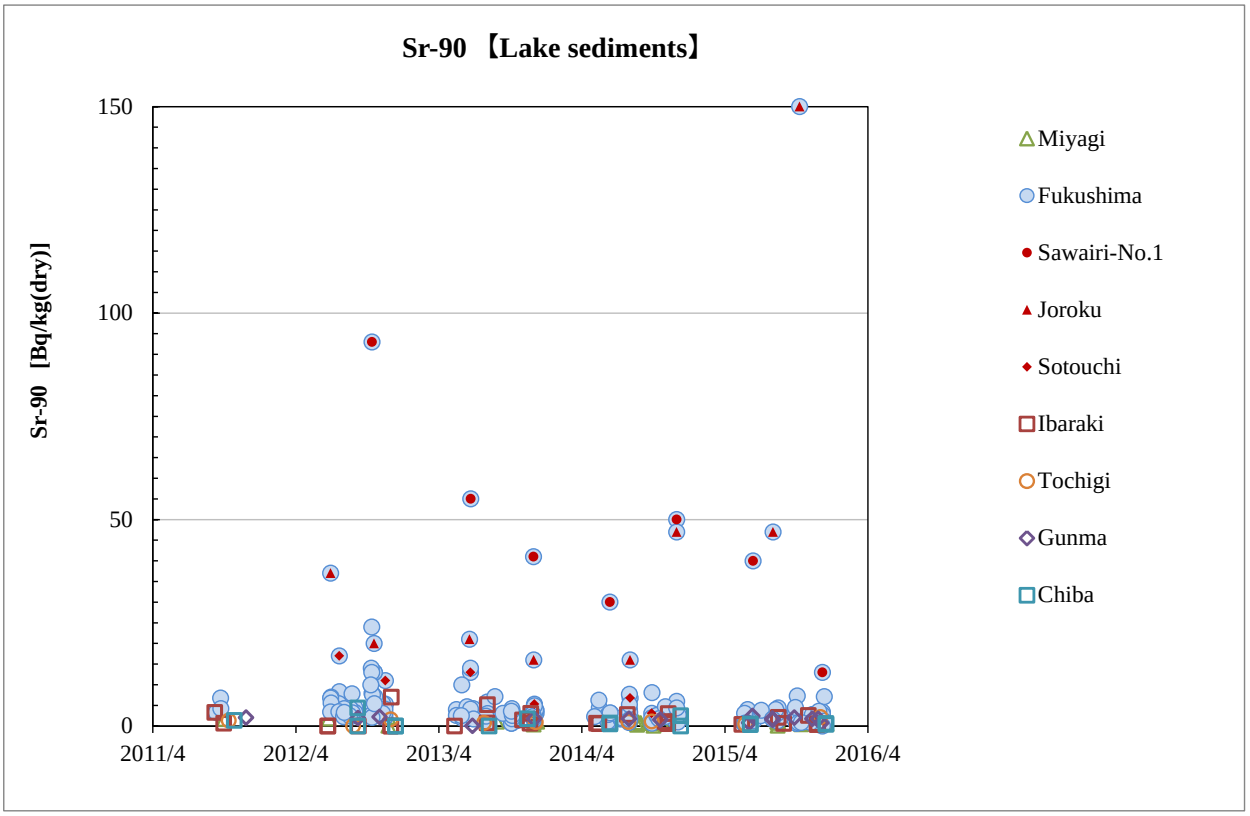


Figure 5.1-1 Detection of Sr-90 in sediment samples from public water areas
(upper: rivers; lower: lakes)

(2) Groundwater

Surveys of Sr-89 and Sr-90 were conducted with regard to approx. the 240 groundwater samples collected in Fukushima Prefecture from January 2012 to February 2016.

The outline of the results of these surveys is as shown in Table 5.1-2. Detected values of Sr-89 and Sr-90 were all below the detection limit (1 Bq/L).

Table 5.1-2 Detection of Sr-89 and Sr-90 in groundwater samples (all collected in Fukushima Prefecture)

Financial year	Sr-90				Sr-89			
	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/L](*1)	Number of samples	Number of detections	Detection rate(%)	Range of measured values [Bq/L](*1)
FY2011	8	0	0.0	-	8	0	0.0	-
FY2012	60	0	0.0	-	60	0	0.0	-
FY2013	77	0	0.0	-	77	0	0.0	-
FY2014	48	0	0.0	-	48	0	0.0	-
FY2015	48	0	0.0	-	48	0	0.0	-
Total	241	0	0.0	-	241	0	0.0	-

*1:Results were compiled by setting the detection limit at 1 Bq/L.In reality, the detection limit was set at 0.0002 Bq/L and at 0.001 Bq/L for Sr-90 and Sr-89, respectively, for the FY2011 survey, and was set at 1 Bq/L for both Sr-90 and Sr-89 for surveys in FY2012 onward.
In the FY2011 survey (calendar year 2012), Sr-90 was detected in all eight specimens, with detected values ranging from 0.0004 to 0.0029 Bq/L. Similarly, while the detection limit for Sr-89 was set to 0.001 Bq/L in FY2011 (calendar year 2012), Sr-89 in all eight specimens was below the detection limit.

