Chapter III Current state analysis/ Task management and examination of statistical approach regarding floating/ sea bed debris

III.1. Examination result

III.1.1 Current state analysis/ task management

III.1.1.1 Analysis of locality (Setonaikai)

(1) Density of sea bed debris

1) This year

(a) Density

The density (individual number) is displayed in diagram III.1-1, the density (weight) is displayed in diagram III.2-2, and the density (volume) is displayed in diagram III.2-3.

Density (individual number) was high in the Mizushima Sea, Hiroshima Bay (north), and Bingo Sea (north), while it was low in the northern section of the Harima Sea (east), western section of the Iyo Sea, and the western section of the Kii Channel (II).

Density (weight) was high in the Hiroshima Bay (north), Mizushima Sea, and the eastern section of the Kii Channel, while it was low in the western section of the Iyo Sea, Bisan Strait (west), Bisan Strait (east), and the Bingo Channel (east).

Density (volume) was high in the Hiroshima Bay (north), Bingo Sea (north), and the eastern section of the Kii Channel, while it was low in the western section of the Iyo Sea, Bungo Channel (eastern section), and the Bisan Strait (west).

As shown in the results above, there are large variances regarding each density (individual number, weight, volume) of sea bed debris according to the sea area of survey. Each density (individual number, weight, volume) was similar in between sea areas of survey with high or low density of debris.

(b) Ratio according to types

The ratio chart according to types is displayed in chart III.1-1, chart III.1-2, and chart III.1-3.

According to sea areas of survey, plastics had the highest individual number density ratio, as its individual number was high in all sea areas of survey apart from the northern section of the Harima Sea (east) where the confirmed individual number was extremely low (10/ km^2). Among the sea areas of survey where the ratio of plastics was highest, metals had the second highest ratio, followed by cloths and rubber. Especially in the Hiroshima Bay (north), southern section of the Suo Sea (east), Hiroshima Bay (south), northern section of the Suo Sea, and the Bisan Strait (east), the ratio of metals were high compared to other sea areas of survey.

According to sea areas of survey, plastics had the highest weight density ratio. The ratio of metals was high in the southern section of the Suo Sea (east), northern section of the Suo Sea, entrance of the Osaka Bay, and the Mizushima Sea.

According to sea areas of survey, plastics had the highest volume density ratio. The ratio of metals was high in the Mizushima Sea, southern section of the Suo Sea (east), and northern section of the Suo Sea. The ratio of other artificial objects (household electronics, stoves etc.) was high in the Bingo Sea (north) and western section of the Kii Channel (II).

【 Density of sea bed debris (individual number/km^2) 】

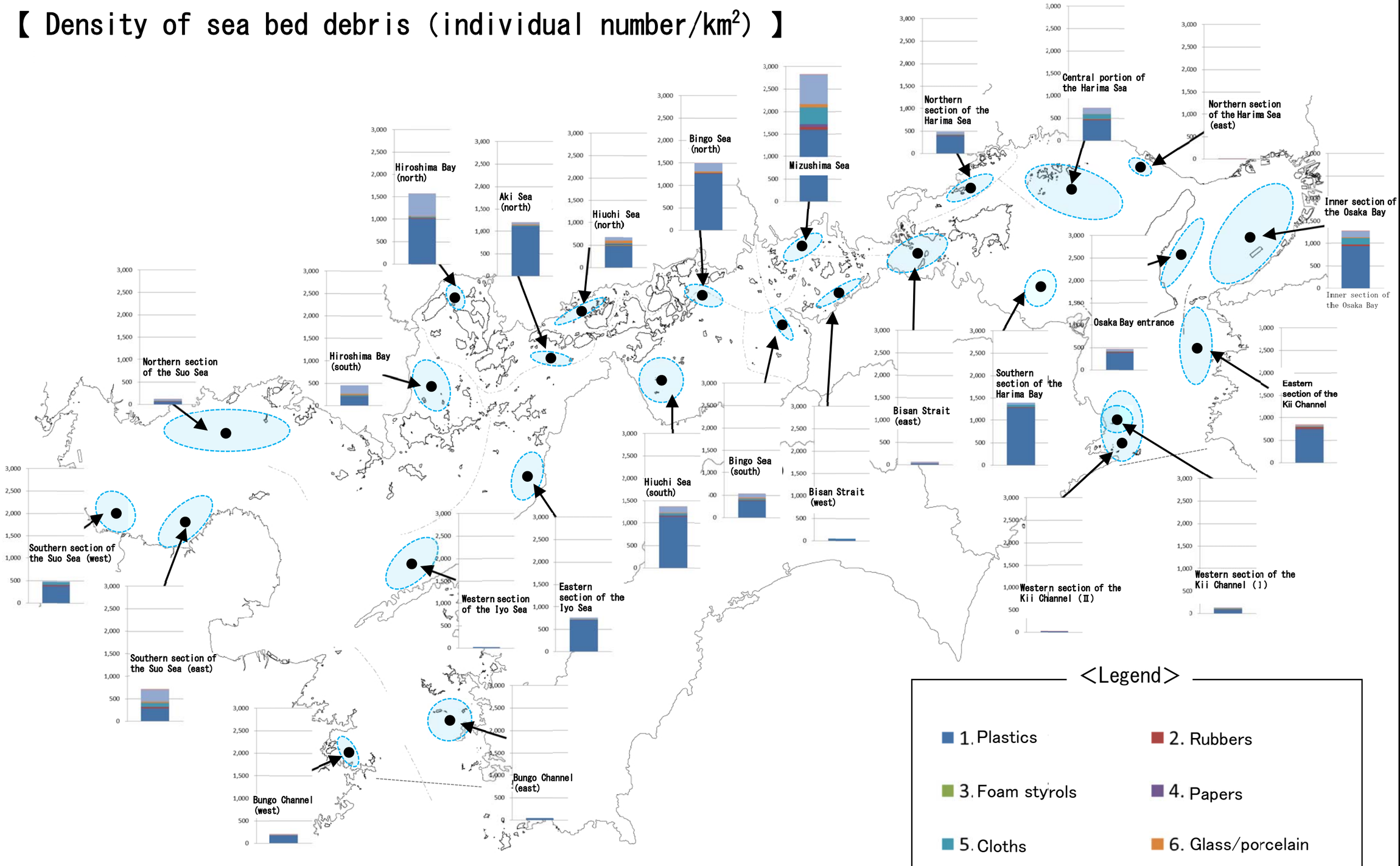

Diagram Ⅲ.1-1 Sea bed debris density (individual number)

【 Density of sea bed debris (weight/km^2) 】

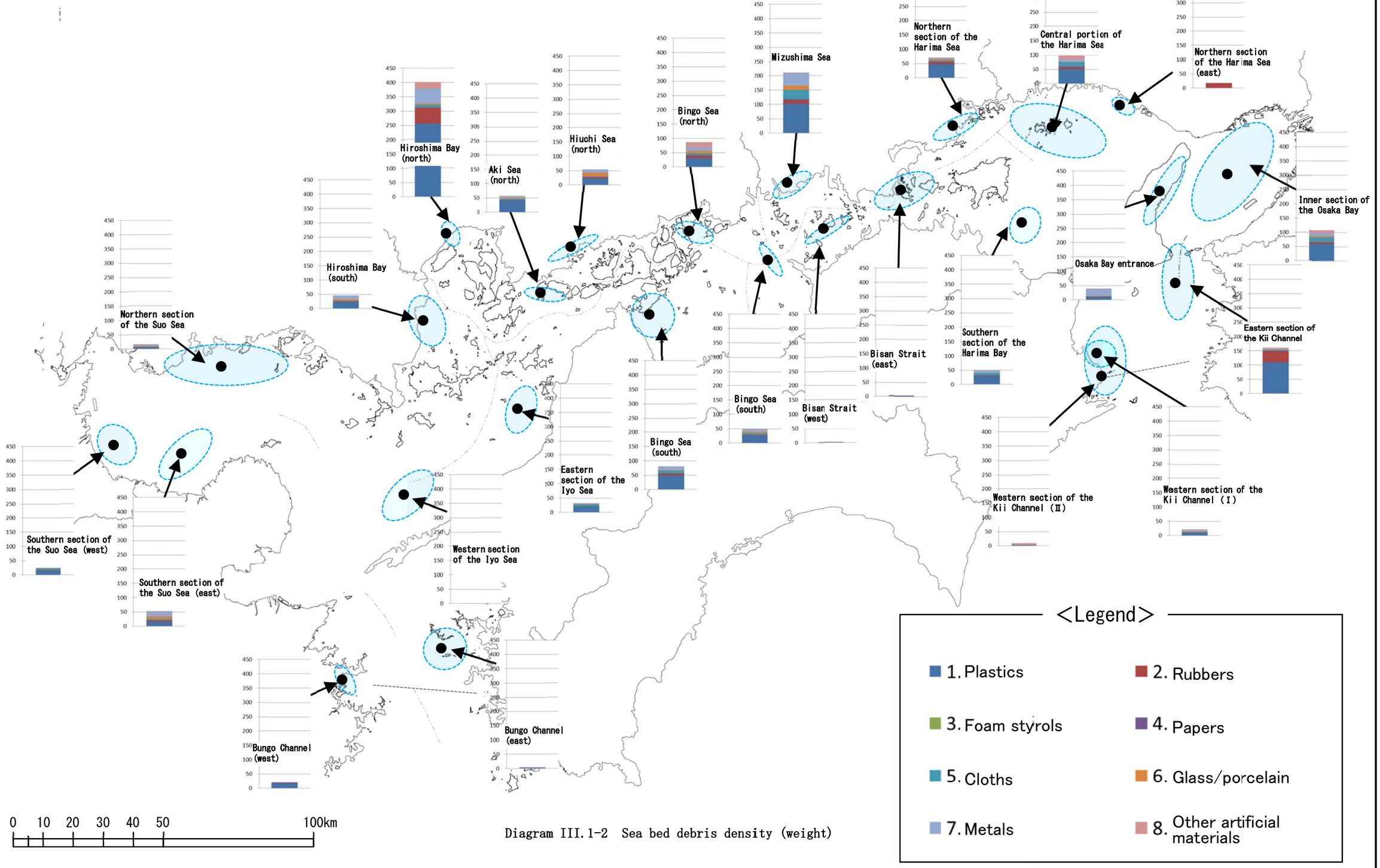

Diagram III.1-2 Sea bed debris density (weight)

【 Density of sea bed debris (volume/km^2) 】

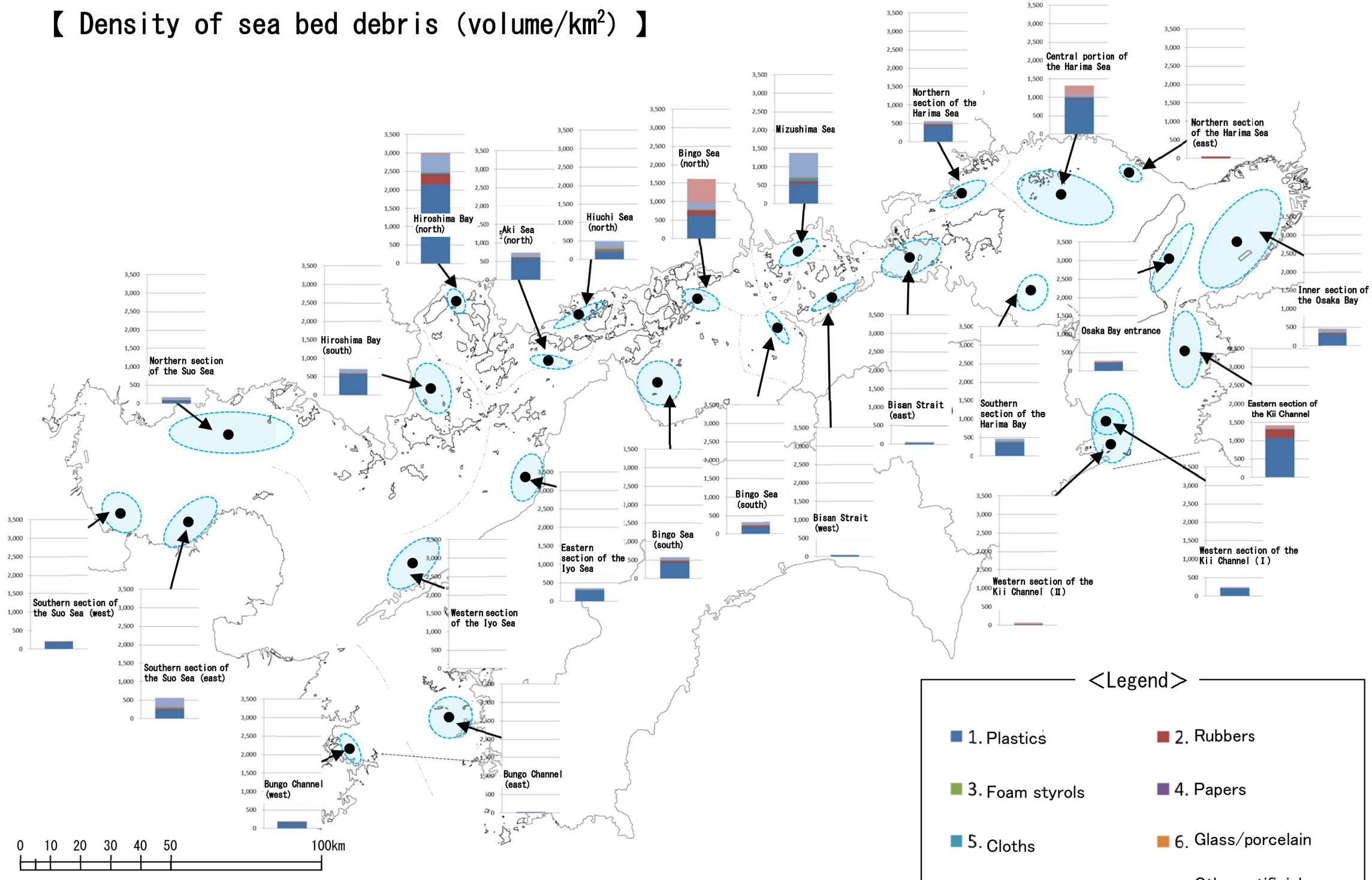

Diagram III.1-3 Sea bed debris density (volume)

Chart III.1-1 Ratio chart according to sea area/ type

Density (individual number)

