Report on the Monitoring of Radionuclides in Fishery Products

(March 2011 - March 2014)

May 2014

Fisheries Agency of Japan

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Overview

This report provides a comprehensive evaluation of the results of radionuclides monitoring conducted on fishery products in the years after the accident at the Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi Nuclear Power Station (NPS). This evaluation found that, although in the immediate aftermath of the accident a considerable number of fish species primarily off the coast of Fukushima were found to contain radioactive cesium in quantities exceeding the limit of 100 Bq/kg, these concentrations decreased in the passing of time, and now, three years after the accident, the number of such samples exceeding 100 Bq/kg has reduced.

Regarding radionuclides in fishery products other than radioactive cesium, 63 samples were inspected for radioactive strontium, and 5 samples were tested for plutonium from the point of the accident to May 2014. It was discovered that, in all but two of the samples for strontium and all of the samples for plutonium, concentrations were at the same levels as those before the accident. Further examination of the two samples in which radioactive strontium was detected revealed that the effective dose of radioactive strontium was sufficiently low relative to the effective dose of radioactive cesium. For this reason, it is possible to say that the assumption made in the calculation of the limits (the hypothesis that, in fishery products, the effective dose of other radionuclides would be equal to the effective dose of radioactive cesium) takes safety into account sufficiently.

Additionally, although TEPCO announced the leakage of contaminated groundwater into area inside the port in July 2013, and afterward that there were cases of contaminated water leakage from storage tanks , the monitoring results found no effect of this leakage upon ocean waters or fishery products outside the port.

Meanwhile, some fish species in some areas were still found to contain radioactive materials exceeding the limits. However, the fish in these waters have been subject to the appropriate restriction orders and suspensions on distribution, and efforts have been made to ensure that they are kept out of the market. Furthermore, accumulated inspection data of this sort have led to the identification of ocean areas and fish species which need extra caution, which is reflected in both the inspection programs of local governments' and "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods concerned Applies" of the Nuclear Emergency Response Headquarters."

In order to secure the safety of fishery products and establish the trust of consumers, the Government of Japan will continue, as its responsibility, monitoring the radioactive levels of fishery products. Should levels exceed the limits, the Government of Japan will cooperate with local governments and relevant bodies to take appropriate measures to prevent the products which exceed the limits from reaching the market.

The Purpose of this Report

The Great East Japan Earthquake and tsunami on March 11, 2011, caused a nuclear accident at the TEPCO's Fukushima Daiichi Nuclear Power Station (NPS). This accident resulted in the emission of radioactive cesium (Cs-137) at a quantity estimated at 8 to 37 PBq. [1]

Since March 2011, the Government of Japan and local governments and relevant organizations have monitored the levels of radioactive materials in fishery products in a concerted manner. The monitoring has been carried out in accordance with "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Food Distribution and/or Consumption Restriction concerned Applies" [2] of the Nuclear Emergency Response Headquarters, and the results of this monitoring show that at present, three years since the accident, the proportion of fishery products containing radioactive cesium in excess of the limit of 100 Bq/kg has greatly decreased in all prefectures monitored, including Fukushima.

However, although it has been three years since the accident, restrictions based on the aforementioned "concepts" and suspensions remain in effect on the distribution of certain fish species in prefectures ranging from Iwate to Chiba and in Gunma. Commercial fishing operations off Fukushima in particular are suspended, and operations are limited to fishing trials on species and in ocean areas that have been confirmed as safe, which shows activities are limited compared to those before the accident.

Moreover, the Fukushima Daiichi NPS accident brought about considerable consumer unease both domestically and internationally with respect to the safety of fishery products, and even products from regions that were not subject to distribution restriction orders have been avoided by consumers due to unfounded reputational damages or misinformation. Concerns over radioactive contamination of fishery products in the Fukushima area reemerged in July 2013, when TEPCO announced contaminated water leakage. In response, the Consumer Affairs Agency and other related government agencies coordinated with local governments, consumer groups, and others to engage in "risk communication" and nation-wide dialogue on the topic of radioactive materials within foods, among specialists, consumers, operators and the Government. [3].

However, according to the surveys of the Consumer Affairs Agency on consumer awareness relevant to unfounded reputational damages or misinformation, the rate of consumers stating that they "hesitate to buy food products made in Fukushima because they wish to buy food that does not contain radioactive materials" was 19.4% in February 2013. Although this figure fell to 15.3% in February 2014, it is apparent that strong worries still remain among some consumers.[4]. Further, according to a survey conducted at the end of fiscal year 2013 by the Fisheries Agency and the National Federation of Fishery Processor's Co-operative Associations on the state of recovery of the Iwate, Miyagi, and Fukushima marine product processing industries, 31% of respondents expressed "unfounded reputational damages and misinformation and securing sales channels" as a major "problem in reconstruction efforts." This outcome demonstrates that, although three years has passed and radioactive material concentration levels within fishery products have reduced, misinformation continue to cause damage.[5]

After the accident, many countries and areas introduced requirement for radioactive-material inspection certification on the export of Japanese fishery products, and some imposed import restrictions on fishery products from certain prefectures. Some of these countries and areas till continue these policies to this day. For example, China has banned fishery product imports from ten prefectures, and Taiwan from five. In July 2013 TEPCO announced that contaminated groundwater had leaked into port waters. Although the influence to sea water has not been observed outside the port according to the monitoring results, announced by the Government of Japan, the Republic of Korea in the following September strengthened its import regulations by banning imports of fishery products from eight prefectures.

These import regulations have had a considerable effect on Japanese fishery product exports. The primary export destination of Alaska pollock has been the Republic of Korea, to which it is freshly exported as an indispensable ingredient in *jjigae* stew. Due to the decrease in exports to the Republic of Korea, the export value of fresh/chilled Alaska pollock dropped to ¥2 billion in 2011 (54% of its 2010 export value of ¥3.7 billion); to ¥1.3 billion in 2012 (36% of the 2010 value); and even further to ¥870 million in 2013 (23% of the 2010 value).

Under this circumstance, although the Fisheries Agency has published all of its monitoring data on its website, there has yet to be a comprehensive summary of the significance and trends of these data. This report reviews a comprehensive evaluation of data accumulated from the inspections in the last three years, provide accurate account of the current safety of fishery products, and introduces the efforts that have been made by the Government of Japan and local governments to the people in and out of Japan.

Part One. Efforts to Guarantee the Safety of Fishery Products

Chapter 1. Monitoring of Radioactive Materials in Food; Restrictions on Distribution and Other Countermeasures

After the Fukushima Daiichi NPS accident in 2011, standard limits were set on permissible amounts of radioactive materials in food. National and prefectural governments coordinated with relevant bodies to ensure, through monitoring and monitoring-based distribution restrictions, that only fishery products containing levels of radioactive cesium below the limit were allowed to distribute to market for consumption.

Additionally, after the accident, coastal fishing and bottom trawling in the waters surrounding Fukushima experienced suspensions of operations. Today, in the interest of carefully resuming fishing operations in the future, thorough inspections and gradual fishing trials are being undertaken only on fish species that have consistently demonstrated levels of radioactive materials below the limits. This chapter will explain these efforts being made to guarantee the safety of these fishery products.

1-1-1 Standard Limits for Radioactive Materials in Food

After the Fukushima Daiichi NPS accident, the Ministry of Health, Labour and Welfare on March 17, 2011, established provisional regulation values for radioactive materials in food. (For fish and shellfish, the value for radioactive cesium[1] was 500 Bq/kg [set March 17], and the value for radioactive iodine was 2,000 Bq/kg [set April 5]). The permissible dosage of exposure from food was, as an emergency response measure, set to an effective dosage of 5 mSv annually for radioactive cesium, and set to a thyroid equivalent dosage of 50 mSv annually for radioactive iodine.

The provisional regulation values were enacted under emergency circumstances in accordance with Food Safety Basic Act Article 11, paragraph (1), item (iii), and hence did not receive a Risk Assessment of the Effect of Food on Health from the Food Safety Commission. Hence, on March 20 of the same year (April 6 for fish and shellfish containing radioactive iodine), in accordance with Article 11, paragraph (2) of the same law, the Minister of Health, Labour and Welfare submitted a request for Risk Assessment of the Effect of Food on Health to the Committee Chairman of the Food Safety Commission.

On October 27, the Committee Chairman of the Food Safety Commission reported the following findings to the Minister of Health, Labour, and Welfare: “The Food Safety Commission has determined that radiation in food has an impact on health at quantities amounting to a lifetime accumulated effective dose of 100 mSv or more, ignoring normal radiation exposure experienced in everyday life.”[6]. Although food items that conformed to provisional regulation values had been generally judged to have

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1 Values are set by taking into account the contribution of radioactive strontium.

no negative effects on health and to be safe, new limits were established after the Food Safety Commission report in order to achieve still greater food safety. These new limits were intended for the long-term established taking into the factors such as the guidelines proposed by the Codex Alimentarius Commission guidelines[7], which adopt the 1mSv per annum intervention exemption level[2] for food, and were intended for the long-term. Following review by the Radiation Council and the Pharmaceutical Affairs and Food Sanitation Council [8], the allowed dosage of radiation exposure from food was reduced to 1mSv per annum. New limits based on these developments were established on April 1, 2012.

The new limits set radioactive cesium as the representative radioactive material, due primarily to its large effect on internal radiation exposure relative to other radioactive materials considered (plutonium, strontium 90, and ruthenium 106). Therefore, if radioactive cesium concentrations are found by inspection to be within the limits, the food is considered to be safely distributed to market with the effect of strontium 90 and other radionuclides taken into account

The new limits on radioactive cesium are set for four food categories (drinking water, infant foods, milk, and general food). Fishery products are classified as "general foods" and hence the limit is 100 Bq/kg. There is no set limit for radioactive iodine, which has a short half-life and has come to be undetectable.

1-1-2 Methods of Testing for Radioactive Materials

For the gathering of samples, the Fisheries Agency has given guidance to local governments and other organizations that the sampling operators should gather approximately 5kg or more of each fish species (as many individual fish as possible) and record the time and location that each sample was collected.

The methods by which radioactive cesium concentration is measured in fishery products include a gamma ray spectrometry radionuclide assay method that utilizes a germanium semiconductor detector, carried out in accordance with the Ministry of Health, Labour, and Welfare's local government-oriented notification, "Testing Methods for Radioactive Materials in Food" (March 15, 2012)[9]. Another method is the NaI scintillation spectrometer method pursuant to the "Partial Revision of the Screening Methods for Radioactive Cesium in foods" (Partially revised on March 1, 2012). [10].

These notifications establish guidelines for controlling the credibility of radioactive material monitoring by establishing practices such as the daily measurement of background radiation, the periodic use of a standard radiation source for calibration, etc. Inspections and monitoring carried out in accordance with these reports help to establish the credibility of the results.

In the case of the gamma ray spectrometry using a germanium semiconductor detector, there are

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[2] "Intervention Exemption level" is the level at which no special measures are considered to be necessary.

limitations to how efficiently a large number of samples can be inspected, such as that it requires rare equipment available in limited numbers, or that relatively many samples are required. With these factors in mind, the screening method used in monitoring practices was established with the objective of detecting samples that have radioactive cesium concentrations that are clearly and definitively lower than the provisional regulation values. The Method was then amended when the newer limits were established. Under the new limits, the screening cut-off was applied to any reading over 1/2 (50 Bq/kg) the limit, with a measurement lower bound of 25 Bq/kg (1/4 the limit). Should a sample's reading exceed the screening cut-off and it be impossible to determine with certainty that radioactive cesium concentrations are below the limits, the sample will undergo further analysis via gamma ray spectrometry using a germanium semiconductor detector, to more precisely determine concentrations.[3] This method is employed in Fukushima fishing trials, the fish market, and other settings.

1-1-3 Inspections of Fishery Products for Radioactive Materials

Since the Fukushima Daiichi NPS accident, the Fisheries Agency has coordinated with prefectural governments and fishing organizations to systematically monitor radioactive materials in fishery products, in accordance with the Nuclear Emergency Response Headquarters' "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods concerned Applies" (hereafter referred to as "Guidelines," announced April 4, 2011; latest revision March 20, 2014) (Figure 3) [2]. These Guidelines outline for local governments the basic concepts (target products, frequency of inspections, etc.) of monitoring practice. The Guidelines have been revised over time as needed, based on results and data accumulated since the Fukushima Daiichi NPS accident, in order to focus inspections on categories of items in which higher concentrations of radioactive cesium have been detected.

To be more concrete, as with normal food, local governments take the lead and establish quarterly monitoring plans that detail target fish species, inspection frequency, and other topics. These plans are created with due consideration of the Guidelines and species of fish harvested. In accordance with these monitoring plans, marine fish areas are divided into various zones, and in each zone pre-shipment inspections of fish are conducted on a weekly basis on major fishery products in related prefectures and on specific fishery products that exceeded 50 Bq/kg in the previous year. (See Figure 1.)

Fish and shellfish live in a wide variety of environments, including the ocean surface, midwater, and the bottom, and existing in various stages of their life cycles and undergoing various kinds of migrations. Fish and shellfish are also eaten differently, some eaten whole and some in fillet, differing from species to species. With these factors under consideration, sampling is taken of fish and shellfish representative

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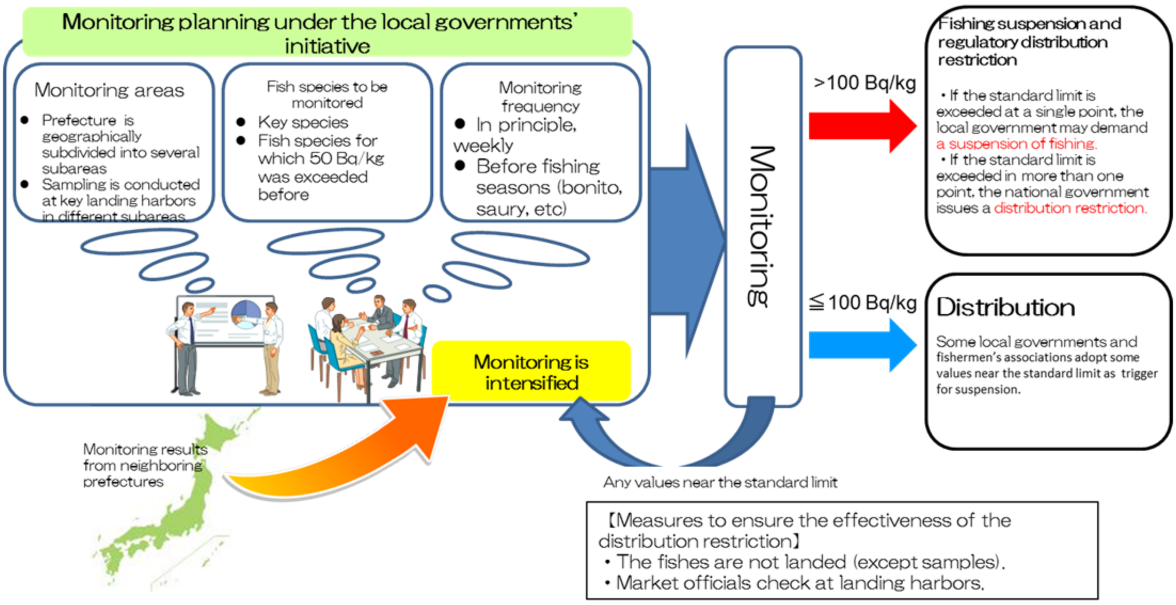
[3] Information on inspection equipment suitable for this screening method can be found on the JRIA website: http://www.jrias.or.jp/products/info/706.html

of each sea zone and habitat, and samples taken of the fish’s edible portions for readings (e.g., the muscular sections for large fish that are eaten in fillet, the entire body for small fish that are eaten whole, etc.).

If, in the course of closely following the outcomes of the above monitoring processes in the relevant prefectures, one prefecture is discovered to have particularly high levels of contamination, neighboring prefectures are notified immediately and inspections are intensified on the fish species and other species living in similar habitats.

Figure 1. The Fishery Products Monitoring Framework



1-1-4 Restrictions and Suspensions on Distribution and Shipping

In cases where the same fishery products at multiple locations along a prefecture’s coast exceed the limits and other situations in which it seems that an item might exceed the limits across an entire region, Act on Special Measures Concerning Nuclear Emergency Preparedness, Article 20, paragraph 2 dictates that that the head of the Nuclear Emergency Response Headquarters (i.e., the Prime Minister of Japan) will impose restrictions on the distribution and shipping of the food item. Should such restrictions be imposed, local governments issue appeals to fishing industry organizations and those affiliated with the market and distribution to prevent the target food items from reaching the market. The cancellation of these distribution/shipping restrictions requires that all inspections at multiple locations within the previous month be below the limits. Products exceeding the limits will be judged to be in violation of the Food Sanitation Act, collected, and discarded without reaching market (Fig.2).

The standards of the above restrictions and their subsequent cancellation are set by the Nuclear Emergency Response Headquarters’ Guidelines.

If fishery samples in multiple places in the same inspection zone are found to exceed the limits, it is regarded that the contamination is in the state of “regional spread”. Should one instance of limit-exceeding results appear within a sea zone, it will become the focus of subsequent inspections.

However, in this case, there is a possibility of “regional spread” of contamination throughout the relevant zone, and therefore local governments appeal to fishing industry organizations to suspend shipping and distribution until safety has been determined through focused inspections, at which point the suspensions may be canceled.

The term “suspensions” may seem to imply that these suspensions are somewhat voluntary, but they are imposed with the cooperation of fishing industry organizations in the same manner as government-imposed restrictions. Hence, until the appeal for suspensions is canceled, relevant parties engage in preventing the target goods in the target zone from reaching the market. Specifically, through extensive publicity and leadership from the fisheries cooperatives toward fishermen, as well as the cooperation of companies affiliated with distribution and the market itself to cease handling the target product (or to clearly label those items of the same type but shipped in from other regions), this “suspension” truly is being implemented.

Figure 2 Process of the Enactment and Cancellation of Restrictions and Suspensions on Shipping and Distribution

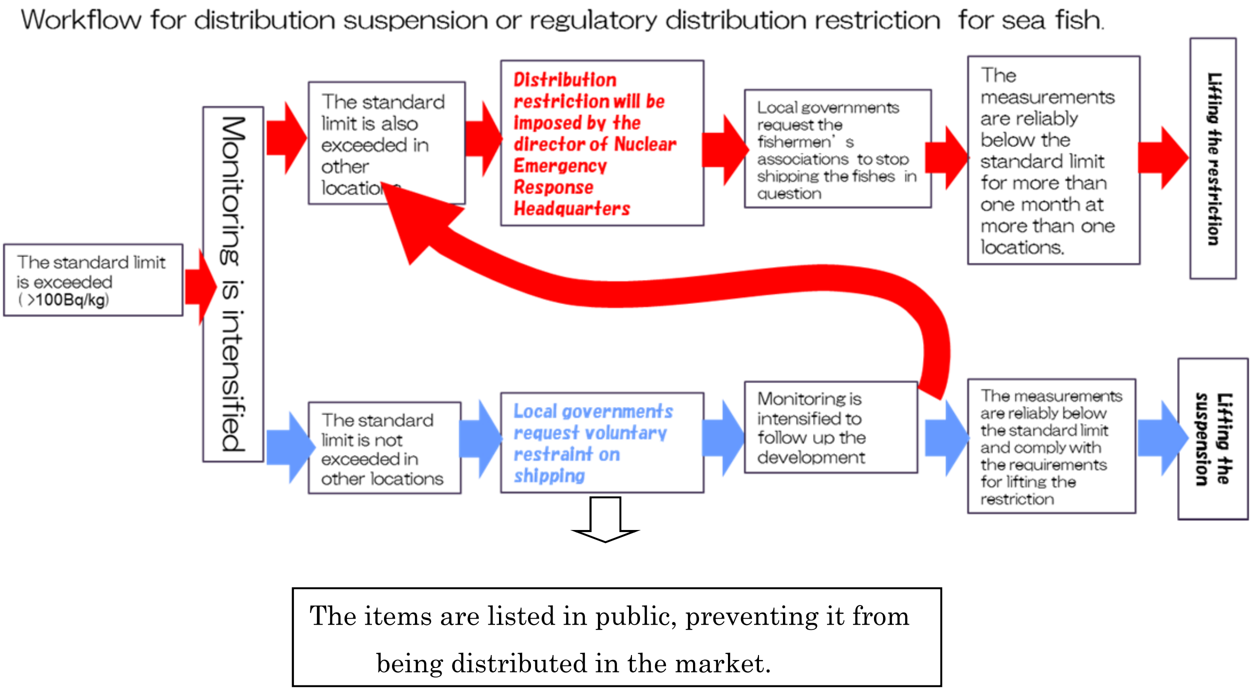
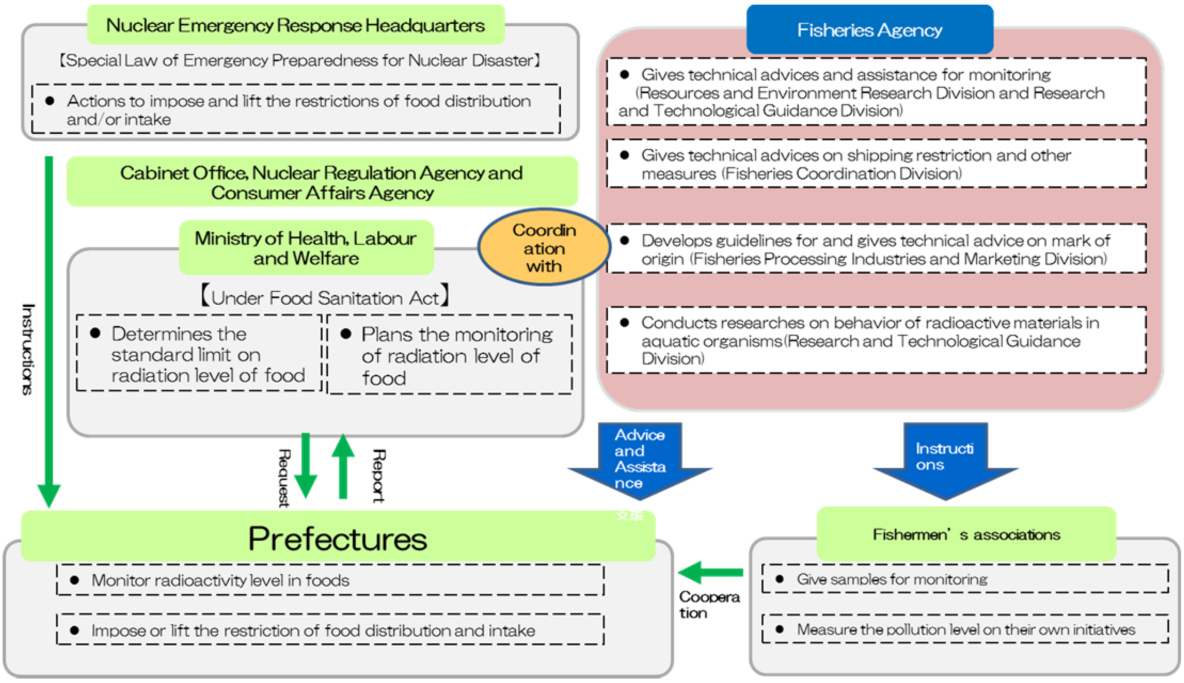


Figure 3 Relationships Between the Various Government Organizations



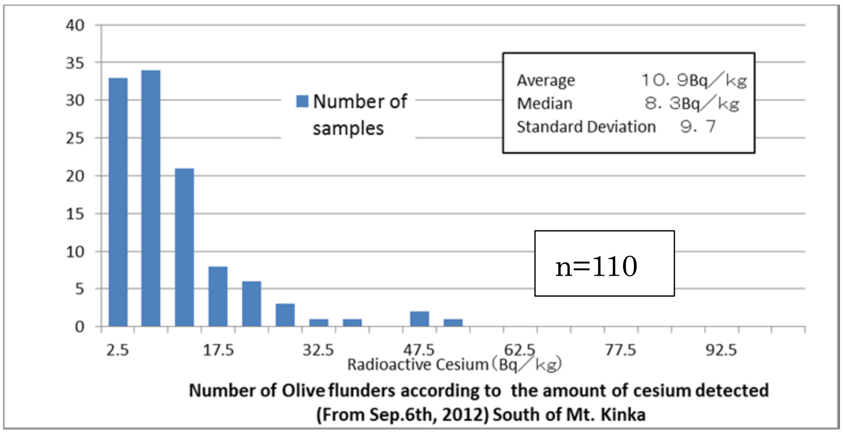
1-1-5 Cancellation of Restrictions on Shipping and Distribution

Radioactive cesium concentrations have dropped since the Fukushima Daiichi NPS accident, and now restrictions on shipping and distribution are gradually being canceled. For example, since 2013, restrictions have been canceled in Fukushima, in addition to other prefectures, on the Flathead flounder, Alaska pollock, and Littlemouth flounder.

To apply for a cancellation of restrictions on shipping and distribution, local governments must demonstrate, along with the presence of post- cancellation distribution management and monitoring systems, that their inspection results are consistently below the limits. Shipping and distribution restriction orders will not be canceled until this application for cancellation is judged to be appropriate.

Example cases of applications for restriction cancellation include the cancellation of restrictions on the Olive flounder in Miyagi Prefecture on April 1, 2013. The inspection results for this application can be found in Figure 4 below. Since a reading of 140 Bq/kg emerged on September 4, 2012, the highest reading out of 110 inspected samples was 51 Bq/kg, with a median reading of 8.3 Bq/kg [11]. Another example case is the cancellation of restrictions on the pacific cod on October 31, 2012, the inspection results of which are shown in Figure 5. Since a reading of 130 Bq/kg emerged on August 9, 2012, the highest reading out of 78 inspected samples was 67 Bq/kg, with a median reading of 7.8 Bq/kg. In this way, only once readings are confirmed to be consistently below limits are the restrictions on shipping and distribution canceled [12].

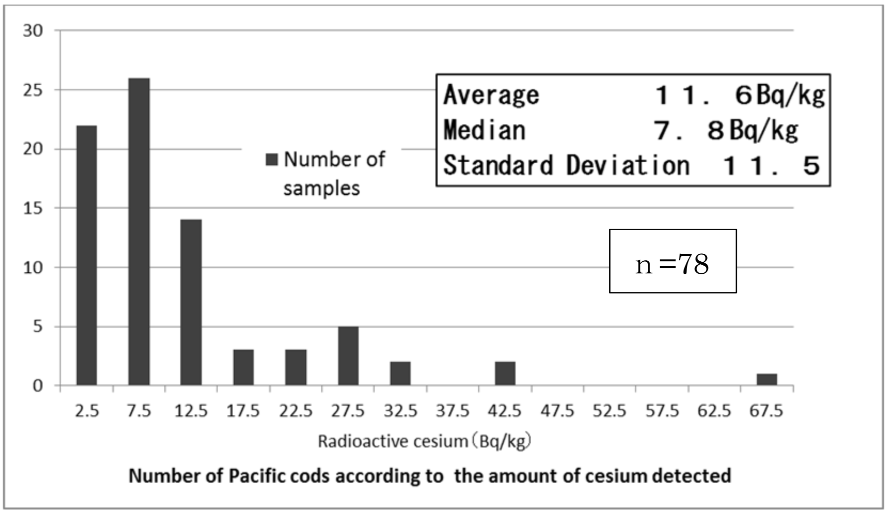
Figure 4　The Cancellation of Restrictions on the Olive flounder, Miyagi Prefecture [11]



<u>Restriction enacted</u>: May 30, 2012

<u>Restriction canceled</u>: April 1, 2013

Figure 5　The Cancellation of Restrictions on the Pacific Cod, Aomori Prefecture [12]



<u>Restriction enacted</u>: August 27, 2012

<u>Restriction canceled</u>: October 31, 2012

Figure 6 The State of Distribution Restrictions and Suspensions in Japan (as of May 14, 2014)

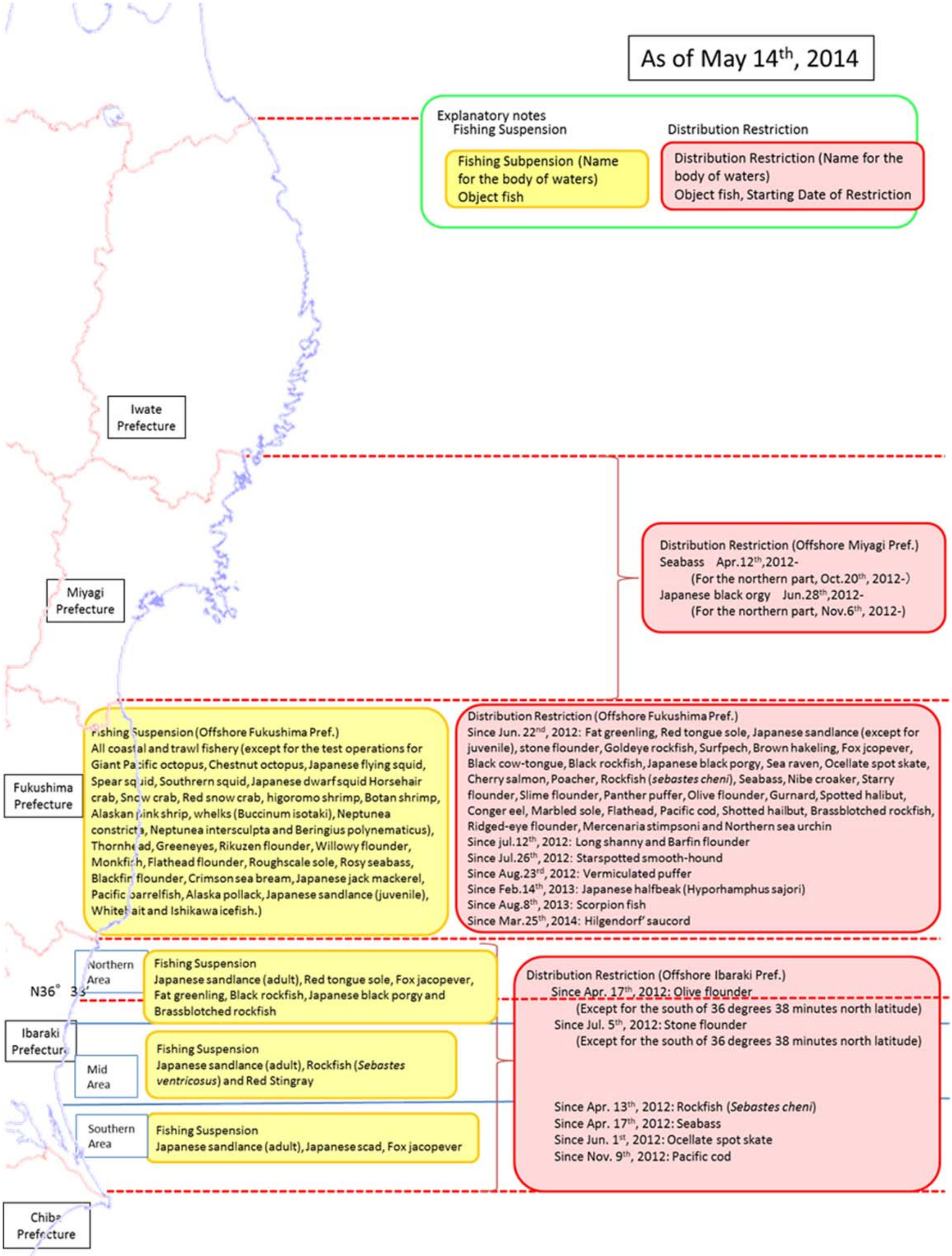


Table 1　From the Guidelines: Target Products and Frequency of Inspections (Marine Fish)

(Revised on March 20, 2014)

Category		Items from which more than 100 Bq/kg of radioactive cesium has been detected	Items from which between 50 and 100 Bq/kg of radioactive cesium has been detected	(Reference) Items not exceeding 50 Bq/kg but attention is required based on the results of inspections conducted on items in the same categories or the past insepctions on the items concerned
Marine fishery products	Japanese scad			Japanese scad
	Halfbeak			Halfbeak
	Olive flounder	Olive flounder		
	Righteye flounders (habitat zone is mainly shallower than depth of water 100 meters.)	Marbled flounder; Stone flounder; Starry flounder	Red tonguesole; Black cow-tongue; Littlemouth flounder	Flounder (*Pleuronichthys japonicus*); Spotted halibut; Ridged-eye flounder
	Righteye flounders (habitat zone is mainly deeper than depth of water 100 meters.)	Slime flounder; Shotted halibut	Ridged-eye flounder	Barfin flounder; Willowy flounder; Flathead flounder
	Fat greenling	Fat greenling		
	Rockfish, Jacopever and Scorpion fish(habitat zone is mainly shallower than depth of water 100 meters.)	Rockfish (white colour); Black rockfish; Goldeye rockfish; Fox jacopever; Brassblotched rockfish; Scorpion fish		Rockfish (black colour); Snowy rockfish
	Rockfish, Jacopever and Scorpion fish(habitat zone is mainly deeper than depth of water 100 meters.)	Hilgendorf saucord	Sea raven	Matsubara's red rockfish
	Shark and Stingray	Ocellate spot skate; Starspotted smooth-hound	Red stingray	Spiny dogfish; Pitted stingray
	Pacific cod	Pacific cod		
	Brown hakeling	Brown hakeling		
	Spiny red gurna, Poacher (saburo), Japanese pricklebac k, Nibe croaker	Spiny red gurnard	Poacher (saburou)	Japanese prickleback Nibe croaker
	Largehead hairtail			Largehead hairtail
	Japanese black porgy, Striped mullet, Japanese surfperch	Japanese black porgy	Striped mullet	Japanese surfperch
	Japanese seabass	Seabass		
	Puffer		Vermiculated puffer	Finepatterned puffer; Panther puffer
	Conger eel		Conger eel	Congrid eel; Beach conger
	Bartail flathead	Bartail flathead		
	Japanese sandlance (adult)			Japanese sandlance
	Northern sea urchin			Northern sea urchin
	Japanese littleneck clam		Japanese littleneck clam	

Restrictions currently apply in Fukushima Prefecture, Miyagi Prefecture, Ibaraki Prefecture, Iwate Prefecture, Chiba Prefecture, Aomori Prefecture (pacific cod only), and Hokkaido (pacific cod only). As a general rule, inspections are held once a week. However, items subject to fishing seasons are inspected prior to the beginning of the season and then once every week during the season.