5.2 Other γ-ray emitting radionuclides

Apart from the aforementioned radionuclides (Cs-134, Cs-137, Sr-89 and Sr-90), measurement results for water samples and sediment samples using a germanium semiconductor detector were analyzed from FY2011 to FY2015 to obtain activity concentrations of accident-derived radionuclides (Ag-110m, Te-129m, Nb-95, Sb-125 and Ce-144, etc[12].) and major naturally occurring radionuclides such as K-40. The summary of the results is as shown in Table 5.2-1.

Among the detected radionuclides, no artificial radionuclides were detected in water samples, while two types of radionuclides, Ag-110m and Sb-125, were detected in sediment samples with detection rates of 1% or less. Since FY2013, neither radionuclide has been detected.

Six naturally occurring radionuclides (K-40, Pb-212, Pb-214, Tl-208, Ac-228 and Bi-214) were detected; K-40 is a naturally occurring radionuclide entrained during the Earth's formation, while the other species are all either uranium series or thorium series radionuclides, which are widely distributed in nature including earth crusts.

Among the detected radionuclides, Ag-110m and Sb-125 are artificial radionuclides that are generated at nuclear power stations, etc. Therefore, their emitting sources are examined below.

[12] For I-131 from among the accident-derived radionuclides, water samples from public water areas (3,111 river water specimens, 1,416 lake water specimens, and 715 coastal area water specimens) and sediment samples (3,073 river sediment specimen, 877 lake sediment specimens, and 393 coastal area sediment specimens) were surveyed from FY 2011 to FY 2012; from FY 2011 to FY 2014, groundwater samples (3,793 specimens) were surveyed. In none of these samples was I-131 detected (lower detection limit values: 1 Bq/L for water and 10 Bq/kg for sediments).

Table 5.2-1 Detection of other radionuclides

<Water>

Fiscal year	Number of samples	Major detected artificial radionuclide		Major detected naturally occurring radionuclide	
		Type	Detection rate and detected values	Type	Detection rate
FY2011	1,755	–	–	K-40	10%
FY2012	3,518	–	–	K-40	6%
FY2013	3,860	–	–	K-40	13%
FY2014	3,856	–	–	K-40	10%
FY2015	3,916	–	–	Pb-214 Pb-212 K-40	9% 7% 7%