Area / Type			1	2	3	4	5	6	7	8	Total (No./km^2)
Number	Sea area for survey	Fishery cooperative									
1	Mizushima Sea	Yorishima	Plastics	Metals	Cloths	Glass/porcelain	Papers	Rubbers	Other artificial materials	Foam styrols	2,830
			1,596	651	379	70	65	58	12	0	
			(56%)	(23%)	(13%)	(2%)	(2%)	(2%)	(0%)	(0%)	
2	Hiroshima Bay (north)	Ohara	Plastics	Metals	Rubbers	Cloths	Glass/porcelain	Other artificial materials	Foam styrols	Papers	1,575
			1,019	497	19	19	16	6	0	0	
			(65%)	(32%)	(1%)	(1%)	(1%)	(0%)	(0%)	(0%)	
3	Bingo Sea (north)	Yoshiwa	Plastics	Metals	Glass/porcelain	Rubbers	Other artificial materials	Papers	Cloths	Foam styrols	1,508
			1,255	196	31	15	5	3	3	1	
			(83%)	(13%)	(2%)	(1%)	(0%)	(0%)	(0%)	(0%)	
4	Southern section of the Harima Sea	Tosan	Plastics	Metals	Cloths	Rubbers	Other artificial materials	Glass/porcelain	Papers	Foam styrols	1,449
			1,274	107	47	13	4	2	1	0	
			(88%)	(7%)	(3%)	(1%)	(0%)	(0%)	(0%)	(0%)	
5	Hiuchi Sea (south)	Sakurai	Plastics	Metals	Cloths	Papers	Glass/porcelain	Rubbers	Other artificial materials	Foam styrols	1,365
			1,137	138	47	15	13	12	3	0	
			(83%)	(10%)	(3%)	(1%)	(1%)	(1%)	(0%)	(0%)	
6	Aki Sea (north)	Shimokamagari	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Other artificial materials	Foam styrols	1,197
			1,098	44	22	19	5	5	3	0	
			(92%)	(4%)	(2%)	(2%)	(0%)	(0%)	(0%)	(0%)	
7	Eastern section of the Iyo Sea	Iyo	Plastics	Metals	Glass/porcelain	Cloths	Rubbers	Papers	Foam styrols	Other artificial materials	755
			693	36	13	8	3	3	0	0	
			(92%)	(5%)	(2%)	(1%)	(0%)	(0%)	(0%)	(0%)	
8	Central portion of the Harima Sea	Boze	Plastics	Metals	Cloths	Rubbers	Papers	Glass/porcelain	Foam styrols	Other artificial materials	718
			455	125	99	26	6	4	2	2	
			(63%)	(17%)	(14%)	(4%)	(1%)	(1%)	(0%)	(0%)	
9	Southern section of the Suo Sea (east)	Nakatsu	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Other artificial materials	Papers	Foam styrols	707
			287	254	87	30	27	21	2	0	
			(41%)	(36%)	(12%)	(4%)	(4%)	(3%)	(0%)	(0%)	
10	Hiuchi Sea (north)	Akitsu	Plastics	Metals	Glass/porcelain	Papers	Cloths	Foam styrols	Rubbers	Other artificial materials	673
			479	73	58	22	19	11	10	0	
			(71%)	(11%)	(9%)	(3%)	(3%)	(2%)	(1%)	(0%)	
11	Bingo Sea (south)	Nishitakuma	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Other artificial materials	Foam styrols	528
			371	82	35	22	11	6	1	0	
			(70%)	(16%)	(7%)	(4%)	(2%)	(1%)	(0%)	(0%)	
12	Northern section of the Harima Sea (west)	Ushimado	Plastics	Metals	Cloths	Rubbers	Glass/porcelain	Papers	Foam styrols	Other artificial materials	487
			389	54	18	15	7	2	0	0	
			(80%)	(11%)	(4%)	(3%)	(1%)	(0%)	(0%)	(0%)	
13	Osaka Bay entrance	kariya	Plastics	Metals	Rubbers	Cloths	Glass/porcelain	Papers	Other artificial materials	Foam styrols	467
			387	45	13	12	6	4	1	0	
			(83%)	(10%)	(3%)	(3%)	(1%)	(1%)	(0%)	(0%)	
14	Hiroshima Bay (south)	Yu	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Foam styrols	Papers	Other artificial materials	452
			196	193	32	23	8	0	0	0	
			(43%)	(43%)	(7%)	(5%)	(2%)	(0%)	(0%)	(0%)	
15	Bungo Channel (west)	Saeki	Plastics	Metals	Rubbers	Papers	Cloths	Glass/porcelain	Other artificial materials	Foam styrols	198
			167	18	4	3	3	2	2	0	
			(84%)	(9%)	(2%)	(2%)	(2%)	(1%)	(1%)	(0%)	
16	Western section of the Kii Channel (Ⅰ)	Tokushima	Plastics	Metals	Cloths	Other artificial materials	Papers	Glass/porcelain	Rubbers	Foam styrols	132
			82	16	11	8	6	5	4	0	
			(62%)	(12%)	(8%)	(6%)	(5%)	(4%)	(3%)	(0%)	
17	Northern section of the Suo Sea	Ube	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Other artificial materials	Foam styrols	114
			61	34	7	6	4	2	1	0	
			(53%)	(30%)	(6%)	(5%)	(3%)	(2%)	(1%)	(0%)	
18	Bisan Strait (east)	TakamatsushiSet ouchi	Plastics	Metals	Papers	Rubbers	Cloths	Glass/porcelain	Other artificial materials	Foam styrols	60
			27	27	2	1	1	1	1	0	
			(45%)	(45%)	(3%)	(2%)	(2%)	(2%)	(2%)	(0%)	
19	Bisan Strait (west)	Marugame	Plastics	Metals	Rubbers	Papers	Cloths	Glass/porcelain	Foam styrols	Other artificial materials	48
			39	6	1	1	1	1	0	0	
			(80%)	(12%)	(2%)	(2%)	(2%)	(2%)	(0%)	(0%)	
20	Bungo Channel (east)	Shimonada	Plastics	Metals	Rubbers	Foam styrols	Papers	Cloths	Glass/porcelain	Other artificial materials	41
			35	4	1	0	0	0	0	0	
			(88%)	(10%)	(3%)	(0%)	(0%)	(0%)	(0%)	(0%)	
21	Western section of the Kii Channel (Ⅱ)	Tachibana	Plastics	Metals	Rubbers	Papers	Cloths	Other artificial materials	Foam styrols	Glass/porcelain	27
			17	5	2	1	1	1	0	0	
			(63%)	(19%)	(7%)	(4%)	(4%)	(4%)	(0%)	(0%)	
22	Inner section of the Osaka Bay	Izumisano	Plastics	Cloths	Metals	Rubbers	Other artificial materials	Glass/porcelain	Papers	Foam styrols	1,278
			936	143	132	36	17	14	1	0	
			(73%)	(11%)	(10%)	(3%)	(1%)	(1%)	(0%)	(0%)	
23	Southern section of the Suo Sea (west)	Houchiku	Plastics	Cloths	Rubbers	Metals	Papers	Glass/porcelain	Foam styrols	Other artificial materials	487
			374	57	25	25	5	2	0	0	
			(77%)	(12%)	(5%)	(5%)	(1%)	(0%)	(0%)	(0%)	
24	Eastern section of the Kii Channel	Aritaminoshima	Plastics	Rubbers	Other artificial materials	Metals	Cloths	Foam styrols	Papers	Glass/porcelain	849
			749	40	28	16	12	4	0	0	
			(88%)	(5%)	(3%)	(2%)	(1%)	(0%)	(0%)	(0%)	
25	Western section of the Iyo Sea	Nagahama	Plastics	Rubbers	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	21
			21	0	0	0	0	0	0	0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	
26	Northern section of the Harima Sea (east)	Higashifutami	Rubbers	Plastics	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	10
			10	0	0	0	0	0	0	0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	

Chart III.1-2 Ratio chart according to sea area/ type Density (Weight)

Area \ Type			1	2	3	4	5	6	7	8	Total (kg/km²)
Number	Sea area for survey	Fishery cooperative									
1	Mizushima Sea	Yorishima	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Other artificial materials	Foam styrols	211.1
			101.5	43.6	32.8	14.4	12.4	4.3	2.2	0.0	
			(48%)	(21%)	(16%)	(7%)	(6%)	(2%)	(1%)	(0%)	
2	Hiuchi Sea (south)	Sakurai	Plastics	Metals	Cloths	Rubbers	Glass/porcelain	Papers	Other artificial materials	Foam styrols	80.6
			49.4	11.9	8.7	5.6	2.7	1.8	0.3	0.0	
			(61%)	(15%)	(11%)	(7%)	(3%)	(2%)	(0%)	(0%)	
3	Aki Sea (north)	Shimokamagari	Plastics	Metals	Cloths	Glass/porcelain	Other artificial materials	Rubbers	Papers	Foam styrols	57.3
			41.0	4.8	4.2	3.7	2.0	1.3	0.2	0.0	
			(72%)	(8%)	(7%)	(6%)	(3%)	(2%)	(0%)	(0%)	
4	Bingo Sea (south)	Nishitakuma	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Other artificial materials	Foam styrols	48.5
			25.1	9.6	5.8	4.4	2.3	1.2	0.1	0.0	
			(52%)	(20%)	(12%)	(9%)	(5%)	(2%)	(0%)	(0%)	
5	Hiroshima Bay (south)	Yu	Plastics	Metals	Glass/porcelain	Cloths	Rubbers	Foam styrols	Papers	Other artificial materials	46.1
			23.9	13.4	5.3	1.8	1.7	0.0	0.0	0.0	
			(52%)	(29%)	(11%)	(4%)	(4%)	(0%)	(0%)	(0%)	
6	Western section of the Kii Channel (Ⅰ)	Tokushima	Plastics	Metals	Other artificial materials	Cloths	Glass/porcelain	Rubbers	Papers	Foam styrols	22.0
			9.5	5.3	2.5	2.3	1.3	0.6	0.6	0.0	
			(43%)	(24%)	(11%)	(10%)	(6%)	(3%)	(3%)	(0%)	
7	Bisan Strait (west)	Marugame	Plastics	Metals	Rubbers	Cloths	Glass/porcelain	Foam styrols	Papers	Other artificial materials	2.7
			1.5	0.7	0.1	0.1	0.1	0.0	0.0	0.0	
			(60%)	(28%)	(4%)	(4%)	(4%)	(0%)	(0%)	(0%)	
8	Inner section of the Osaka Bay	Izumisano	Plastics	Cloths	Other artificial materials	Metals	Rubbers	Glass/porcelain	Papers	Foam styrols	108.1
			59.4	17.1	11.3	10.4	6.0	3.8	0.1	0.0	
			(55%)	(16%)	(10%)	(10%)	(6%)	(4%)	(0%)	(0%)	
9	Central portion of the Harima Sea	Boze	Plastics	Cloths	Other artificial materials	Metals	Rubbers	Papers	Glass/porcelain	Foam styrols	97.2
			50.7	15.8	12.7	8.2	6.1	2.9	0.6	0.1	
			(52%)	(16%)	(13%)	(8%)	(6%)	(3%)	(1%)	(0%)	
10	Southern section of the Harima Sea	Tosan	Plastics	Cloths	Metals	Rubbers	Other artificial materials	Glass/porcelain	Papers	Foam styrols	48.6
			27.9	8.9	7.9	2.9	0.6	0.4	0.1	0.0	
			(57%)	(18%)	(16%)	(6%)	(1%)	(1%)	(0%)	(0%)	
11	Eastern section of the Iyo Sea	Iyo	Plastics	Cloths	Metals	Glass/porcelain	Rubbers	Papers	Foam styrols	Other artificial materials	32.4
			21.9	5.2	3.1	1.7	0.3	0.2	0.0	0.0	
			(68%)	(16%)	(10%)	(5%)	(1%)	(1%)	(0%)	(0%)	
12	Southern section of the Suo Sea (west)	Houchiku	Plastics	Cloths	Rubbers	Metals	Papers	Glass/porcelain	Foam styrols	Other artificial materials	24.9
			14.4	6.3	2.1	1.2	0.6	0.3	0.0	0.0	
			(58%)	(25%)	(8%)	(5%)	(2%)	(1%)	(0%)	(0%)	
13	Hiroshima Bay (north)	Ohara	Plastics	Rubbers	Metals	Other artificial materials	Cloths	Glass/porcelain	Foam styrols	Papers	401.6
			256.2	56.5	53.1	22.4	9.9	3.4	0.0	0.0	
			(64%)	(14%)	(13%)	(6%)	(2%)	(1%)	(0%)	(0%)	
14	Eastern section of the Kii Channel	Aritaminoshima	Plastics	Rubbers	Other artificial materials	Cloths	Foam styrols	Papers	Glass/porcelain	Metals	160.1
			108.6	39.5	7.2	4.8	0.0	0.0	0.0	0.0	
			(68%)	(25%)	(4%)	(3%)	(0%)	(0%)	(0%)	(0%)	
15	Northern section of the Harima Sea (west)	Ushimado	Plastics	Rubbers	Glass/porcelain	Metals	Cloths	Papers	Foam styrols	Other artificial materials	71.3
			47.8	8.5	5.2	5.2	4.4	0.3	0.0	0.0	
			(67%)	(12%)	(7%)	(7%)	(6%)	(0%)	(0%)	(0%)	
16	Bungo Channel (west)	Saeki	Plastics	Rubbers	Metals	Cloths	Other artificial materials	Papers	Glass/porcelain	Foam styrols	21.6
			18.0	1.3	1.0	0.5	0.4	0.2	0.2	0.0	
			(83%)	(6%)	(5%)	(2%)	(2%)	(1%)	(1%)	(0%)	
17	Bingo Sea (north)	Yoshiwa	Plastics	Other artificial materials	Metals	Rubbers	Glass/porcelain	Cloths	Papers	Foam styrols	86.4
			31.0	17.0	12.6	10.0	8.4	7.2	0.1	0.0	
			(36%)	(20%)	(15%)	(12%)	(10%)	(8%)	(0%)	(0%)	
18	Bungo Channel (east)	Shimonada	Plastics	Other artificial materials	Metals	Rubbers	Glass/porcelain	Foam styrols	Papers	Cloths	4.6
			2.6	1.3	0.4	0.1	0.1	0.0	0.0	0.0	
			(58%)	(29%)	(9%)	(2%)	(2%)	(0%)	(0%)	(0%)	
19	Hiuchi Sea (north)	Akitsu	Plastics	Glass/porcelain	Metals	Papers	Rubbers	Cloths	Foam styrols	Other artificial materials	54.0
			22.0	13.2	11.4	3.8	2.1	1.5	0.1	0.0	
			(41%)	(24%)	(21%)	(7%)	(4%)	(3%)	(0%)	(0%)	
20	Bisan Strait (east)	TakamatsushiSetouchi	Plastics	Glass/porcelain	Metals	Rubbers	Other artificial materials	Papers	Cloths	Foam styrols	4.6
			2.3	1.0	0.7	0.2	0.2	0.1	0.1	0.0	
			(50%)	(22%)	(15%)	(4%)	(4%)	(2%)	(2%)	(0%)	
21	Western section of the Iyo Sea	Nagahama	Plastics	Rubbers	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	0.1
			0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	
22	Southern section of the Suo Sea (east)	Nakatsu	Metals	Plastics	Glass/porcelain	Rubbers	Cloths	Other artificial materials	Papers	Foam styrols	53.7
			16.5	15.6	8.6	5.7	4.7	2.4	0.1	0.0	
			(31%)	(29%)	(16%)	(11%)	(9%)	(4%)	(0%)	(0%)	
23	Osaka Bay entrance	kariya	Metals	Plastics	Rubbers	Other artificial materials	Glass/porcelain	Cloths	Papers	Foam styrols	39.4
			24.2	9.6	1.8	1.7	1.2	0.7	0.3	0.0	
			(61%)	(24%)	(5%)	(4%)	(3%)	(2%)	(1%)	(0%)	
24	Northern section of the Suo Sea	Ube	Metals	Cloths	Plastics	Rubbers	Glass/porcelain	Other artificial materials	Papers	Foam styrols	16.2
			5.7	3.6	3.4	1.5	1.4	0.5	0.1	0.0	
			(35%)	(22%)	(21%)	(9%)	(9%)	(3%)	(1%)	(0%)	
25	Northern section of the Harima Sea (east)	Higashifutami	Rubbers	Plastics	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	18.2
			18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	
26	Western section of the Kii Channel (Ⅱ)	Tachibana	Other artificial materials	Plastics	Metals	Rubbers	Glass/porcelain	Cloths	Foam styrols	Papers	9.5
			5.0	2.5	1.0	0.6	0.2	0.1	0.0	0.0	
			(53%)	(27%)	(11%)	(6%)	(2%)	(1%)	(0%)	(0%)	