(Column 1) Calculation of the Limits

In the calculation of the limits[8], the regulated radionuclide types were, among those released in the Fukushima Daiichi NPS accident, all of the radionuclides on the Nuclear and Industrial Safety Agency's emissions trial calculation list that have a half-life of over one year (cesium-134, cesium-137, strontium-90, plutonium, ruthenium-106). The limits were not set for iodine, which has a short half-life, and uranium, which even at the site of the accident was detected in quantities comparable to naturally-occurring levels.

Measurements of radioactive materials other than radioactive cesium (plutonium, strontium-90, ruthenium-106) are time-consuming. Therefore, the transfer factor of each type of radionuclide was analyzed for each transfer path, and the contribution rate of radioactive cesium was calculated with respect to the product type and age group. For land-made products, because the vast majority of contamination occurs through the intake of radionuclides from the soil, environment monitoring data (or, when there are no data available, NISA trail calculation values) are used for initial cesium-137 concentration values in calculations. For marine products, because there is a great deal of variety in habitats and environment monitoring data is relatively limited compared to land-made products, assumptions are set to be safe with a wide margin of error. Hence, radionuclides other than radioactive cesium are assumed in marine products to have a contribution rate as high as 50%. As a result, in the age group of over 19-year-old, for example, radiation dosage from non-cesium radionuclides in food is estimated on the large side at approximately 12%.

It was further assumed that 50% of the food products sent to market were contaminated with radioactive materials at the maximum amount under the limit. Based on the above food intake amounts by age group as well as the contribution rate conversion factors of other radionuclides were taken into account to set the limits for radioactive cesium that would keep dosage below the annual dosage allotted to exposure from food (i.e., the annual dosage upper bound of 1mSv minus the aggregate dosage allotted to drinking 10 Bq/kg of water for a year [approx. 0.1mSv], resulting in an annual dosage from food of approx. 0.9 mSv).

(The limit for food, minus drinking water) [in Bq/kg]

= (The annual dosage allotted to food) [mSv/y]

÷ Σ (the total target-radionuclides dosage factor in each food classification) [mSv/Bq]

x (annual intake of each food product in each food classification) [kg/y]

x (the proportion of items sent to market that are contaminated)

* The total target-radionuclides dosage factor (mSv/Bq) is a coefficient that expresses the total dosage of regulated radionuclides (mSv) per 1 Bq of radioactive cesium (134+137) in food. This coefficient is calculated by calculating the amount of Bq of each radionuclide is contained in a food unit with 1 Bq of cesium, then multiplying each radionuclide type by the dosage coefficient and taking the sum of those values.

The result was to set the limit for radioactive cesium in food at 100 Bq/kg, such that the limit would be considered safe for any age group, based on the most severe (smallest) limit value of all the ages and demographics, 120 Bq/kg for 13- to 18-year-old boys.

(Column 2) Survey of Radiation Dose from Radionuclides in Foods Calculation of the Limits

In Column 1, we have explained the concept of the limits for radionuclides in food. In accordance with the limits, testing of radionuclides in foods has been conducted, and measures such as distribution restriction of foods whose radiation level exceeds the limits have been implemented. The Ministry of Health, Labour and Welfare (MHLW) carried out surveys on dietary intake of radionuclides and resulting dose of radiation exposure.

Two types of surveys have been carried out: (1) "market basket survey (MB survey)" and (2) "duplicate diet survey". In the MB survey, "market basket samples" were prepared as national average portion of meal, using foods actually distributed in the market, and their radiation doses were measured. In the duplicate diet survey, duplicate portions of actual meals served in households were collected and mixed uniformly, and their radiation doses were measured. Six surveys targeted radioactive cesium, and two surveys targeted radioactive strontium and plutonium (as of May 2014) [13; 14; 15; 16; 17; 18; 19; 20].

In the first survey after the F1NPS accident carried out from September through November 2011, targeting Miyagi Prefecture, Fukushima Prefecture (Naka-dori) and Tokyo, the radiation doses from radioactive cesium (Cs-134 + Cs-137) in foods were estimated to be 0.0021~0.019 mSv/year. In the following surveys, the estimated doses have not exceeded 0.01 mSv/year, in all areas targeted in the surveys. In the latest MB survey, the estimated dose was 0.0071 mSv/year even in the region showing the highest value. These estimated doses were way below 1mSv/year, which was used as a basis of establishing the current limits [19].

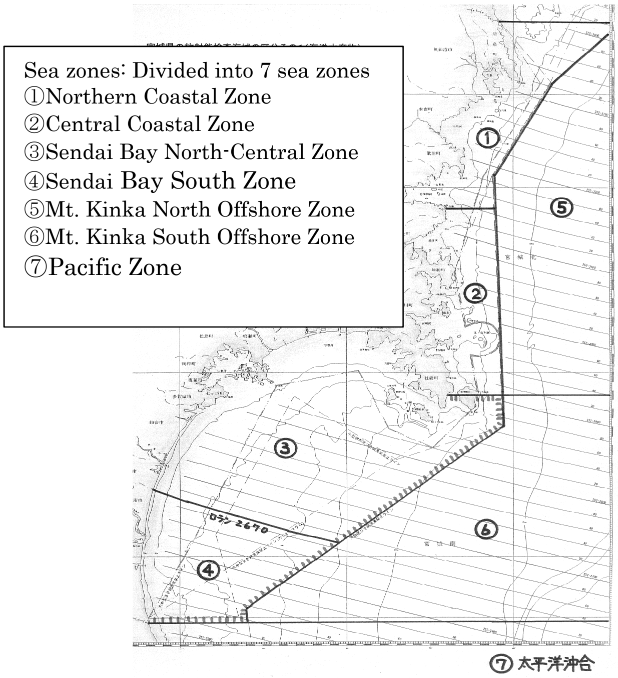
The same surveys also estimated annual doses from radioactive potassium (K-40) which naturally exists in foods. The results showed that estimated annual doses from radioactive cesium have been substantially lower than those from K-40 (0.14~0.2 mSv) [16;17].

In MB survey etc. carried out in February to May 2012, September and October 2012, and February and March 2013 in many parts of Japan, targeted Strontium 90 and plutonium (Pu-238, Pu-239+240). Strontium 90 was detected in some samples, but the value was within the range detected before F1NPS accident. Plutonium were not detected [15;20].

These results show that the management of radiation doses from foods have been functioning properly since the aftermath of F1NPS accident to today.

(Column 3) Example of a Local Government monitoring plan

<Sample monitoring plan: Miyagi Prefecture FY2013 4th Quarter (Jan.-Mar. 2014)[21]>



○Samples are secured in each sea zone and inspection began.

Category (Food items inspected before or at the time of distribution)	# of items	Freq. of inspection	# of cities in which samples collected
Marine fish	27	>1 a week (whenever necessary)	Entire pref.
Inland fish	5	>1 a week	Entire pref.

Inspection frequency is increased if the detected level of radionuclides approach or exceed the limit

○ Inspected items (that are actually harvested in the planned period)

A. Items in which radioactive cesium of over 1/2 the limit has been detected

(a) Marine fish species

Japanese horse mackerel, olive flounder, flatfish (2 groups), fat greenling, rockfish / scorpionfish / marbled rockfish (2 groups), shark/ ray, Pacfic cod, Alaskan Pollock / Japanese codling, Lophiidae, gurnard / croaker / white croaker / sailfin poacher, sea bream (except black porgy) / John Dory/ black porgy / sea chub, seabass, puffers, conger eel, flathead, Japanese sand lance (adult), sea urchins

(b) Inland fish species (omitted)

B. Major Items After Production Status Taken Into Account

Japanese sandlance, whitebait, sardines, mackerel, yellowtail, giant sea bass, scabbard fish, Japanese whiting, coho salmon, crustaceans, shellfish, seaweeds, squid, octopus

Chapter 2 Results of Radioactive Cesium Inspections for Fishery Products

As explained in Chapter 1, radioactive materials in fishery products have been monitored continuously since immediately after the Fukushima Daiichi NPS accident. Further, 2-1-1 below explains the detail of intake and emission of radioactive materials by fish and other fishery products, and shows that cesium concentration in fishery products drop as cesium concentrations in the environment drop. This chapter will show inspection results with respect to region, changes with time (time-series), trends in different major fish groups, and other topics. Inspection results for other fishery products not discussed in this chapter are collected in an appendix table at the end of this report.

As stated previously, inspections are, in principle, performed prior to shipping and distribution. If even one of the results of these inspections exceeds the limits, local governments appeal to fishermen in the relevant sea zone to cease shipping and distributing that type of fish. In situations where a regional spread of such limit-exceeding occurs, the director of the Nuclear Emergency Response Headquarters orders that a shipping and distribution restriction be placed on the relevant sea zone and/or fish species. Among the inspection results explained in this chapter are those currently under shipping and distribution restrictions. Therefore, the presence of such inspection results in this chapter does not mean that there are fishery products detected with over-the-limit radioactive cesium concentrations in active distribution in the market.

About the graphs:

- Histogram: Concentrations on the horizontal axis; on the vertical axis, each concentration's relative frequency calculated year-by-year. Suitable for examining overall distribution of concentrations and the changes therein.
- Scatter plot: Time on the horizontal axis; radioactive cesium concentration on the vertical axis. Suitable for examining the trends of radioactive cesium concentration over time.
- Figures 7 to 34 have been drawn based on data from fishery product radioactive material inspections published by the Fisheries Agency [22].

1-2-1 Inspection Results for Nationwide Fishery Products in Japan (in total)

Figure 7 displays cumulative totals of all nationwide inspections to the present date. From the date of the Fukushima Daiichi NPS accident to end of March 2014, 48,836 samples have undergone inspection. Of these, 94.1 % (45,965) were found to have radioactive cesium concentrations within the current limit of 100 Bq/kg. In Fukushima Prefecture, 87.6 % (16,677 of 19,044) of samples were within 100 Bq/kg. Outside of Fukushima Prefecture, the figure is 98.3 % (29,288 of 29,792).

Figure 8 displays aggregated inspection results by fiscal year. It is important to note that because the inspections focus on fish species and sea zones found in the previous year to contain high radioactivity values, the breakdown of each year is different and years cannot simply be compared to one another. However, with the passing of time, the proportion of results exceeding 100 Bq/kg has dropped, and also, the overall distribution of concentrations has shifted to lower level (i.e., shifting to the left in the graphs).

This trend, as explained in 2-2-1, is considered to show that as radioactive cesium concentrations drop off in sea water that once produced high readings, radioactive cesium concentrations drop off in fishery products as well. The details are described below. Although there are differences in levels of contamination and the rate at which readings drop off from fish species to species, the trends are the same for all of them.

Figure 7 Nationwide Fishery Products Inspection Results (Mar. 2011- Mar. 2014)

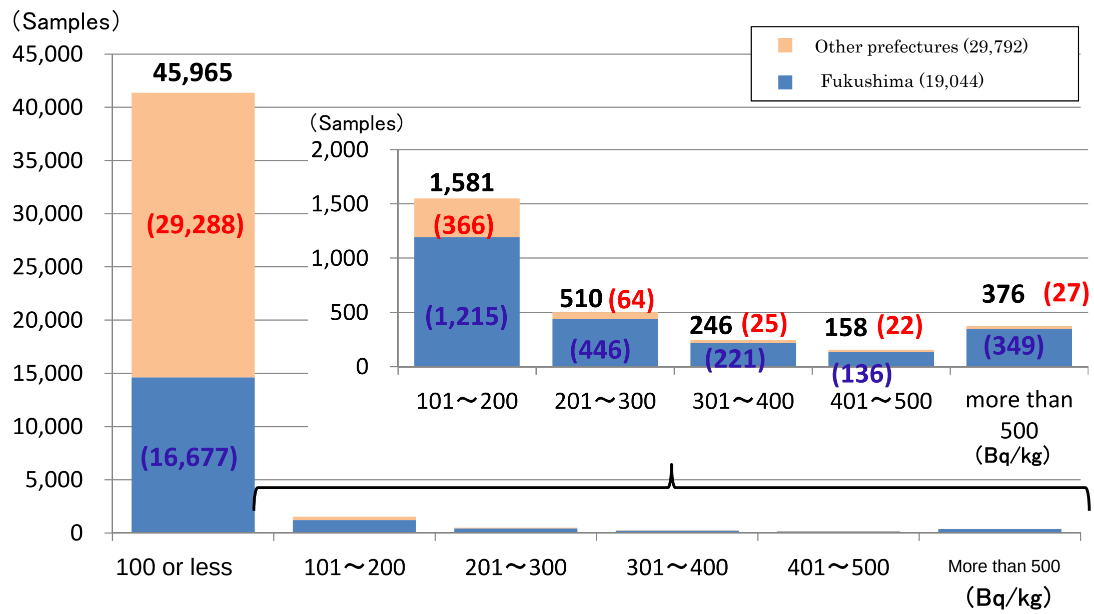
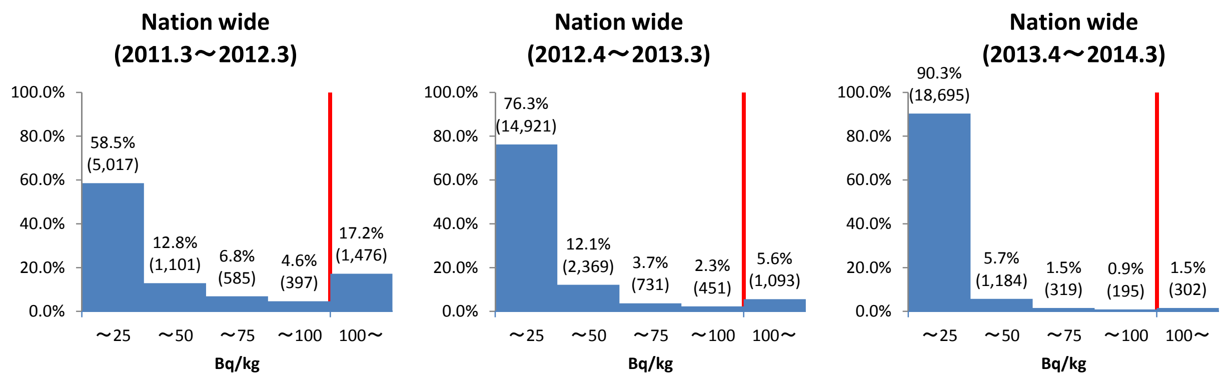


Figure 8 Nationwide Fishery Products Inspection Results (by fiscal year)



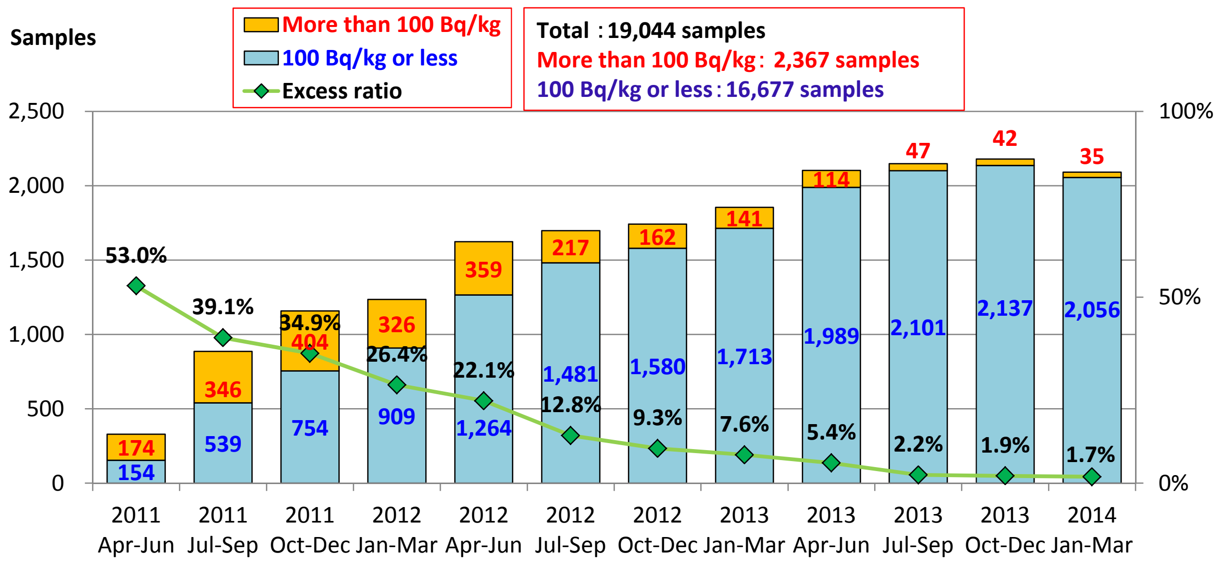
1-2-2 Inspection Results for Fukushima Prefecture Fishery Products (all)

Figure 9 displays the number of samples in Fukushima Prefecture inspections that exceeded 100 Bq/kg in 3-month periods, as well as its ratio relative to the total number of inspections (hereinafter, “excess ratio”) in that period.

Figure 10 shows this same data displayed by fiscal year. In Fukushima Prefecture, 53.0 % of samples taken in the period immediately following the Fukushima Daiichi NPS accident (April – June 2011) were over 100 Bq/kg; however, in the single year after the accident, that proportion dropped by half. Since FY2012, the focus of inspections was shifted to the specific fish species that over 50 Bq/kg were detected during one year after the accident, but even still the proportion of samples exceeding 100 Bq/kg continued to decline. In January to March 2014, the figure dropped to 1.7 %.

Coastal fishing and bottom trawling operations in the waters around Fukushima were subject to suspensions after the accident in March 2011. However, after thorough inspections, trial fishing and sales resumed in June 2012 for species that consistently demonstrated radionuclide levels below the limits, followed by gradual increase of target fish species and expansion of allowed fishing areas. Information on the species subject to trial fishing and sales, developments on allowed fishing areas and fishing methods, and the results of inspections performed during trial fishing and sales are all published on the Fukushima Prefectural Federation of Fisheries Co-operative Associations website.[4]

Figure 9 Inspection Results for Fukushima Prefecture Fishery Products (all) (>100 Bq/kg readings in 3-month periods)



4 Fukushima Prefectural Federation of Fisheries Co-operative Associations website http://www.jf-net.ne.jp/fsgyoren/

Figure 10 Inspection Results for Fukushima Prefecture Fishery Products (by fiscal year)

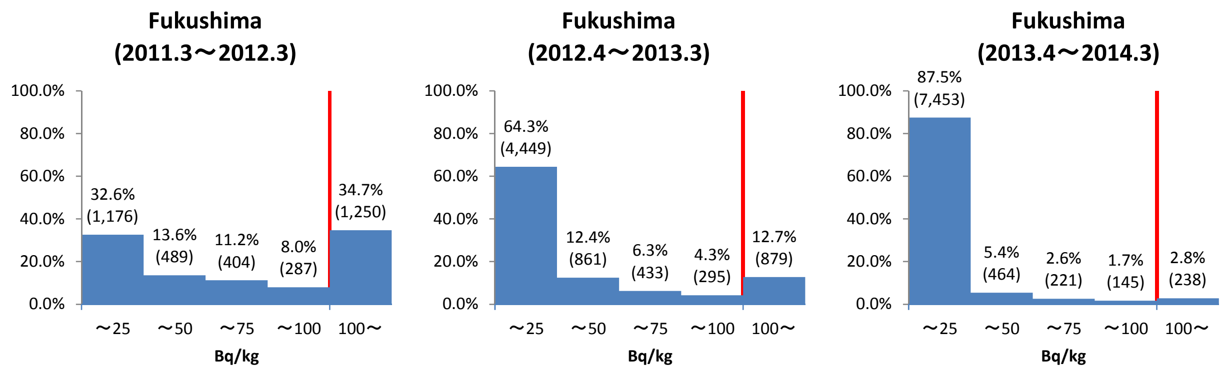


Figure 11 through Figure 14 show the number of Fukushima Prefecture samples exceeding readings of 100 Bq/kg and the excess ratio relative to the total number of samples, separated into marine and freshwater fish species, and aggregated in 3-month and fiscal year periods.

For marine fish, as displayed in Figure 12, 64.8 % of samples in FY2011 were within 100 Bq/kg. However concentrations declined in the passage of time, with 97.7 % of samples in FY2013 being within 100 Bq/kg. As explained in 2-1-1, the function by which marine fish eject salts from their bodies is considered to explain why radioactive cesium concentrations drop in fish bodies as they simultaneously also drop in the marine water itself.

For freshwater fish, as displayed in Figure 14, 68.3% of samples were within 100 Bq/kg in FY2011, but by FY2013, 91.7% of results were within 100 Bq/kg. Although overall concentrations of radioactive cesium have decreased, the rate of decrease is slower than that of marine fish. This is thought to be due to the function by which freshwater fish retain salts within their bodies, making it more difficult for them to discharge radioactive cesium compared to marine fish.

Figure 11 Inspection Results for Fukushima Prefecture Marine Fish Species (>100 Bq/kg readings, by 3-month periods)

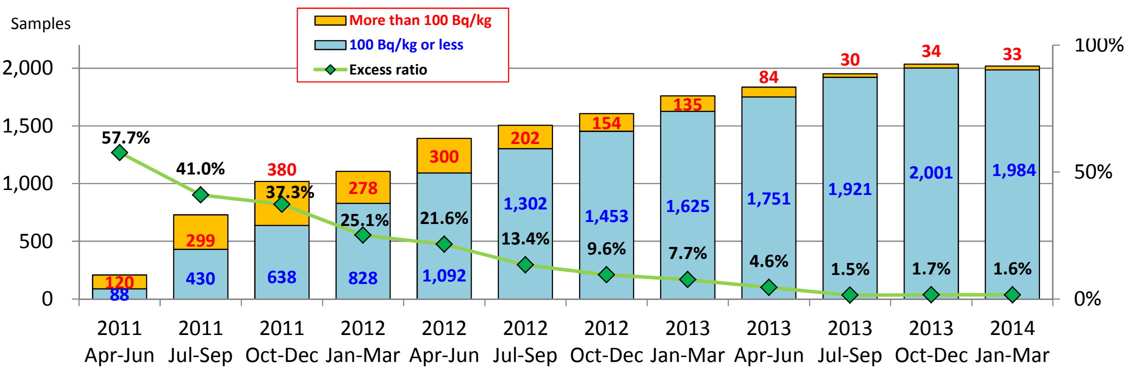


Figure 12 Inspection Results for Fukushima Prefecture Marine Fish Species (by fiscal year)

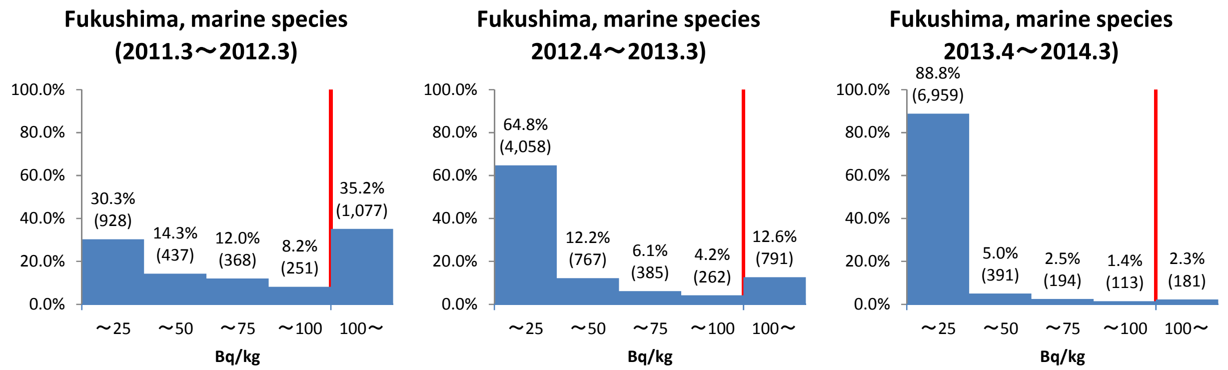


Figure 13 Inspection Results for Fukushima Prefecture Freshwater Species

(>100 Bq/kg readings, by 3-month periods)

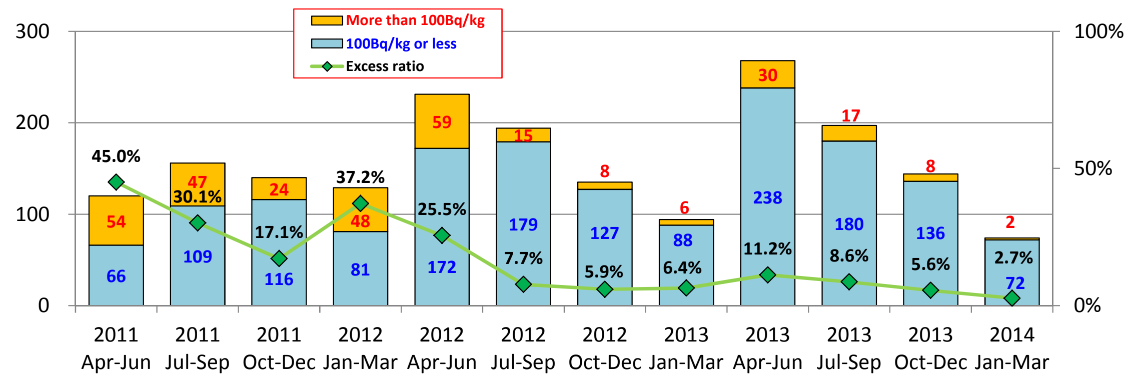
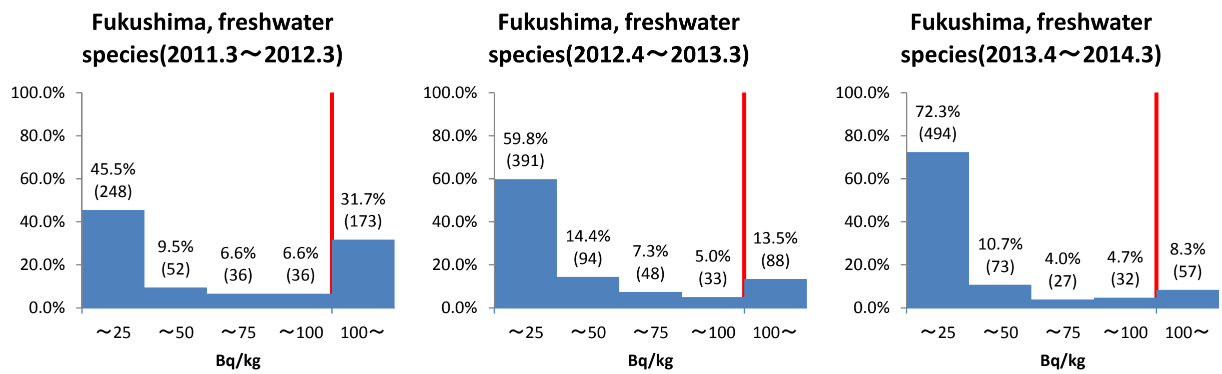


Figure 14 Inspection Results for Fukushima Prefecture Freshwater Species (by fiscal year)



1-2-3 Inspection Results for Fishery Products (all) from Outside Fukushima Prefecture

Figure 15 shows the number of non-Fukushima Prefecture samples exceeding readings of 100 Bq/kg and the excess ratio relative to the total number of samples, aggregated into 3-month periods. Figure 16 shows the same data summed up by fiscal year. As Figure 15 demonstrates for areas outside of Fukushima Prefecture, even in the March to June 2011 period after the accident, 93.5 % of samples were within the 100 Bq/kg. Excess ratio dropped even further over time, with 99 % of samples reading within

100 Bq/kg in the October to December 2012 period; and 99.6 % of samples within 100 Bq/kg in January to March 2014.

Figure 17 through Figure 20 show the number of non-Fukushima Prefecture samples exceeding readings of 100 Bq/kg and the excess ratio relative to the total number of samples, separated into marine and freshwater fish species, and aggregated in 3-month and fiscal year periods. As Figure 18 and Figure 20 show, results of FY2013 inspection reveals that within 99.9 % of marine fish samples were within 100 Bq/kg, And 98.0 % of freshwater fish samples were within 100 Bq/kg. Further examination of the proportion of FY2013 samples over 50 Bq/kg shows that, 0.5 % of marine fish samples were over 50 Bq/kg, 6.1 % of freshwater fish samples exceeded that mark. Hence, although the difference is small, radioactive cesium concentrations were slightly higher in freshwater fish samples than in marine fish samples.

