

2014 Research project entrusted by Ministry of the Environment, Japan

2014 Research report on marine debris floating on the ocean surface  
and settled on the sea bed in coastal areas around Japan

<Summarized Version>

March 2015

SANYO TECHNO MARINE

## <Summary>

In July, 2009, the new law “the Act on Promotion of Disposal of Articles Washed Ashore for Conservation of Good Coastal Views and Environment for Conserving Beautiful Rich Nature (Act No. 82 of 2009; Washed-Ashore Articles Disposal Promotion Act)” was established. Based on this law, countermeasures against marine debris washed ashore has been implemented. About some floating debris and sea bed debris that are not categorized as the beach debris, the additional resolution to the law states that “It is necessary to actively work on their collection and disposal.” and “It is necessary to make an effort to cooperate with local governments and fishermen and to finance their activity.”

This project was focused on coastal areas in corporation with off-shore surveys conducted by the other project. Setonaikai suffering a damage by floating and sea bed debris was selected as a representative of coastal areas. In order to examine its present condition and to plan countermeasures, summarizing existing data and field surveys were carried out.

### (1) Summary of existing information

Existing information about drifting debris was summarized based on the results of marine-debris collecting vessel of the Ministry of Land, Infrastructure, Transport and Tourism, the results of payments of fishing-boat insurance claims, and the results of a questionnaire survey to the concerned parties.

### (2) Survey of sea bed debris

Surveys of sea bed debris were carried out in 26 selected areas in Setonaikai with the cooperation of bottom trawling fishermen. Quality and quantity of collected debris were determined.

Their density expressed as a number of pieces, as a weight, and as a volume in a unit area were calculated for each survey area. As a number of pieces, the maximum was 1,575/km<sup>2</sup> and the minimum was 75/km<sup>2</sup>. As a weight, the maximum was 401.6kg/km<sup>2</sup> and the minimum was 8.2 kg/km<sup>2</sup>. As a volume, the maximum was 2,998.2L/km<sup>2</sup> and the minimum was 61.8L/km<sup>2</sup>.

### (3) Survey of floating debris

Visual observations of floating debris were carried out in 7 areas. Furthermore, a neuston net was towed at a speed of 2 knots for 20 minutes in order to collect micro-plastics (pieces smaller than 5 mm). Collected samples were sorted and microplastics were quantified by microscopic examination and by counting the 1-5 mm siz fragments.

The maximum density of the sum of 3 major categories (Expanded polystyrene, Plastic bottle and Petrochemical) expressed as a number of pieces in a unit area was 32 /km<sup>2</sup> and the minimum was 0.6/km<sup>2</sup>. The maximum density of microplastics in a unit volume was 0.098 piece /m<sup>3</sup> and the minimum was 0.003 piece /m<sup>3</sup>.

### (4) Committee meeting

A committee to examine present conditions of marine floating debris and sea bed debris in Setonaikai was set up to oversee this project. Nineteen members comprised of scientific experts, government officials and other people concerned were appointed to the committee. The committee meeting was held twice in Okayama City. Their helpful guidance and cooperation were very much appreciated.

“Factual Investigation Commission of Floating/ Sea bed Debris in the Setonaikai”

(Honorific titles omitted, in Alphabetical order)

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	Yoko OKI	Vice president, Okayama University Professor, Graduate School of Environmental and life Science
	Haruyuki KANEHIRO	Proffessor, Faculty of Home Economics, Department of Clothing and Textiles, Otsuma Women’s University
	Tadashi TOKAI	Proffessor, Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology
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	Eichi YAGYU	Environmental Maintenance Section, Environmental Management Bureau, Agricultural Administration and Environmental Department of Hyogo Prefecture
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Material Section

## Chapter I Survey Outline

### I.1. Purpose of survey

In July 2009, “the law regarding the promotion regarding the disposal of articles washed ashore on costal areas relating to the protection of the environment as well as fine sceneries of coastal regions in order to protect the beautiful and rich nature” (hereinafter referred to as “Act for the Promotion of Marine Litter Processing”) was enacted, and based on this law measures against articles washed ashore in costal areas are being promoted. Sea bed debris as well as floating debris are not included as articles that wash ashore in costal areas in this law. Regarding these wastes the supplementary resolution of this law states that “proactive efforts must be taken to collect and appropriately dispose of such wastes” and “coordinate with local authorities and those involved with fishery, and provide necessary financial support”.