Chart III.1-3 Ratio chart according to sea area/ type Density (Volume)

Area \ Type			1	2	3	4	5	6	7	8	Total (L/km^2)
Number	Sea area for survey	Fishery cooperative									
1	Hiroshima Bay (north)	Ohara	Plastics	Metals	Rubbers	Other artificial materials	Cloths	Glass/porcelain	Foam styrols	Papers	2998.2
			2,151.9	472.5	279.9	46.6	34.3	13.0	0.0	0.0	
			(72%)	(16%)	(9%)	(2%)	(1%)	(0%)	(0%)	(0%)	
2	Aki Sea (north)	Shimokamagari	Plastics	Metals	Other artificial materials	Rubbers	Glass/porcelain	Cloths	Papers	Foam styrols	734.7
			576.1	83.4	25.4	17.8	14.0	11.2	6.7	0.0	
			(78%)	(11%)	(3%)	(2%)	(2%)	(2%)	(1%)	(0%)	
3	Hiroshima Bay (south)	Yu	Plastics	Metals	Glass/porcelain	Rubbers	Cloths	Foam styrols	Papers	Other artificial materials	707.5
			573.5	103.4	14.3	9.8	6.5	0.0	0.0	0.0	
			(81%)	(15%)	(2%)	(1%)	(1%)	(0%)	(0%)	(0%)	
4	Hiuchi Sea (south)	Sakurai	Plastics	Metals	Rubbers	Cloths	Papers	Glass/porcelain	Other artificial materials	Foam styrols	571.3
			435.4	67.7	32.4	17.6	7.6	7.6	2.9	0.0	
			(76%)	(12%)	(6%)	(3%)	(1%)	(1%)	(1%)	(0%)	
5	Northern section of the Harima Sea (west)	Ushimado	Plastics	Metals	Rubbers	Glass/porcelain	Cloths	Papers	Foam styrols	Other artificial materials	560.6
			446.1	55.0	26.6	17.7	14.8	0.4	0.0	0.0	
			(80%)	(10%)	(5%)	(3%)	(3%)	(0%)	(0%)	(0%)	
6	Hiuchi Sea (north)	Akitsu	Plastics	Metals	Glass/porcelain	Cloths	Papers	Foam styrols	Rubbers	Other artificial materials	480.9
			208.2	168.5	37.2	22.3	18.6	14.9	11.2	0.0	
			(43%)	(35%)	(8%)	(5%)	(4%)	(3%)	(2%)	(0%)	
7	Inner section of the Osaka Bay	Izumisano	Plastics	Metals	Rubbers	Cloths	Other artificial materials	Glass/porcelain	Foam styrols	Papers	460.3
			313.5	76.7	21.2	21.2	19.8	7.8	0.0	0.0	
			(68%)	(17%)	(5%)	(5%)	(4%)	(2%)	(0%)	(0%)	
8	Southern section of the Harima Sea	Tosan	Plastics	Metals	Cloths	Rubbers	Other artificial materials	Glass/porcelain	Papers	Foam styrols	455.0
			337.6	52.7	46.8	17.0	0.7	0.2	0.1	0.0	
			(74%)	(12%)	(10%)	(4%)	(0%)	(0%)	(0%)	(0%)	
9	Eastern section of the Iyo Sea	Iyo	Plastics	Metals	Cloths	Glass/porcelain	Rubbers	Papers	Foam styrols	Other artificial materials	352.9
			292.0	31.5	20.4	6.9	1.8	0.3	0.0	0.0	
			(83%)	(9%)	(6%)	(2%)	(1%)	(0%)	(0%)	(0%)	
10	Bingo Sea (south)	Nishitakuma	Plastics	Metals	Rubbers	Glass/porcelain	Cloths	Papers	Other artificial materials	Foam styrols	324.2
			193.1	72.0	19.5	19.0	16.1	4.1	0.3	0.0	
			(60%)	(22%)	(6%)	(6%)	(5%)	(1%)	(0%)	(0%)	
11	Western section of the Kii Channel (Ⅰ)	Tokushima	Plastics	Metals	Other artificial materials	Cloths	Glass/porcelain	Papers	Rubbers	Foam styrols	236.8
			203.3	12.6	6.8	5.8	3.9	3.1	1.3	0.0	
			(86%)	(5%)	(3%)	(2%)	(2%)	(1%)	(1%)	(0%)	
12	Bungo Channel (west)	Saeki	Plastics	Metals	Rubbers	Cloths	Other artificial	Papers	Glass/porcelain	Foam styrols	195.4
			162.7	14.0	11.0	2.8	2.8	1.4	0.7	0.0	
			(83%)	(7%)	(6%)	(1%)	(1%)	(1%)	(0%)	(0%)	
13	Bisan Strait (east)	TakamatsushiSetouchi	Plastics	Metals	Other artificial materials	Glass/porcelain	Rubbers	Papers	Cloths	Foam styrols	67.2
			40.1	16.0	4.8	2.4	1.6	1.6	0.8	0.0	
			(60%)	(24%)	(7%)	(4%)	(2%)	(2%)	(1%)	(0%)	
14	Bisan Strait (west)	Marugame	Plastics	Metals	Rubbers	Cloths	Glass/porcelain	Papers	Foam styrols	Other artificial materials	48.5
			38.6	6.8	1.0	1.0	0.5	0.4	0.1	0.0	
			(80%)	(14%)	(2%)	(2%)	(1%)	(1%)	(0%)	(0%)	
15	Bungo Channel (east)	Shimonada	Plastics	Metals	Other artificial materials	Glass/porcelain	Rubbers	Foam styrols	Papers	Cloths	25.1
			16.6	3.4	3.4	0.9	0.8	0.0	0.0	0.0	
			(66%)	(14%)	(14%)	(4%)	(3%)	(0%)	(0%)	(0%)	
16	Eastern section of the Kii Channel	Aritaminoshima	Plastics	Rubbers	Other artificial materials	Cloths	Foam styrols	Metals	Papers	Glass/porcelain	1,416.2
			1,077.6	227.8	90.3	19.5	0.9	0.1	0.0	0.0	
			(76%)	(16%)	(6%)	(1%)	(0%)	(0%)	(0%)	(0%)	
17	Southern section of the Suo Sea (west)	Houchiku	Plastics	Rubbers	Metals	Cloths	Papers	Glass/porcelain	Foam styrols	Other artificial materials	218.1
			169.6	17.6	15.5	13.2	2.2	0.1	0.0	0.0	
			(78%)	(8%)	(7%)	(6%)	(1%)	(0%)	(0%)	(0%)	
18	Central portion of the Harima Sea	Boze	Plastics	Other artificial materials	Metals	Cloths	Rubbers	Papers	Glass/porcelain	Foam styrols	1,315.4
			939.8	252.0	48.1	38.5	25.9	9.6	0.9	0.6	
			(71%)	(19%)	(4%)	(3%)	(2%)	(1%)	(0%)	(0%)	
19	Osaka Bay entrance	kariya	Plastics	Other artificial materials	Rubbers	Metals	Papers	Cloths	Glass/porcelain	Foam styrols	272.5
			215.2	25.2	15.1	10.4	3.0	2.0	1.5	0.0	
			(79%)	(9%)	(6%)	(4%)	(1%)	(1%)	(1%)	(0%)	
20	Western section of the Iyo Sea	Nagahama	Plastics	Rubbers	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	6.2
			6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	
21	Mizushima Sea	Yorishima	Metals	Plastics	Cloths	Rubbers	Glass/porcelain	Papers	Other artificial materials	Foam styrols	1,376.4
			633.1	548.2	92.7	46.4	24.0	16.0	16.0	0.0	
			(46%)	(40%)	(7%)	(3%)	(2%)	(1%)	(1%)	(0%)	
22	Southern section of the Suo Sea (east)	Nakatsu	Metals	Plastics	Rubbers	Cloths	Glass/porcelain	Other artificial materials	Papers	Foam styrols	561.1
			233.2	230.1	30.1	27.6	25.1	12.5	2.5	0.0	
			(42%)	(41%)	(5%)	(5%)	(4%)	(2%)	(0%)	(0%)	
23	Northern section of the Suo Sea	Ube	Metals	Plastics	Rubbers	Cloths	Glass/porcelain	Papers	Other artificial materials	Foam styrols	168.1
			67.7	65.6	17.1	9.0	4.5	2.3	1.8	0.0	
			(40%)	(39%)	(10%)	(5%)	(3%)	(1%)	(1%)	(0%)	
24	Bingo Sea (north)	Yoshiwa	Other artificial materials	Plastics	Metals	Rubbers	Glass/porcelain	Cloths	Papers	Foam styrols	1,610.4
			637.0	635.7	177.4	116.8	28.0	13.5	1.8	0.2	
			(40%)	(39%)	(11%)	(7%)	(2%)	(1%)	(0%)	(0%)	
25	Western section of the Kii Channel (Ⅱ)	Tachibana	Other artificial materials	Plastics	Metals	Rubbers	Papers	Cloths	Glass/porcelain	Foam styrols	71.3
			36.5	20.6	7.3	5.0	0.9	0.6	0.4	0.0	
			(51%)	(29%)	(10%)	(7%)	(1%)	(1%)	(1%)	(0%)	
26	Northern section of the Harima Sea (east)	Higashifutami	Rubbers	Plastics	Foam styrols	Papers	Cloths	Glass/porcelain	Metals	Other artificial materials	54.4
			54.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
			(100%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)	

2) Comparison with past years

In the investigative meeting regarding sea bed debris in the Setonaikai in FY 2007, a survey regarding the distribution status of sea bed debris was conducted in 12 bay/ sea areas (Kii Channel, Osaka Bay (sea area on the side of Osaka prefecture), Osaka Bay (sea area on the side of Hyogo prefecture), Harima Sea, sea area nearby Kojima Bay, Bisan Strait, Hiuchi Sea, Aki Sea, Hiroshima Bay (inner section of bay), Hiroshima Bay (southern section), Iyo Sea, Suo Sea), and 53 points of location.

Here the results of the survey in FY 2007 and of this year (FY 2014) were compared, and the changes over the years were examined.

The sea areas of survey for this year that match with those of the survey in FY 2007 are displayed in chart III.1-4.

Regarding the comparison, the results of sea areas of survey for this year's research were calculated as the average density per unit area (km^2) for each bay/ sea area of the survey conducted in FY 2007, and the results were compared with those of FY 2007.

In this year's survey the Kojima Bay was not included in the survey area, and in the survey of FY 2007 the Bingo Sea and Bungo Channel were not included in the survey area.

Chart III.1-4 Sea bed debris survey,
Comparison of FY 2007 survey and survey for this year

Bay/ sea area of the survey conducted in FY 2007	Sea areas of survey for FY 2014 (this year)
Kii Channel<5 points>	・Eastern section of the Kii Channel ・Western section of the Kii Channel (Ⅱ) ・Western section of the Kii Channel (Ⅰ)
Osaka Bay(sea area on the side of Osaka prefecture)<5 points>	・Inner section of the Osaka Bay
Osaka Bay(sea area on the side of Hyogo prefecture)<4 points>	・Osaka Bay entrance
Harima Sea<5 points>	・Central portion of the Harima Sea ・Northern section of the Harima Sea (east) ・Northern section of the Harima Sea (west) ・Southern section of the Harima Sea
Kojima Bay<3 points>	*not included in the survey area
Bisan Strait<3 points>	・Mizushima Sea ・Bisan Strait (west) ・Bisan Strait (east)
Bingo Sea<*not included in the survey area>	・Bingo Sea (north) ・Bingo Sea (south)
Hiuchi Sea<5 points>	・Hiuchi Sea (north) ・Hiuchi Sea (south)
Aki Sea<3 points>	・Aki Sea (north)
Hiroshima Bay (Inner section of bay)<4 points>	・Hiroshima Bay (north)
Hiroshima Bay(southern section)<8 points>	・Hiroshima Bay (south)
Iyo Sea<4 points>	・Western section of the Iyo Sea ・Eastern section of the Iyo Sea
Suo Sea<4 points>	・Northern section of the Suo Sea ・Southern section of the Suo Sea (west) ・Southern section of the Suo Sea (east)
Bungo Channel<*not included in the survey area>	・Bungo Channel (west) ・Bungo Channel (east)

Note; (1) The number of time trawling was carried out in each point of location for the survey of FY 2007 was once, and a total of 53 times.