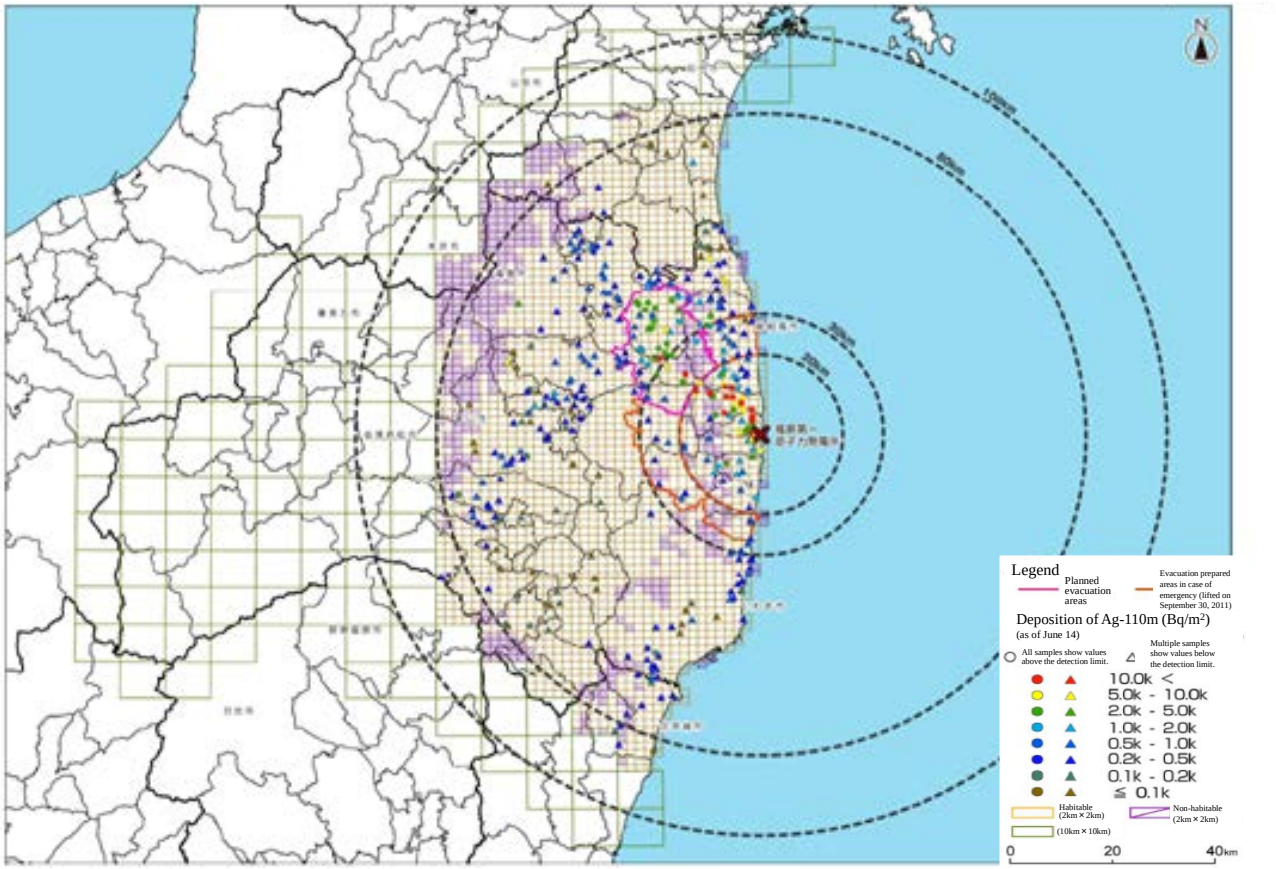
<Sediments> (detection limits: 7 - 180 Bq/kg for Ag-110m and 130 - 330 Bq/kg for Sb-125)

Fiscal year	Number of samples	Major detected artificial radionuclide		Major detected naturally occurring radionuclide	
		Type	Detection rate and detected values	Type	Detection rate
FY2011	1,559	Ag-110m	4 samples (0.26%) 46 - 170 Bq/kg	K-40	79%
				Pb-212	41%
				Pb-214	16%
				Tl-208	14%
FY2012	2,885	Ag-110m	26 samples (0.90%) 7.9 - 350 Bq/kg	Ac-228	41%
				Bi-214	43%
				K-40	97%
		Sb-125	3 samples (0.10%) 140 - 420 Bq/kg	Pb-212	75%
				Pb-214	44%
				Tl-208	39%
FY2013	3,062	-	-	Ac-228	25%
				Bi-214	25%
				K-40	91%
				Pb-212	49%
				Pb-214	23%
				Tl-208	23%
FY2014	3,035	-	-	Ac-228	24%
				Bi-214	24%
				K-40	91%
				Pb-212	48%
				Pb-214	24%
				Tl-208	24%
FY2015	3,158	-	-	Ac-228	32%
				Bi-214	60%
				K-40	88%
				Pb-212	63%
				Pb-214	67%
				Tl-208	37%

The two types of detected artificial radionuclides (Ag-110m and Sb-125) were not included in the publicized reference materials concerning the amount of radioactive materials discharged due to the Fukushima NPS Accident[13], but the Distribution Maps of Radiation Doses, etc., prepared in October 2011 include a detailed map showing activity concentrations in soil which contains data for Ag-110m (see Figure 5.2-1). In addition, there were instances of detection of Sb-125 in Niigata Prefecture after the accident[14]. Since FY2013, however, Sb-125 has not been detected.

Ag-110m is produced as the result of activation of Ag-109 in a nuclear reactor, while Sb-125 is a radioisotope produced as a result of nuclear fission.

Accordingly, in light of the distribution of the detected artificial radionuclides and their production processes, they are considered to have been derived from the Fukushima NPS Accident.