The number of requests for assistance regarding measure against such floating/ sea bed debris from local authorities facing issues has been increasing. At the same time the impacts on the ecosystem are also a concern, and so the government is required to assess the situation, determine the cause, and consider countermeasures against the issue.

This survey regarding floating/sea bed debris focused on costal areas while coordinating with surveys in offshore areas. Being a representative area of the country suffering impacts from drifting/sea bed debris, the Setonaikai was selected as the survey location. The current conditions as well as impacts were assessed, existing information was organized, and countermeasures for the future were examined.

### I.2. Survey Period

October 28, 2014–March 31, 2015

### I.3. Composition of this survey

This survey is composed of the following 2 items of I.3.1 and I.3.2. The flow of this survey is displayed in diagram I.4-1 and the survey process is displayed in chart I.5-1.

#### I.3.1 Factual survey regarding floating/sea bed debris

##### I.3.1.1 Summary of existing information

Along with the “FY 2013 Consignment of Factual Survey of Floating/Sea bed Debris (hereinafter referred to as “survey of the previous year”)”, interviews/ questionnaire survey was conducted to relevant people regarding the results of debris collection by floating debris recovery ships of the Ministry of Land, Infrastructure, Transport and also regarding the payment status of fishing boat insurances in order to gather the same information as from the “survey of the previous year”. Regarding the gathering of this information, the report of the “survey of the previous year” was referred to so that results could be easily compared with those of the survey of the previous year.

#### **I.3.1.2 Conducting of field survey of sea bed debris**

An area with serious impacts caused by sea bed debris within the Setonaikai area was selected. Based on the following procedures an sea bed debris collection survey as well as analysis was conducted in cooperation with people from the fishery cooperatives.

##### **(1) Selection of survey areas (sea areas for survey)**

With the cooperation of those belonging to the fishery cooperative and based on the expected depositions state of sea bed debris in the Setonaikai area, 26 areas (sea areas for survey) where selected as target sites for the survey. The final decisions regarding the survey areas (sea areas for survey) were made based on the opinions presented at the investigative meeting of this survey.

## **(2) Conducting of the survey**

An explanation regarding the survey was given to the fishery cooperatives of the prefectures of areas selected in (1) (hereinafter referred to as “fishery cooperatives”), and requests for collecting debris while operating ships as well as entry into the survey field note were made to fishermen belonging to the fishery cooperative who use trawl nets (about 20 vessels in each area. Hereinafter referred to as “fishermen”).

Interviews were conducted regarding the collection of debris towards fishermen who were unable to provide constant cooperation with entry into the field note.

After the completion of the survey period, the collected debris was divided, and the number/weight/volume were recorded.

Interviews were also conducted towards fishermen etc. regarding sea bed debris, and the current state of taking back sea bed debris was assessed.

The following information were gathered from the result of the survey.

- The amount of sea bed debris (number, weight, volume)
- The types of sea bed debris (major classifications, certain type classifications)
- Climate conditions

## **(3) Assessment of results**

The survey field notes of the above (2) were collected to determine the cleared sea area (total of trawling time X speed X length of nets). By comparing and analyzing the collected amount of debris above, the necessary data of “the amount of debris per sea area” was analyzed/sorted.

### **I.3.1.3 Field survey of floating debris**

Areas in the Setonaikai expected to have been greatly impacted by floating debris and also having large amounts of floating debris were selected, and based on the following procedures, an observational/collecting survey of floating debris was conducted.

#### **(1) Selection of survey areas (sea areas for survey)**

7 areas for survey (sea areas for survey) of prefectures nearby the Setonaikai expected to have been greatly impacted by floating debris and also having large amounts of floating debris were selected based on information from the prefectures nearby the Setonaikai. By taking into consideration of the opinions stated in this investigative meeting, the final survey areas (sea areas for survey) were selected.

#### **(2) Conducting of survey**

In each of the survey areas (sea areas for survey) selected in (1), measurements of floating debris (about 2 days in each area) were conducted through observation from ships. At this time the accurate locations of floating debris were obtained using GPS etc. For micro plastics, which are difficult to measure with the eye, neuston nets were



used to the conduct survey. Other specific measurement methods were decided based on opinions stated in this investigative meeting.

### **(3) Gathering of results**

The data obtained from the above were statistically processed as decided, based on the opinions stated in this investigative meeting.