(2) The number of time trawling was carried out in this year's survey varies according to each sea area of survey, however the least was the Hiroshima Bay (north) and Hiroshima Bay (south) with 20 times, while the most was the Suo Sea with 580 times, and the overall total was 2,419 times.

(a) Density (individual number)

The comparison of density (individual number) between the survey of FY 2007 and of this year is displayed in diagram III.1-4 and chart III.1-5. Since there were great variances with bays/seas in both years, the comparison was displayed using a logarithmic graph.

The density (individual number) in each bay/sea had decreased for this year when comparing with the survey of FY 2007.

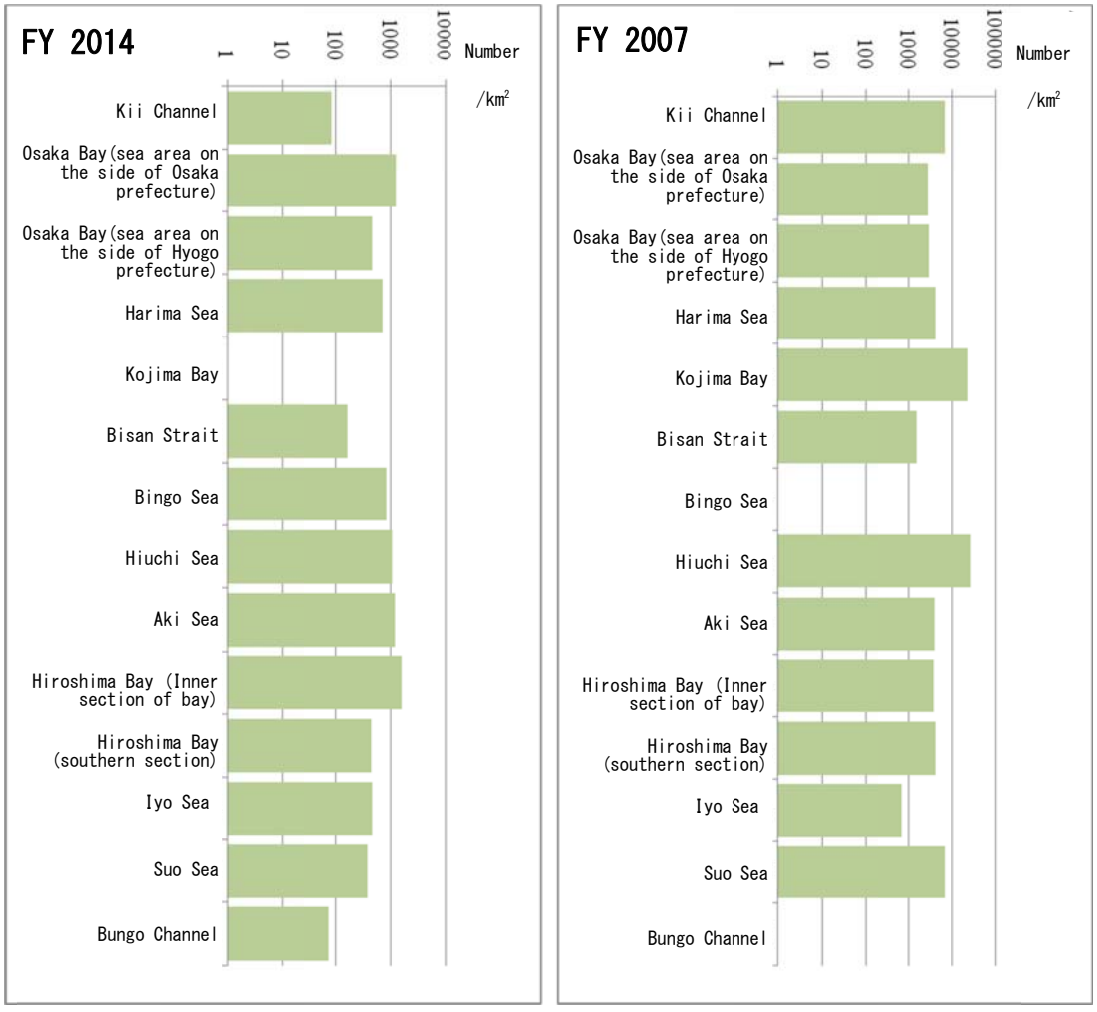

Diagram III.1-4 Comparison of sea bed debris density (individual number) between the FY 2007 survey and this year's survey (no./km²)

Chart III.1-5 Comparison of sea bed debris density (individual number) between the FY 2007 survey and this year's survey (no./km²)

No. /km²

	Kii Channel	Osaka Bay (sea area on the side of Osaka prefecture)	Osaka Bay (sea area on the side of Hyogo prefecture)	Harima Sea	Kojima Bay	Bisan Strait	Bingo Sea	Hiuchi Sea	Aki Sea	Hiroshima Bay (Inner section of bay)	Hiroshima Bay (southern section)	Iyo Sea	Suo Sea	Bungo Channel
FY 2007	6,988	2,833	2,941	4,244	22,306	1,526	-	26,783	4,028	3,790	4,198	689	6,941	-
FY 2014	84	1,278	467	736	-	170	853	1,072	1,197	1,575	452	476	377	75
FY2014 -FY2007	-6904	-1555	-2474	-3508	-	-1356	-	-25711	-2831	-2215	-3746	-213	-6564	-

Chart III. 1-6 Comparison of sea bed debris according to sea area of the FY 2007 survey and this year's survey (weight/km²)

Weight /km²

	Kii Channel	Osaka Bay (sea area on the side of Osaka prefecture)	Osaka Bay (sea area on the side of Hyogo prefecture)	Harima Sea	Kojima Bay	Bisan Strait	Bingo Sea	Hiuchi Sea	Aki Sea	Hiroshima Bay (Inner section of bay)	Hiroshima Bay (southern section)	Iyo Sea	Suo Sea	Bungo Channel
FY 2007	95.7	206.7	102.7	54.4	137.9	1927.9	-	532.0	54.7	74.4	75.1	6.5	199.9	-
FY 2014	17.5	108.0	39.0	67.0	-	12.3	61.1	69.3	57.3	401.6	46.1	20.1	28.5	8.2
FY2014 -FY2007	-78	-99	-64	13	-	-1916	-	-463	3	327	-29	14	-171	-

(b) Density (weight)

The comparison of density (weight) between the survey of FY 2007 and of this year is displayed in diagram III.1-5 and chart III.1-6. Since there were great variances with bays/seas in both years, the comparison was displayed using a logarithmic graph.

There was more weight in the Kii Channel, Osaka Bay (sea area on the side of Osaka prefecture), Osaka Bay (sea area on the side of Hyogo prefecture), Bisan Strait, Hiuchi Sea, Hiroshima Bay (southern section), and Suo Sea for the survey in FY 2007, There was more weight in the Hiroshima Bay (inner section of bay), Iyo Sea, Harima Sea, and Aki Sea for this year's survey. A reason for this could be due to a slightly large amount of sandbags included in the Hiroshima Bay (inner section of bay).

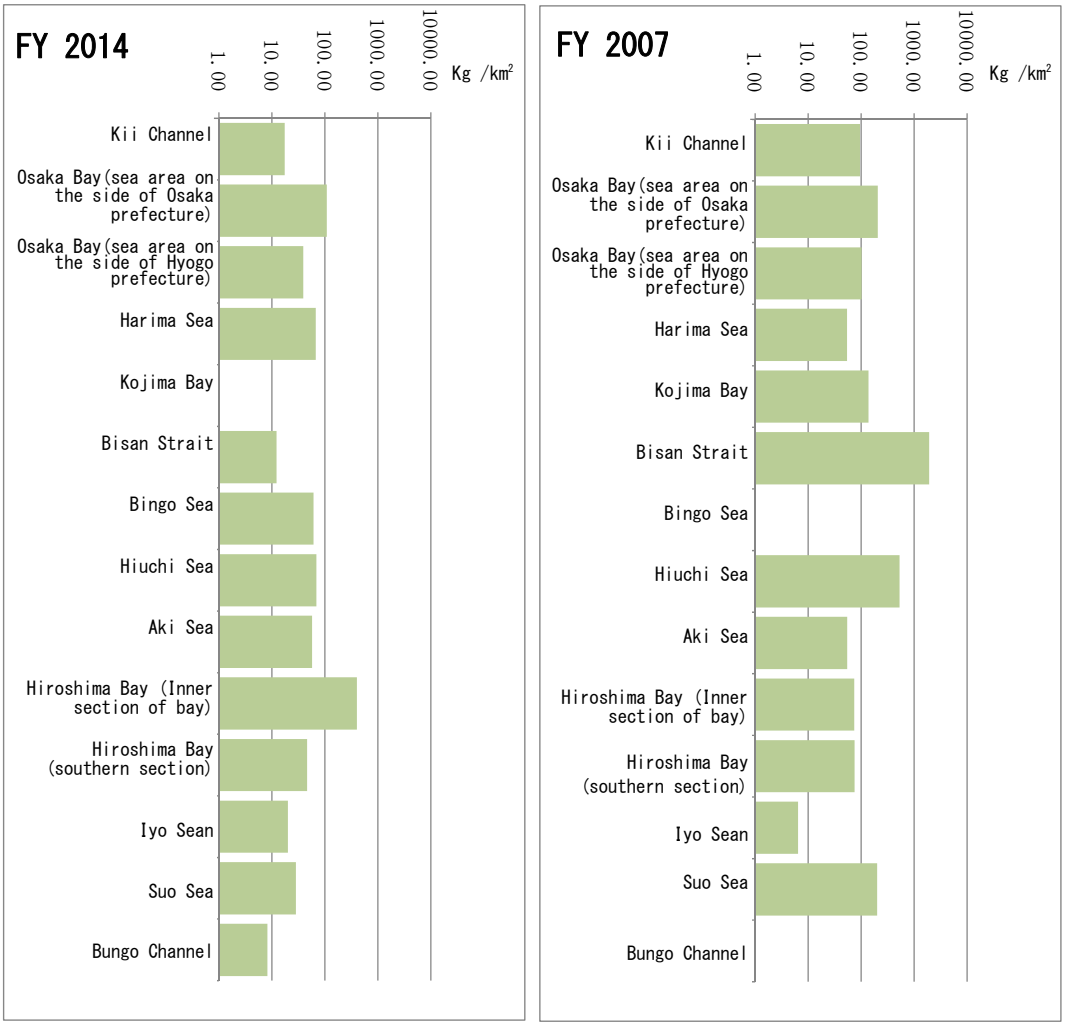

Diagram III. 1-5 Comparison of sea bed debris according to sea area of the FY 2007 survey and this year's survey (weight/km²)

(2) Density of floating debris

1) This year

With observational survey, the data of all 7 sea areas of survey were gathered and analyzed since the number of samples was too small with just 1 sea area of survey for this time. When looking at the data according to items even with using all data of the 7 sea areas of survey, there was little discovered individual numbers that could be used for the estimation of the semi effective sweep width. For this reason the semi effective sweep width regarding plastic films (V), foam styrol (EP), and other petrochemicals (EP), which are the top 3 items with relatively large discovered numbers, were estimated and the density was calculated.

The density (individual number) of floating debris (top 3 items) through observational survey is displayed in diagram III.1-6, and the density (individual number) of micro plastics through micro plastic survey is displayed in diagram III.1-7.

The sea areas with low density for observational survey and micro plastic survey were the Hiroshima Bay (Kainan) and Mizushima Sea. The trends were similar while there seemed to be variances according to areas.

With the ratio according to types, the ratio of plastic films was high with floating debris of observational survey, and the ratio of artificial objects was high. On the other hand, when looking at the recovery result of floating debris by recovery vessels of the Ministry of Land, Infrastructure, Transport and Tourism mentioned in Chapter II, the collected amount of natural objects such as plants and marine plants was also high, and so the trends differed with the observational survey of floating debris of this time.

Regarding micro plastics, the ratio of foam styrol was high in the Mizushima Sea and Hiuchi Sea (north). In other sea areas the ratio of plastics was high.