Figure 15 Inspection Results for Non-Fukushima Fishery Products (>100 Bq/kg readings, by 3-month periods)

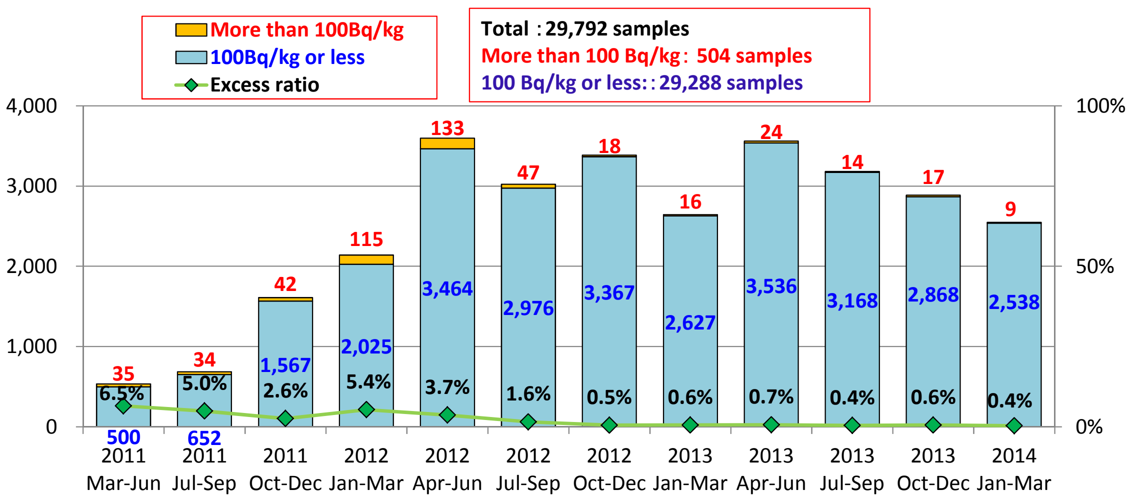


Figure 16 Inspection Results for Non-Fukushima Fishery Products (by fiscal year)

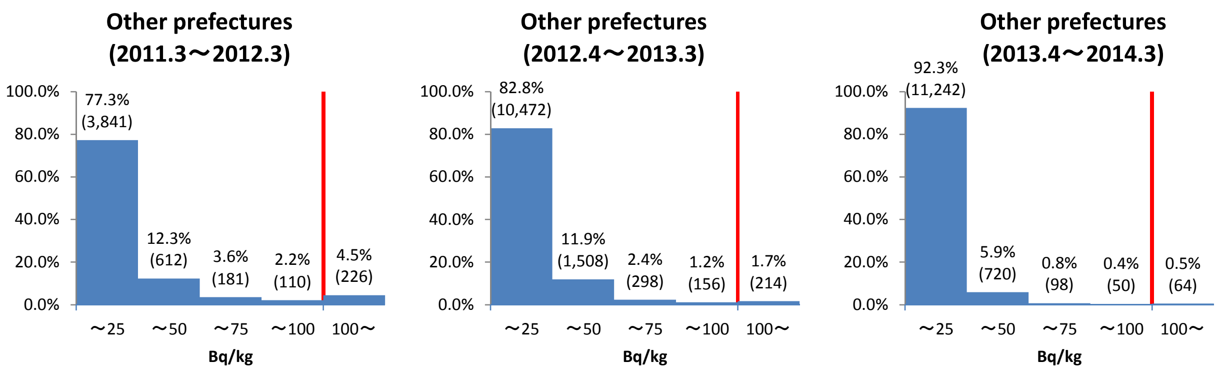


Figure 17 Inspection Results for Non-Fukushima Marine Fish Species (>100 Bq/kg readings, by 3-month periods)

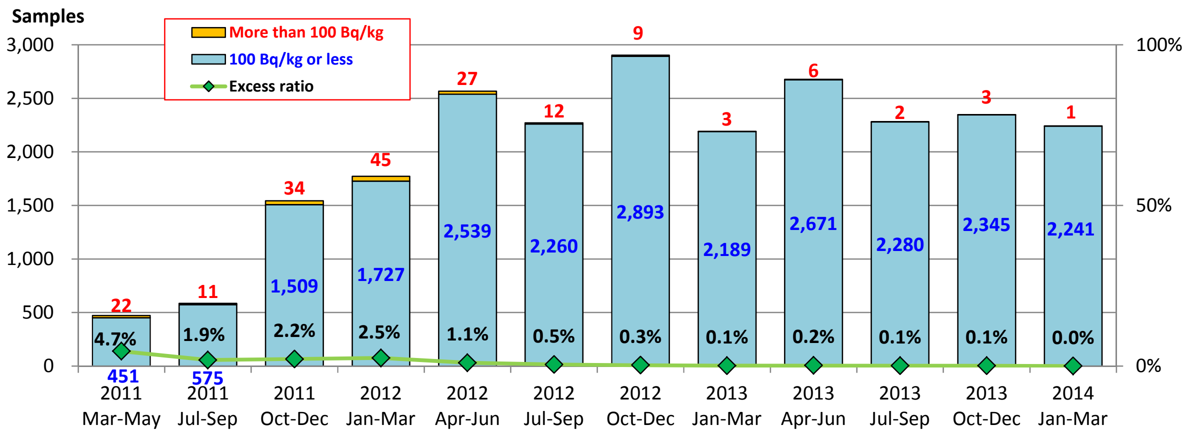


Figure 18 Inspection Results for Non-Fukushima Marine Fish Species (by fiscal year)

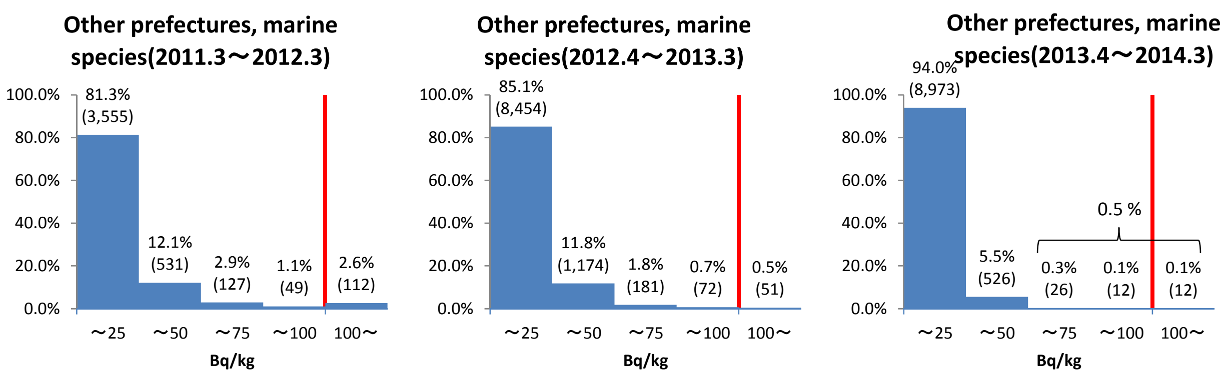


Figure 19 Inspection Results for Non-Fukushima Freshwater Fish Species (>100 Bq/kg readings, by 3-month periods)

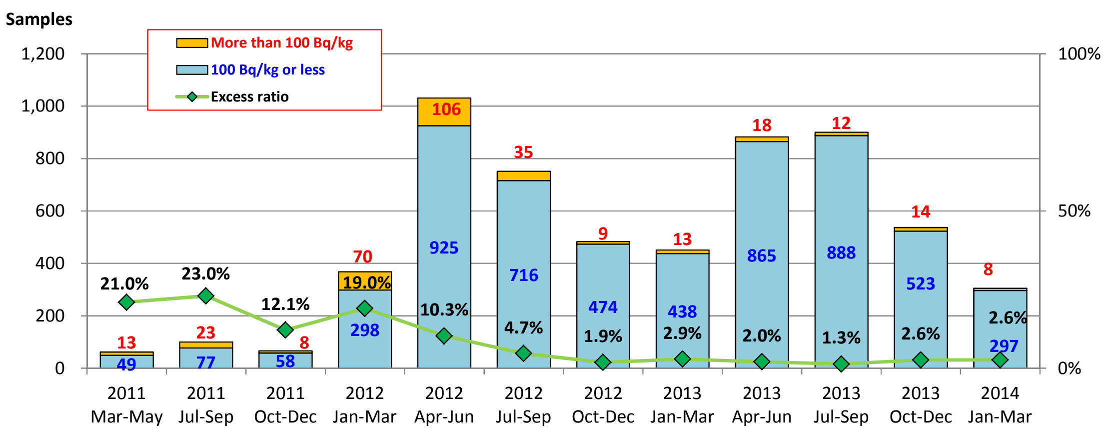
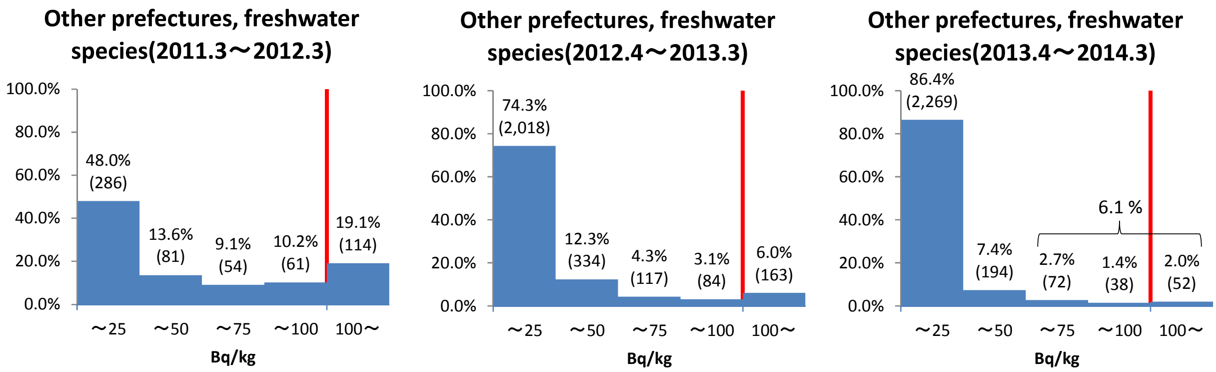


Figure 20　Inspection Results for Non-Fukushima Freshwater Fish Species (by fiscal year)



1-2-4　Trends within Fish Species

Differences in radioactive cesium concentrations among various fish species and sea zones become apparent through monitoring. The feeding habit and living habitat type of each species is thought to be relevant to the difference. As the differences between marine and freshwater fish have already been explained, this section focuses on the differences among the main fish species.

(1)　Surface-level fish

As shown in Figure 21 (leftmost chart) and Figure 22, there were samples of Japanese sandlance （juvenile） and whitebait (juvenile anchovy) in the immediate post-accident period that exceeded provisional regulation values of 500 Bq/kg, but the levels of radioactive cesium concentration quickly dropped off. Except for one sample of halfbeak harvested in February 2013 in the waters off Fukushima Prefecture, there have been no surface-level fish since autumn 2011 with readings that exceeded 100 Bq/kg.

(2)　Migratory fish

Inspection results for saury and chum salmon, migratory fish species, are displayed in Figure 21 (center graph). The levels of radioactive cesium have never exceeded 100 Bq/kg. They have been within 50 Bq/kg. Samples for skipjack and other tuna species have also never exceeded 100 Bq/kg.

(3)　Squid and octopus

Inspection results for the spear squid and the north pacific giant octopus are displayed in Figure 21 (rightmost graph). There were some high readings immediately after the accident in 2011, but afterward there was a precipitous drop in radioactive cesium concentrations that was even more rapid than with surface-level fish like the Japanese sandlance and the whitebait (juvenile anchovy). Today, no sample has been found to be beyond 50 Bq/kg. As with crustaceans and shellfish discussed later, salts are exchanged freely in and out of invertebrates' bodies and the sea water. Therefore, it is thought that if radioactive cesium concentrations in the water drop, then concentrations inside invertebrates' bodies will also quickly drop.

Figure 21　Inspection Results for Surface-level Fish, Migratory Fish, Squid, and Octopus

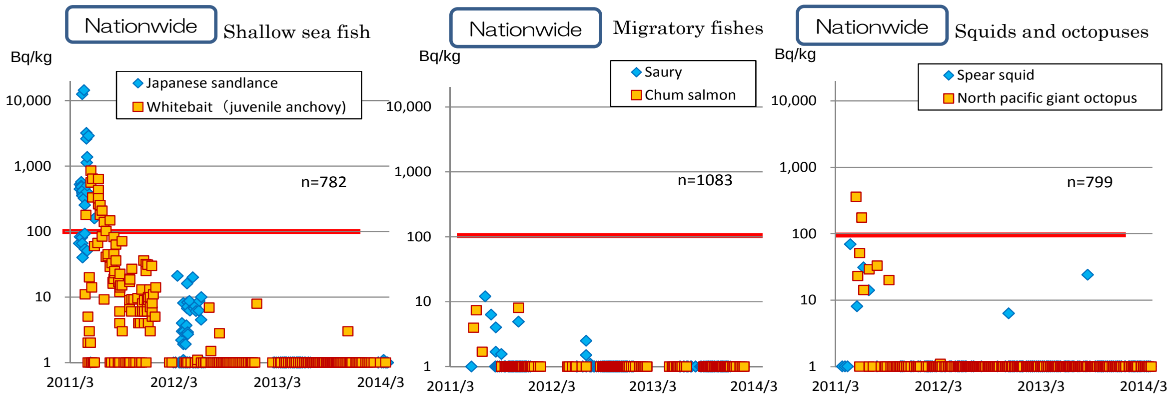
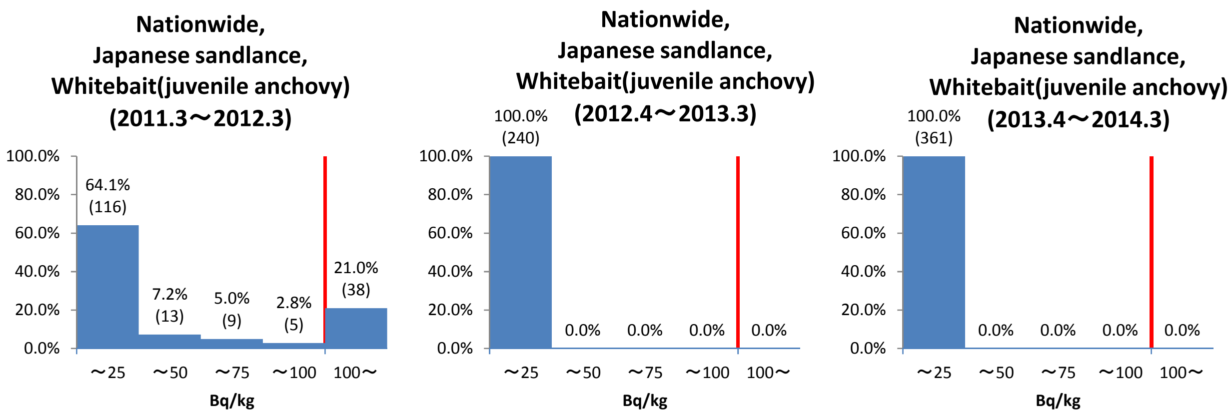


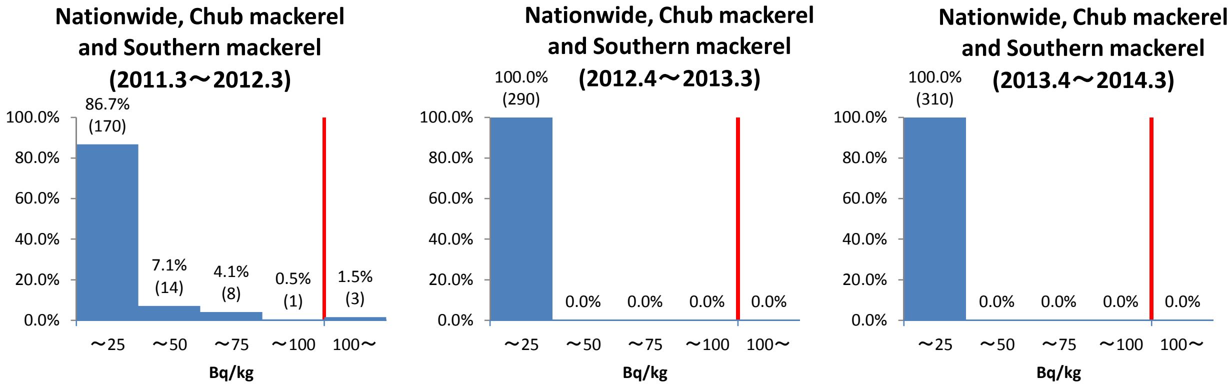
Figure 22　Nationwide Inspection Results for Surface-level Fish
（Japanese sandlance, whitebait (juvenile anchovy)）



(4)　Mid-depth fish (chub mackerel, southern mackerel)

Figure 23 displays inspection results for the chub mackerel and southern mackerel. None of the radioactive cesium readings exceed either the post-accident provisional regulation values of 500Bq/kg (in place until year-end FY2011) or the limits of 100Bq/kg (in place since FY2012). Moreover, no sample has been found to be beyond 50 Bq/kg since FY2012.

Figure 23　Nationwide Inspection Results for Mid-depth Fish（chub mackerel, southern mackerel）



(5)　Crab, Shrimp, and other Crustaceans

Inspection results for the horsehair crab, snow crab, and north pacific krill are displayed in Figure 24. Readings since the 2011 accident have not exceeded 100 Bq/kg, with absolutely no readings beyond 50 Bq/kg.

(6) Shellfish

Inspection results for shellfish (Japanese littleneck clam/common orient clam, surf clam, and oysters) are displayed in Figure 24 (center graph) and Figure 25. For hen clams, there were some samples that exceeded provisional regulation values of 500 Bq/kg immediately following the 2011 accident, but since FY2012 all readings have been within 100 Bq/kg, with almost no readings beyond 50 Bq/kg.

(7) Seaweed

Inspection results for seaweed（wakame seaweed [raw and salted], laver [dry laver], sea tangle [raw and salted]）are shown in Figure 24. Although there were some samples that exceeded provisional regulation values of 500 Bq/kg immediately following the 2011 accident, radioactive cesium concentrations rapidly dropped off, and there are no more readings beyond 50 Bq/kg.

Figure 24　　Inspection Results for Crabs, Shrimp, Shellfish, and Seaweed

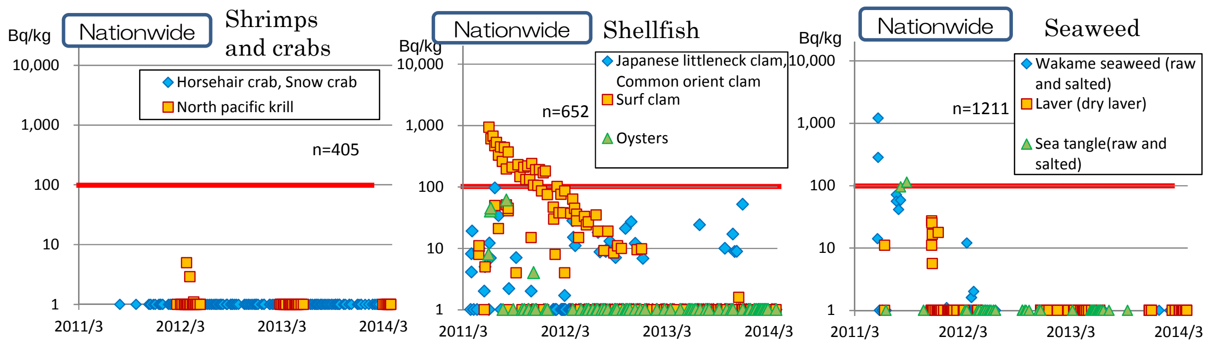
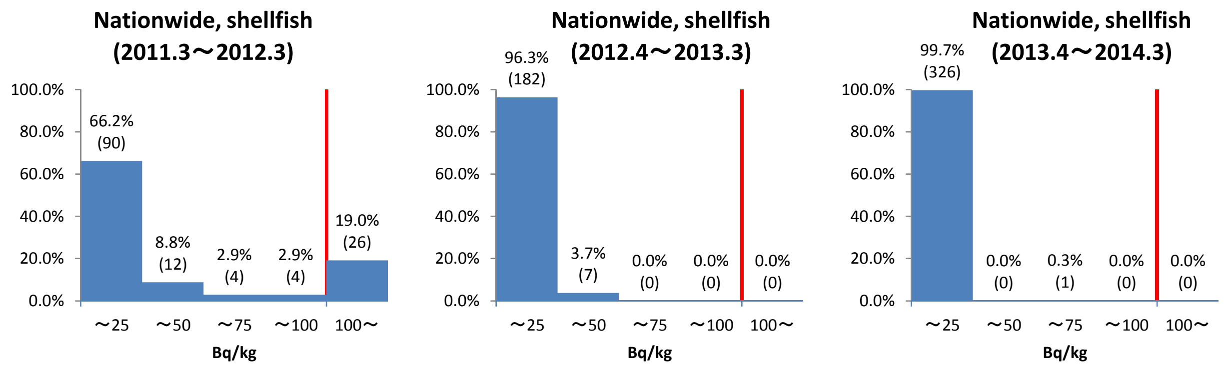


Figure 25　Nationwide Inspection Results for Shellfish (Japanese littleneck clam, common orient clam , surf clam, oysters)



(8) Bottom fish

As shown in Figure 26(leftmost and center graph), among the bottom fish that inhabit the area near the ocean floor are some species that still demonstrate radioactive cesium levels above the　limit, but the proportion of these is gradually shrinking.

The trends among bottom fish vary significantly among species. Some samples of the marbled/stone flounder (Figure 27), olive flounder (Figure 28), and the rockfish family species of fish in the Fukushima Prefecture areas still exceed the limits even today (Figure 32). Furthermore, same samples from species like pacific cod which, from FY2011 to FY2012 displayed high levels of radioactive cesium across a wide area but the concentrations in FY2013 decreased dramatically (Figure 29), and on the other hand, fish species like the Alaska Pollock (Figure 30) and red seabream (Figure 31), which have produced almost no readings beyond 50 Bq/kg since the 2011 accident.

Figure 26　Inspection Results for Bottom Fish, Freshwater Fish (wild)

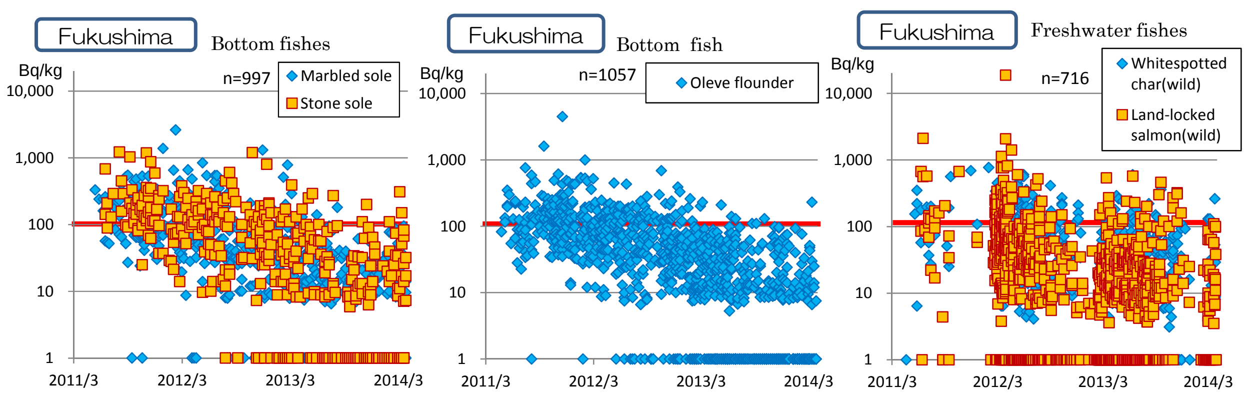


Figure 27 shows the inspection results for marbled flounder and stone flounder. In Fukushima Prefecture, 56 % of samples were over 100 Bq/kg in FY2011. However, this proportion dropped to 27.2 % in FY2012, and then to 3.3 % in FY2013. Overall levels of radioactive cesium concentration are also clearly dropping. In other prefectures, 8.6 % of samples in FY2011 were over 100 Bq/kg, but in FY2013. All samples were within 100 Bq/kg, with nearly no readings beyond 50 Bq/kg.

Figure 27 Inspection Results for the Marbled flounder and Stone Flounder

Figure 28 shows inspection results for the olive flounder. It displays similar trend as marbled flounder and stone flounder.

Figure 28 Inspection Results for the Olive Flounder

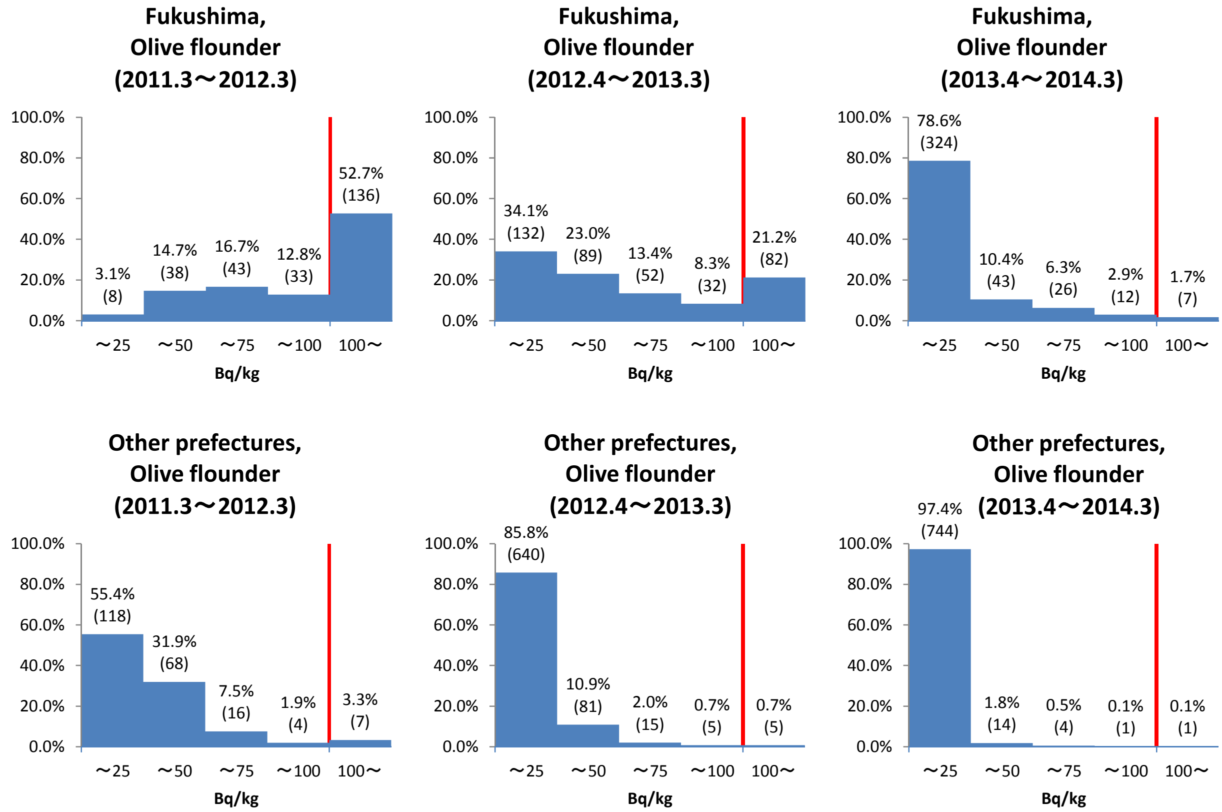


Figure 29 displays the nationwide inspection results for the pacific cod. Samples of pacific cod actually exceeded the limits even outside of Fukushima Prefecture, producing high readings in a comparatively broad range. This is thought to be because the pacific cod has a period in which it approaches relatively highly contaminated coastal areas, and then in migratory period, it travels comparatively long distances [23]. Today, concentrations of radioactive cesium have dropped off across the board. Whereas 13.0 % of samples exceeded 100 Bq/kg in FY2011, 99.8 % of samples were within 100 Bq/kg in FY2013, with 98.9% of samples within 50 Bq/kg.

Figure 29 Nationwide Inspection Results for the Pacific Cod

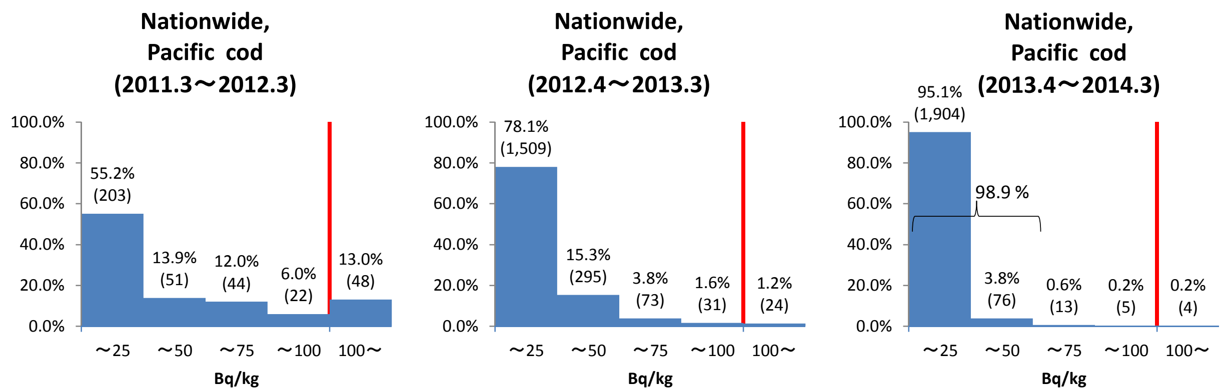


Figure 30 shows the nationwide inspection results for the Alaska pollock. Although it is in the same gadid family as the pacific cod, it displays a different trend. Except for one Alaska Pollock sample off the coast of Fukushima in FY2012 which was found to have a reading of over 100 Bq/kg, there have been almost no high readings at all for this fish since FY2011.

Figure 30　Nationwide Inspection Results for the Alaska Pollock

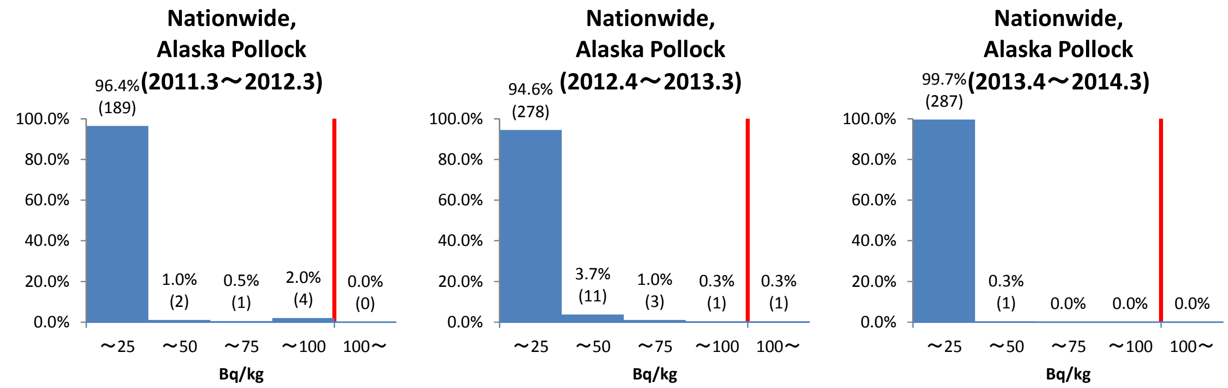


Figure 31 shows the nationwide inspection results for the red seabream. There have been no readings in excess of 100 Bq/kg since the accident, and FY2013 saw absolutely no readings within 50 Bq/kg.