#### **I.3.2 Current state analysis regarding floating/sea bed debris, and the sorting of tasks as well as examination of statistical approach**

Based on the survey results of the above, and also the discussions in this investigative meeting, the current state analysis of floating/ sea bed debris issues in the Setonaikai was conducted from the perspectives of locality (whether this is an issue restricted to a limited area), diversity of relevant entities (whether this is an issue of a limited entity), and urgency. Also, survey results obtained by relevant personnel in the surrounding areas of the Setonaikai were used, information regarding the movement of debris from land to the sea (amount and characteristics) was gathered, and the prevention method of sea bed debris in the Setonaikai areas were examined. Apart from this, the organization/ analysis of data using a statistical approach for assessing the currently remaining amount as accurately as possible were used for the survey of floating/ sea bed debris.

#### **I.3.3 Holding of investigative meeting**

Regarding the details of the above survey/analysis/examination, investigative meetings with 19 experts were held twice (Dec. 22, 2014 and March 10, 2015) at Okayama city, Okayama prefecture. The details of the discussions as well as materials etc. of the investigative meeting were thoroughly assessed with the investigative committee, and proposals regarding improvement were flexibly incorporated in the survey details/investigative meeting materials as much as possible.

#### I.4. Flow of survey

The flow of survey is displayed in diagram 1.4-1.