【The density of floating debris through observational survey (Individual number/km²)】

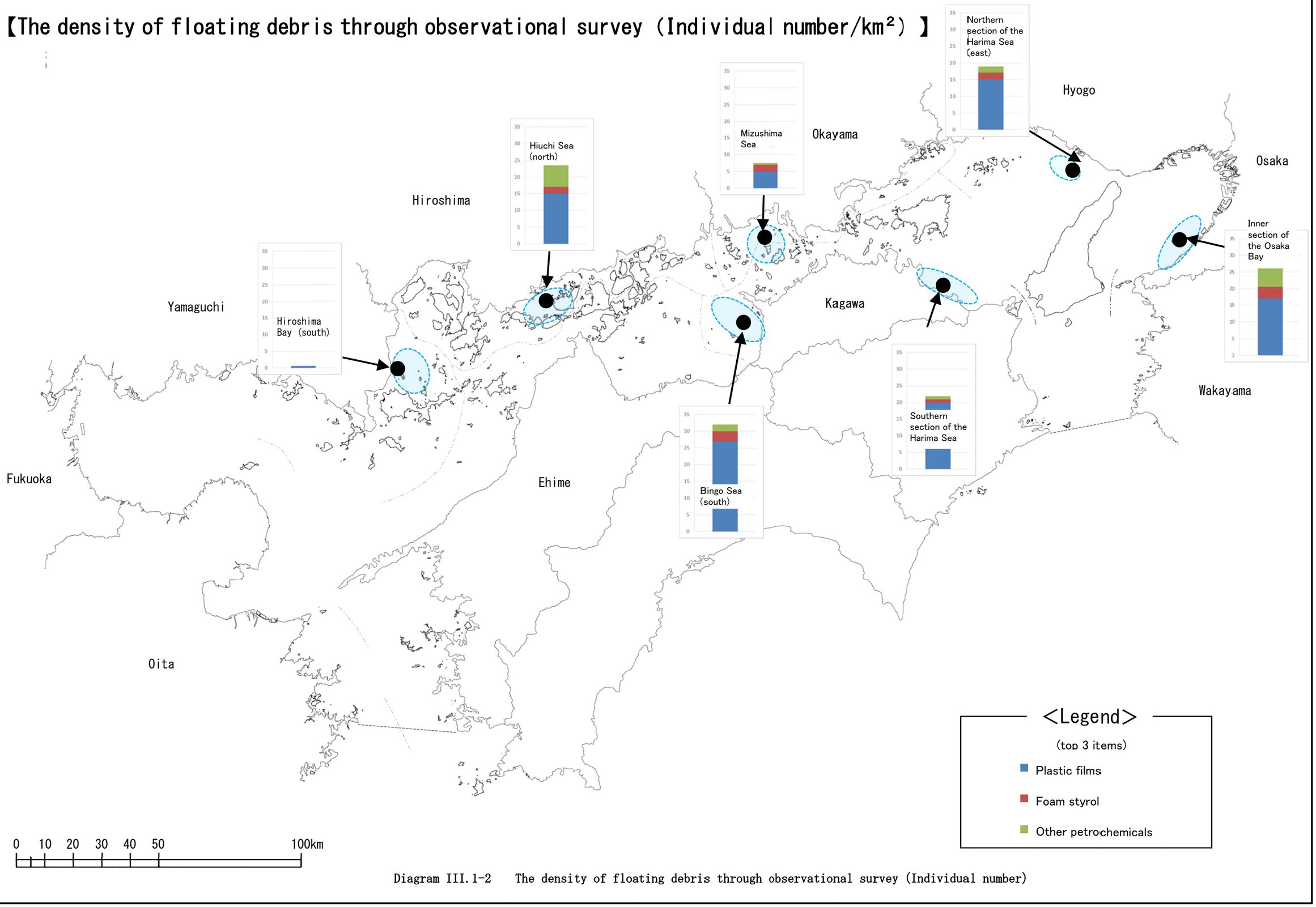

Diagram III.1-2 The density of floating debris through observational survey (Individual number)

【 The density of floating debris (micro plastics) (Individual number/m^3) 】

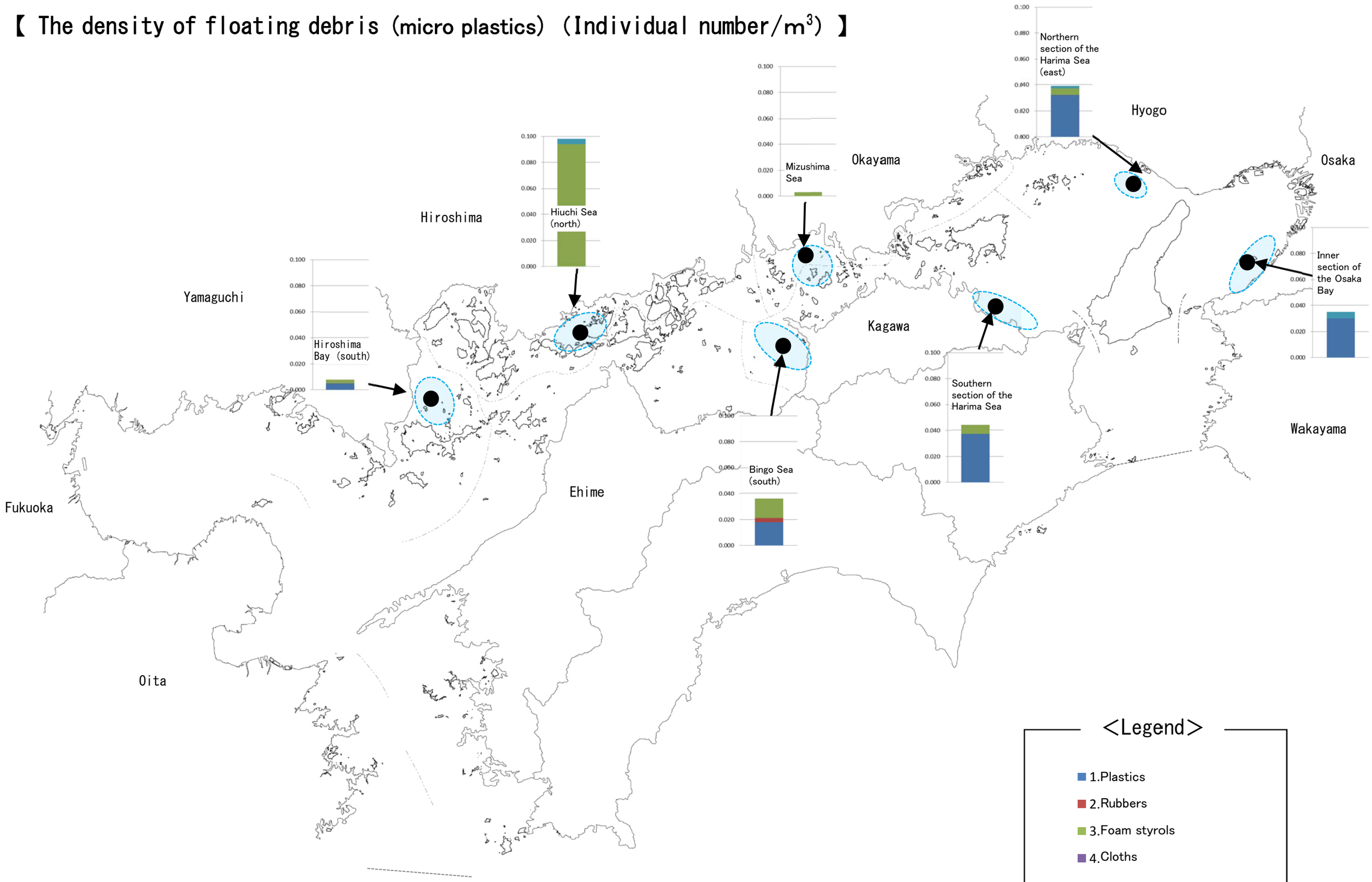

Diagram III.1-3 The density of floating debris (micro plastics) (Individual number)

2) Comparison with past years

An observational survey and micro plastics survey were no conducted for the field survey of FY 2007.

(3) Total of Bay/Sea areas

From the above results, the density and total amount of sea bed/floating debris calculated in bay/sea areas is displayed in chart III.1-7. Regarding the density and total amount of sea bed debris in the Bingo Sea (south), the offshore data of Kannon city, Kagawa prefecture, where survey was not conducted for this year (obtained from the FY 2013 Sea bed/floating debris factual survey (consigned by the Ministry of Environment). Each density was calculated by adding individual number: 6,496/km^2, weight: 285kg/km^2, and volume: 1,867 liter/km^2.

Chart III.1-7 Density, total amount of sea bed/floating debris according to bay/sea

No.	Sea/bay	Sea/bay FY2007	Sea area for survey	Underwater debris					Floaing debris	
				FY2007		FY2014			Observational	Micro plastics
				Density (no.)	Density (weight)	Density (no.)	Density (weight)	Density (volume)	Density (no.)	Density (no.)
				No./km^2	kg/km^2	No./km^2	kg/km^2	L/km^2	No./km^2	No./km^3
1	Kii Channel	Kii Channel	Eastern section of Kii Channel	6,988	95.7	84	17.5	161.3		
			Western section of the Kii Channel (Ⅰ)							
			Western section of the Kii Channel (Ⅱ)							
2	Osaka Bay	Osaka Bay(sea area on the side of Osaka prefecture)	Inner section of the Osaka Bay	2,833	206.7	1,278	108.0	272.5	26.1	0.034
		Osaka Bay(sea area on the side of Hyogo prefecture)	Osaka Bay entrance	2,941	102.7	467	39.0	460.3		
3	Harima Sea	Harima Sea	Central portion of Harima Bay	4,244	54.4	736	67.0	647.9	20	0
			Northern section of the Harima Sea							
			Northern section of the Harima Sea							
			Southern section of the Harima Sea							
4	Bisan Strait	Bisan Strait	Bisan Strait (west)	1,526	1927.9	170	12.3	112.6	8	0
			Bisan Strait (east)							
			Mizushima Sea							
5	Bingo Sea	Bingo Sea	Bingo Sea (north)			999	66.9	779.5	32	0.035
			Bingo Sea (south)							
6	Hiuchi Sea	Hiuchi Sea	Hiuchi Sea (north)	26,783	532.0	1,072	69.3	533.0	24	0
			Hiuchi Sea (south)							
7	Aki Sea	Aki Sea	Aki Sea (north)	4,028	54.7	1,197	57.3	734.7		
8	Hiroshima Bay	Hiroshima Bay (Inner section of bay)	Hiroshima Bay (north)	3,790	74.4	1,575	401.6	2998.2		
		Hiroshima Bay(southern section)	Hiroshima Bay (south)	4,198	75.1	452	46.1	707.5	0.6	0.008
9	Iyo Sea	Iyo Sea	Western section of the Iyo Sea	689	6.5	476	20.1	220.8		
			Eastern section of the Iyo Sea							
10	Suo Sea	Suo Sea	Northern section of the Suo Sea	6,941	199.9	377	28.5	285.2		
			Southern section of the Suo Sea (west)							
			Southern section of the Suo Sea (east)							
11	Bungo Channel	Bungo Channel	Bungo Channel (west)			75	8.2	61.8		
			Bungo Channel (east)							

No.	Sea/bay	Sea/bay FY2007	Sea area for survey	Area of sea/bay	Underwater debris					Floaing debris	
					FY2007		FY2014			Observation	Micro plastics
					Total amount (no.)	Total amount (weight)	Total amount (no.)	Total amount (weight)	Total amount (volume)	Total amount (no.)	Total amount (no.)
				km^2	No.	kg	No.	kg	L	No.	No.
1	Kii Channel	Kii Channel	Eastern section of Kii Channel	1,938	13,542,744	185,467	162,202	33,829	312,602		
			Western section of the Kii Channel (Ⅰ)								
			Western section of the Kii Channel (Ⅱ)								
2	Osaka Bay	Osaka Bay(sea area on the side of Osaka prefecture)	Inner section of the Osaka Bay	1,447	4,176,281	235,286	1,224,318	103,457	521,345	37,767	27,550,880
		Osaka Bay(sea area on the side of Hyogo prefecture)	Osaka Bay entrance								
3	Harima Sea	Harima Sea	Central portion of Harima Bay	3,426	14,539,944	186,374	2,522,650	229,655	2,219,755	68,520	78,660,960
			Northern section of the Harima Sea (east)								
			Northern section of the Harima Sea (west)								
			Southern section of the Harima Sea								
4	Bisan Strait	Bisan Strait	Bisan Strait (west)	1,063	1,622,138	2,049,358	180,833	13,024	119,647	7,973	1,785,840
			Bisan Strait (east)								
			Mizushima Sea								
5	Bingo Sea	Bingo Sea	Bingo Sea (north)	773			772,098	51,688	602,542	24,736	15,150,800
			Bingo Sea (south)								
6	Hiuchi Sea	Hiuchi Sea	Hiuchi Sea (north)	1,619	43,361,677	861,308	1,736,117	112,229	862,981	38,208	88,850,720
			Hiuchi Sea (south)								
7	Aki Sea	Aki Sea	Aki Sea (north)	744	2,996,832	40,697	890,362	42,664	546,601		
8	Hiroshima Bay	Hiroshima Bay (Inner section of bay)	Hiroshima Bay (north)	1,043	4,242,733	78,144	546,902	71,921	891,218	626	4,672,640
		Hiroshima Bay(southern section)	Hiroshima Bay (south)								
9	Iyo Sea	Iyo Sea	Western section of the Iyo Sea	4,009	2,762,201	26,059	1,906,600	80,620	885,246		
			Eastern section of the Iyo Sea								
10	Suo Sea	Suo Sea	Northern section of the Suo Sea	3,805	26,410,505	760,620	1,435,981	108,443	1,085,373		
			Southern section of the Suo Sea (west)								
			Southern section of the Suo Sea (east)								
11	Bungo Channel	Bungo Channel	Bungo Channel (west)	2,744			206,797	22,636	169,716		
			Bungo Channel (east)								

III.1.1.2 Analysis of locality (Comparison with areas apart from the Setonaikai)

A comparison between the survey results of offshore surveys and the survey results of FY 2013 were conducted according to sea sectors.

(1) Density of sea bed debris

The distribution of density (individual number) is displayed in diagram III.1-8, the distribution of density (weight) is displayed in diagram III.1-9, and the distribution of density (volume) is displayed in diagram III.1-10.

In the Setonaikai sector of this year's coastal survey, there were higher densities (individual number, weight, and volume) compared to the sea sectors of FY 2013 and the East China Sea sector of offshore surveys.

The low number of samples for the survey result of FY 2013 must be considered, however it can be said that the amount of sea bed debris in the Setonaikai is larger compared to other sea areas.