Figure 31　Nationwide Inspection Results for the Red Seabream

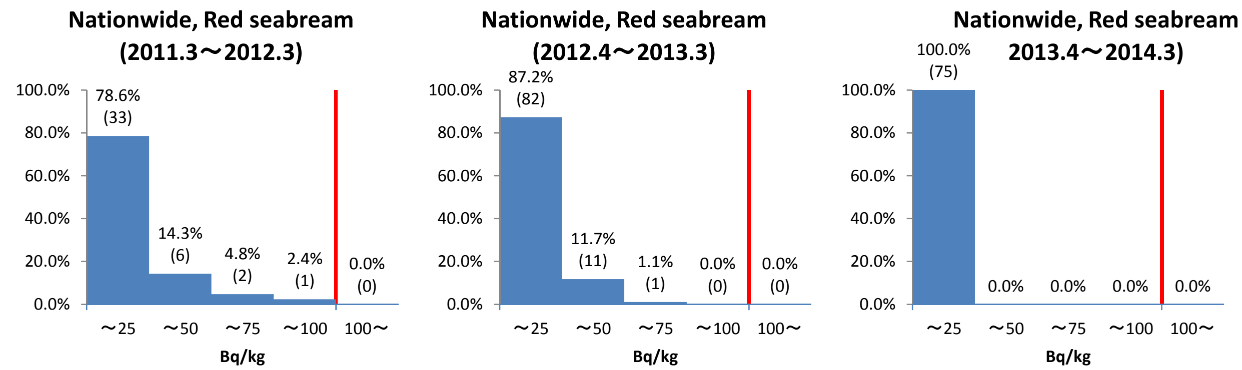
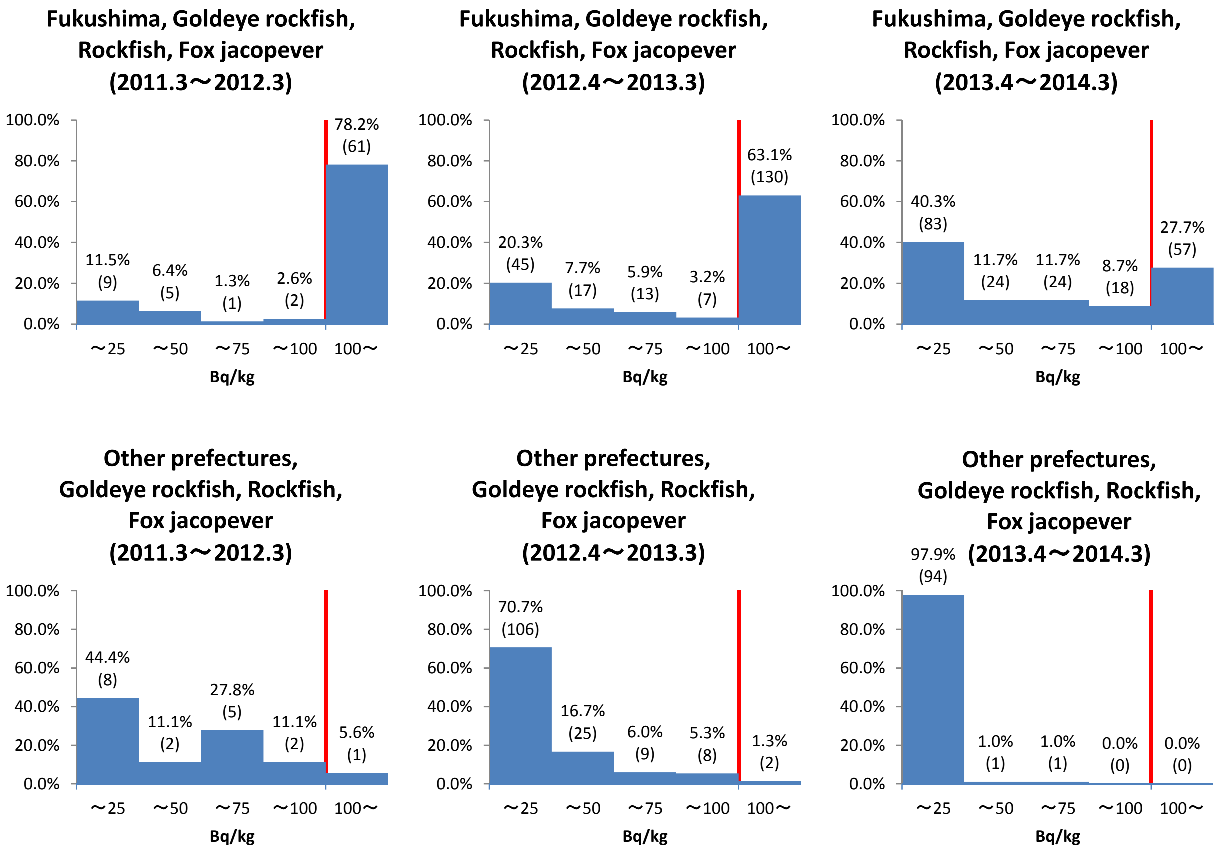


Figure 32 shows the inspection results for the rockfish family of fish. 78.2 % of samples in Fukushima Prefecture in FY2011 exceeded 100 Bq/kg, and concentration levels were observed across the board. In FY2013, this figure dropped to 27.7 % of samples exceeded 100 Bq/kg, with high readings are still observed; however, these readings are steadily decreasing with the passage of time. Outside of Fukushima Prefecture, 5.6 % of rockfish family samples exceeded 100 Bq/kg in FY2011, dropping to 1.3 % in FY2012. In FY2013, no samples exceeded 100 Bq/kg.

Figure 32 Inspection Results for the Rockfish Family

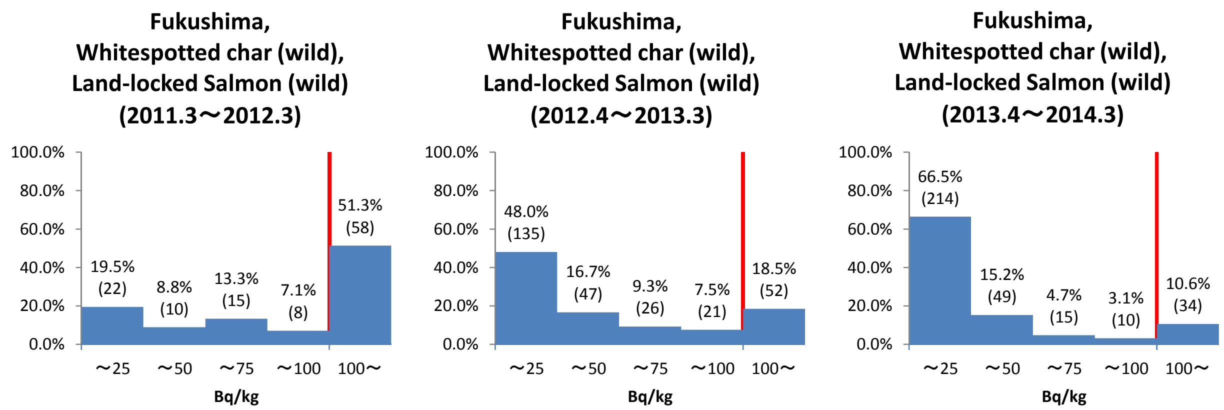
(Goldeye rockfish, Rockfish, Fox jacopever)



(9) Freshwater fish

Figure 33 shows inspection results for the whitespotted char (wild) and land-locked salmon (wild) in Fukushima Prefecture. 51.3 % of samples in FY2011 were over 100 Bq/kg, then 18.5 % in FY2012, and 10.6 % in FY2013. Readings beyond 100 Bq/kg still observed, but there is a steady decline in radioactive cesium concentrations.

Figure 33 Fukushima Prefecture Inspection Results for the Whitespotted Char (wild) and Land-locked Salmon (wild)



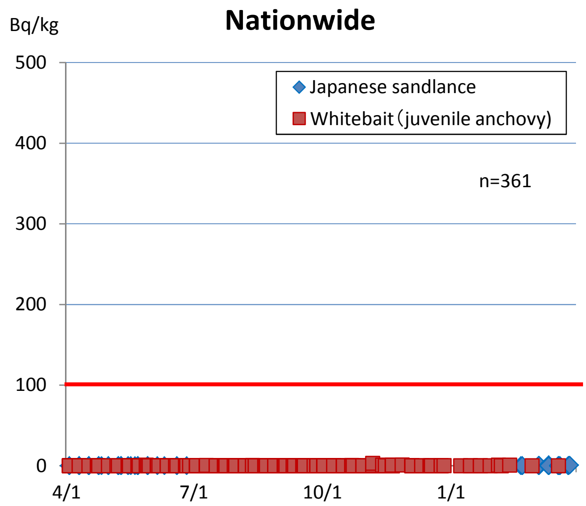
1-2-5 Inspection Results for Different Fish Species in the Last Year

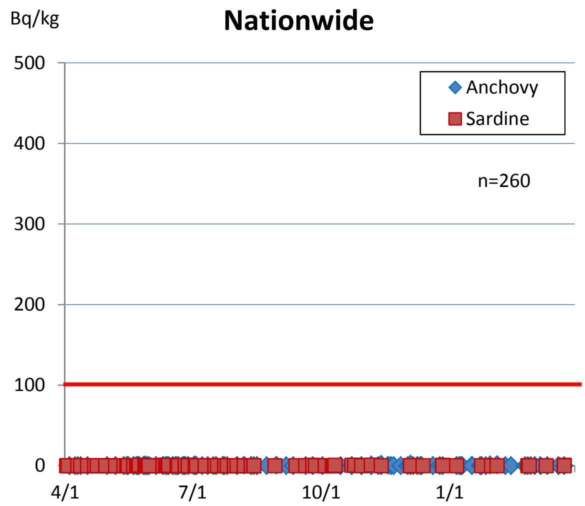
Figure 34 displays the most recent year (April 2013 – March 31, 2014) of inspection results for various individual fish species. This section focuses on main target species of fishing activity in the Pacific off the eastern Japan since before the Fukushima Daiichi NPS accident occurred. Some species included below are currently under governmental restriction orders on shipping and distribution in some sea zones.

Figure 34 Inspection Results for Various Fish Species (April 2013 – March 31, 2014)

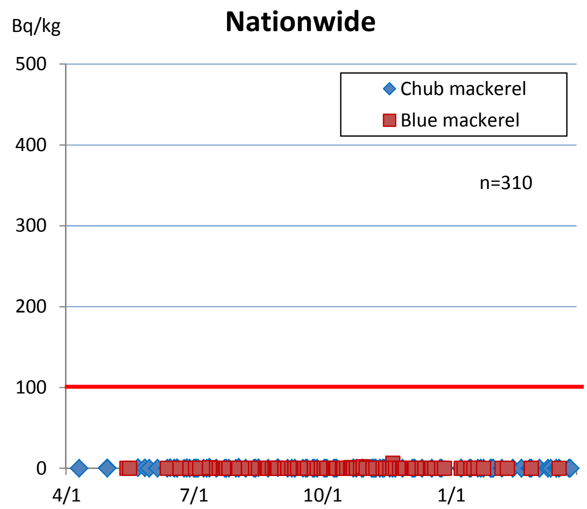
【1． Species below the limits within the previous one year (April 2013-)】

Surface Layer

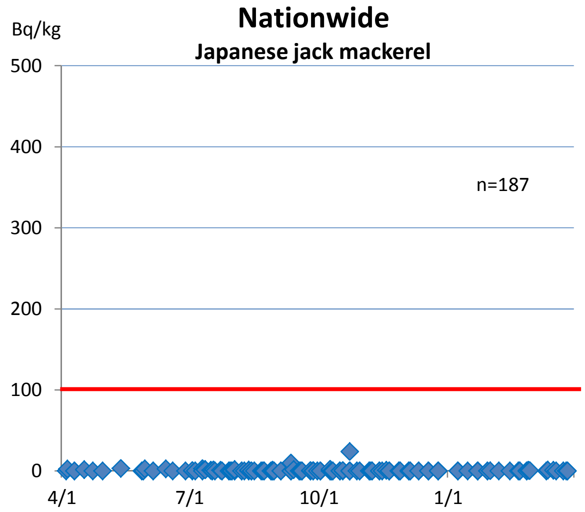


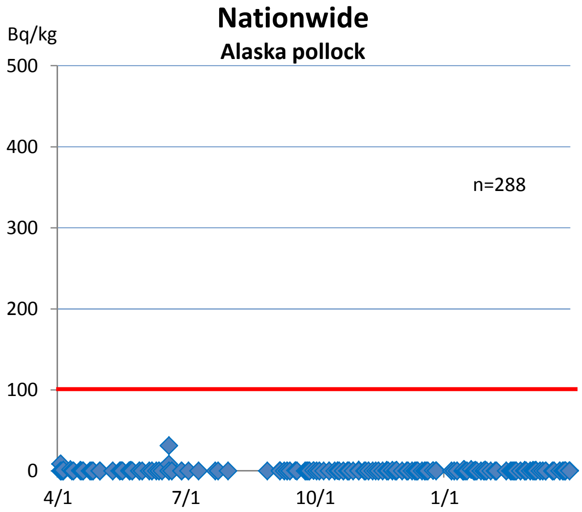


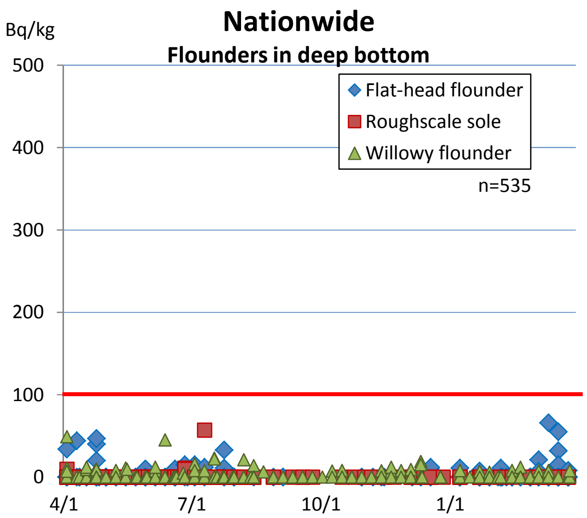
Intermediate Layer

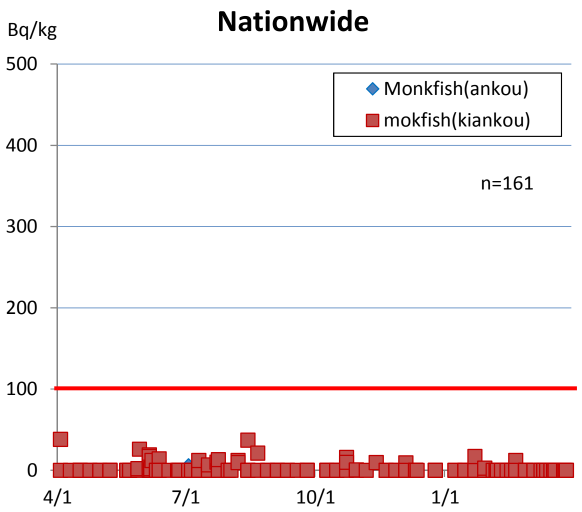


Bottom Layer

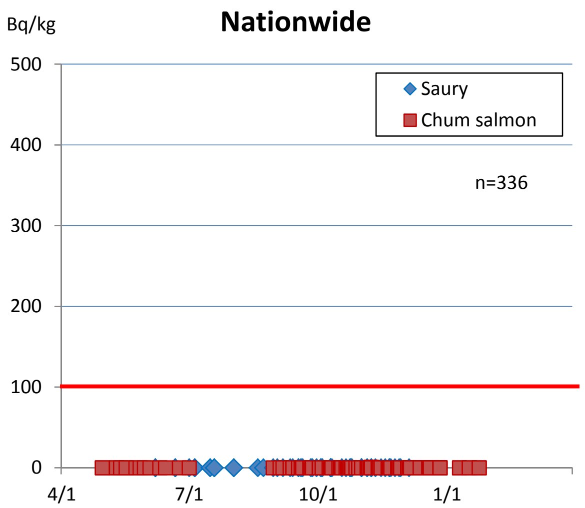


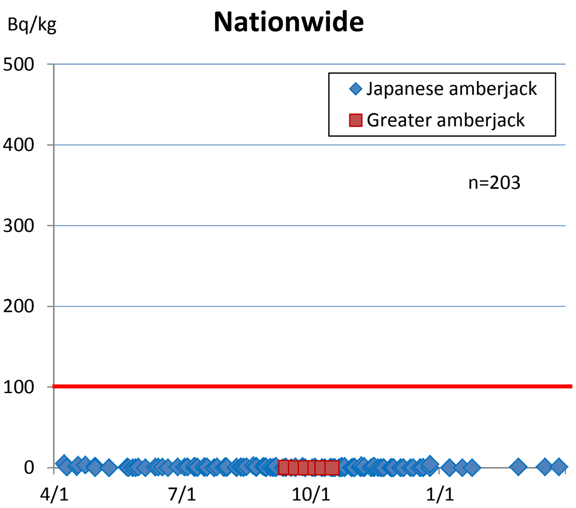


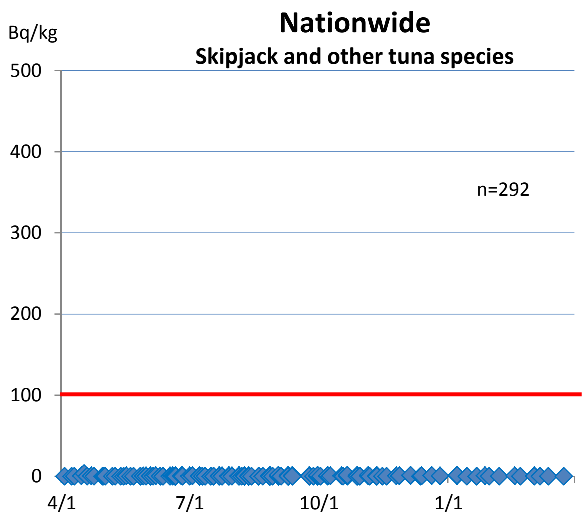


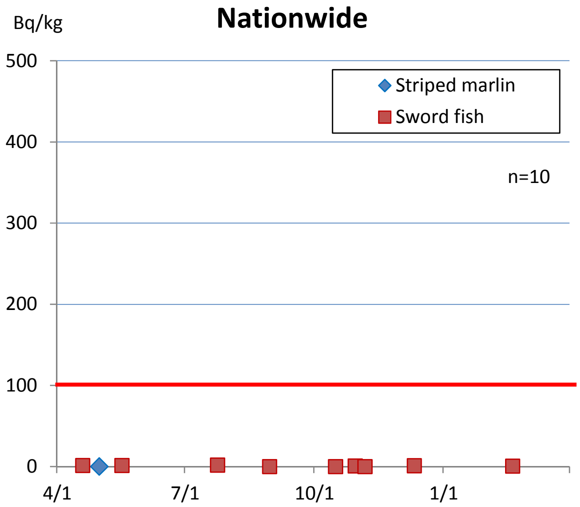


Migratory Fishes

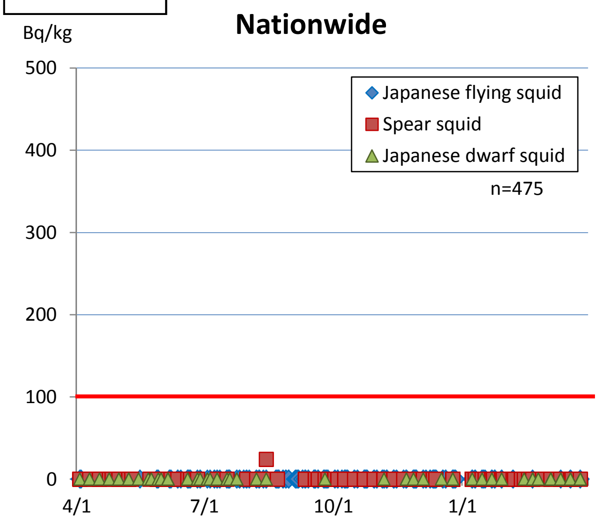


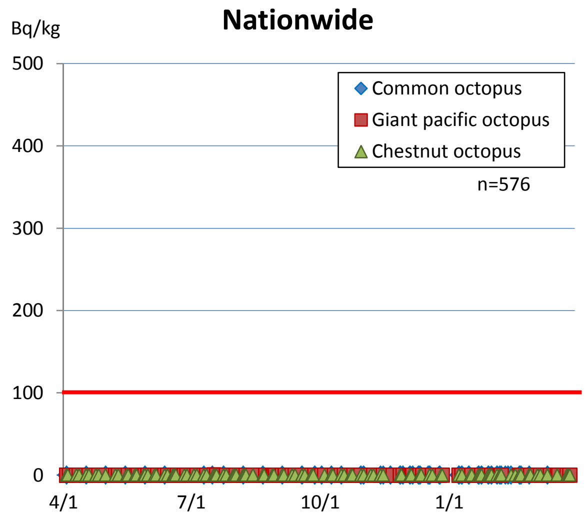




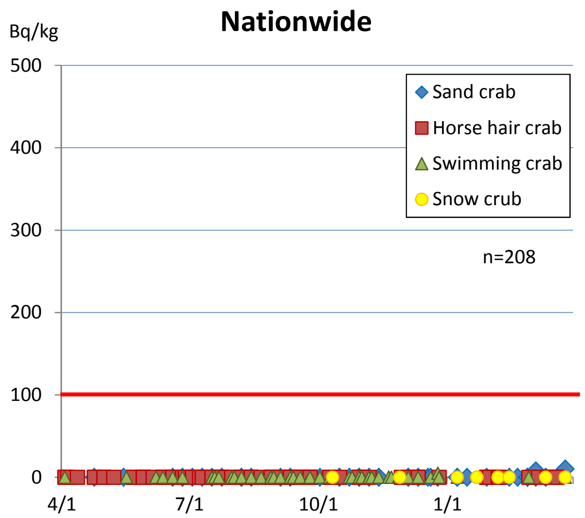


Molluscs

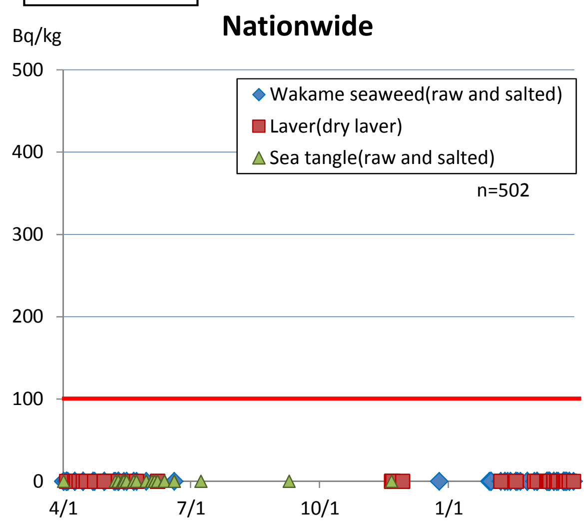




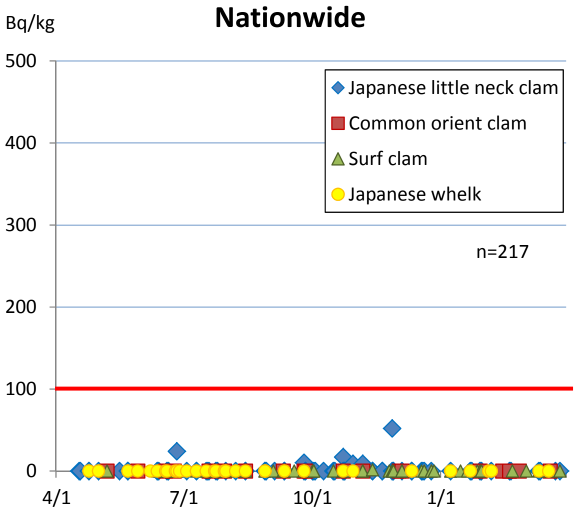
Crustacean

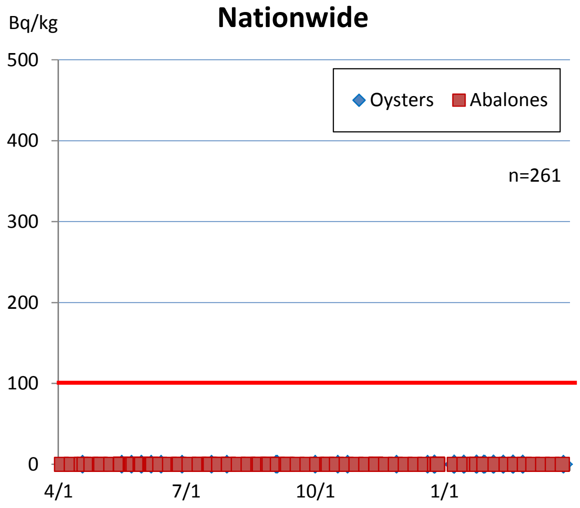


Seaweeds



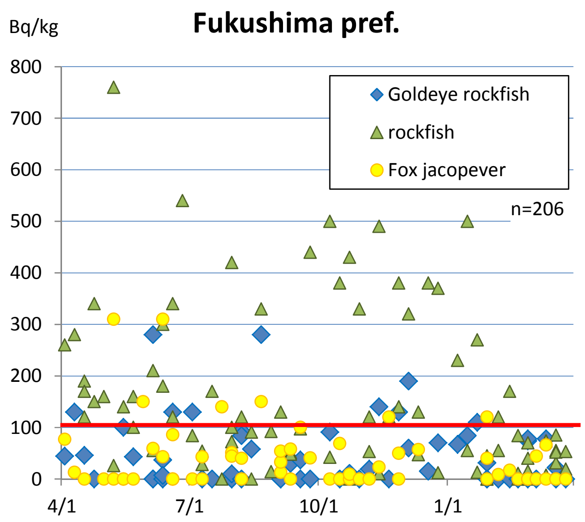
Shellfish

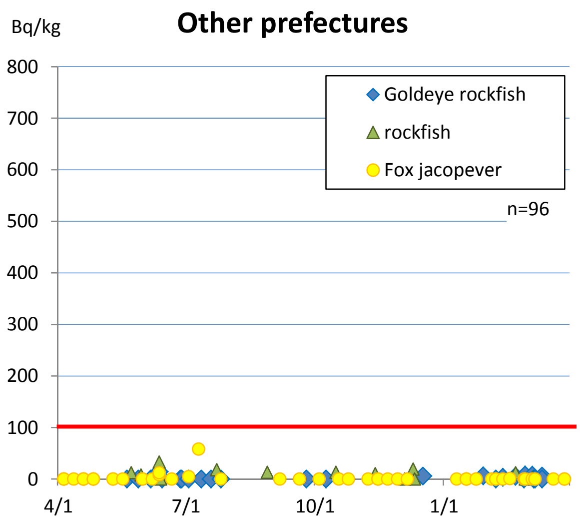

Bq/kg
Nationwide
500
400
300
200
100
0
4/1
7/1
10/1
1/1
Japanese little neck clam
Common orient clam
Surf clam
Japanese whelk
n=217

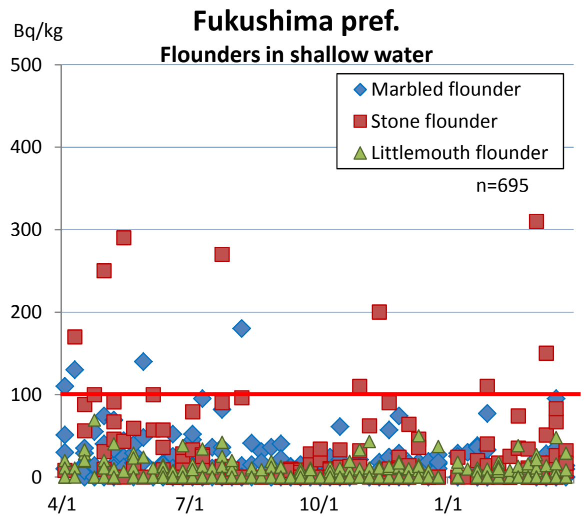

Bq/kg
Nationwide
500
400
300
200
100
0
4/1
7/1
10/1
1/1
Oysters
Abalones
n=261

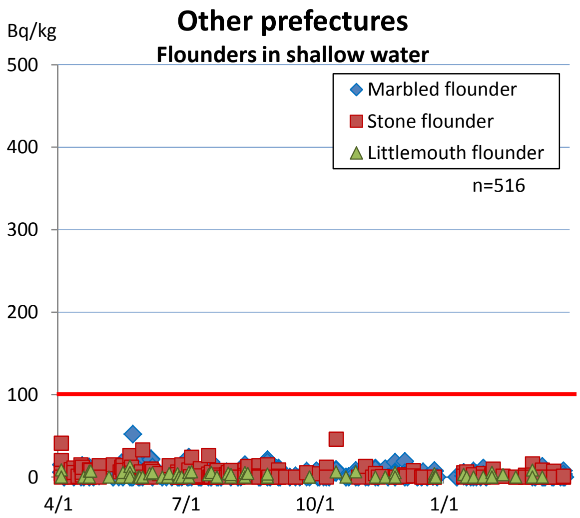
【2. Species over the limits only in Fukushima pref. within the previous one year (April 2013-)】

Bottom Layer



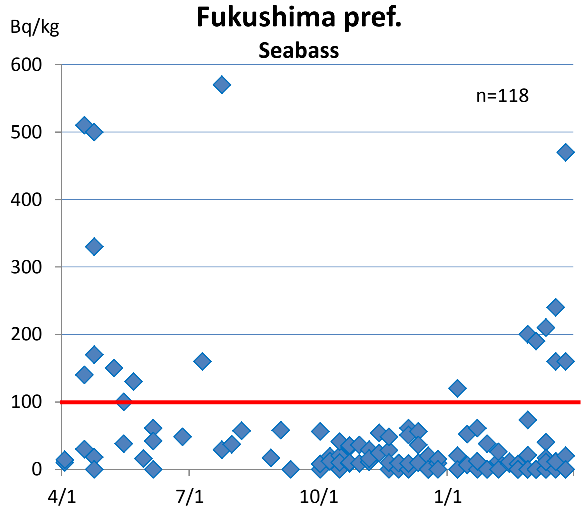


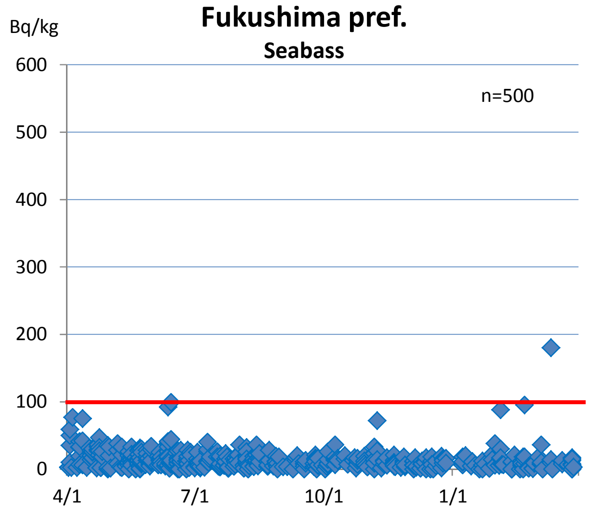




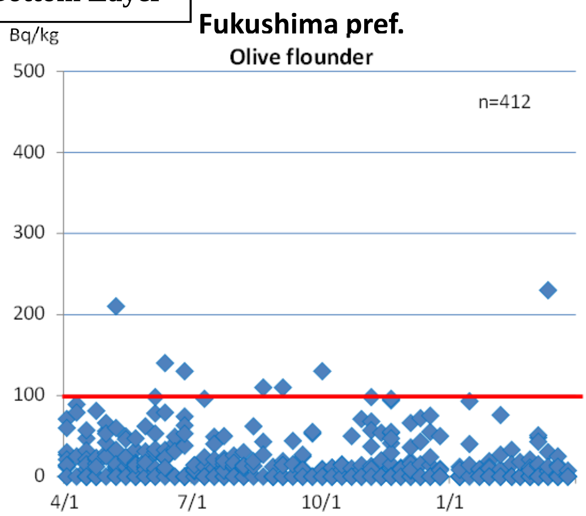
【3. Species over the limits within the previous one year (April 2013-)】

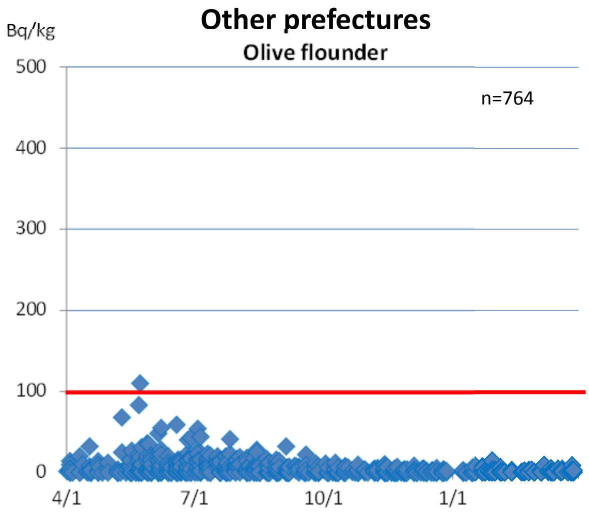
Intermediate Layer

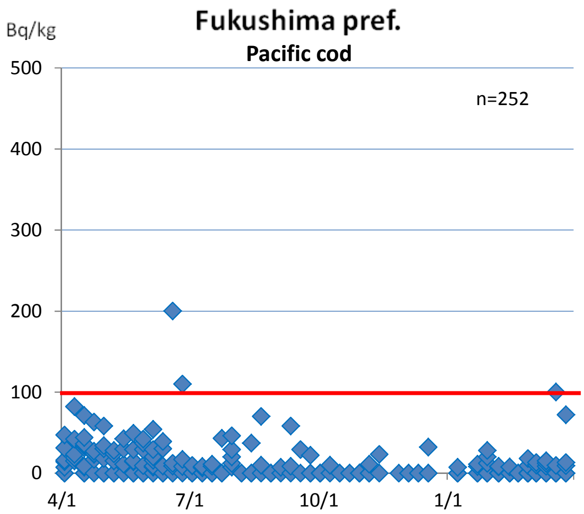


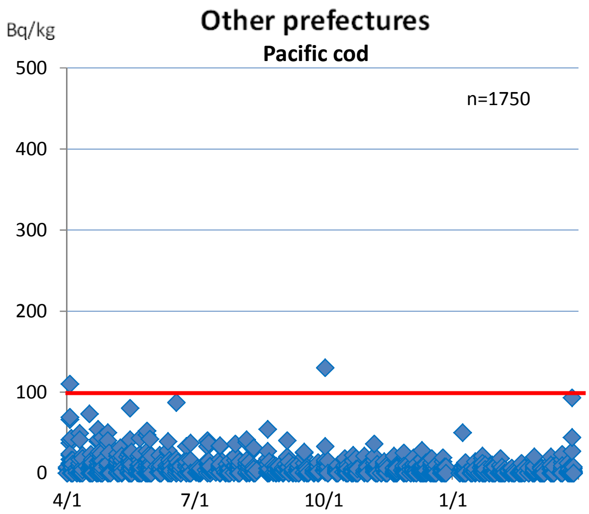


Bottom Layer



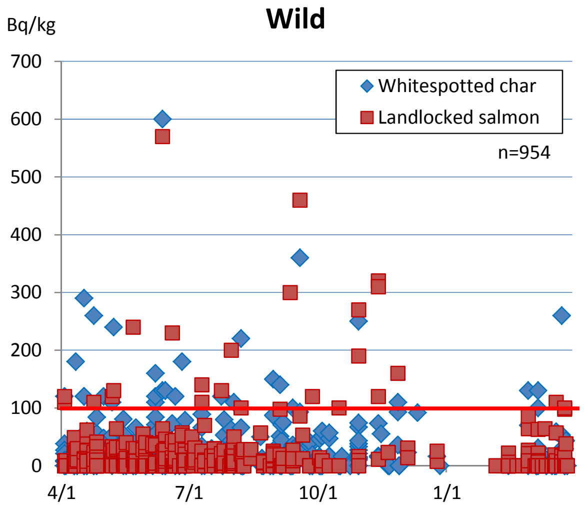


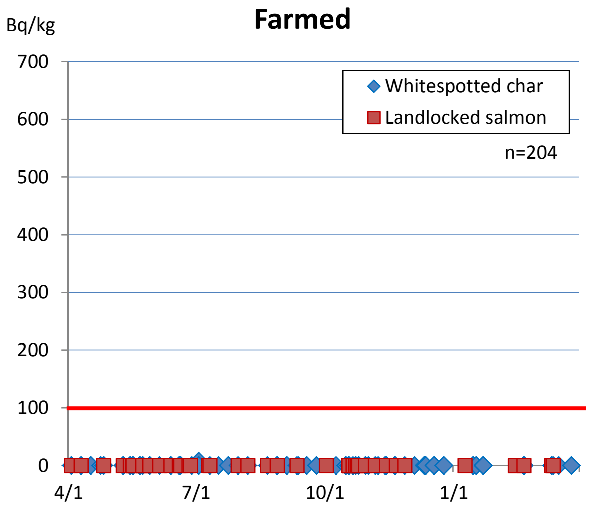




【4. Farmed Whitespotted char and landlocked salmon are below the limits】

Freshwater fishes





1-2-6 Screening test by Prefectural and Municipal Governments

Prefectural and municipal governments conduct screening test apart from the inspections prescribed by the Guidelines. This screening test uses inspection equipment (NaI scintillation spectrometer) set up in a location like the marketplace and covers a substantial number of samples (Table 2).