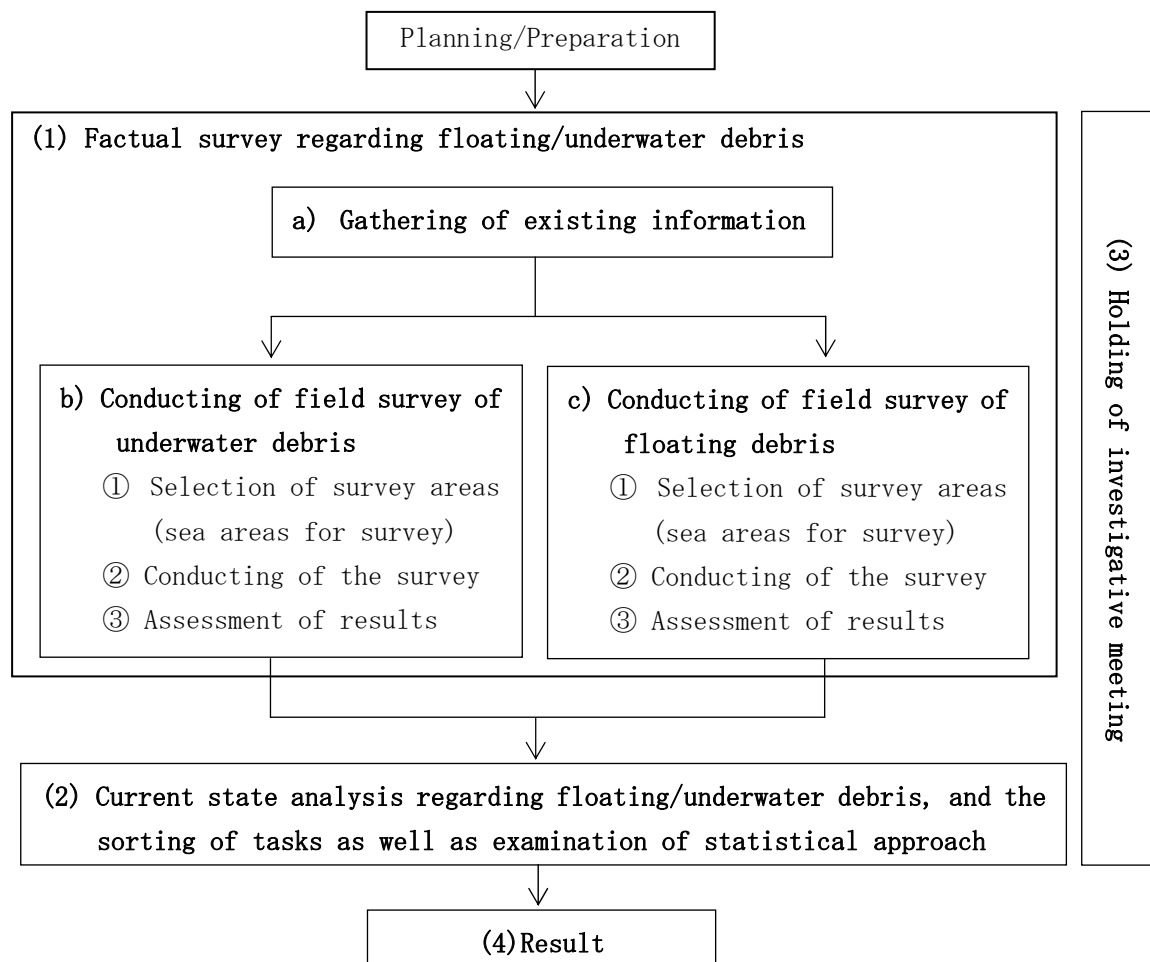
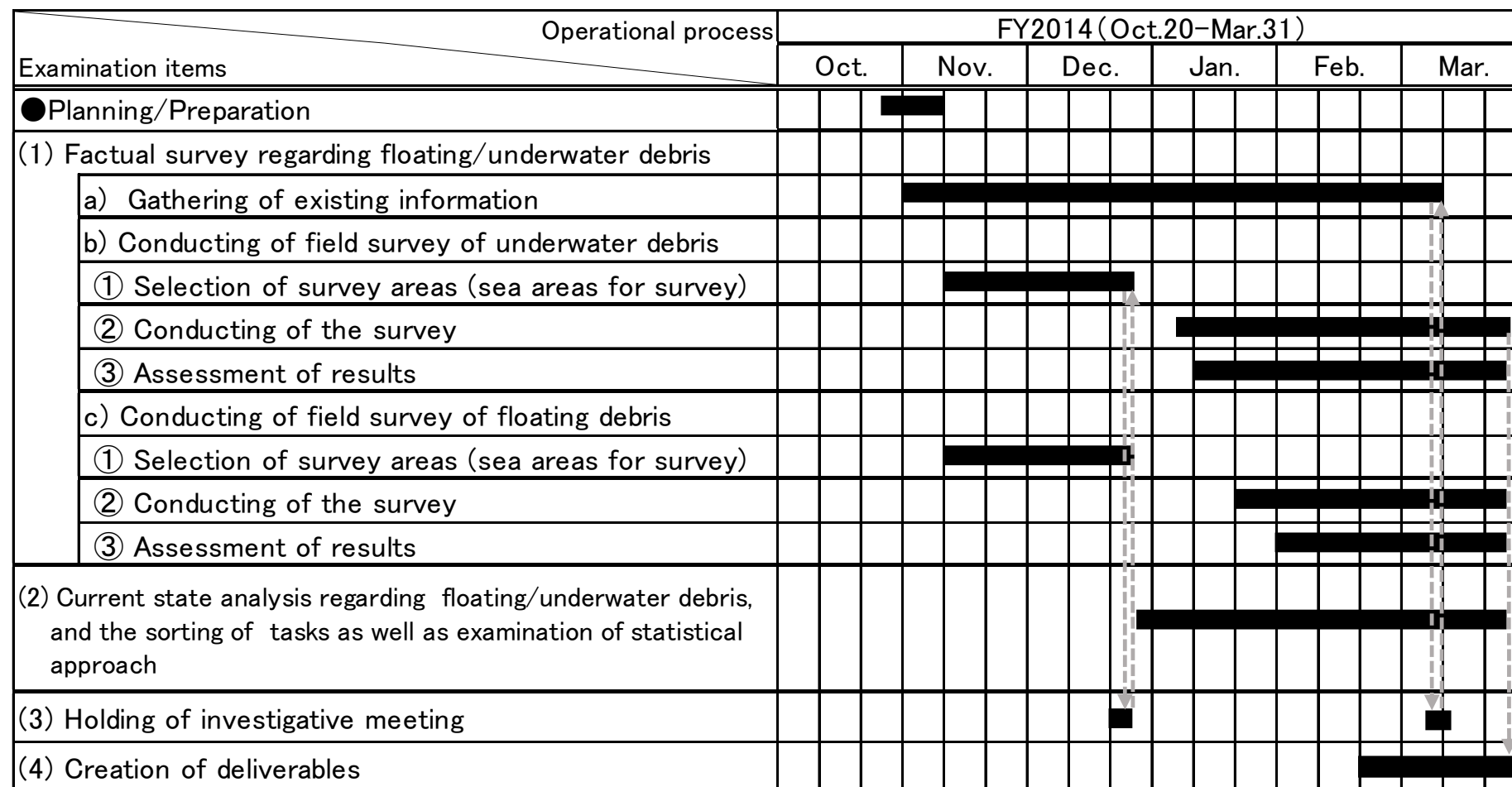


Figure I.4-1 Flow of survey

## I.5. Survey process

The survey process is displayed in chart 1.5-1.



I.5-1 Survey process