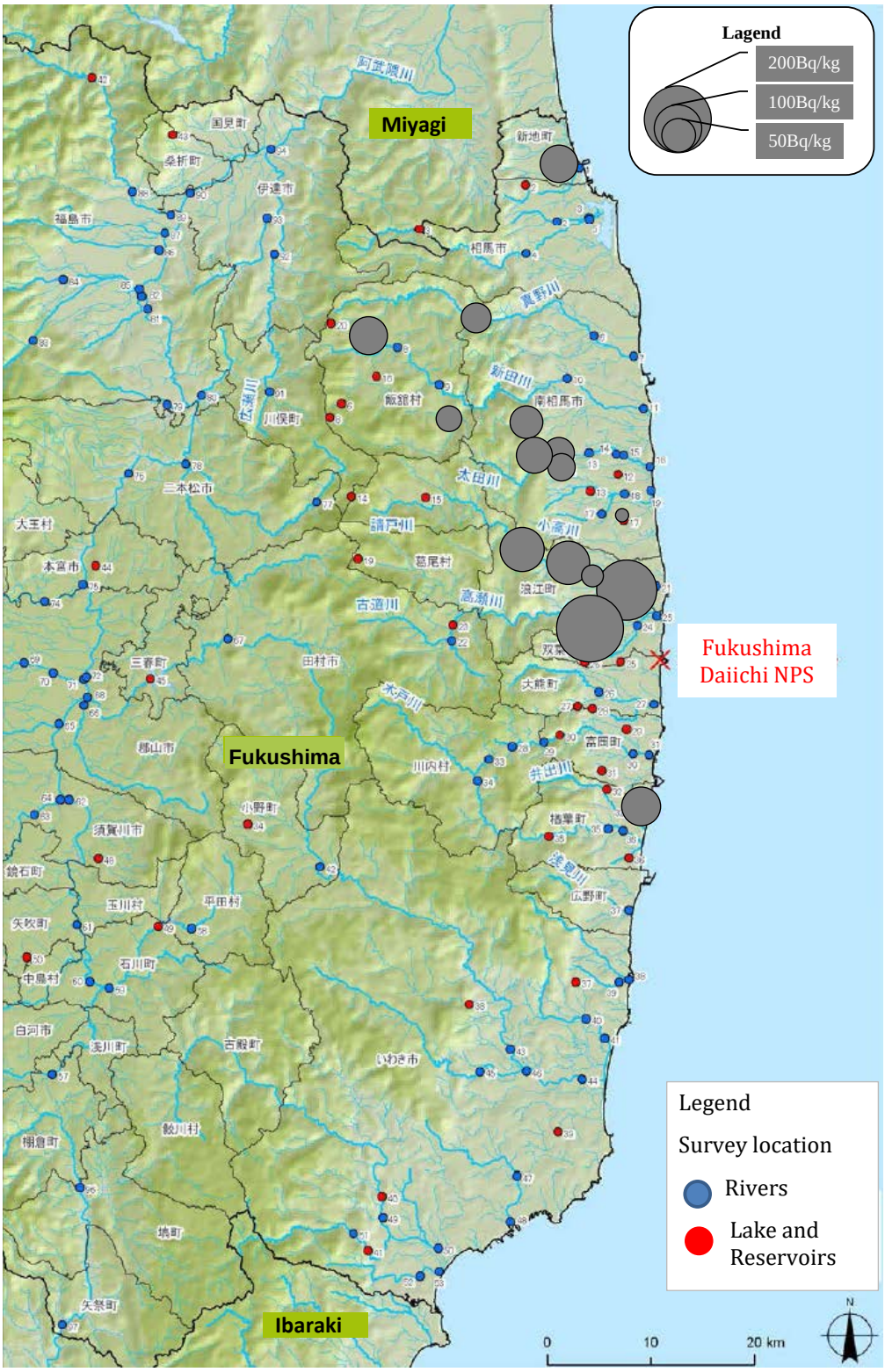
(*) Reference: Website of the Ministry of Education, Culture, Sports, Science and Technology[15]

Figure 5.2-1 Map showing concentrations of Ag-110m in soil

[13] Errors in the Released Data on the Amount of Radioactive Materials (October 20, 2011; Nuclear and Industrial Safety Agency) http://www.meti.go.jp/press/2011/10/20111020001/20111020001.pdf

[14] Artificial Radionuclides Detected in Niigata Prefecture After the Accident at the Fukushima Daiichi NPS, by Ono, et al.; Annual Report of the Niigata Prefectural Institute of Environmental Radiation Monitoring, vol. 9, 19-29.

[15] Preparation of Distribution Maps of Radiation Doses, etc. (Te-129m and Ag-110m) by MEXT: http://radioactivity.nsr.go.jp/ja/contents/6000/5050/24/5600_111031_rev130701.pdf



(*) Average of detected values; Ag-110m was not detectable at any other time, or at any unmarked locations.

(*) Sb-125 was detected only at Joroku (agricultural reservoir) (approx. 10 km northwest of the Fukushima Daiichi NPS) at Levels of 140 to 420 Bq/kg during the period from July to November 2012.

Figure 5.2-2 Detection of Ag-110m in sediment samples from public water areas (average of data from September 2011 to March 2013)