Except for one hilgendorf saucord caught in February 2014 during trial fishing in Fukushima, all samples inspected via these processes have been below the limits. These results act to support the credibility of the overall monitoring regime carried out by the prefectures.

Coastal fishing and bottom trawling operations in the waters around Fukushima were subject to suspensions after the accident in March 2011. However, after thorough inspections, trial fishing and sales resumed in June 2012 for species that consistently demonstrated radionuclide levels below the limits, followed by gradual expansion of target fish species and allowed fishing areas. Information on the species subject to trial fishing and sales, developments on allowed fishing areas and fishing methods, and the results of inspections performed during trial fishing and sales are all published on the Fukushima Prefectural Federation of Fisheries Co-operative Associations website.[5]

Table 2 Screening test by Prefectural and Municipal Governments

Prefecture	Ownership of the inspection equipment	Installation site	Number of readings in FY2013	Target species
Aomori	Hachinohe City	Hachinohe Fish Market	238	chub mackerel、southern mackerel、Pacific cod、sardine
	Aomori Pref.	National Food Research Institute (Hachinohe)	108	Japanese scallop、hen clam and other shellfish, seaweeds and sea water etc.
		Aomori Brand Research Center (Mutsu)		
		Agriculture and Forestry Research Center		
		Agricultural Produce Processing Research Center		
Miyagi	Miyagi Pref.	Kesennuma Fish Market	7,961	Pacific cod、oliver flounder and other species with lifted restrictions, fish in season and fish from before the opening of the fishing season
		Minamisanriku-cho Fish Market		
		Onagawa Fish Market		
		Ishinomaki Fish Market		
		Shiogama Fish Market		
Fukushima	Fukushima Pref.	Soma Haragama Local Wholesale Market	803	Fish species caught during trial fishing
		Onahama Fish Market		
Chiba	Chiba Pref.	Chiba Prefectural Fisheries Research Agency	288	sardine、Japanese jack mackerel、seabass、mackerel and other species major to the prefecture
		〃 (Choshi office)		
	Choshi City	Choshi Fisheries Cooperative Association	531	sardine、mackerel、Japanese jack mackerel、Japanese amberjack、saury and other often-caught species

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5 Fukushima Prefectural Federation of Fisheries Co-operative Associations website http://www.jf-net.ne.jp/fsgyoren/

Chapter 3 Inspection for Radionuclides Other Than Radioactive Cesium

Apart from local governments' monitoring of fishery products for radioactive cesium, the Fisheries Agency and the Fisheries Research Agency conduct examinations on a wide variety of fish species, such as mackerel and Alaska pollock, testing for radioactive strontium (63 samples as of the end of May 2014) and plutonium (5 samples as of the end of March 2014). These results are then released to the public (see Table 3)

Monitoring of radioactive materials in fishery products date back to March 1954, when the *Daigo Fukuryu Maru* fishing vessel was exposed to radiation from nuclear weapons testing. This prompted the Fisheries Agency to begin conducting the survey. Other surveys include the monitoring of land and waters surrounding nuclear power facilities by relevant local governments and others since before the Fukushima Daiichi NPS accident. The historical data on radioactivity levels in the environment which include these and other studies undertaken with the cooperation of relevant ministries, prefectural governments, and others are stored in the Nuclear Regulation Authority's Environmental Radiation Database. According to this database, up through the period of 2000-2010 prior to the Fukushima Daiichi NPS accident, in the fish, shellfish and algae in the sea zones around Japan contained strontium-90 in concentrations between 0.26 Bq/kg and below the detection limit.

After the Fukushima Daiichi NPS accident, samples containing high concentrations of radioactive cesium such as rockfish (cesium-134+cesium-137: 970 Bq/kg, strontium-89: 0.45 Bq/kg, strontium-90: 1.2 Bq/kg) and Ishikawa icefish (cesium-134+cesium-137: 40 Bq/kg, strontium-90: 0.4 Bq/kg) contained somewhat high levels of radioactive strontium compared to pre-accident levels. However, except for these samples, levels of strontium were largely the same as pre-accident levels, with strontium-90 concentrations being between 0.21 Bq/kg and below the detection limit, and strontium-89 concentrations being below the detection limit.

Referring back to the database, it provides data that shows that up through the period of 2000-2010 prior to the Fukushima Daiichi NPS accident, the fish and shellfish in the sea zones around Japan contained plutonium-238 in concentrations between 0.0016 Bq/kg and below the minimum detectable level. After the accident, plutonium-239+plutonium-240 concentrations were detected between 0.073 Bq/kg and below the detectable level. These samples were harvested from all of the representative sea zones around Japan. (Figure 35)

As stated in Column1, the limits for marine products were calculated based on the assumption that the effective dose from radioactive cesium is the same as the effective dose from other radionuclides. This means that the value of effective dose of cesium-134 + cesium-137 is assumed for the same as the effective dose of strontium-90 + plutonium (Pu-238, 239, 240, and 241) + ruthenium-106.

As shown in Table 4 and Table 5, in the rockfish and Ishikawa icefish samples in which strontium was detected, as a presumed impact of the accident, the effective dose of the strontium radionuclides is significantly less than the effective dose of the radioactive cesium. It is difficult to say whether this assumption is sufficiently safe with only data on strontium at hand. Yet, considering plutonium and ruthenium emissions from a nuclear power station and concentrations in the surround sea water, their dosage is presumed to be considerably low[24]. For this reason, it is sufficiently safe to assume that the non-cesium radionuclides contained in marine products have an effective dose equal to that of the cesium radionuclides' effective dose.

Table 3　Inspection Results for Radioactive Strontium in Fishery Products

				Test Result (Unit: Bq/kg)							
NO	Species	Sampling date	Publication date	Sr−89	Sr−90	Cs−134	Cs−137	I−131	Pt−238	Pt−239+240	Ref. (analyzed part)
1	Japanese sardine (Sardinops melanostictus)	April 6, 2011	June 28, 2011	−	N.D. (Detection limit: 0.04)	4.4	4.1	4.9	−	−	Sr: Whole body Cs & I : muscle
2	Japanese sandlance (Ammodytes personatus)	April 8, 2011	June 28, 2011	−	N.D. (Detection limit: 0.02)	38	43	598	−	−	Sr: Whole body Cs & I : muscle
3	Japanese sandlance (Ammodytes personatus)	April 12, 2011	June 28, 2011	−	N.D. (Detection limit: 0.03)	33	33	397	−	−	Sr: Whole body Cs & I : muscle
4	Anchovy (Engraulis japonicus)	April 14, 2011	June 28, 2011	−	N.D. (Detection limit: 0.04)	3.8	4.1	N.D.	−	−	Sr: Whole body Cs & I : muscle
5	Pacific cod (Gadus macrocephalus)	April 21, 2011	August 30, 2011	N.D. (Detection limit: 0.04)	0.03 (Detection limit: 0.03)	16	18	N.D.	−	−	Sr: Whole body Cs & I : muscle
6	Flathead flounder (Hippoglossoides dubius)	April 22, 2011	August 30, 2011	N.D. (Detection limit: 0.03)	N.D. (Detection limit: 0.03)	1.5	1.8	N.D.	−	−	Sr: Whole body Cs & I : muscle
7	Swimming crab (Portunus trituberculatus)	May 26, 2011	August 30, 2011	N.D. (Detection limit: 0.03)	N.D. (Detection limit: 0.03)	7.2	10.0	N.D.	−	−	Sr: Whole body Cs & I : muscle
8	Japanese sardine (Sardinops melanostictus)	June 22, 2011	August 30, 2011	N.D. (Detection limit: 0.03)	N.D. (Detection limit: 0.03)	8.2	11.0	N.D.	−	−	Sr: Whole body Cs & I : muscle
9	Southern mackerel (Scomber australasicus)	July 1, 2011	August 30, 2011	N.D. (Detection limit: 0.04)	N.D. (Detection limit: 0.03)	1.1	3.4	N.D.	−	−	Sr: Whole body Cs & I : muscle
10	Rockfish (Sebastes cheni)	December 21, 2011	March 9, 2012	0.45	1.2	390	580	N.D.	−	−	Sr: Whole body Cs & I : muscle
11	Shotted halibut (Eopsetta grigorjewi)	December 21, 2011	March 9, 2012	N.D. (Detection limit: 0.05)	0.094	16	24	N.D.	−	−	Sr: Whole body Cs & I : muscle
12	Southern mackerel (Scomber australasicus)	December 21, 2011	March 9, 2012	N.D. (Detection limit: 0.04)	0.03	2.9	4.2	N.D.	−	−	Sr: Whole body Cs & I : muscle
13	Ishikawa icefish (Salangichthys ishikawae)	January 18, 2012	May 10, 2012	N.D. (Detection limit: 0.09)	0.4	18	29	N.D.	−	−	Sr & Cs: Whole body
14	Rockfish (Sebastes cheni)	June 26, 2012	November 15, 2012	−	N.D. (Detection limit: 0.036)	18	33	N.D.	−	−	Sr: Whole body Cs & I : muscle
15	Alaska pollock (Theragra chalcogramma)	August 1, 2012	November 15, 2012	−	N.D. (Detection limit: 0.025)	0.17	0.38	N.D.	−	−	Sr & Cs: Whole body
16	Pacific saury (Cololabis saira)	June 24, 2012	November 15, 2012	−	N.D. (Detection limit: 0.016)	0.44	0.78	N.D.	−	−	Sr & Cs: Whole body
17	Chub mackerel (Scomber japonicus)	October 28, 2011	November 15, 2012	−	N.D. (Detection limit: 0.025)	11	15	N.D.	−	−	Sr & Cs: Whole body
18	Conger eel (Conger myriaster)	December 21, 2011	August 1, 2013	−	0.043 (Detection limit: 0.020)	8.7	13	N.D.	−	−	Sr & Cs: Whole body
19	Southern mackerel (Scomber australasicus)	February 1, 2012	August 1, 2013	−	N.D. (Detection limit: 0.015)	0.73	1.1	N.D.	−	−	Sr & Cs: Whole body
20	Sakura shrimp (Sergia lucens)	November 18, 2011	August 1, 2013	−	N.D. (Detection limit: 0.019)	0.047	0.096	N.D.	−	−	Sr & Cs: Whole body
21	Black scraper (Thamnaconus modestus)	February 19, 2012	August 1, 2013	−	N.D. (Detection limit: 0.023)	2.2	3.1	N.D.	−	−	Sr & Cs: Whole body
22	Blunthead puffer (Sphoeroides pachygaster)	February 21, 2012	August 1, 2013	−	N.D. (Detection limit: 0.013)	0.91	1.1	N.D.	−	−	Sr & Cs: Whole body
23	Southern mackerel (Scomber australasicus)	August 29, 2012	August 1, 2013	−	N.D. (Detection limit: 0.013)	0.18	0.45	N.D.	−	−	Sr & Cs: Whole body
24	Japanese sardine (Sardinops melanostictus)	August 20, 2012	August 1, 2013	−	N.D. (Detection limit: 0.013)	0.18	0.39	N.D.	−	−	Sr & Cs: Whole body
25	Mahi−mahi (Coryphaena hippurus)	September 3, 2012	August 1, 2013	−	N.D. (Detection limit: 0.029)	0.14	0.29	N.D.	−	−	Sr & Cs: Whole except edible part
26	Swimming crab (Portunus trituberculatus)	September 2, 2012	August 1, 2013	−	N.D. (Detection limit: 0.018)	N.D.	N.D.	N.D.	−	−	Sr & Cs: Whole body
27	Japanese jack mackerel (Trachurus japonicas)	August 29, 2012	August 1, 2013	−	N.D. (Detection limit: 0.018)	0.45	0.94	N.D.	−	−	Sr & Cs: Whole body
28	Round herring (Etrumeus teres)	September 2, 2012	August 1, 2013	−	N.D. (Detection limit: 0.018)	N.D.	0.10	N.D.	−	−	Sr & Cs: Whole body
29	Chum salmon (Oncorhynchus keta)	November 1, 2012	August 1, 2013	−	N.D. (Detection limit: 0.018)	N.D.	0.13	N.D.	−	−	Sr & Cs: Whole body
30	Scallop (Mizuhopecten yessoensis)	November 8, 2012	August 1, 2013	−	N.D. (Detection limit: 0.013)	N.D.	0.048	N.D.	−	−	Sr & Cs: Whole except shell
31	Southern mackerel (Scomber australasicus)	October 16, 2012	August 1, 2013	−	N.D. (Detection limit: 0.017)	0.14	0.34	N.D.	−	−	Sr & Cs: Whole body
32	Chub mackerel (Scomber japonicus)	December 12, 2012	August 1, 2013	−	N.D. (Detection limit: 0.017)	0.12	0.29	N.D.	−	−	Sr & Cs: Whole body

Table 3 Inspection Results for Radioactive Strontium in Fishery Products (cont.)

				Test Result (Unit: Bq/kg)							
NO	Species	Sampling date	Publication date	Sr−89	Sr−90	Cs−134	Cs−137	I−131	Pt−238	Pt−239+240	Ref. (analyzed part)
33	Black rockfish (Sebastes schlegeli)	November 5, 2012	August 1, 2013	−	N.D. (Detection limit: 0.032)	0.79	1.6	N.D.	−	−	Sr & Cs: Whole except edible part
34	Steller's sculpin (Myoxocephalus stelleri)	November 9, 2012	August 1, 2013	−	N.D. (Detection limit: 0.029)	0.40	0.71	N.D.	−	−	Sr & Cs: Whole except edible part
35	Neon Flying Squid (Ommastrephes bartramii)	June 4, 2012	August 1, 2013	−	N.D. (Detection limit: 0.011)	0.050	0.15	N.D.	−	−	Sr & Cs: Muscle part
36	Alfonsino (Beryx splendens)	October 17, 2012	August 1, 2013	−	N.D. (Detection limit: 0.023)	0.49	1.1	N.D.	−	−	Sr & Cs: Whole except edible part
37	Pacific granadier (Coryphaenoides acrolepis)	August 6, 2012	August 1, 2013	−	N.D. (Detection limit: 0.028)	0.23	0.44	N.D.	−	−	Sr & Cs: Whole except edible part
38	Giant Pacific octopus (Paroctopus dofleini)	July 21, 2012	August 1, 2013	−	N.D. (Detection limit: 0.016)	0.040	0.094	N.D.	−	−	Sr & Cs: Muscle part
39	Flounder (Pleuronectes obscures)	November 5, 2012	August 1, 2013	−	N.D. (Detection limit: 0.022)	N.D.	0.12	N.D.	−	−	Sr & Cs: Whole except edible part
40	Flame snapper (Etelis coruscans)	November 15, 2012	August 1, 2013	−	N.D. (Detection limit: 0.023)	N.D.	0.096	N.D.	−	−	Sr & Cs: Whole except edible part
41	Alaska pollock (Theragra chalcogramma)	October 28, 2012	October 25, 2013	N.D. (Detection limit: 0.039)	N.D. (Detection limit: 0.016)	0.029	0.11	N.D.	−	−	Sr & Cs: Whole except viscera
42	Alaska pollock (Theragra chalcogramma)	January 22, 2013	October 25, 2013	N.D. (Detection limit: 0.081)	N.D. (Detection limit: 0.014)	0.030	0.13	N.D.	−	−	Sr & Cs: Whole except viscera
43	Alaska pollock (Theragra chalcogramma)	February 15, 2013	October 25, 2013	N.D. (Detection limit: 0.11)	N.D. (Detection limit: 0.018)	0.022	0.11	N.D.	−	−	Sr & Cs: Whole except viscera
44	Alaska pollock (Theragra chalcogramma)	September 19, 2013	November 26, 2013	N.D. (Detection limit: 0.12)	N.D. (Detection limit: 0.015)	0.058	0.19	N.D.	−	−	Sr & Cs: Whole body
45	Alaska pollock (Theragra chalcogramma)	September 19, 2013	November 26, 2013	N.D. (Detection limit: 0.059)	N.D. (Detection limit: 0.014)	0.032	0.16	N.D.	−	−	Sr & Cs: Whole body
46	Alaska pollock (Theragra chalcogramma)	October 2, 2013	November 26, 2013	N.D. (Detection limit: 0.034)	N.D. (Detection limit: 0.013)	0.036	0.16	N.D.	−	−	Sr & Cs: Whole body
47	Alaska pollock (Theragra chalcogramma)	October 2, 2013	November 26, 2013	N.D. (Detection limit: 0.094)	N.D. (Detection limit: 0.016)	0.031	0.094	N.D.	−	−	Sr & Cs: Whole body
48	Scallop (Mizuhopecten yessoensis)	October 7, 2013	January 23, 2014	N.D. (Detection limit: 0.053)	N.D. (Detection limit: 0.0089)	0.016	0.038	N.D.	N.D. (Detection limit: 0.00053)	0.0011(注3)	Sr, Cs and Pt: Whole except shell
49	Alaska pollock (Theragra chalcogramma)	September 19, 2013	January 23, 2014	N.D. (Detection limit: 0.092)	N.D. (Detection limit: 0.015)	0.058	0.19	N.D.	N.D. (Detection limit: 0.00092)	N.D. (Detection limit: 0.00092)	Sr, Cs and Pt: Whole body
50	Alaska pollock (Theragra chalcogramma)	September 19, 2013	January 23, 2014	N.D. (Detection limit: 0.093)	N.D. (Detection limit: 0.016)	0.032	0.16	N.D.	N.D. (Detection limit: 0.00093)	N.D. (Detection limit: 0.00093)	Sr, Cs and Pt: Whole body
51	Alaska pollock (Theragra chalcogramma)	October 2, 2013	January 23, 2014	N.D. (Detection limit: 0.085)	N.D. (Detection limit: 0.014)	0.036	0.16	N.D.	N.D. (Detection limit: 0.00085)	N.D. (Detection limit: 0.00085)	Sr, Cs and Pt: Whole body
52	Alaska pollock (Theragra chalcogramma)	October 2, 2013	January 23, 2014	N.D. (Detection limit: 0.087)	N.D. (Detection limit: 0.015)	0.031	0.094	N.D.	N.D. (Detection limit: 0.00087)	N.D. (Detection limit: 0.00087)	Sr, Cs and Pt: Whole body
53	Laver	December 19, 2013	February 5, 2014	N.D. (Detection limit: 0.52)	0.069	N.D. (Detection limit: 0.060)	0.084	N.D.	−	−	Whole body
54	Wakame seaweed (Undaria pinnatifida)	December 19, 2013	February 5, 2014	N.D. (Detection limit: 0.40)	0.055	0.040	0.082	N.D.	−	−	Whole body
55	Scallop (Mizuhopecten yessoensis)	October 7, 2013	March 13, 2014	N.D. (Detection limit: 0.098)	N.D. (Detection limit: 0.012)	N.D. (Detection limit: 0.017)	0.038	N.D.	−	−	Sr & Cs: Whole except shell
56	Olive flounder (Paralichthys olivaceus)	September 30, 2013	March 13, 2014	N.D. (Detection limit: 0.34)	0.026	1.94	6.07	N.D.	−	−	Sr & Cs: Whole body
57	Redwing searobin (Lepidotrigla microptera)	September 30, 2013	March 13, 2014	N.D. (Detection limit: 0.45)	N.D. (Detection limit: 0.015)	1.50	3.20	N.D.	−	−	Sr & Cs: Whole body
58	Stone flounder (Kareius bicoloratus)	November 24, 2013	March 13, 2014	N.D. (Detection limit: 0.29)	N.D. (Detection limit: 0.015)	1.94	4.85	N.D.	−	−	Sr & Cs: Whole body
59	Crimson sea bream (Evynnis japonica)	November 24, 2013	March 13, 2014	N.D. (Detection limit: 0.43)	N.D. (Detection limit: 0.024)	1.22	2.96	N.D.	−	−	Sr & Cs: Whole body
60	Rockfish (Sebastes cheni)	September 11, 2013	May 23, 2014	N.D. (Detection limit: 1.1)	0.21	23.4	51.4	N.D.	−	−	Sr & Cs: Whole body
61	Olive flounder (Paralichthys olivaceus)	July 29, 2013	May 23, 2014	N.D. (Detection limit: 0.09)	0.018	2.15	5.01	N.D.	−	−	Sr & Cs: Whole body
62	Olive flounder (Paralichthys olivaceus)	July 29, 2013	May 23, 2014	N.D. (Detection limit: 0.08)	0.016	0.97	2.64	N.D.	−	−	Sr & Cs: Whole body
63	Krill	June 30, 2012	May 23, 2014	N.D. (Detection limit: 0.023)	N.D. (Detection limit: 0.0077)	0.17	0.24	N.D.	−	−	Sr & Cs: Whole body

Note 1: Sample nos. 5 & 10-14 were harvested by the Fisheries Research Agency in the waters off of Fukushima, an area in which fishing operations are under suspensions, and hence samples like these will not reach the market.

Note 2: According to the Nuclear Regulation Authority's Environment Radiation Database, up through the period of 2000-2010 prior to the Fukushima Daiichi NPS accident, the fish, shellfish and algae in the sea zones around Japan contained strontium-90 in concentrations between 0.094 Bq.kg and below the minimum detectable level.

Note 3: According to the Nuclear Regulation Authority's Environment Radiation Database, up through the period of 2000-2010 prior to the Fukushima Daiichi NPS accident, the fish and shellfish in the sea zones around Japan contained plutonium-238 in concentrations between 0.0016 Bq/kg and below the minimum detectable level. Concentrations of plutonium-239+240 were between 0.073 Bq/kg and below the minimum detectable level.

Note 4: Nos. 19, 20, 33, 34, 40 have undetermined harvest locations and are therefore not shown in the map.

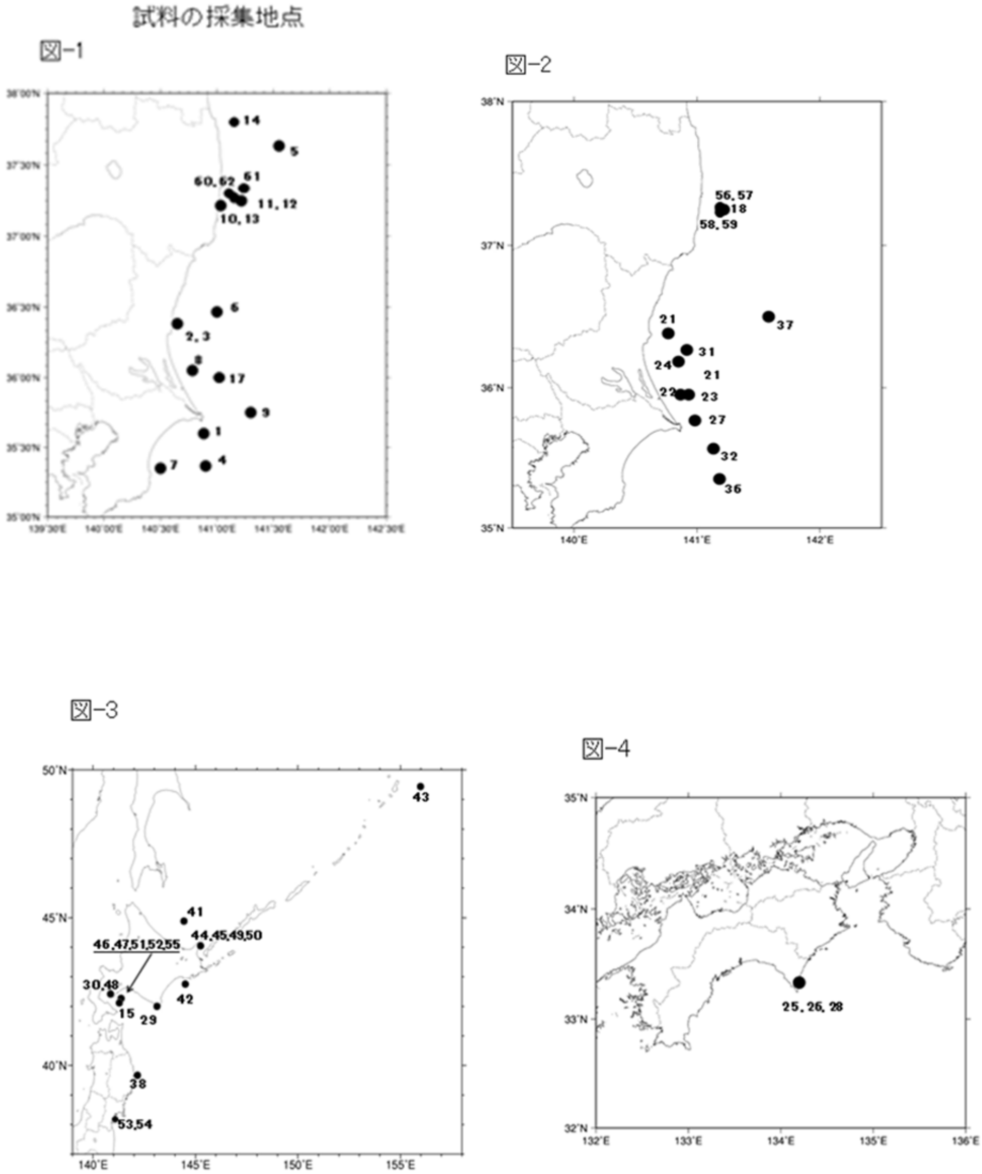
Note 5: Nos. 18 – 40 were provided by the FY2012 Project on Clarifying the Impact of Nuclear Substances

Note 6: Nos. 41 – 47, 53 – 59 were provided by the FY2013 Project on Clarifying the Impact of Nuclear Substances.

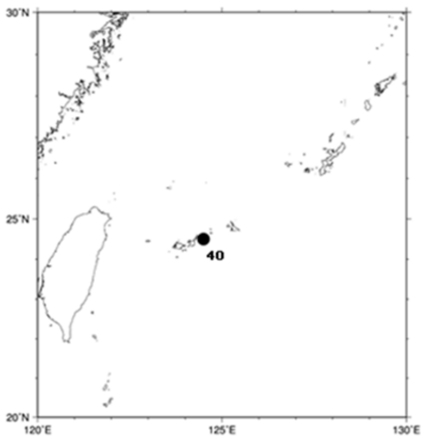
Note 7: Nos. 48 – 52 were provided by a research project commissioned by the FY2013 Radioactivity Research Fund.

Note 8: Nos. 60– 63 were provided by a research project commissioned by the FY2014 Radioactivity Research Fund.

Figure 35 Sampling Sites



図−5



図−6

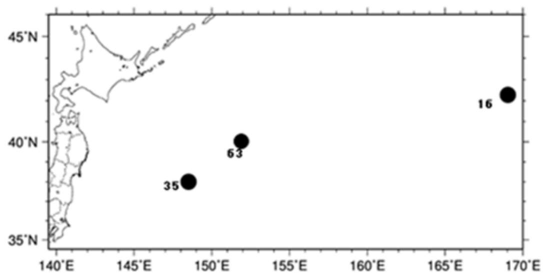


Table 4 No.10 Calculation of effective dose in rockfish

radionuclides	Bq/kg	Dose Coefficient (for adult)	Effective Dose mSv
Cs-137	580	$1.3 * 10^{-5}$	$7.5 * 10^{-3}$
Cs-134	390	$1.9 * 10^{-5}$	$7.4 * 10^{-3}$
Sr-89	0.45	$2.6 * 10^{-6}$	$1.2 * 10^{-6}$
Sr-90	1.2	$2.8 * 10^{-5}$	$3.4 * 10^{-5}$

Effective dose of radioactive Sr is approximately 1/430 of that of radioactive Cs.
Note: Sr 89 was not included in the calculation of the limits

Table 5 No.11 Calculation of effective dose in Ishikawa icefish

radionuclides	Bq/kg	Dose Coefficient (for adult)	Effective Dose mSv
Cs-137	29	$1.3 * 10^{-5}$	$3.8 * 10^{-4}$
Cs-134	18	$1.9 * 10^{-5}$	$3.4 * 10^{-4}$
Sr-90	0.4	$2.8 * 10^{-5}$	$1.1 * 10^{-5}$

Effective dose of radioactive Sr is approximately 1/67 of that of radioactive Cs.