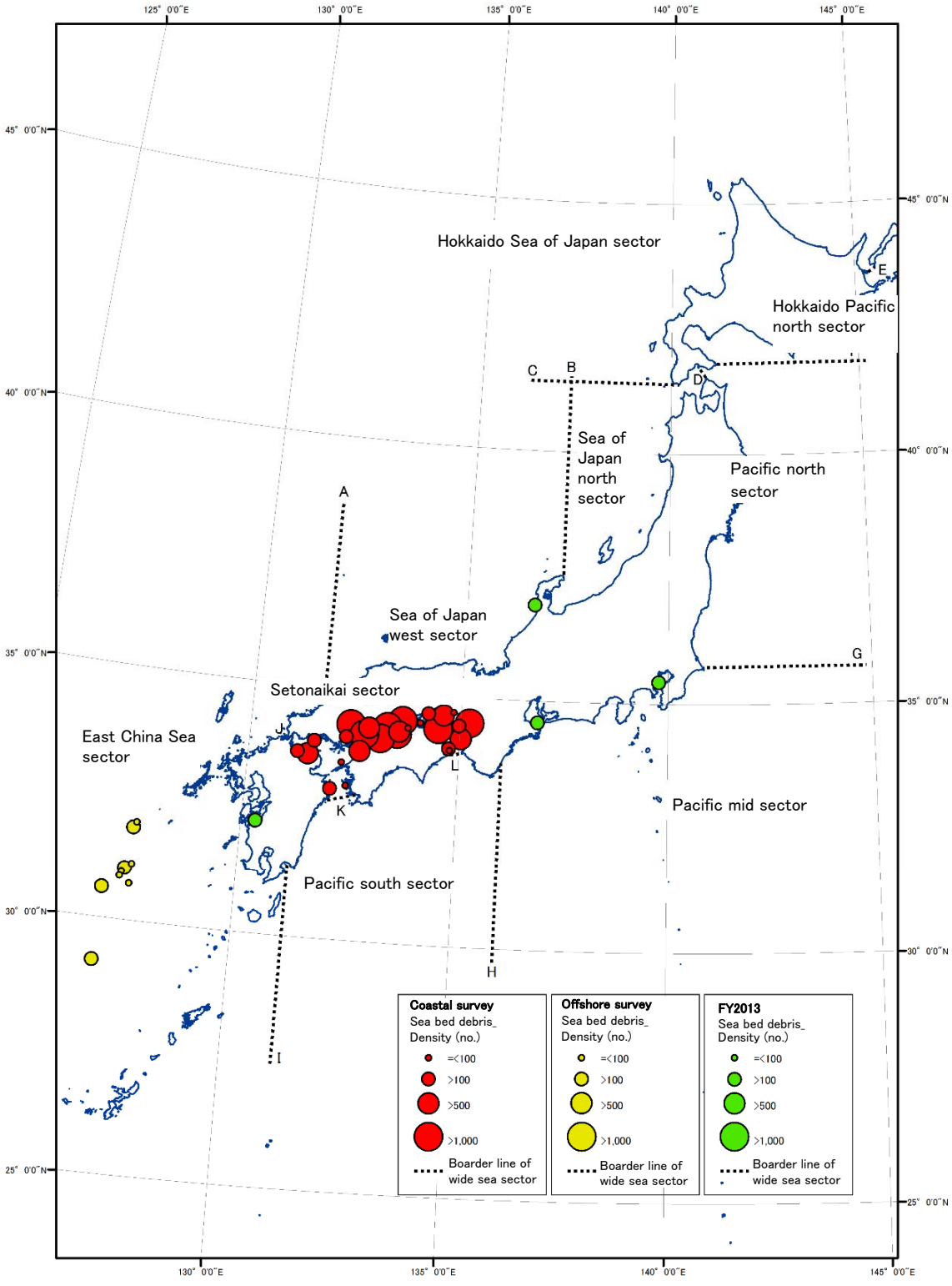

Diagram III.1-8 Distribution of density (individual number) of sea bed debris

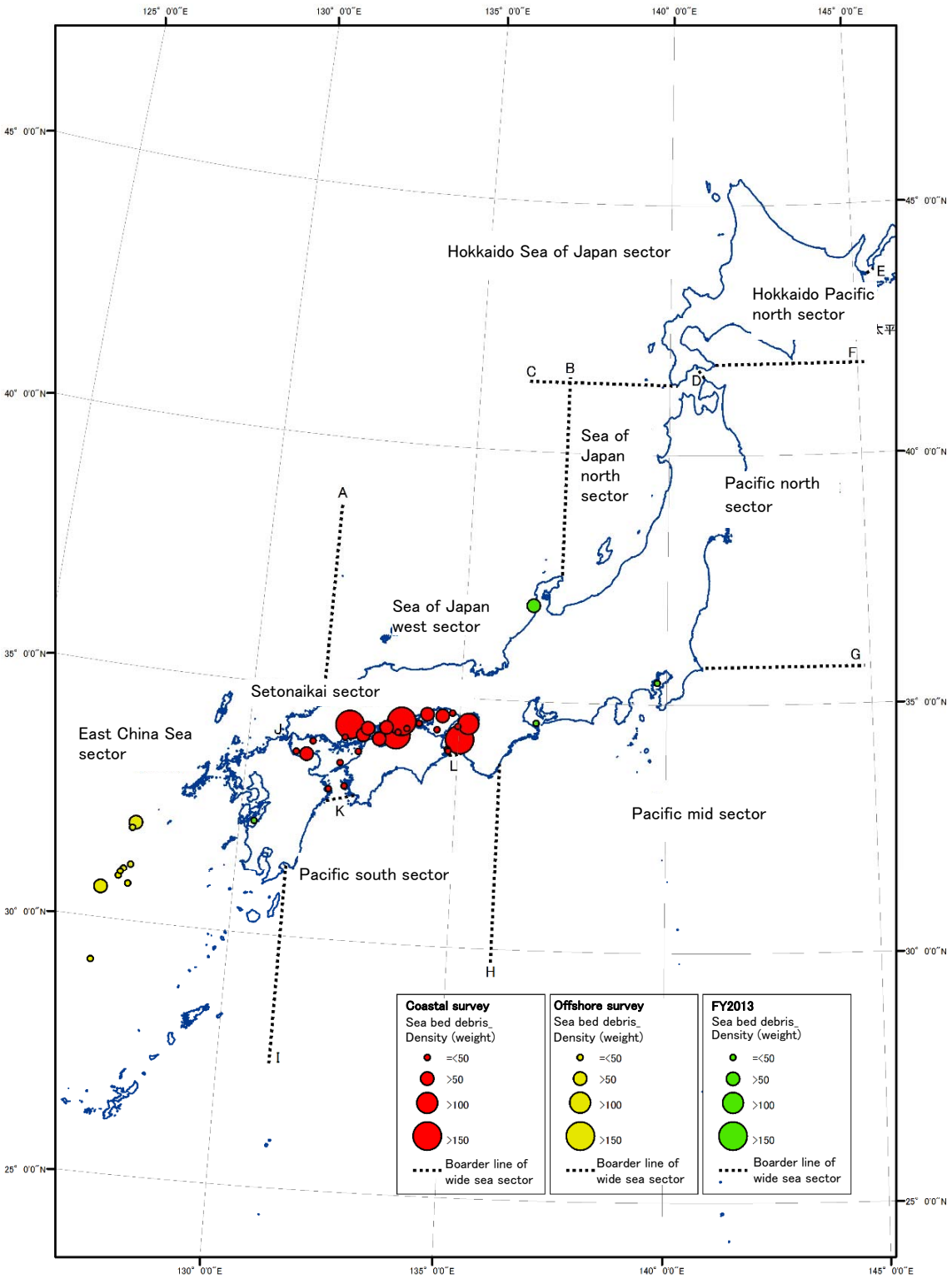

Diagram III.1-9 Distribution of density (weight) of sea bed debris

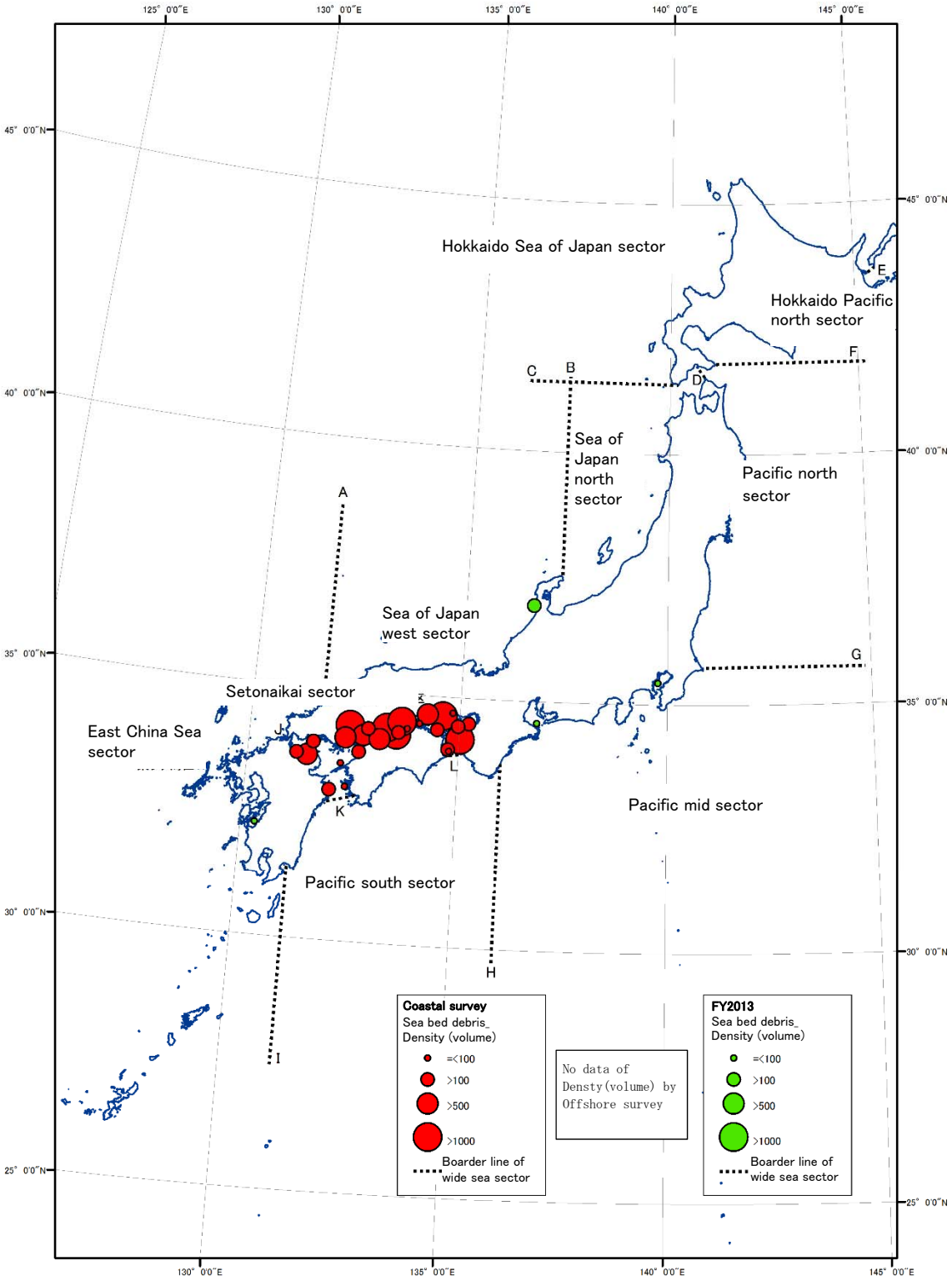

Diagram III.1-10 Distribution of density (volume) of sea bed debris

(2) Density of floating debris

1) Observational survey

The density of floating debris with the observational survey of floating debris conducted in the offshore survey of FY 2014* and the observational survey in this survey (coastal survey) was compared. The comparison was regarding the 3 items (plastic films, foam styrol, other petrochemicals) used to estimate the density in this survey. The result of the offshore survey was gathered according to ocean sectors.

The distribution status of floating plastic film debris is displayed in diagram III.1-11, the distribution status of floating foam styrol debris is displayed in diagram III.1-12, and the distribution status of floating other petrochemicals debris is displayed in diagram III.1-13.

Also, the distribution status regarding the floating density of the 3 items combined is displayed in diagram III.1-14.

From the above results, the amount of observable floating debris in the Setonaikai is believed to be less compared to other sea areas.

* Ministry of Environment (2015) Consigned factual survey report regarding floating/sea bed debris in offshore sea areas in FY 2014

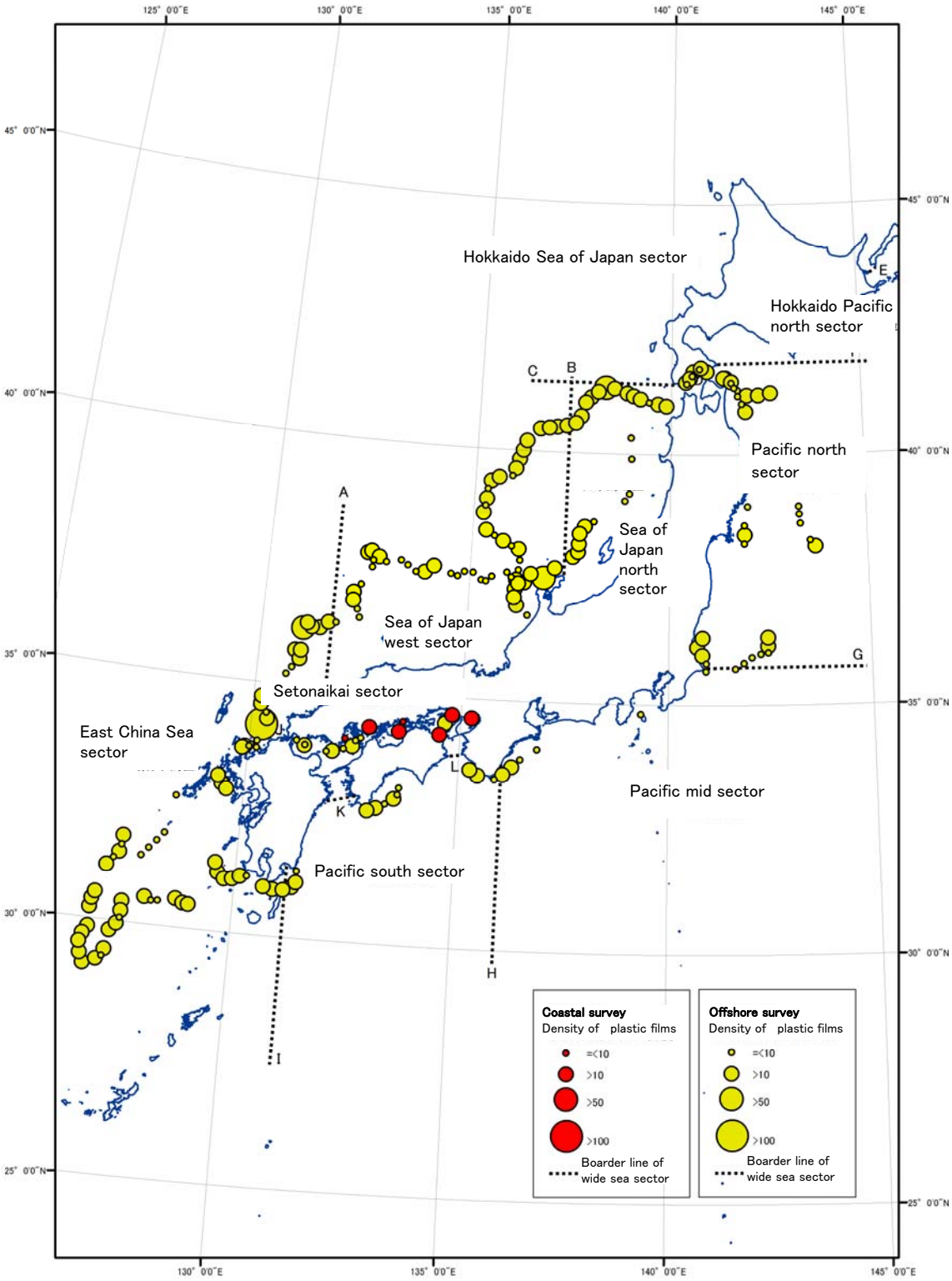

Diagram III.1-11 Distribution of floating density through observational survey of floating debris (plastic films)