Part Two. The State of Radionuclides Released into the Environment

Chapter 1. The Movement of Radioactive Cesium Released into the Environment

Radioactive cesium radionuclides released into the environment by the Fukushima Daiichi NPS accident are thought to have two paths of intake by fishery species. One path is through water in the environment, and another is through the intake of prey organism. The chemical properties of cesium are similar to those of potassium, and the two behave in the same way when entering fish body. Further, cesium is also (like potassium) excreted from the body through urination and similar processes, and hence a reduction in the concentration of radioactive cesium in the environment brings a reduction in the concentration of radioactive cesium in fishery products. This chapter will discuss the mechanism by which radioactive cesium enters fish body, as well as the movement and changes of radioactive materials emitted into the land, ocean, and environment.

2-1-1 Intake and Excretion by Fish[25]

As with potassium and other minerals, radioactive cesium in environmental waters (ocean or freshwater) is, after being taken into the bodies of fish, gradually excreted from them (Figure 36).

According to previous research, the concentration of radioactive cesium in marine fish is (including food-chain effects) 5 to 100 times higher than the concentration in the surrounding seawater, although there are differences among fish species. Depending on the concentration of radioactive cesium in the surrounding seawater and the intake/excretion capabilities of the fish, the concentration of radioactive cesium in fish can be temporarily high.

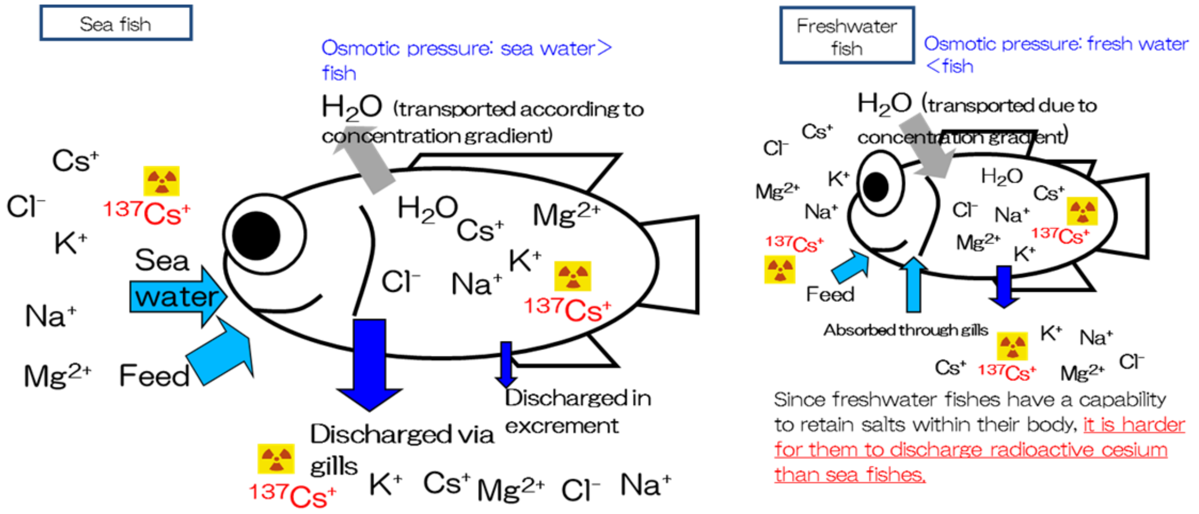
When marine fish take in radioactive cesium or other minerals, their bodies work to quickly excrete the substance. In an environment with no radioactive cesium, half of the amount taken in is excreted from the body in approximately 50 days. For this reason, a reduction in the concentration of radioactive cesium in the surrounding seawater will result in a gradual reduction in radioactive cesium concentrations within the bodies of marine fish.

In invertebrates, the majority of salts flow freely between the seawater and the inside of the invertebrates' bodies. For this reason, radioactive cesium concentrations will drop off more quickly in invertebrates than in marine fish if there is a reduction in radioactive cesium concentrations in the surrounding seawater.

In this way, radioactive cesium within marine products do not behave like mercury or organochlorine compounds in that they do not accumulate within fishes' bodies through the food chain. Moreover, current concentrations of radioactive cesium in ocean waters are, as discussed in detail in 2-2-2, quite low outside of port. Therefore, it is thought that concentrations of radioactive cesium in marine products will drop in the passage of time.

Meanwhile, the bodies of freshwater fish naturally attempt to retain radioactive cesium and other minerals, and freshwater fish require more time to excrete radioactive cesium than do marine fish.

Figure 36　Intake of Radioactive Materials by Fish



2-1-2 Movement within the Environment

Radioactive cesium in the ocean is diluted and dispersed with large amounts of water as it is transported by ocean currents. It also may be carried onto the ocean floor sticking to suspended particles or coagulation sedimentation and. Radioactive cesium present in marine soil is thought to move with the soil as it is gradually scattered around. For inland waters, radioactive cesium that falls on mountains or plains is transported via rain or melting snow into rivers, lakes, and marshes, eventually pouring into the ocean or falling to the bottom of a lake or marsh (Figure 37).

After the Fukushima Daiichi NPS accident, Fukushima Prefecture; the Ministry of Education, Culture, Sports, Science and Technology (now the Nuclear Regulation Authority and the Ministry of the Environment); and TEPCO conducted a study on the movement and changes of radioactive cesium in the environment. This study showed that radioactive cesium concentrations in the waters around the power station in Fukushima Prefecture were initially very high, immediately after the accident; but these concentrations clearly dropped off afterward (Figure 38).

Meanwhile, radioactive cesium-containing marine soil was found increasingly less off the coast of Fukushima Prefecture even as early as March 2012, as shown in Figure 39. It is inferred that this soil was moved further north, south, and offshore, as the high-concentration marine soil around the nuclear power station was gradually scattered around (Figure 39).

Figure 37　The Progression of Contamination due to the Nuclear Accident

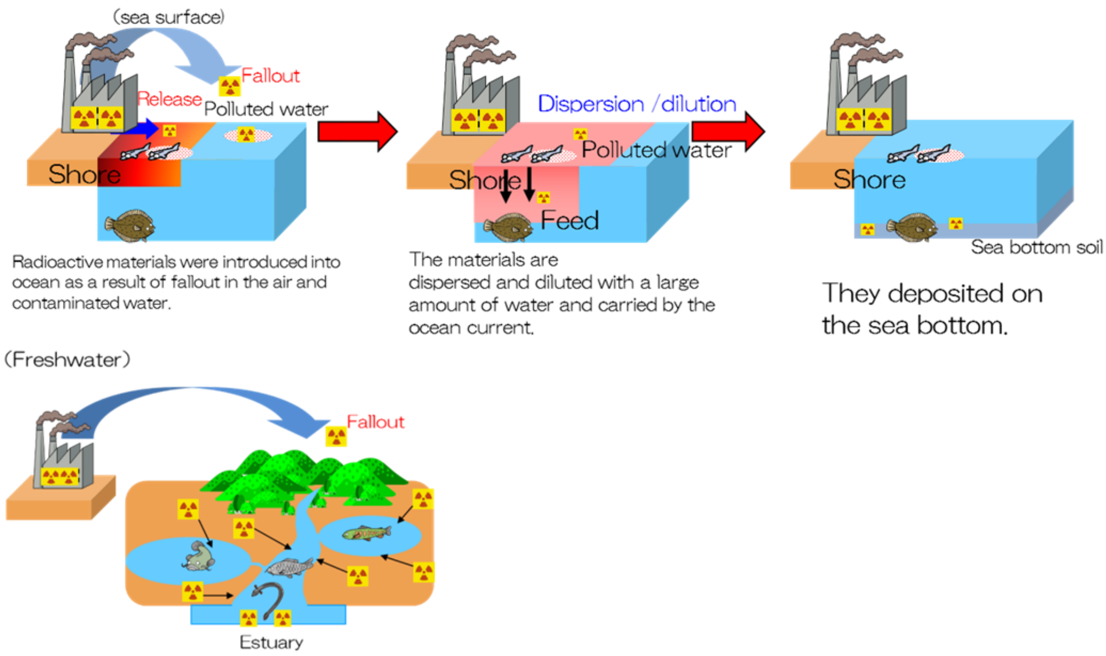


Figure 38　Results of Cesium Monitoring in Sea Water Off the Coast of Fukushima [26]

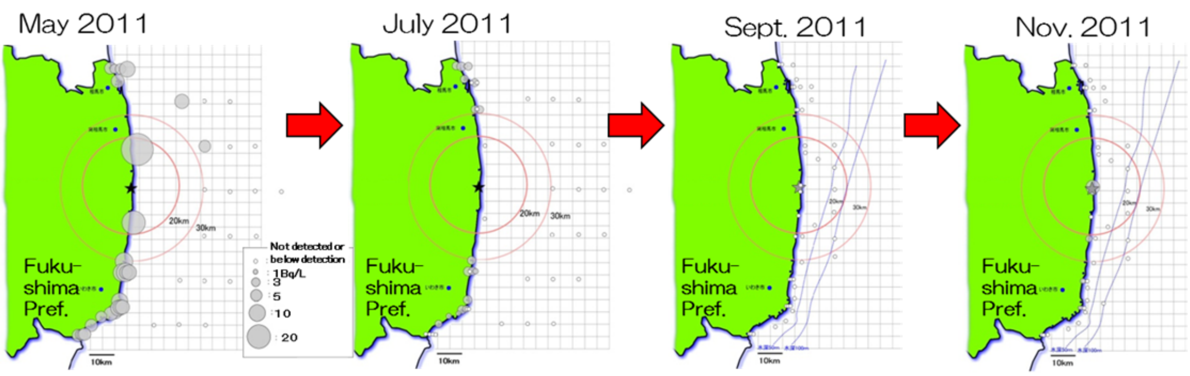
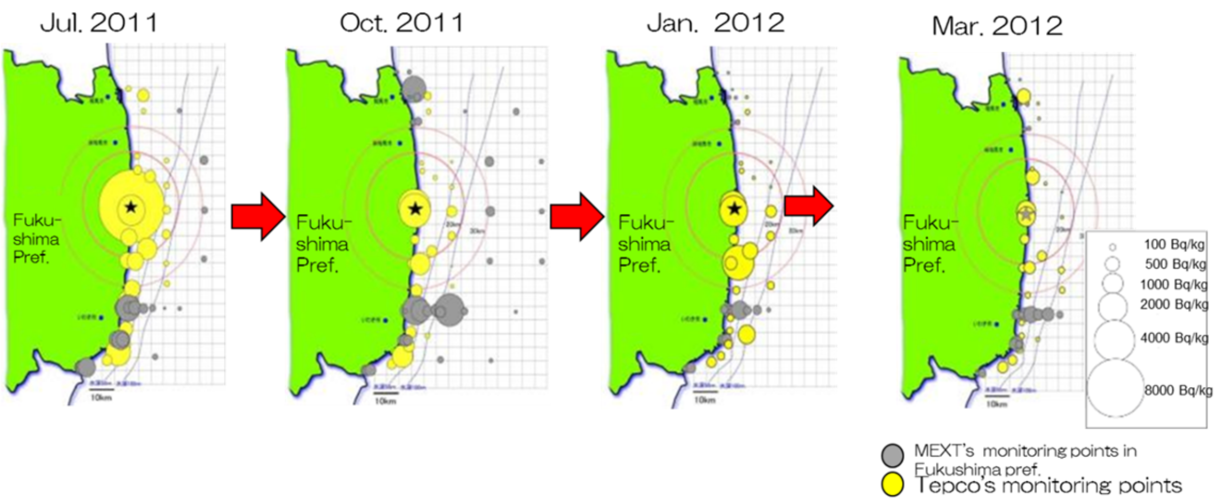


Figure 39　Results of Cesium Monitoring in Marine Soil off the Coast of Fukushima [27]



Chapter 2　The Leakage of Contaminated Water into the Fukushima Daiichi NPS Port

2-2-1　The Impact of Contaminated Water Leakage and Countermeasures

In May 2013, a high concentration of tritium was detected in groundwater at the seawall area between intakes of unit 1 and unit 2. TEPCO conducted a survey of the groundwater in the area, and announced at the end of July 2013 that contaminated groundwater from the seawall was leaking into the port. According to the TEPCO study, the quantity of cesium radionuclides that has leaked into the ocean since May 2013 is estimated to be far less than the quantity that leaked out in April 2011 (see Column 4). Moreover, although some amount of radioactive materials were detected in water in the port, concentrations at the port entrance were low and the impact outside the port is expected to be limited (Figure 40).

Three basic principles guide efforts to stop the leakage of contaminated water: Remove source of contamination; Isolate water from contamination; and Prevent leakage of contaminated water [28]. Further, to prevent the spread of contaminated marine organism out of the port, TEPCO has installed nets at the port entrance and carries out exterminations inside the port [29].

Figure 40　The Impact of Contaminated Water Leakage into the Fukushima Daiichi NPS Port

Source: Created by the Fisheries Agency using TEPCO materials [30]

(Column 4) Quantity of Radioactive Material Leaked into the Ocean (Est.)

According to estimation by TEPCO, the amount of cesium-137 leaked into the ocean over the 850 days since May 2011 is approximately 1 to 20 TBq [31]. This quantity is 1/47 to 1/940 the amount of cesium-137 leaked from the Fukushima Daiichi NPS Reactor Unit 2 from April 1 to April 6, 2011 (940 TBq [32]) in highly contaminated water.

The main source of the contamination of fishery products today is thought to be the large leakage that took place from April 1 to April 6. Later leakages are considered to have contributed little to this contamination.

Further, inspection results on radioactive strontium in fishery products are described in Chapter 3 of Part One.

Additionally, tritium has an effective dose coefficient (the coefficient that expresses the relationship between the amount of radioactive substance taken in and exposure dosage) that is 1/700 of that of cesium-137 (ICRP Publication 72, *Biological Half-life* [33]). When found in the natural world, tritium is primarily found in water, and hence even if it is taken in by living creatures such as humans or marine organism, it is not concentrated and is quickly excreted. It is inconceivable that that tritium will be found within food in considerable doses, and hence it is not considered relevant to the limits for food items [8].

Comparison of the amount of radionuclides in the contaminated water leaked in Apr.2011 with that in the contaminated water leaked from May.2011 to Aug.2013, which was estimated by TEPCO

radionuclides	the amount of radionuclides in the contaminated water leaked in Apr.2011 1)		the amount of radionuclides in the contaminated water leaked since may.2011, which was estimated by TEPCO 2)	
	leak periods	leak amount (Bq)	leak periods	leak amount (Bq)
cesium 134+137	6 days	ca. 18 $* 10^{14}$	–	
cesium 137	6 days	ca. 9. 4 $* 10^{14}$	850 days	ca. 1 $* 10^{12}$ – ca. 2 $* 10^{13}$
strontium 90	–		850 days	ca. 7 $* 10^{11}$ – ca. 1 $* 10^{13}$
tritium	–		800 days	ca. 2 $* 10^{13}$ – ca. 4 $* 10^{13}$

Note: 220 Bq/L (Aug.19 sampling), 49 Bq/L (Aug.19) and 0.36 Bq/L(Jun.26) for strontium-90 were detected at the North side of Unit1-4 water intake channel (north side of East Seawall Break), port entrance and the point near the south discharge channel, respectively.

Sources: Created based on information from:

1) Material publicized by the government [32]

2) Cesium-137 and strontium-90: estimation by TEPCO [31]
   Tritium: estimation by TEPCO [34]

2-2-2 Concentrations of Radioactive Cesium in Fishery Products

In July 2013, TEPCO reported that contaminated groundwater had leaked from a seawall into the plant port. According to the monitoring results, the influence to sea water has not been observed outside of the port.

However, the controversy over this leakage of contaminated water reignited domestic and international fears over fishery products in the Fukushima area and, in September of the same year, the Republic of Korea announced that it would strengthen its regulations on fishery product imports from Japan.

This section will explain the results of a statistical analysis to examine the significance of an effect by the July 2013 leakage on radioactive cesium concentrations in Fukushima area fishery products.

2-2-2 (1) Comparison of Cesium Concentrations in Fishery Products: Just after the accident and Most recent period

As stated in 2-2-1, trial calculations on contaminated water leakage published by TEPCO in July 2013 show that the amount of cesium-137 estimated to have leaked into the ocean over the 850 days since May 2011 is approximately 1/47th to 1/940th the amount leaked from April 1 to April 6, 2011. For this reason, the contamination immediately following the accident is thought to remain the major source of fishery product contamination today, and as seen in Chapter 1, radioactive cesium concentrations in marine products have been on a declining trend ever since the accident.

Furthermore, if we were to assume that there was an effect from contaminated water leakage occurring after May 2011, marine products in Fukushima Prefecture would be expected to experience the largest effect. Inspection results in Fukushima from two periods—the six months immediately following the accident (April to September 2011) and the most recent six months (October 2013 to March 2014) — are compared in Table 6. As can be seen in the table, the median radioactive cesium concentration has declined in every fish species. The following statistical test was performed to determine whether this decline in median concentration is statistically significant.

(1) Period of comparison

April to September 2011, 6 months (accident aftermath); and October 2013 to March 2014, 6 months (most recent)

(2) Fish species compared

All Fukushima Prefecture marine species for which 20 or more results are available in the given period.

(3) Method of statistical test

As in Chapter 1, the distributions of radioactive cesium concentrations in fishery products are not bilaterally symmetrical from left to right, but rather most distributions have a high frequency of low-concentration samples and then trail off to the right. Therefore, for comparison of unpaired two groups, a non-parametric method, Mann–Whitney U test was used to test for the significance of a difference in medians between the two samples.

Null hypothesis H_0: There is no difference, immediately post-accident versus the recent period, in radioactive cesium concentrations in the target fish species,

Alternative hypothesis H_1: Recent radioactive cesium concentrations in target fish species are lower than concentrations immediately post-accident.

With these as hypotheses, a one-sided test was performed with a significance level of 5%.

When both cesium-134 and 137 are below detection limit, the sum of their respective detection limits is used. Detection limits for 2011 have not been made public, and therefore the mean of 2012 detection limits, 16 Bq/kg, was used. In Table 6, even when actual readings were below the detection limit, the calculated value was used.

(4) Results

As shown in Table 7, for every fish species the null hypothesis was rejected at a 5% significance level. It can be concluded that the decrease in median radioactive cesium concentration, from the post-accident period of April to September 2011 to the most recent period of October 2013 to March 2014, is significant.

Table 6　Comparison of Radioactive Cesium in Fishery Products Between Two Periods

Species	2011.4～2011.9 Number of inspections	Median (Bq/kg)	Interquartile range (Bq/kg)	2013.10～2014.3 Number of inspections	Median (Bq/kg)	Interquartile range (Bq/kg)
fat greenling	48	170	(110～410)	156	16	(14～19)
brown hakeling	20	150	(110～490)	90	16	(15～17)
monkfish	20	53	(36～79)	59	16	(15～17)
ocellate spot skate	37	310	(150～600)	88	42	(20～80)
whitebait	40	53	(16～190)	61	16	(15～17)
slime flounder	41	62	(35～190)	156	16	(14～18)
olive flounder	73	130	(75～200)	209	16	(14～18)
gurnard	21	120	(79～140)	61	15	(14～17)
Japanese jack mackerel	25	28	(16～86)	67	16	(14～17)
conger eel	25	25	(16～53)	91	15	(14～17)
littlemouth flounder	35	73	(59～150)	184	15	(13～17)
marbled flounder	37	180	(71～250)	113	17	(14～21)
John Dory	23	25	(18～54)	32	15	(14～16)

Table 7　Comparison of Radioactive Cesium in Fishery Products Between Two Periods (Results of statistical test)

Species	P-value	Test statistic (U)
fat greenling	<0.001	7236.5
brown hakeling	<0.001	1800
monkfish	<0.001	1154
ocellate spot skate	<0.001	3057.5
whitebait	<0.001	2018.5
slime flounder	<0.001	5331
olive flounder	<0.001	14709.5
gurnard	<0.001	1280
Japanese jack mackerel	<0.001	1295.5
conger eel	<0.001	1705.5
littlemouth flounder	<0.001	6412
marbled flounder	<0.001	4042
John Dory	<0.001	613

2-2-2(2) Comparison of Before and After the Leakage of Contaminated Water

The July 2013 TEPCO report on the contaminated water leakage reignited domestic and international fears over fishery products in the Fukushima area, and in September of the same year, the Republic of Korea announced that it would strengthen its regulations on imports from Japan. According to the monitoring results, the influence to sea water has not been observed outside of the port. Hence it is thought that there was no increase in radioactive cesium concentrations among fishery products. Table 8 compares inspection results from two periods: latter period, a 6-month period from April to September 2013 in which TEPCO announced the leakage; and former period, the preceding 6-month period from October 2012 to March 2013. While the median radioactive cesium concentration for many of the fish species is either unchanged or drops from former period to latter period, some of the species display an increase in median. The following statistical test was performed to determine whether this increase in median in some species from one period to the next is statistically significant.

(1) Period of comparison

October 2012 to March 2013, 6 months (former period); and April to September 2013, 6 months (latter period)

(2) Fish species compared

All Fukushima Prefecture marine species for which 20 or more results are available in the given period and which also displayed an increase in median radioactive cesium concentration from one period to the next (Fox jacopever (Sebastes vulpes), Alaska pollock, and Seabass).

(3) Method of statistical test

As in 2-2-2(1), a Mann–Whitney U test was used to test for the significance of a difference in medians between two periods. Readings below the detection limit were treated in the same manner as in 2-2-2(1).

Null hypothesis H_0: There is no difference between former and latter period radioactive in cesium concentrations in the target fish species.

Alternative hypothesis H_1: There is an increase in radioactive cesium concentrations in the latter period relative to the former period.

With these as hypotheses, a one-sided test was performed with a significance level of 5%.

(4) Results

As Table 9 shows, in every fish species the null hypothesis was not rejected at a 5% significance level. There was no significant increase in radioactive cesium concentrations from the former period of October 2012 to March 2013, to the latter period of April to September 2013.

Table 8　Comparison of Radioactive Cesium Concentrations Before and After the Contaminated Water Leakage Controversy

	2012.10～2013.3			2013.3～2013.9		
Species	Number of inspections	Median (Bq/kg)	Interquartile Range (Bq/kg)	Number of inspections	Median (Bq/kg)	Interquartile Range (Bq/kg)
fat greenling	152	62	(25～140)	180	19	(15～57)
flathead founder	75	16	(14～17)	69	15	(14～17)
Ishikawa icefish	62	16	(14～17)	30	16	(15～17)
stone flounder	91	36	(17～98)	70	17	(14～41)
goldeye rockfish	27	130	(28～210)	30	24	(16～78)
redwing searobin	64	15	(9.3～18)	64	14	(12～16)
monkfish	41	16	(15～18)	59	16	(15～18)
fox jacopever	28	18	(15～60)	33	40	(16～59)
black rockfish	26	31	(15～130)	23	27	(16～51)
hairy crab	23	16	(14～17)	57	16	(15～17)
sea raven	42	24	(15～43)	80	16	(14～18)
sand eel	28	16	(15～17)	38	15	(14～17)
ocellate spot skate	95	100	(58～170)	96	55	(40～86)
roughscale sole	33	16	(14～17)	94	15	(14～17)
halfbeak	30	15	(14～16)	27	15	(14～16)
whitebait	53	16	(15～17)	138	16	(15～17)
rockfish	60	190	(91～310)	39	130	(78～240)
dwarf squid	24	15	(15～16)	31	15	(15～16)
Alaska pollock	44	15	(14～18)	41	16	(14～17)
seabass	75	39	(18～73)	27	48	(19～145)
slime flounder	135	17	(15～57)	190	16	(14～19)
olive flounder	220	31	(16～61)	203	16	(14～30)
gurnard	51	17	(12～19)	46	15	(12～17)
Japanese jack mackerel	40	15	(13～17)	34	15	(14～17)
conger eel	77	16	(13～18)	78	15	(12～17)
littlemouth flounder	109	17	(13～30)	115	15	(13～17)
marbled flounder	111	33	(18～53)	119	16	(14～27)
Pacific cod	127	21	(14～44)	134	16	(14～29)
John Dory	32	17	(14～20)	22	15	(12～16)
Rikuzen flounder	65	16	(14～17)	124	16	(15～17)
giant Pacific octopus	51	16	(14～17)	78	15	(14～17)
shotted halibut	65	16	(14～20)	65	15	(13～17)
chestnut octopus	57	16	(14～17)	126	16	(14～17)
willowy flounder	66	15	(12～17)	103	15	(14～17)
spear squid	52	16	(15～17)	37	15	(15～17)
hildendorf saucord	55	15	(13～16)	84	15	(14～17)

Table 9　Comparison of Radioactive Cesium Concentrations Before and After the Controversy over the Leakage of Contaminated Water (Results of statistical test)

Species	P-value	Test statistic (U)
fox jacopever	0.22	408.5
Alaska pollock	0.64	943
seabass	0.16	878.5

2-2-2(3)　Summary

Based on the results of the test in 2-2-2(1), we have confirmed a statistically significant decrease in radioactive cesium concentrations in Fukushima Prefecture marine product within every fish species tested since the immediate post-accident period. Second, the controversy over contaminated water leakage reignited domestic and international fears over fishery products in the Fukushima area, and in September 2013 the Republic of Korea announced that it would strengthen its regulations on imports from Japan. However, the results of the test in 2-2-2(2) indicate that there was no statistically significant increase in radioactive cesium concentrations of Fukushima area marine products from the former period to the latter period.

Chapter 3　Monitoring of Radionuclides in the Ocean

Part One discussed the results of monitoring of radioactive cesium in fishery products. Monitoring of ocean waters and marine soil is not only conducted by TEPCO within the nuclear power station port; it is also periodically conducted in the vicinity of the nuclear plant, in the coasts of neighboring prefectures, off-shore area, and in the outer sea area (except marine soil) by TEPCO, the Nuclear Regulation Authority, the Ministry of the Environment, Fukushima Prefecture, and others. In events such as leakages from the Fukushima Daiichi NPS, TEPCO and relevant government agencies coordinate their efforts as necessary to provide the level of monitoring appropriate for the event. This data produced through this monitoring is published on the websites of the relevant organization.[6] This chapter will serve to summarize these monitoring results.

2-3-1　Results from Ocean Water Monitoring (Figure 41, Figure 42)

Concentrations of radioactive materials in ocean waters near the Fukushima Daiichi NPS showed quite high value immediately following the accident in 2011, but readings have declined afterward.

Additionally, TEPCO announced in July 2013 that contaminated groundwater had leaked into the port of Fukushima Daiichi NPS. According to the monitoring results, the influence to sea water has not been observed outside of the port.

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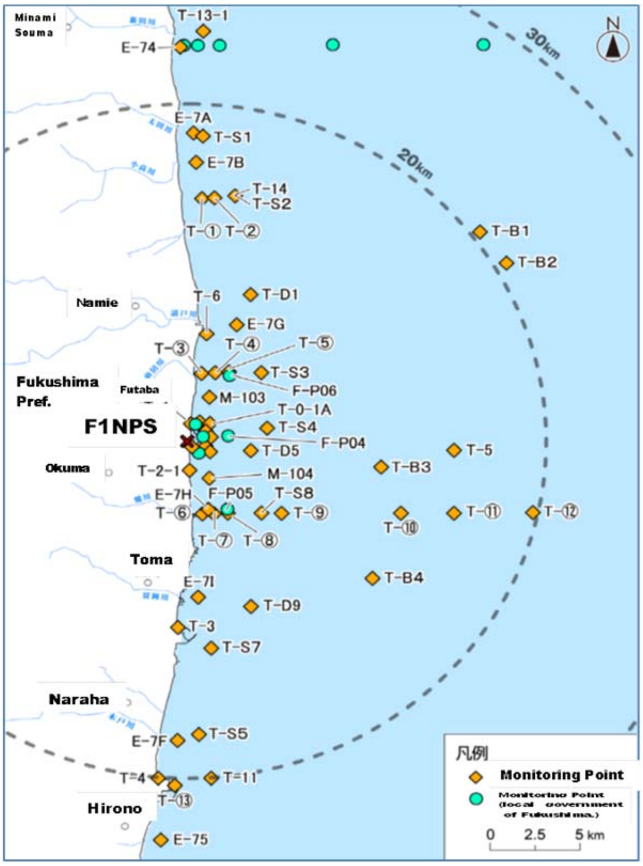
[6] Nuclear Regulation Authority　http://radioactivity.nsr.go.jp/ja/list/428/list-1.html

Figure 41　Sampling Points in the Vicinity of the Fukushima Daiichi NPS
(Source: Nuclear Regulation Authority website [35])

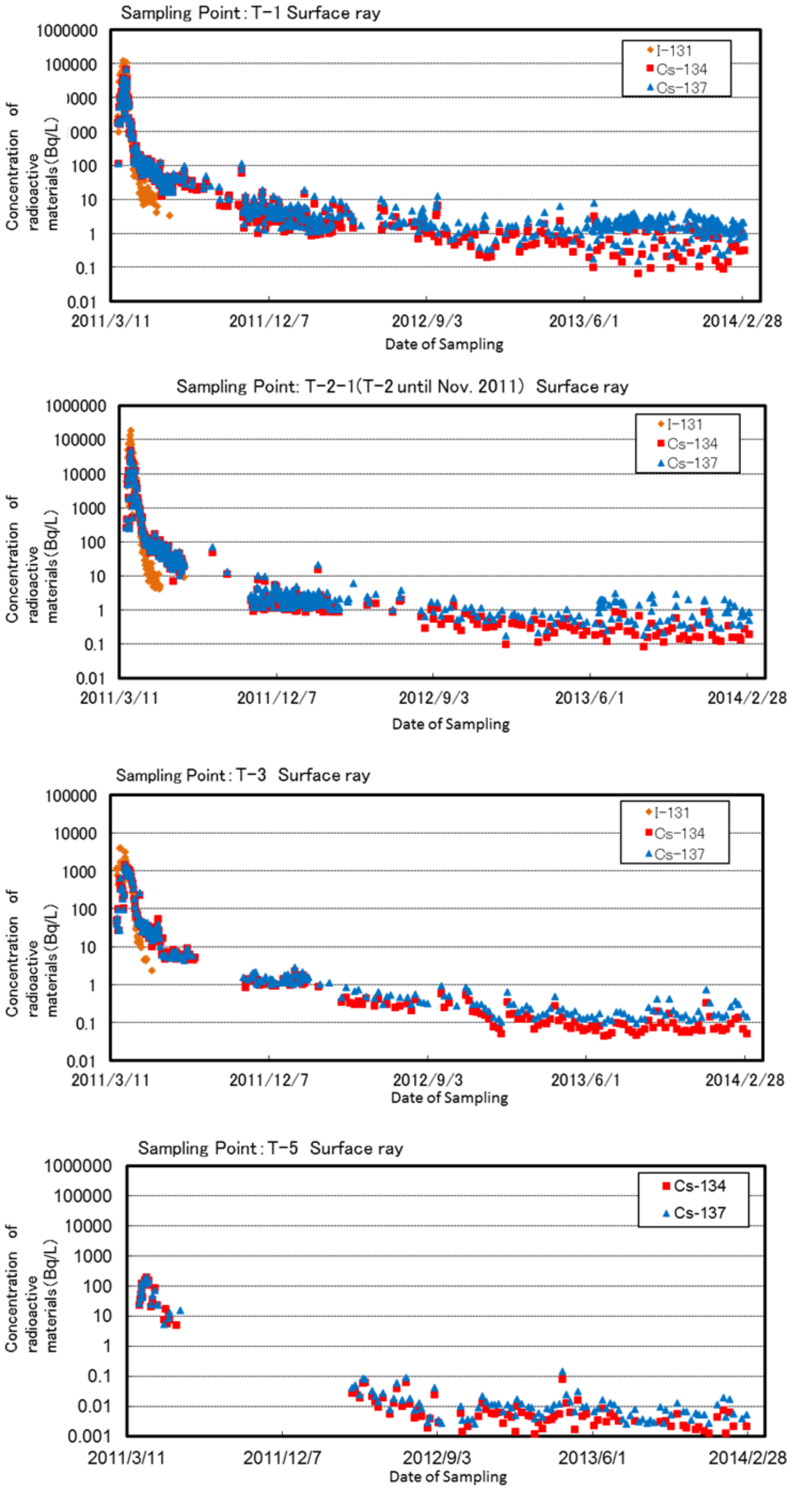


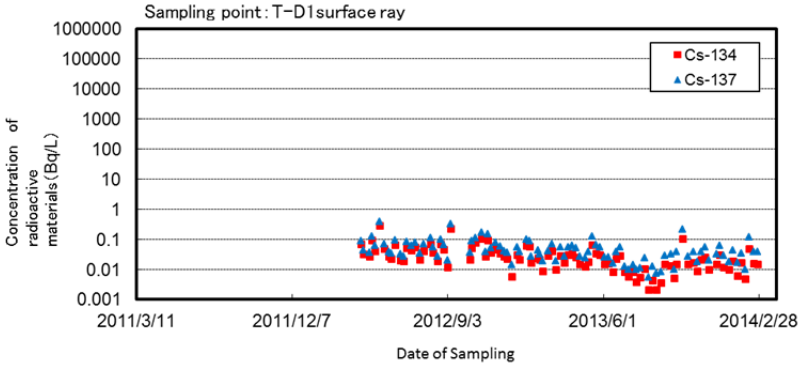
Sampling Point		Point no.	Latitude	Longtitude
Coast	North side of 1F 5-6 water outlet	T-1	37° 25′ 52″	141° 02′ 04″
	Around 1F south water outlet	T-2-1	37° 24' 22"	141° 02' 01"
	Around 2F north water outlet	T-3	37° 19′ 20″	141° 01′ 35″
Within 20 km radius	3km offshore of Ukedo River	T-D1	37° 30′ 00″	141° 4′ 20″
	3km offshore of 1F	T-D5	37° 25′ 00″	141° 4′ 20″
	3km offshore of 2F	T-D9	37° 20′ 00″	141° 4′ 20″
	15km offshore of 1F	T-5	37° 25′	141° 12′
	Around 15km offshore of Odaka Area	T-B1	37° 32'	141° 13'

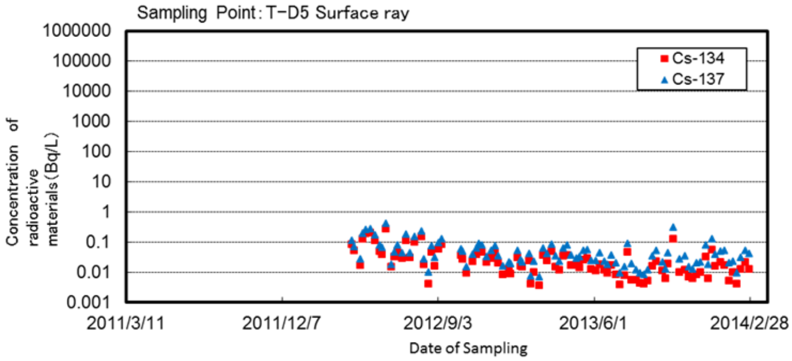
Excerpt from Nuclear Regulation Agency website（based on reference documents made

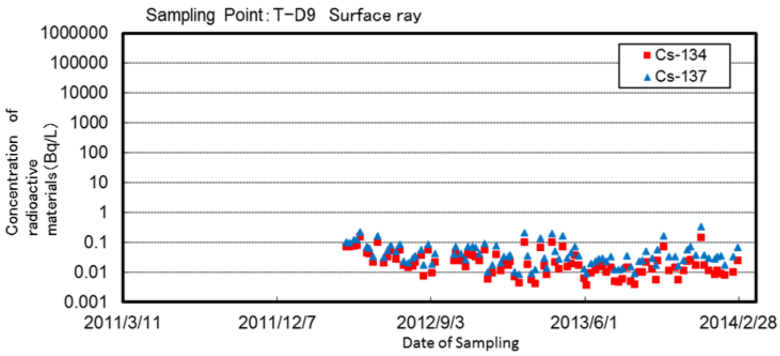
(Source: Relevant portions Excerpted from the Nuclear Regulation Authority website [36])

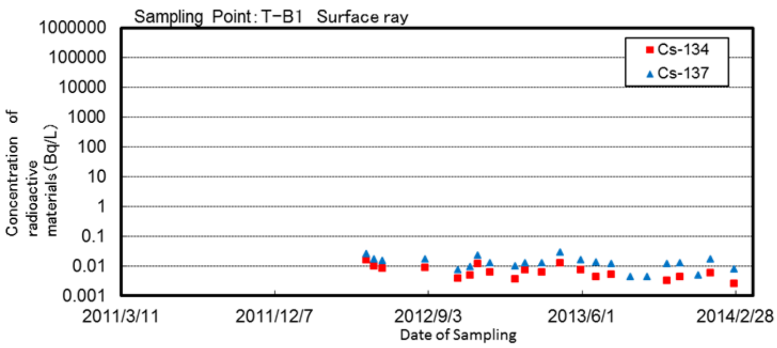
Figure 42 Changes in the Radioactive Material Concentrations in the Vicinity of the Fukushima Daiichi NPS and Coastal Ocean Waters (excerpted from the Nuclear Regulation Authority website [37])




Sampling point : T-D1surface ray
Cs-134
Cs-137
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Concentration of radioactive materials (Bq/L)
2011/3/11
2011/12/7
2012/9/3
2013/6/1
2014/2/28
Date of Sampling


Sampling Point : T-D5 Surface ray
Cs-134
Cs-137
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Concentration of radioactive materials (Bq/L)
2011/3/11
2011/12/7
2012/9/3
2013/6/1
2014/2/28
Date of Sampling


Sampling Point : T-D9 Surface ray
Cs-134
Cs-137
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Concentration of radioactive materials (Bq/L)
2011/3/11
2011/12/7
2012/9/3
2013/6/1
2014/2/28
Date of Sampling


Sampling Point : T-B1 Surface ray
Cs-134
Cs-137
1000000
100000
10000
1000
100
10
1
0.1
0.01
0.001
Concentration of radioactive materials (Bq/L)
2011/3/11
2011/12/7
2012/9/3
2013/6/1
2014/2/28
Date of Sampling

2-3-2 Results from Marine Soil Monitoring (Figure 41, Figure 43)

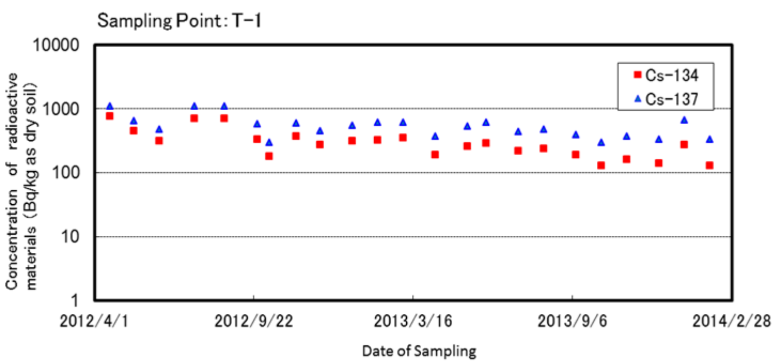
According to monitoring results since April 2012, radioactive cesium concentrations in marine soil within 20 km of the Fukushima Daiichi NPS vary depending on the measurement site but are in the range of 10 to several thousand Bq/kg with no particular change observed over time.

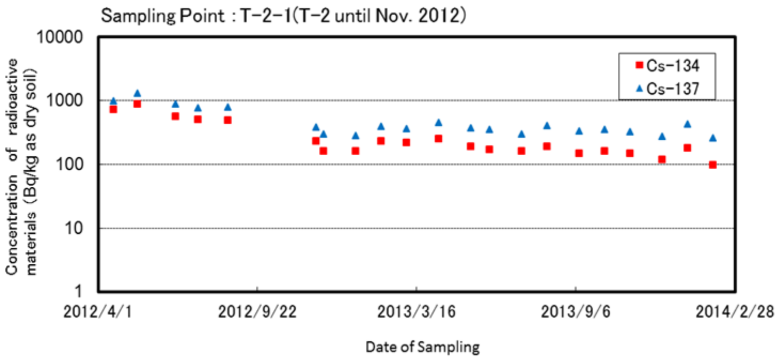
Although the marine soil displays higher-than-normal concentrations of accumulated radioactive cesium, this does not mean that marine species inhabiting that sea zone will necessarily contain cesium concentrations exceeding the limits. The reasons for this include the fact that the transfer coefficient from ocean water to marine soil is 2000 – 4000 (concentration in marine soil /concentration in ocean water), and hence the cesium in the ocean water sticks strongly to argilliferous soil on the ocean bottom; and also the fact that the transfer rate from marine soil to benthic organisms is very small (0.04 – 0.17), meaning that it is difficult for cesium stuck to the clay to be adsorbed in the bodies of sea organisms.

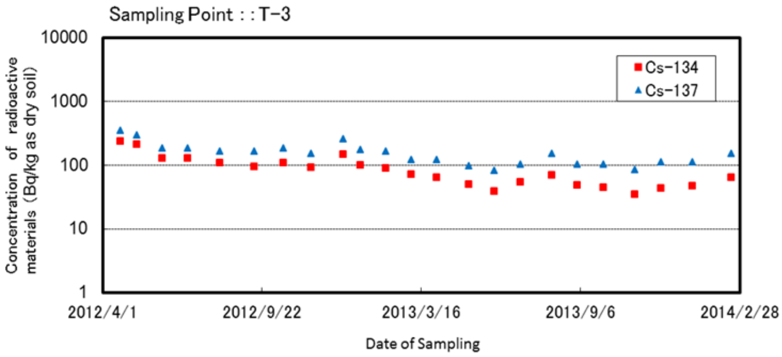
Meanwhile, cesium that is not stuck to argilliferous soil is relatively more easily taken in the bodies of sea organisms, and this cesium is considered to be one of the causes of contamination in fishery products.

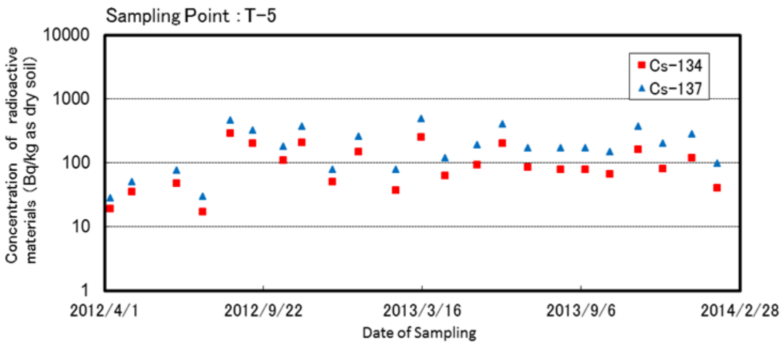
Additionally, in December 2013 the IAEA began publishing information provided by Japan on matters related to the Fukushima Daiichi NPS accident to its website, with IAEA evaluations of the information attached. On the topic of the impact of contaminated water on the ocean, the IAEA commented: " [i]ncreased radionuclide concentrations have been monitored in the sea, these have occurred only in a small area within the port of the Fukushima Daiichi Nuclear Power Station. The monitoring results that have been provided for the surrounding sea region and off shore areas indicated no rise in radionuclide concentrations and remain within the WHO guidelines for drinking water. [t]he IAEA considers the public is safe" [38].

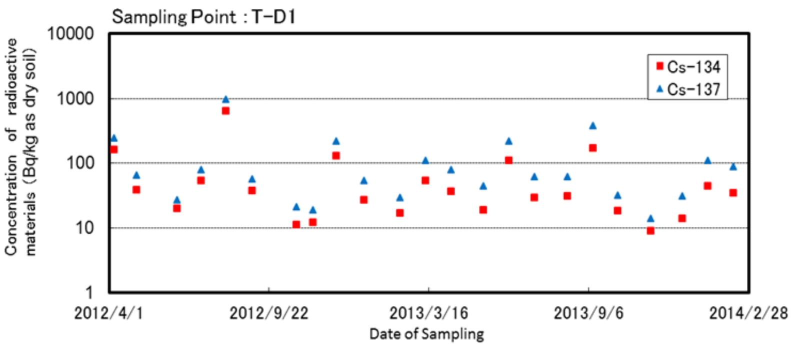
Figure 43 Radioactive Materials Concentrations in Marine Soil in the Vicinity of the Fukushima Daiichi NPS and Coastal Sea Area (excepted from the Nuclear Regulation Authority website [39])

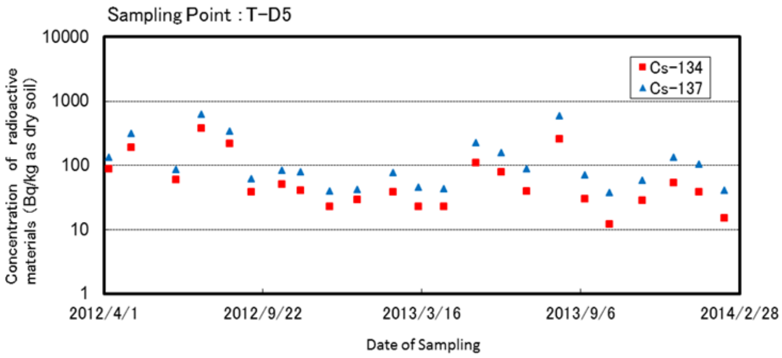



Sampling Point : T-2-1(T-2 until Nov. 2012)
Cs-134
Cs-137
10000
1000
100
10
1
Concentration of radioactive materials (Bq/kg as dry soil)
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling

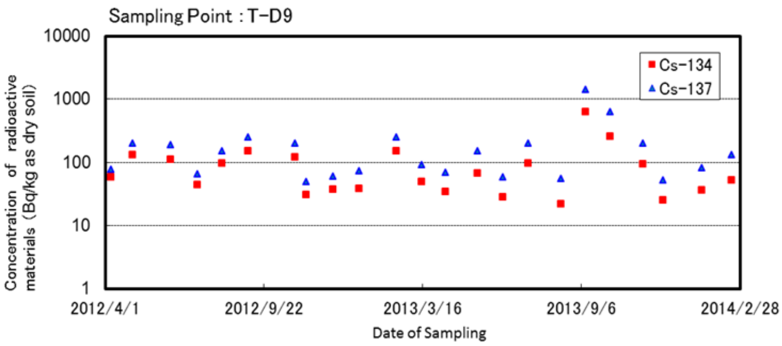

Sampling Point : : T-3
Cs-134
Cs-137
10000
1000
100
10
1
Concentration of radioactive materials (Bq/kg as dry soil)
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling


Sampling Point : T-5
Cs-134
Cs-137
10000
1000
100
10
1
Concentration of radioactive materials (Bq/kg as dry soil)
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling

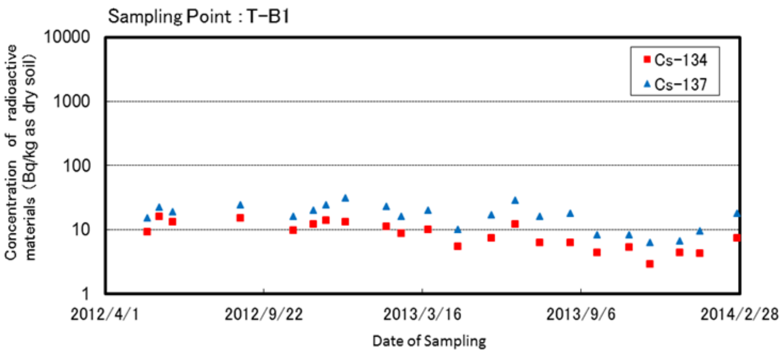

Sampling Point : T-D1
Cs-134
Cs-137
10000
1000
100
10
1
Concentration of radioactive materials (Bq/kg as dry soil)
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling



Sampling Point : T-D5
Concentration of radioactive materials (Bq/kg as dry soil)
10000
1000
100
10
1
Cs-134
Cs-137
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling



Sampling Point : T-D9
Concentration of radioactive materials (Bq/kg as dry soil)
10000
1000
100
10
1
Cs-134
Cs-137
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling



Sampling Point : T-B1
Concentration of radioactive materials (Bq/kg as dry soil)
10000
1000
100
10
1
Cs-134
Cs-137
2012/4/1
2012/9/22
2013/3/16
2013/9/6
2014/2/28
Date of Sampling

Part Three. Research on the Mechanism by which Radionuclides are Transferred to Fishery Products

Chapter 1. Relationship with Prey Organisms and Ecology of Fish Species

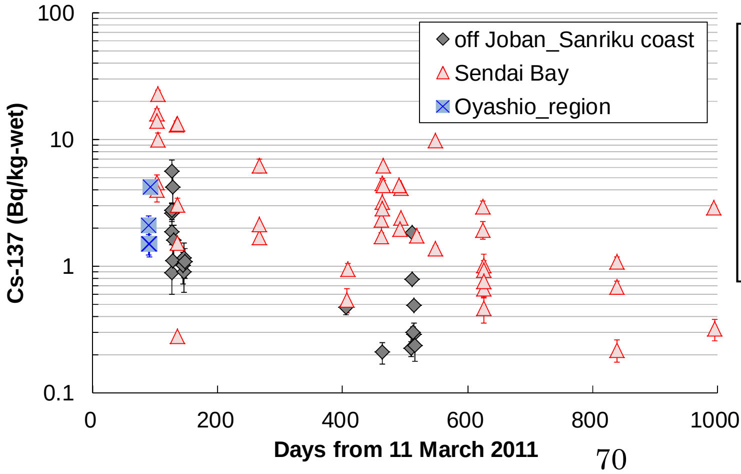
As was shown in 2-3-2, marine soil containing radioactive cesium has accumulated primarily on the sea bottom off Fukushima. Among bottom fish are some in which radioactive cesium concentrations have been declining quite slowly, and there is concern that radioactive cesium are being transferred to them through prey. For this reason, researches have been carried out to better understand the movement of radioactive cesium within an ecosystem and the process by which it is transferred via the food chain, and new findings have been obtained. This chapter will explain the outcomes of this research [23].

3-1-1 Research on Radioactive Materials within Prey Organisms

From 2011 to 2013, radioactive cesium concentrations were measured in zooplankton in Sendai Bay and waters off Fukushima. Radioactive cesium concentrations have been dropping year by year, and in the 2013 study cesium-137 was found in the 0.22 - 2.9 Bq/kg range, while cesium-134 was found in the 0.40 - 1.1 Bq/kg range (Figure 44).

From May to October 2013, radioactive cesium concentrations were measured within benthos (ocean-bottom organisms) at the mouth of the Abukuma River and waters off Fukushima (Figure 44, 45). No correlation was found in these measurements between radionuclide levels in benthos and levels in marine soil (Figure 46). Radioactive cesium concentrations were found to vary by taxon, for example being high within benthic polychaetes of flabelligeridae and terebellidae, but low within glycera (bloodworms). A possible reason for high concentrations in some taxa is due to the effect of marine soil containing radioactive cesium on the body surface or in digestive tract. Still more studies have been performed on the possibility that contaminated marine soil is taken in by fish via benthos, but it is becoming newly apparent that concentrations of radioactive cesium within benthos only rise a few percent of concentrations in marine soil (i.e. concentration does not arise), and moreover that if placed in a clean habitat, benthos quickly excrete radioactive materials (70-80% of radionuclides is excreted from the body in four days' time).

Figure 44 Chronological Trend of Cs-137 concentration in zooplanktons



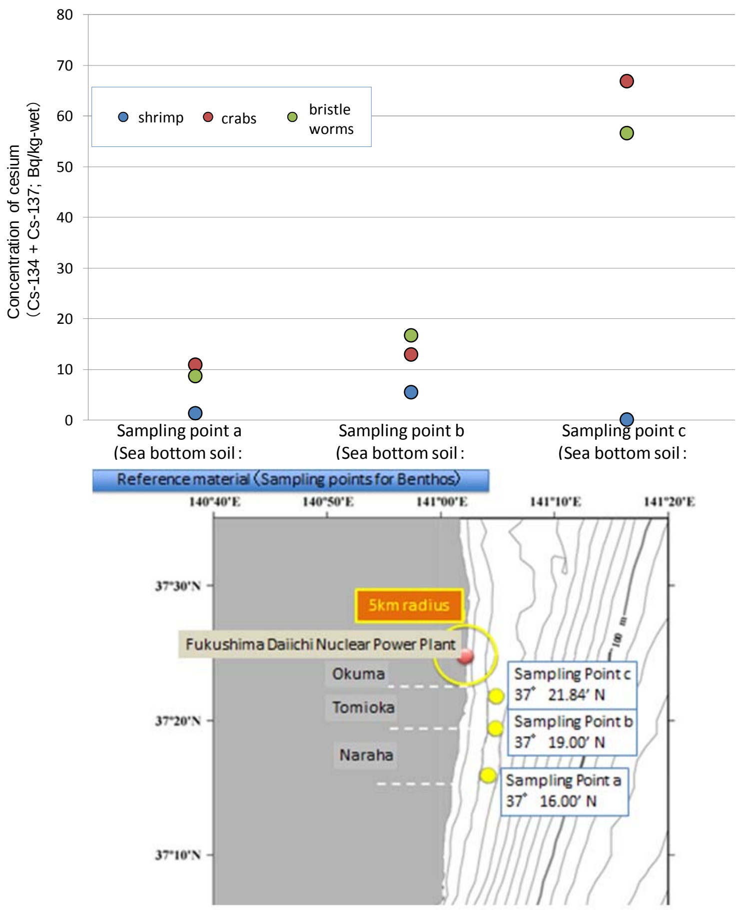
The concentration of Cs-137 in zooplanktons in waters off Joban-Sanriku coast, Sendai bay and Oyashio-region has declined over time.

Figure 45　Radioactive cesium concentration in benthos taken at the mouth of the Abukuma River

Species	Parts of the body measured	Sampling Point	Date of Catch	Cs-134 + Cs-137 (Bq/kg-wet)
Swimming crab (Large)	muscle	South side, off the estray	Aug 3, 2013	0.704
Swimming crab (Middle)	muscle			0.444
Swimming crab (Small)	muscle			1.52
Sand crab	whole body			0.814
Cocktail shrimp	whole body			4.90
Cocktail shrimp	muscle			1.10
Cocktail shrimp	other than muscle			8.38
Metapenaeopsis dalei	whole body			2.30
Grass shrimps	whole body			4.11
Cocktail shrimp	whole body	North side, off the estray	Aug 3, 2013	1.16
Cocktail shrimp	muscle			0.971
Cocktail shrimp	other than muscle			5.57
Swimming crab	muscle			1.81
Paradorippe granulata	whole body			15.1
Philyra syndactyla	whole body			2.47
Hermit crabs	whole body			3.42

- The concentrations of marine soil samples taken from these sampling points (10 m in depth) have not been measured yet.
- In the environment sampling research preceding the marine living organisms sampling, the survey was conducted along with the line starting from the mouth of river extending to offshore so that hot-spots are covered. The concentration of marine soil at the point between two sampling points (10 m in depth and at the mouth of river) were:
Cs-137: 2,440 Bq/kg-dry
Cs-134: 1,213 Bq/kg-dry

Figure 46　Chronological Trend of Radioactive cesium concentration in benthos taken in waters off Fukushima Prefecture in May 2013

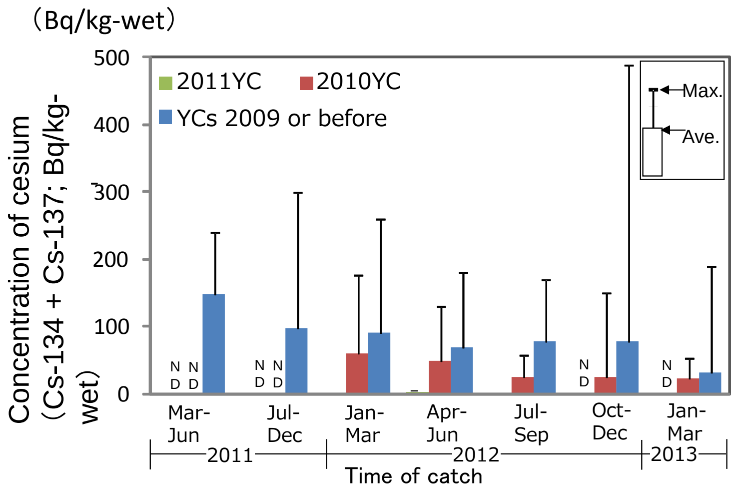


No correlation was found between radionuclide levels in benthos and those in marine soil.

3-1-2 Research on Ecology of Fish Species and the Timing of Radionuclide Transfer

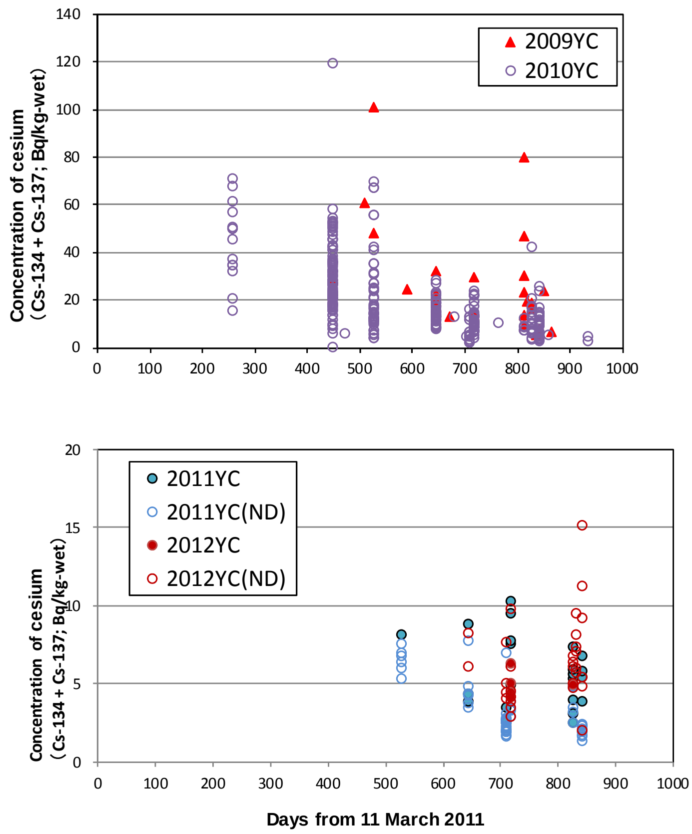
Pacific cod, which were collected between March 2011 and March 2013 and were harvested off the coast of Fukushima were divided into 2009, 2010, and 2011 birth year classes to examine changes in radioactive cesium concentrations via time series. Fish in the earlier birth year classes displayed higher concentrations of radioactive cesium, while those in the 2011 year class contained miniscule amounts of the radioactive cesium. In previous studies, it has been discovered that pacific cod over one year old migrate to shallow sea areas in low-water temperature seasons. In this study, the 2011 year class did not take in any radioactive cesium in the 2012 low-water temperature season, and the 2009 and 2010 year classes did not show any increase in their radioactive cesium concentrations during low-water temperature season (Figure 47). Therefore, it has been surmised that primarily pacific cod born in or before 2010 migrated to the shallow sea areas after the Fukushima Daiichi NPS accident and, while there, took in some amount of radioactive cesium where the sea zone contained high concentrations of it, but after 2012 these fish took in little radioactive cesium.

Figure 47 Chronological Trend of radioactive cesium concentration in Pacific cod taken in waters off Fukushima



Also, there is a study that examine changes in radioactive cesium concentrations by Olive flounder's birth year groups. In this monitoring study which began in November 2011, the greatest reading among the 2009 and 2010 year classes was about 100 Bq/kg, while for the 2011 and 2012 year classes were mostly below detection limit (Figure 48). Moreover, research has been carried out on the relationship between body length and radioactive cesium concentrations. Samples were taken from individuals of 300mm-400mm in length, whose eating habits are equal to those of adult fish and habitat areas largely overlap with those of adult fish. The maximum reading from samples in the 2010 year class was 120 Bq/kg, while readings were mostly in the 0-70 Bq/kg range; but in the 2011 year class, none of the samples exceeded 10 Bq/kg (Figure 49). Hence it is thought that, for olive flounders as well, little intake of radioactive cesium took place in and after the winter of 2012.

Figure 48 Olive Flounder, by Birth Year Class: Relationship between the Number of Days Elapsed Since the Fukushima Daiichi NPS accident and Radioactive Cesium Concentrations

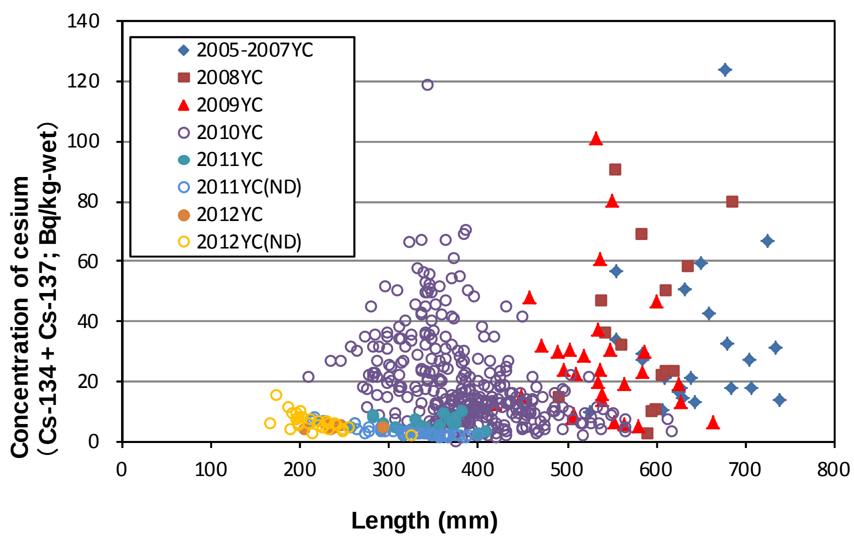


TOP: 2009, 2010 year classes (YC).

BOTTOM: 2011, 2012 year classes (YC). 2011YC (ND) and 2012YC (ND) are samples below detection limits, and the detection limits were plotted.

Note that the scale of the Y axis differs between the top and bottom graph.

Figure 49 The Relationship between the Length of and Radioactive Cesium Concentration of Olive Flounder, by Birth Year Class



When comparing individuals of 300-400 mm in length, the readings from 2010 year class mostly ranged in 0-70 Bq/kg and displayed 120 Bq/kg at the maximum, while in the 2011 year class, none of the samples exceeded 10 Bq/kg.

3-1-3 Conclusion and Challenges

This study demonstrates that benthos, prey for fish, do not reflect the radionuclide concentrations of marine soil. Additionally, declining trends in concentrations of radioactive cesium in fishery products including bottom fish despite the still-contaminated state of marine soil in some sea zones suggests that benthos is not a major pathway through which radionuclides transfer to fishery products. Radioactive cesium contained in benthos is not considered to cause advancement of the contamination in fishery products, but rather a cause of delay in the reduction of contamination.

Meanwhile, despite the fact that some monitory samples of pacific cod and olive flounder show high concentrations of radioactive cesium in sea zones across a relatively wide area, it has been shown that there is low intake of radionuclides by fish in the 2011 or later year class, and also that there has been low intake in general since the winter of 2012. It is expected that as the number of fish born after the Fukushima Daiichi NPS accident increase in number, concentrations of radioactive cesium in fishery products will continue to decrease.

Further research on transfer routes of radioactive materials will make it possible to provide fishermen and consumers with the specific causes of fishery product contamination and predictions regarding its reduction.

Chapter 2　Urgent Research on the Sause of Contamination of Highly Contaminated Fish (fat greenling)

As seen in Part One, Chapter 2, radioactive cesium concentrations in fishery products are generally in decline. However, though while a year after the nuclear accident many fishery products demonstrated decline radioactive cesium concentrations, in August 2012 a highly contaminated fat greenling (a very sedentary species) was taken at the mouth of the Ota River, approx. 20 km from the Fukushima Daiichi NPS.