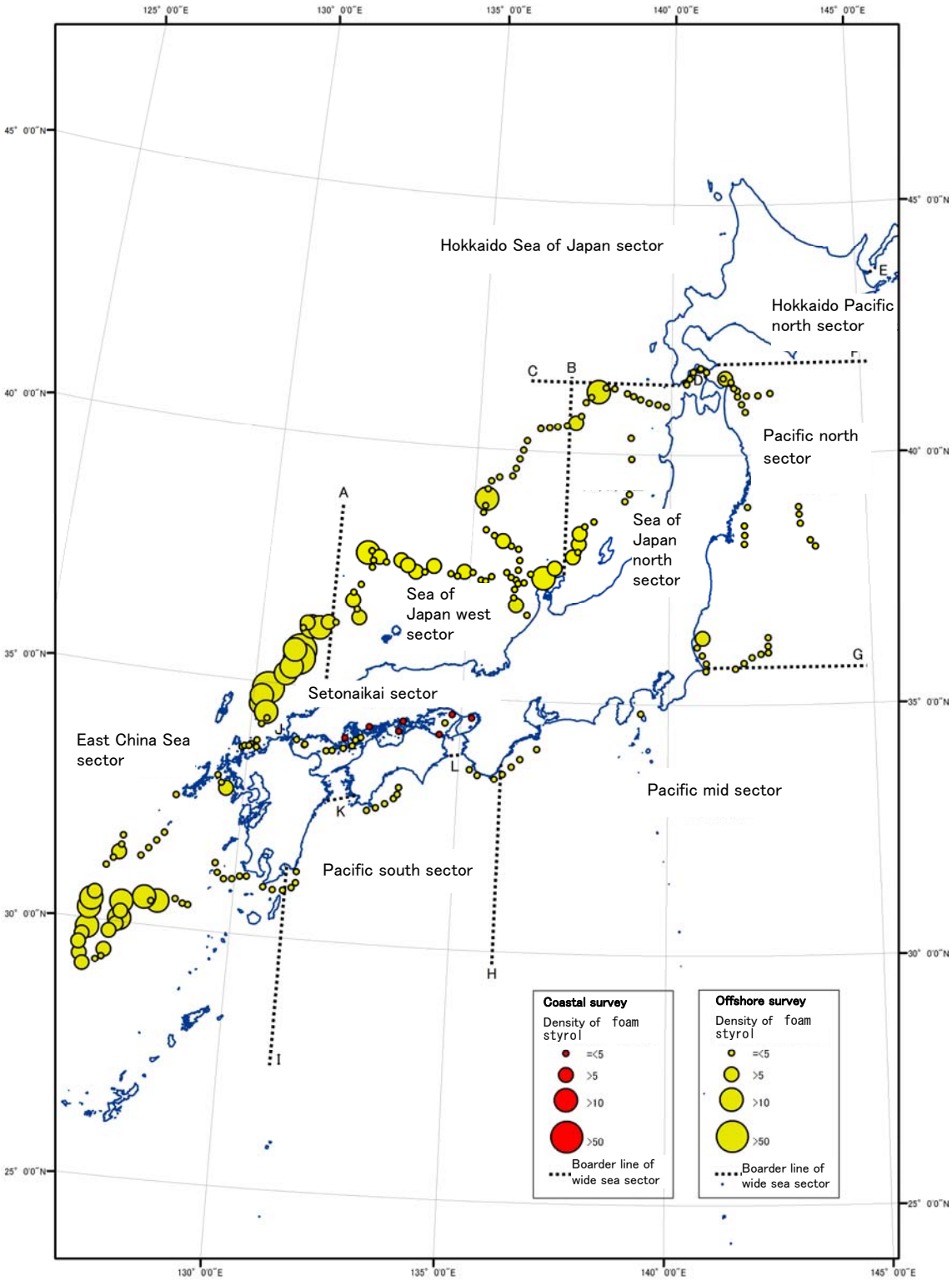

Diagram III.1-12 Distribution of floating density through observational survey of floating debris (foam styrol)

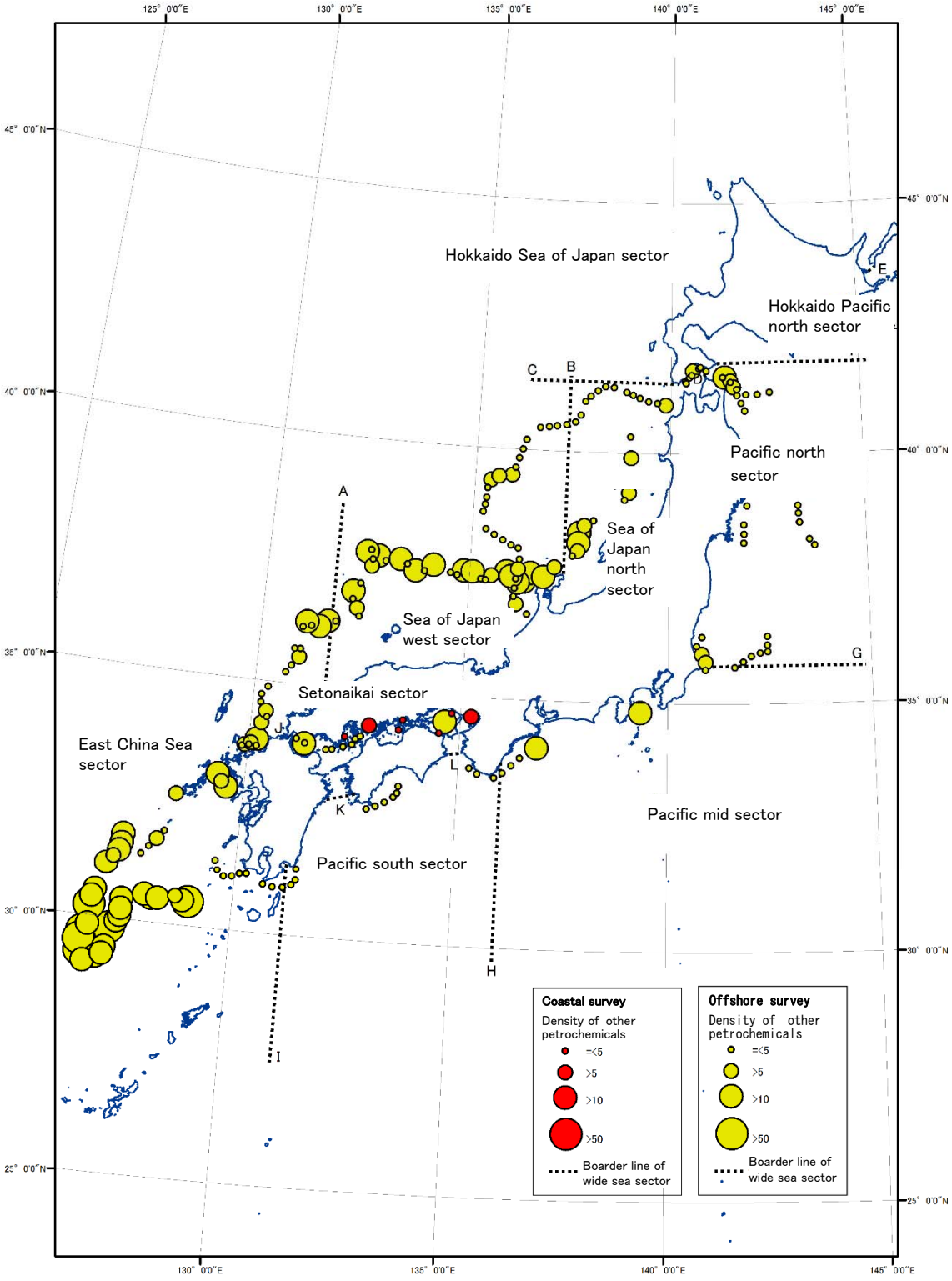

Diagram III.1-13 Distribution of floating density through observational survey of floating debris (other petrochemicals)

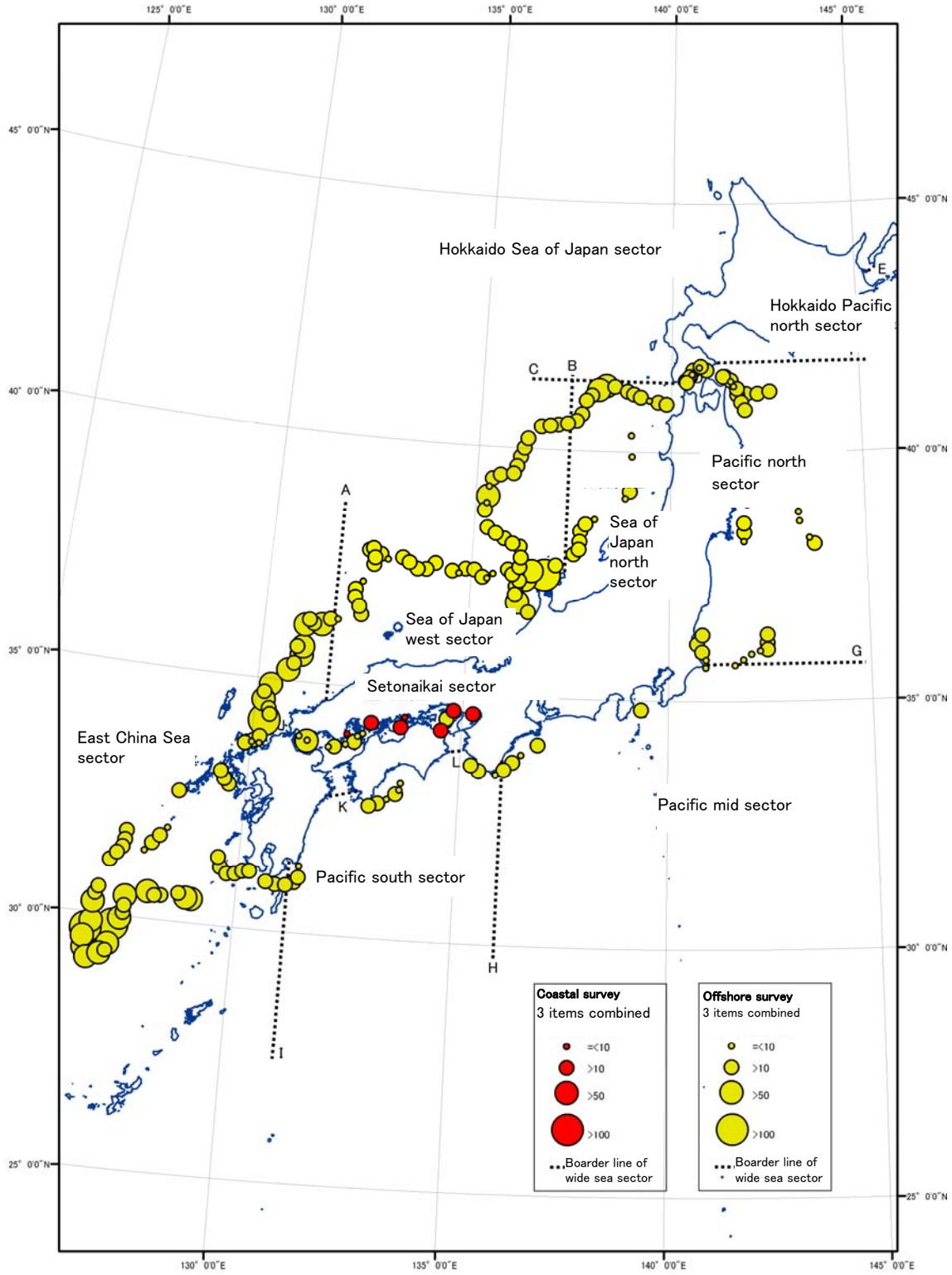

Diagram III.1-14 Distribution of floating density through observational survey of floating debris (3 items combined)

2) Micro plastics survey

A micro plastics survey was conducted in the FY 2013 offshore survey. Within the result of this offshore survey, a comparison between the floating density of 1-5mm large micro plastics and the floating density (1-5mm) of this survey (coastal survey) was conducted. The result of the offshore survey was gathered according to ocean sectors. The distribution status of floating density according to sea area of survey is displayed in diagram III.1-15.

Apart from the Pacific mid sector, the floating density (0.041/m^3) of the Setonaikai was greatly low compared to the average figure of ocean sectors of the offshore survey. (The Setonaikai sector was about 1/14 of the second lowest East China Sea sector (0.594/m^3)).

The offshore survey was conducted during the summer period from July 17, 2013-August 8. On the other hand this survey (coastal survey) was conducted during the winter period from February 5, 2014-March 16, and so the seasons of both surveys differ. In general, there is a trend where the amount of floating debris increases during the summer due to inundation caused by rainfall. Apart from the difference with sea areas where the surveys were conducted, variances according to seasons could be considered as a possible factor for the lower figure compared to the offshore survey.

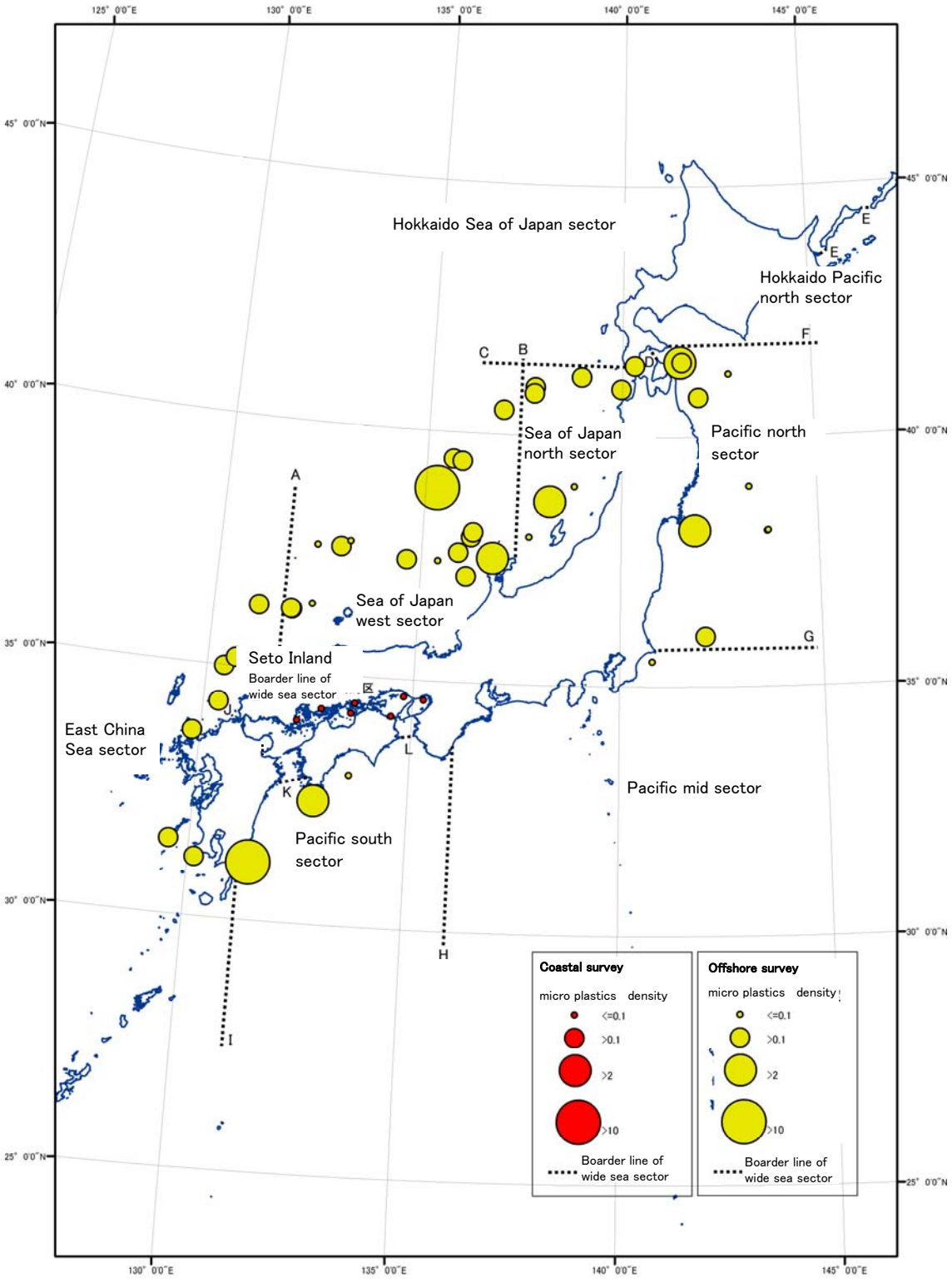

Diagram III.1-15 Distribution of micro plastics floating density

III.1.1.3 Analysis regarding the diversity of related entities

Regarding related entities, the following analysis from the 3 perspectives of the source, damage, and recovery of floating/sea bed debris was conducted.

1) Source

Plastics covered the largest ratio regarding the types of sea bed debris, and among them the amount of wastes produced in everyday life such as supermarket/convenience store bags were the most. Apart from plastics there were various types of debris including fishing wastes such as fishing nets or fishing cages, and industrial wastes such as tires/wires. Plastics also covered a large ratio with the types of floating debris.

From the above reasons, the main source of debris can be said to be lifestyle related wastes produced on land. Industrial wastes can also be considered as a source regarding heavy and large debris. While the numbers are not high, fishing nets and fishing cages could be the source of debris emerging at sea.

2) Damage

From the results of interviews towards fishermen, the following damages that affect fishermen were assessed.

- Damage of trawls and difficulty with raising/collecting trawls due to sea bed debris.
- Damages caused by floating debris coming into contact with screws and hindrance of vessel operation due to screw entanglements.

Apart from physical damages such as those mentioned above, there were also concerns regarding the impact of accumulated sea bed debris on bio-productivity, and so the possibility of direct impacts on fishermen from the perspective of productivity regarding fishery can also be considered.

3) Recovery

Regarding recovery, the Ministry of Land, Infrastructure, Transport and Tourism and local governments have placed waste recovery boxes. Through these there are cases where fishermen voluntarily bring back wastes and then are collected by the local government for disposal, showing conditions were mainly fishermen, the municipality, and the government cooperate to collect wastes.

III.1.1.4 Analysis of exigency etc.

As an example of high exigency, cases where large amounts of floating debris enter the port and affect the operation of ships were indicated through the result of interviews conducted towards fishermen.

III.1.1.5 Task sorting

A summary of the current status and the results of task sorting are displayed below.

(1) Sea bed debris

(a) Differences according to areas

The density varies according to area, and areas with high or low densities (individual number, weight, volume) showed similar trends.

Also, the ratio of plastics with each density (individual number, weight, volume) was high. There were also areas with a high ratio of metals and other artifacts regarding weight and volume.

The ratio of lifestyle related wastes such as “parts of sheets and bags” and “supermarket/convenience store bags” was high among plastics.

(b) Comparison with areas apart from the Setonaikai

There was a higher trend regarding density (individual number) and density (weight) compared to other ocean sectors.

(c) Chronological changes

In this year's survey there was a slight increase with density (volume) in the Hiroshima Bay (inner section of bay) and the Iyo Sea. However there was not any increase trend in other sea areas regarding density (individual number) and density (weight).

(d) Tasks with field surveys

In this sea bed survey the method of handing field notes to fishermen and having them fill in, as well as the method of conducting supplementary interviews towards fishermen were used regarding the recording to trawling distances. Regarding field notes, improvements for having fishermen record data more easily will further raise efficiency for obtaining data in the future.

(2) Floating debris

(a) Differences according to areas

There were variances regarding density (individual number) according to areas with both observational survey and micro plastics survey. Also, the ratio of plastics was high.

(b) Comparison with sea areas apart from the Setonaikai

With observational surveys, the floating density of plastic films, foam styrol, and other petrochemicals of the Setonaikai of this survey showed a figure that was about the same as with the ocean sectors of the offshore survey where figures were low.

With the micro plastics survey, the average floating density of the Setonaikai in this survey showed a much lower figure than the average figure of ocean sectors in both offshore surveys, apart from the Pacific mid sector.

The period of time when this survey was conducted differed from that of the offshore survey, and so there is the possibility of variances due to the time when the surveys were conducted.

(c) Chronological changes

The same survey had not been conducted in past years.

(d) Tasks with field survey

Since this survey was conducted from winter-spring when the amount of floating debris is relatively fewer, we did not assess the annual status of floating debris. In the future it is necessary to conduct a survey during the summer when the amount of floating debris is relatively large in order to assess the annual status of floating debris.

Regarding observational survey, it is necessary to raise the accuracy of estimation through semi effective sweep width by accumulating data in the future.

(3) Summary of existing information

The collected and organized summary of existing information in Chapter II was compared and examined with this survey. The compared and examined data are as follows, and all regarding floating debris.

<Summary of existing information>

(a) Recovery result by floating debris recovery vessels of the Ministry of Land, Infrastructure, Transport and Tourism

(b) Payment status of fishing vessel insurance

(c) Marine environment monitoring by the Ministry of Environment

(d) Monitoring survey result of floating plastics by the Meteorological Agency

<Survey result for this year>

(e) Floating debris survey Observational survey result

(f) Floating debris survey Micro plastics survey result

The comparison of the summary of existing information and this survey is displayed in chart III.1-8.

Chart III.1-8 Comparison of the summary of existing information and this survey is displayed in

Survey name (summary)	Summary of existing information				This survey	
	(a) Recovery result by floating debris recovery vessels of the Ministry of Land, Infrastructure, Transport and Tourism	(b) Payment status of fishing vessel insurance	(c) Marine environment monitoring by the Ministry of Environment	(d) Monitoring survey result of floating plastics by the Meteorological Agency	(e) Floating debris survey Observational survey result	(f) Floating debris survey Micro plastics survey result
Survey method	Recovery amount data collection of floating debris recovery vessels	Ratio of cases of damages caused by floating debris	Collecting by using Neuston nets	Observational	Observational	Collecting by using Neuston nets (only micro plastics)
Survey location	Coast	-	Coastal-offshore 1 calculation line towards offshore	offshore	Off coast (offshore*)	Off coast (offshore*)
Survey period	Throughout the year (monthly gather data)	Throughout the year (annually gather data)	Roughly once from fall-winter		Winter-spring (summer-fall*)	Winter-spring (summer-fall*)
Summary unit	m^2/month	%	No./km^2 g/km^2	No./100km	No./km^2	No./km^2
Information of type of debris	Available	None	Available	None	Available	Available

*Separate survey: Ministry of Environment (FY 2015) 2014 Consigned factual survey report of floating/sea bed debris in offshore sea areas

-: Unknown

When comparing (a) with (e) of the observational survey, there are large amounts of wood material/bamboo in “Osaka Bay/Ise Bay/Kii Channel” of (a), while the amount of plastics/foam styrol was high in “Hiroshima Bay/Aki Sea, and common reeds/grass/marine plants were high in “other areas of the Setonaikai”. On the other hand in (e), the amount of artificial materials such as plastic films and foam styrols etc. were high. As a reason for this difference, it could be said that in (a) the figures are of a location where floating debris gathered in a time when large amounts of floating debris were produced, while the figure of (e) was not that of a such particular status. In general, after inundation during the summer period can be considered as a condition when large amounts of floating debris are produced. At the same time “wood materials/bamboo” and “common reed/grass” also flowed from rivers, and is believed to have been recovered by many recovery vessels. In the coastal survey of (e), this was conducted from winter-spring when the amount of floating debris was relatively low, and the figure is of a location where floating debris did not concentrate. Also, in (a), since debris recovery vessels conducted recovery using buckets from the surface at a certain depth of water, floating debris right under the sea surface is also collected. In (e) only the debris visible on the surface is collected, and so it is possible that the types of debris targeted for analysis are slightly different. From these reasons, (a) and (e) both assess different aspects of floating debris. By keeping these points in mind and making a complementary observation, it could serve as help in order to assess the overall state of floating debris.

(b) is not about the amount of floating debris, but the ratio of cases of damages of fishing vessels caused by floating debris, and the figures may change due to the type of operation of fishing vessels. From this reason this is considered as a data to be examined from the perspective of understanding the actual state of damages rather than using for comparison with other survey results.

(c) is the same with (f) in the sense that is about collecting with Neuston nets. However (c) targets all collected objects for analysis while (f) targets only micro plastics for analysis, and so a direct comparison is difficult. The survey location in (f) is restricted to coastal or offshore areas, while in (c) there is a survey calculation line from the coast to offshore, allowing to confirm the differences from the coast to offshore areas.

(d) is the same as (e) in the sense that it is an observational survey. However in (d) the summary unit is the number per 100km, while in (e) it is the number per km^2, and so a comparison of the results is difficult. If this can be compared it would show the relation of the Japanese coastal/offshore areas and sea areas further out at sea, making it useful.

<Tasks>

The above 6 survey results all display the distribution status of floating debris in sea areas nearby Japan, and by complementing them it is expected to be used for understanding the overall distribution status of floating debris. The tasks that must be accomplished for this are as follows.

The current survey periods vary, however by unifying this to periods of inundation or after inundation it will allow comparing results more easily.

It is also preferable to unify or using methods that allow conversion of summarization methods or summarizing units. For example in (c) regarding collected objects, through analysis by separating micro plastics and others, a comparative observation with (f) would become easy to conduct.

III.1.2 Examination of prevention methods

(1) Wastes generated on land

In this survey the amount of lifestyle related wastes was high with both floating and sea bed debris, and most of it is believed to have generated on land. Therefore awareness-raising activities towards the standard public can be considered as a prevention method. Also, most wastes are believed to flow into the sea through rivers, and so recovering wastes while they are still "river debris" can also be considered as a preventive measure.

(2) Wastes generated at sea

In this survey there were areas with large amounts of fishing tools among sea bed debris. In these areas an awareness raising activity towards fishermen can be considered as a prevention method.

(3) Making use of local characteristics

In this survey there were variances of floating and sea bed debris according to areas. For areas with high density it is necessary to clarify the causes in the future and consider a suitable prevention method for that area in order to efficiently control the generation of wastes.

III.1.3 Examination of a statistical approach

III.1.3.1 Density estimation of the observational survey of floating debris

Regarding a statistical approach with this observational survey of floating debris, this method was examined as a method for estimating the density of floating debris and used to conduct the survey.

As a method for being able to use all data of floating debris that can be visually confirmed, we were introduced with a statistical approach that allows to estimate the density of floating debris using the semi effective sweep width by Professor Tadashi Tokai of the Tokyo University of Marine Science and Technology. With this observational survey of floating debris, the density was estimated using this method (the results are displayed in Chapter II). The effects of the method of this year's survey are displayed below.

(1) Regarding the effects of the method of this year's survey method

The summary of the survey result of floating debris of last year's survey is displayed in chart III.1-9.

Chart III.1-1 The summary of the survey result of floating debris of last year's survey

Survey area	Survey period	No. of survey calculation lines	Calculation line extension	Observational range	Visibility	Total confirmed number
Offshore of Ashikitamachi, Kumamoto prefecture	Feb. 28, 2016	5 calculation lines	11.2km	Left and right both 3m	Good	3

The total confirmed number was 3 and a one-digit figure. In this case the effective number will be one-digit even if the density is calculated. In order to secure a two-digit effective figure in sea areas such as here were density is low, it is necessary to have a confirmed number of over 10, and for this the calculation line distance must be extended by 3.3 times. On the other hand by using this method, the visually confirmable range of floating debris from the gunwale of the ship is not restricted to a 3m width, even with the same calculation distance, and it is possible to use all numbers of floating debris that were visually confirmed. Therefore if it is the same length of calculation distance the confirmation of numbers for securing a two-digit effective figure becomes simple, and so the method for this year's survey can be said to be more favorable than that of last year's survey.