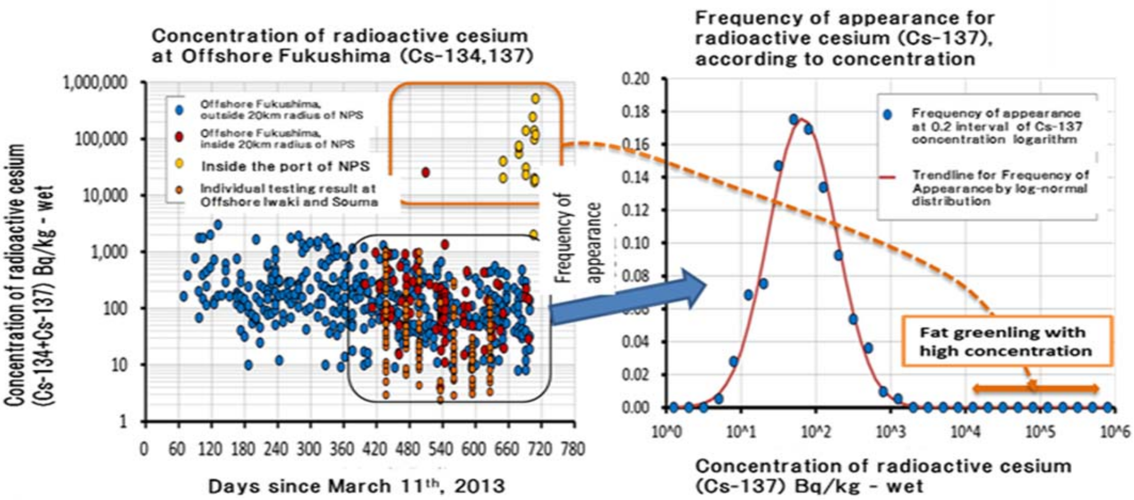
In order to provide fishermen and consumers with an explanation, based on scientific foundations, of the reason for the appearance of highly contaminated fish, the Fisheries Agency, in cooperation with the Fisheries Research Agency and other related organizations, undertook a research project on the route and cause of those highly contaminated fish samples. This chapter explains the results of this research [40].

3-2-1　The Frequency of Appearance of Highly Contaminated Fat Greenlings

Among the fat greenlings taken in the Fukushima sea zone between April 2012 and February 2013 emerged the aforementioned highly-contaminated sample, in which a radioactive cesium was detected at the level of 25,800 Bq/kg-wet. This differed substantially from other samples and was on the same level as samples taken from the Fukushima Daiichi NPS port (Figure 50, left graph). Excluding this sample from all fat greenlings samples taken in the Fukushima sea zone from April 2012 to February 2013, and assuming a frequency distribution approximated by a log-normal distribution, the probability that a sample exceeding 10,000 Bq/kg-wet will appear is less than 1/50,000 (Figure 50, right graph).

Based on these facts, the highly contaminated sample taken in August 2012 was considered to have passed through an environment different from that experienced by all other samples taken in the Fukushima sea zone up until that point. The sample was conjectured to have been contaminated either within the power station port or in an area very close to the station itself.

Figure 50　Concentrations of Radioactive Cesium within Fat Greenlings in the Waters off Fukushima



3-2-2 Determining the Time of Contamination through Autoradiography Experiment

β-rays were measured in the otolith of fat greenlings at the mouth of the Ota River and within the Fukushima Daiichi NPS port, as well as in brassblotched rockfish in the Fukushima Daiichi NPS port. From these measurements, a proportional relationship was confirmed to exist between radioactive cesium-137 in muscle material and β-rays in the otolith (Figure 51, left graph). Further, through analysis of the β-rays from the otolith of brassblotched rockfish in the Fukushima Daiichi NPS port, it was learned that there is a deviation in the β-rays' emission location (Figure 51, right graph). Additionally, analysis of the relationship between the high-concentration fat greenling's otolith rings and an imaging plate (IP) of the otolith (Figure 52) revealed that primary location of the β-rays' emission corresponded to spring/summer 2011, and hence this sample was judged to have been contaminated shortly after the Fukushima Daiichi NPS accident through exposure to highly-contaminated waters.

Figure 51 Analysis of the Fukushima Daiichi NPS port Brassblotched Rockfish Otolith

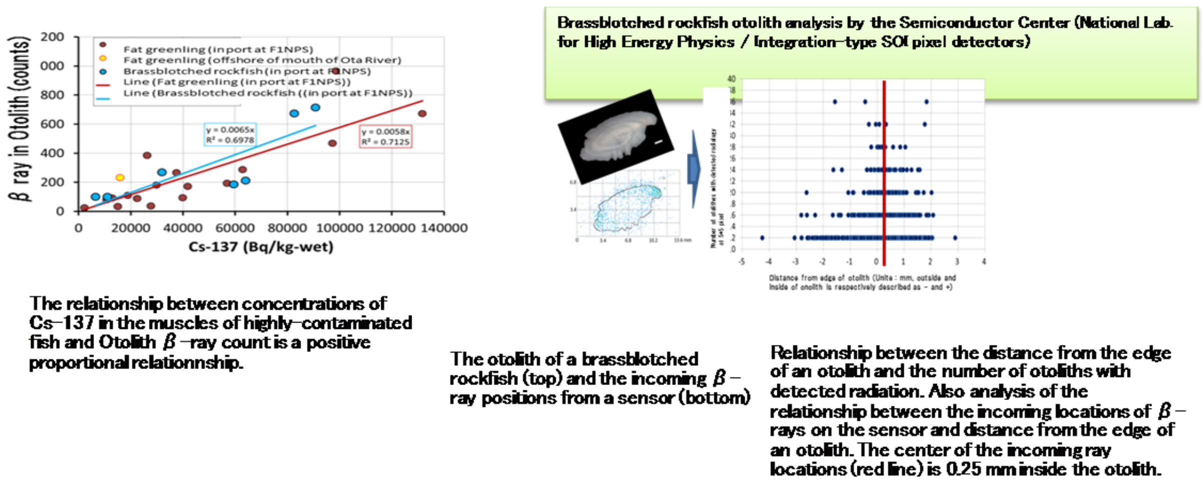
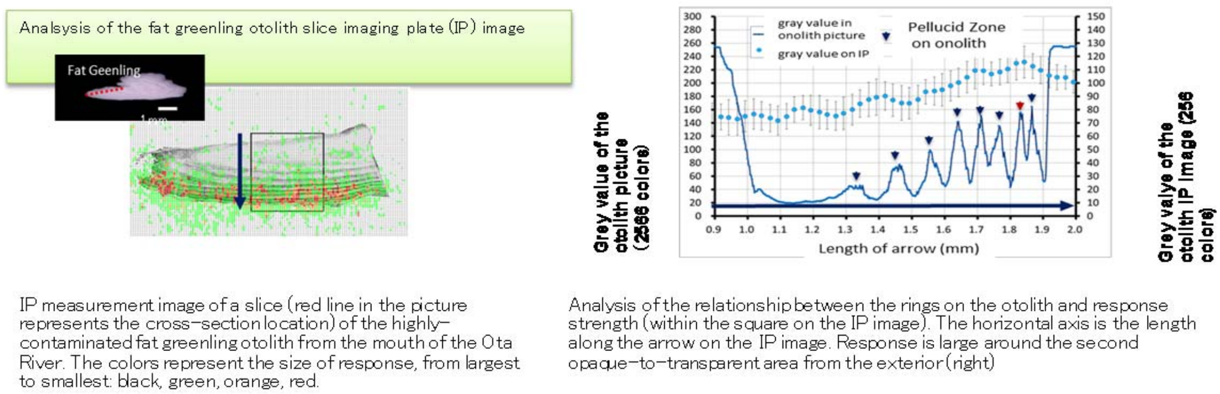


Figure 52 Analysis of the Highly-Contaminated Fat Greenling's Otolith



3-2-3 Study on the Migration Ecology and Habitat History of the Fat Greenling

Previous capture-and-recapture studies have reported that fat greenlings can migrate as much as 27 km, although most samples migrated between 0 and 15 km (avg. 8 km) [41]. The highly-contaminated sample found in August 2012 was harvested at the mouth of the Ota River, approx. 20 km from the nuclear plant port and within the reported migration ranges. To learn more about the migration of the fat greenling, tagged fat greenling were released in the ocean near Souma and off the Fukushima Daiichi NPS (within 20-km radius) (no recapture yet as of end of March, 2014).

To determine whether the highly-contaminated fat greenling displayed a strong freshwater influence in its habitat history, sample taken in the Iwaki sea zone and sample taken at the mouth of the Ota River were compared by otolith Sr/Ca ratio, which shows a low value in low-salinity environment. However, no strong signs of freshwater influence were observed in the highly-contaminated sample.

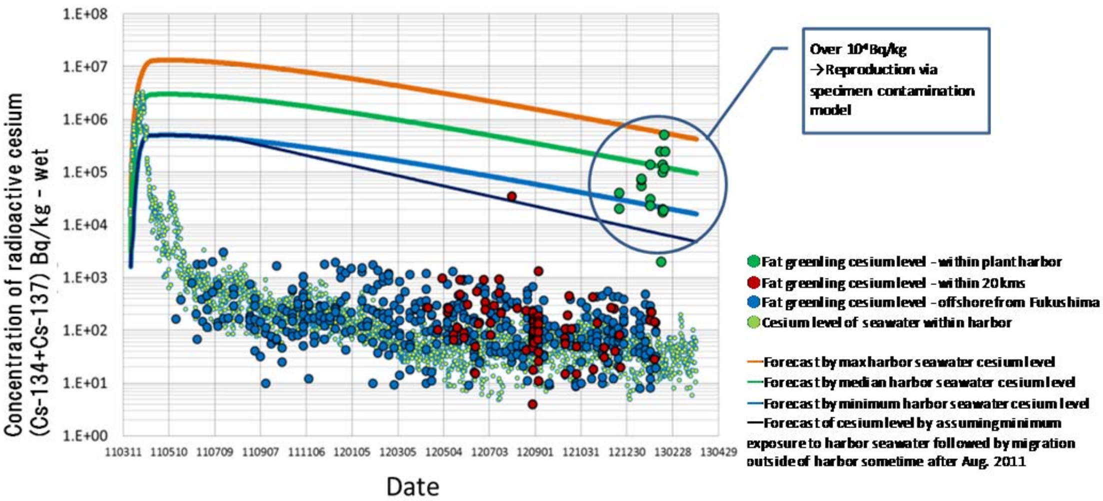
3-2-4 The Estimate of Contamination Source by Contamination Model for the Fat Greenling Sample

In order to conjecture the contamination source of the highly-contaminated fat greenling sample, a simulation model was constructed for radioactive cesium concentrations within a fish's body, based on cesium levels in the water of the Fukushima Daiichi NPS port and historical parameters (coefficient of intake from seawater: 0.2; biological half-life: 100 days; food intake: 1% of body weight). This simulation model was used to perform a simulation using multiple condition settings for contamination source and migration route.

Contamination sources were set as high-, mid-, and low-concentration values based on the range of concentrations within the Fukushima Daiichi NPS port. Migration routes were set as a) staying within the port, and b) moving out of the port area after August 2011.

Through this simulation model, radioactive cesium concentrations frequently reoccurred on the level of the >10^4 Bq/kg fat greenling taken within the port between December 2012 and February 2013. Further, when low-concentration seawater within the port was set as the contamination source, the result of calculations on the individual that migrated out of the port after August 2011 produced radioactive cesium concentrations close to those of the highly-contaminated sample found at the mouth of the Ota River. These results, in combination with the results from the otolith analysis, suggest that the sample was strongly affected by highly-contaminated water within the Fukushima Daiichi NPS port in the initial period after the accident (Figure 53).

Figure 53 Simulation Model of Radioactive Cesium Concentrations within a Fat Greenling



3-2-5 Conclusion and Challenges

The highly contaminated sample taken in August 2012 is considered to have been heavily affected shortly after the Fukushima Daiichi NPS accident by highly contaminated water in the Fukushima Daiichi NPS port, then to have remained at high concentrations through the ingestion of contaminated prey or by inhabiting, relatively high contaminated water, continually affected by leakage from the port, near the port for a long period of time. This sample is then considered to have migrated at some point to the place at which it was taken.

Three years have passed since the Fukushima Daiichi NPS accident, and situation of affected ocean areas, including waters off Fukushima (except for the Fukushima Daiichi NPS port interior), has improved in terms of contamination. TEPCO is engaged in efforts to stop the spread of contaminated marine organisms by installing nets at the mouth of the port and exterminating marine organisms within the port. These measures should be taken firmly in order to lower the frequency of appearance of such highly-contaminated sample.

Part Four. Efforts to Sweep Away Unfounded Reputational Damages and Misinformation Present Domestically and Overseas

Chapter 1. Domestic Situation Regarding Unfounded Reputational damage and misinformation

Part One of this report explained that concentrations of radioactive materials in fishery products, caused by the Fukushima Daiichi NPS accident, have largely declined; and that rigorous inspections and response measures for over-limit cases have ensured the safety. However, the Fukushima Daiichi NPS accident has had a major psychological impact on consumers. The Consumer Affairs Agency has conducted surveys of consumer consciousness regarding unfounded reputational damages and misinformation since 2013. Consumers stating that they “hesitate to buy food products made in Fukushima because they wish to buy food that does not contain radioactive materials” amounted to 19.4% of all respondents in February 2013, and although this figure shrank to 15.3% in 2014, some consumers continue to hold persistent concerns [4].

In order to assess the current state of recovery of fishery products processing industry in Iwate, Miyagi, and Fukushima Prefectures three years after the Great East Japan Earthquake in 2011, the Fisheries Agency and National Federation of Fishery Processor’s Co-operative Associations conducted a survey among the 673 member companies of the Federation present in the aforementioned three prefectures. This survey was conducted from February 28 to March 12, 2014, and received responses from 231 companies (34%). Results of the survey indicates that under the “problems in reconstruction efforts” heading, 31% of respondents selected “unfounded reputational damages and misinformation / establishment of sales channels” and 25% selected “securing staff/personnel,” both of which are important components of reconstruction. In this way, unfounded reputational damages and misinformation have a major impact on industry in the accident-stricken areas. Moreover, the unfounded reputational damages and misinformation have become a prolonged and grave problem, with previous business partners finding replacement companies, so that even if the rumor problem were to disappear, sales of processed products would not recover [5].

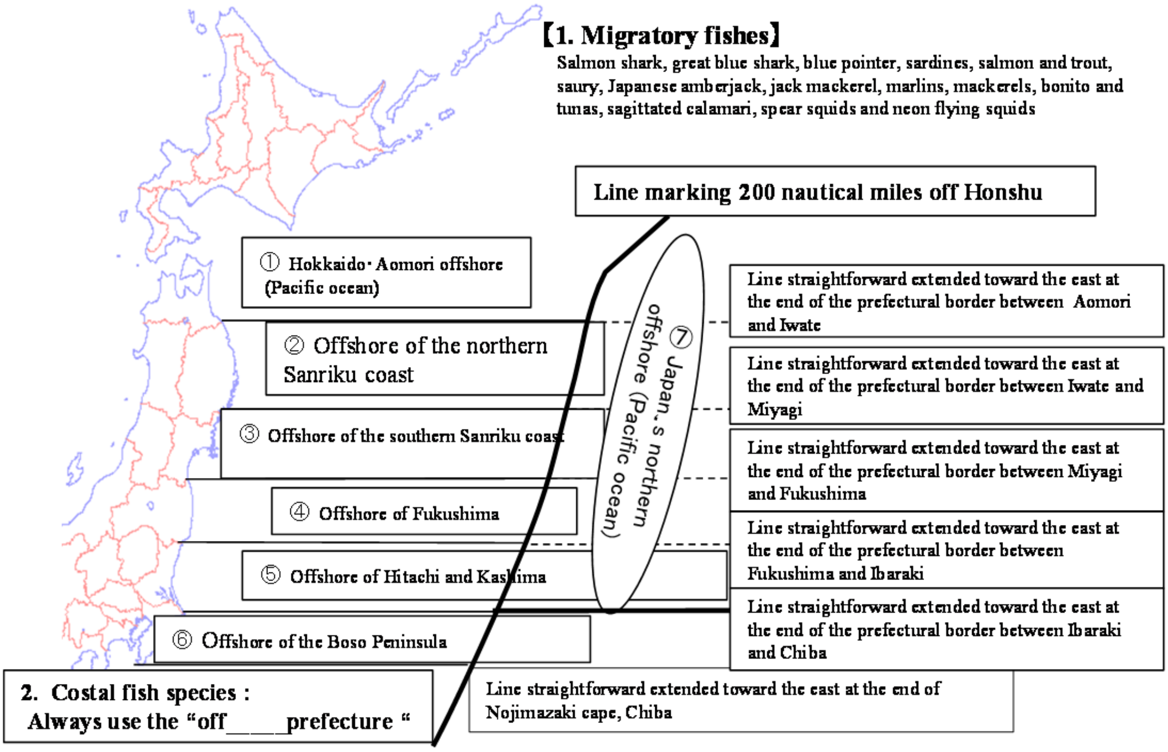
Chapter 2. Enhanced Provision/Dissemination of Information , Domestically and Internationally

In the aftermath of the Fukushima Daiichi NPS accident, consumer interest has risen in information on origin (harvest area) of fresh fishery products. In response, the Fisheries Agency has recommended clearer demarcation and labelling of harvest areas for fishery products harvested in the Pacific off the east coast of Japan. More specifically, it recommends labelling of harvest are using seven water areas for migratory fish species; and "Offshore of ___ Prefecture" for coastal fish species (i.e., fish species other than migratory fish)(Figure 54)[42].

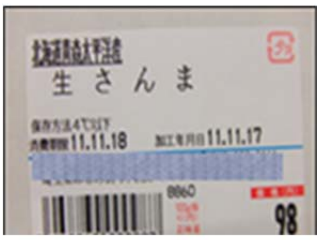
The provision of information in a way that is both accurate and easy-to-understand is important in defeating unfounded reputational damages and misinformation both domestically and internationally. The Fisheries Agency is engaged in efforts to provide accurate and easy-to-understand information by publishing monitoring results on radioactive materials in fishery products; by publishing Q&As on the impact of radioactive materials on marine products, in both Japanese and English (Figure 55); and by holding briefing sessions for consumers, distributors, and domestic and international press (Figure 56). Further, in order to ensure thorough understanding of consumers, the Consumer Affairs Agency and other related government agencies have coordinated with local governments, consumer groups, and others to engage in "risk communication" on the topic of radioactive materials within foods, assembling experts, consumers, business operators, and administrators for a national dialogue and opinion-exchange in various parts of Japan.

Figure 54 Labelling of Harvest Area in the Pacific Off the East Coast of Japan [42]

How eastern Japan's sea production zone names are displayed



Examples of Labelling of harvest area



(Upper)
Harvested in offshore of the Boso Peninsula

(Lower)
Harvested in Hokkaido-Aomori offshore

Figure 55　Publishing Inspection Results and Q&As on the Fisheries Agency Website

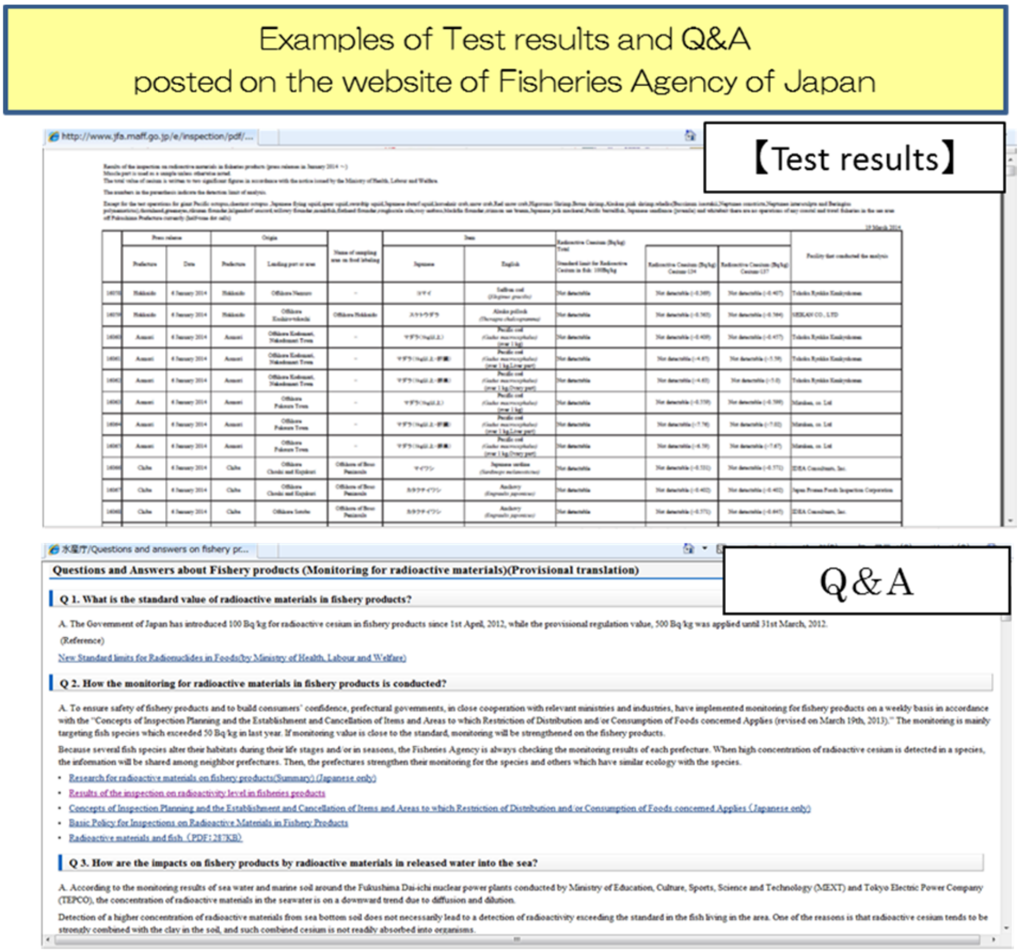


Figure56　Briefing Sessions for Foreign Press, etc.

Briefing sessions

【Briefing Organizers】

Producers: Fishery cooperatives-affiliated groups and fishery product processors

Distributors: Tsukiji Market wholesaler, intermediate wholesalers and traders and mass retailers

Others: Consumer groups and journalists

December 10, 2013

Briefing and discussion session for foreign journalists at Marine Ecology Research Institute

Chapter 3. Response to International Issues

4-3-1 Response to Import Restrictions Imposed by Foreign Countries

The Fukushima Daiichi NPS accident has even impacted foreign trade. After the accident, some nations have introduced measures to demand, for the import of fishery product, certification of origin and/or test certificates of radioactive materials. Some nations also introduced measures to ban imports on fishery products from particular areas of Japan (Table 10). The Fisheries Agency has responded to these demands by issuing certificates; holds information seminars for foreign media; and provides information on Japanese relevant measures through diplomatic channels.

The Japanese limits for radioactive materials are established by the Ministry of Health, Labour and Welfare in consultation with experts from the Food Safety Commission and the Pharmaceutical Affairs and Food Sanitation Council etc., based on scientific foundations. Even by international standards, these are proper and appropriate limits. Monitoring of radioactive materials in foods has been carried out in accordance with the Nuclear Emergency Response Headquarters' Guidelines, and local governments take the lead in systematically focusing on those items and regions that show potential of exceeding limits, on highly-consumed items, on major products, etc., and food items distributed in the market are considered to have their safety guarantee. Therefore, the Fisheries Agency has pointed out that ban of imports of all fishery products from accident-affected areas is not based on scientific evidences and unjustifiable. The government is working through diplomatic channels to demand the repeal of such measures, and has also raised them as a "specific trade concern" in the WTO/SPS committee.[7]

[7] The committee is established to oversee the implementation of the SPS Agreement (one of the WTO Agreements [Annex1A]; full name: "Agreement on the application of Sanitary and Phytosanitary Measures").

Table 10 Import Regulations Imposed by Major Countries against Japanese Fishery Products (as of April 1, 2014)

1) Import bans on fishery products from certain regions

The Republic of Korea

Target Prefectures	Nature of Regulation
Aomori, Iwate, Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Chiba (8 prefectures)	Import ban
Hokkaido, Tokyo, Kanagawa, Aichi, Mie, Ehime, Kumamoto, Kagoshima (8 prefectures)	Demands government-issued test certificates of radionuclides
All other prefectures	Demands government-issued certificates of origin

Additionally, if inspection within the Republic of Korea detects even a small amount of radioactive cesium or radioactive iodine, additional test certificate for radioactive strontium and other radionuclides will be required.

China

Target Prefectures	Nature of Regulation
Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Niigata, Nagano (10 prefectures)	Import ban
All other prefectures	Demands government-issued test certificates of radionuclides and certificates of origin site

Russia

Russian regulations on imports from Japan include regulations on food items in general, and additional individual regulations on fishery products and processed fishery products.

■Regulations on all food items

Target Prefectures	Nature of Regulation
Fukushima, Ibaraki, Tochigi, Gunma, Chiba, Tokyo (6 prefectures)	Demands government-issued testing certificate of radionuclides
All other prefectures	Sampling Inspection in Russia

■Fishery products and processed fishery products

Facilities*	Nature of Regulation
Facilities in Aomori, Iwate, Miyagi, Yamagata, Fukushima, Ibaraki, Chiba, Niigata (8 prefectures)	Import ban
Facilities in all other prefectures	Sampling Inspection in Russia

* For fishery products or processed fishery products to be exported to Russia, the facilities in which the products undergo final processing or are stored for export to Russia shall be registered to Russia.

Brunei

Target Prefectures	Nature of Regulation
Fukushima	Import ban
All other prefectures	Demands government-issued testing certificate of radionuclides

Taiwan

Target Prefectures	Nature of Regulation
Fukushima, Ibaraki, Tochigi, Gunma, Chiba (5 prefectures)	Import ban
All other prefectures	All lots are inspected in Chinese Taipei

Singapore

Target Prefectures	Nature of Regulation
Fukushima	Import ban
Ibaraki, Tochigi, Gunma (3 prefectures)	Demands government-issued test certificate of radionuclides
All other prefectures	Demands certificate of origin, issued by government or Chamber of Commerce and Industry

Macao

Target Prefectures	Nature of Regulation
Fukushima	Import ban
Miyagi, Tochigi, Ibaraki, Gunma, Saitama, Tokyo, Chiba, Nagano, Niigata, Yamagata, Yamanashi (11 prefectures)	Demands testing report with information of origin issued by designated inspection organization(s)

2) Demands test certificate of radionuclides or certificate of origin

Indonesia

Target Prefectures	Nature of Regulation
All 47 prefectures	Demands government-issued test certificate of radionuclides

Thailand

Target Prefectures	Nature of Regulation
Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Chiba, Kanagawa, Shizuoka (8 prefectures)	Demands government-issued test certificate of radionuclides; or testing report with information of origin issued by designated inspection organization(s)
All other prefectures	Demands certificate of origin, issued by government or Chamber of Commerce and Industry

French Polynesia

Target Prefectures	Nature of Regulation
Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Yamanashi, Nagano, Shizuoka (12 prefectures)	Demands government-issued test certificate of radionuclides
All other prefectures	Demands government-issued certificate of origin

United Arab Emirates

Target Prefectures	Nature of Regulation
Aomori, Iwate, Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano, Shizuoka (15 prefectures)	Demands government-issued test certificate of radionuclides
All other prefectures	Demands government-issued certificate of origin

Egypt

Target Prefectures	Nature of Regulation
Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Yamanashi, Shizuoka (11 prefectures)	Demands government-issued test certificate of radionuclides
All other prefectures	Demands government-issued certificate of origin

Morocco

Target Prefectures	Nature of Regulation
Miyagi, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano (13 prefectures)	Demands government-issued test certification of radionuclides
All other prefectures	Demands government-issued certificate of origin

EU

Target Prefectures	Nature of Regulation
Fukushima, Iwate, Miyagi, Ibaraki, Tochigi, Gunma, Saitama, Chiba (8 prefectures)	Demands government-issued test certificate of radionuclides
All other prefectures	Demands government-issued certificate of origin

3) Demands certificates for some regions

Hong Kong

Target Prefectures	Nature of Regulation
Fukushima, Ibaraki, Tochigi, Gunma, Chiba (5 prefecture)	Demands government-issued test certificate of radionuclides
All other prefectures	Sampling in Hong Kong

Brazil

Target Prefectures	Nature of Regulation
Fukushima	Demands government-issued test certificate of radionuclides

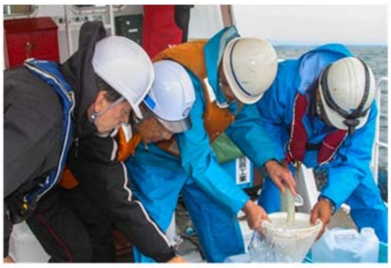
4-3-2 IAEA Evaluation of Food Monitoring

The International Atomic Energy Agency (IAEA), at the request of the Japanese government, organized two review missions in 2013 [44; 45] to review efforts being made along the "Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4" [43]. The second review mission was conducted from November 25 to December 4, 2013, and reviewed the efforts being made based on the Mid-and-Long-Term Roadmap. In the 2nd Review Report, the team stated that introduction of limits for food controls, comprehensive monitoring system for seawater and for the products in the food chain, and measures such as distribution restriction ensure the safety of the marine fishery products in the market (Figure 57).

Additionally, the IAEA, with regard to the comprehensive information on Fukushima Daiichi NPS-related issues that began being published on its website in December 2013, made the following comments on food safety: systems are in place to prevent food and agricultural products with cesium radionuclide levels in excess of Japan's legal limits from entering the supply chain" and " the measures taken to monitor and rapidly respond to any issues in the food system regarding radionuclide contamination are appropriate, and that the food supply chain in Japan is safely under control" [46]

Figure 57 Review by the IAEA [45]

" Japan adopted a limit of 100 Bq/kg in combined Cs-134 and Cs-137 for food products in 2012, which also applies for marine fishery products, to keep public dose below the international standard level (1mSv/year, the Codex Alimentarius, http://www.codexalimentarius.org/codex-home/en/). Accordingly, the comprehensive monitoring system has been developed by Japan, both for seawater and for the products in the food chain. Additionally, Japan has introduced limits for food controls that are based on the international standard level. This systematic approach, together with the distribution restrictions by relevant local governments, ensures the safety of the marine fishery products in the market. "



IAEA expert observing sea water monitoring near Fukushima Dai-ichi Nuclear Power Plant

Source: IAEA/David Osborn

Press conference by IAEA review team after completion of the mission

Video of the press conference is available at: http://www.youtube.com/watch?v=zklb9HAl-yE

Conclusion

This report has comprehensively assessed the results of the monitoring of fishery products for radioactive materials, which has been carried out since the Fukushima Daiichi NPS accident in 2011. The results indicate that in the immediate post-accident period, several species of fish, mainly in waters off Fukushima Prefecture, were found to contain radionuclides at concentrations in excess of 100 Bq/kg. Three years has passed to the present day, and the proportion of concentrations in excess of 100 Bq/kg has drastically declined. Further, although there were some cases of leakage of contaminated water, the influence to sea waters or fishery products has not been observed outside the Fukushima Daiichi NPS port.

However, the efforts being made by national and local governments as well as fishermen to ensure the safety of fishery products are not necessarily understood, and the persistence of unfounded reputational damages and misinformation both domestically and internationally remains to be a problem, creating a need for enhancing the provision of accurate information on radioactive materials.

As shown in Part Two, marine fish species possess a bodily function for quickly excreting radioactive cesium taken in much like any other mineral, and hence if the seawater environment of the marine fish has a low concentration of radioactive cesium, the fish itself will gradually lower the concentration in its body. Indeed, as shown in Part One, radioactive cesium concentrations have in fact dropped among marine fish. On the other hand, freshwater fish species possess a bodily function for preserving radioactive cesium taken in, much like any other mineral. Therefore, a tendency can be seen for it to take longer for freshwater fish to excrete radioactive cesium than it does for marine fish.

Although measures such as distribution restriction have been in place, it is a fact that even today, three years after the Fukushima Daiichi NPS accident, there is still low-frequency detection of certain species of fish in some areas excessing the limits. In order to continue to secure the safety of marine products and the trust of consumers, it is necessary, as a matter of obligation, for the national government to continue its monitoring of fishery products; to cooperate with local governments and relevant organizations to take proper measures in the event that the limits are exceeded; and thus to work to supply safe fishery products to the market. Further, it is also necessary to explicate the mechanisms of contamination that serve as the causes of contaminated fish samples, and to explain these causes to fishermen and consumers.

The data results produced by the monitoring of fishery products for radioactive materials are important for Japan, as well as for other countries. In addition to offering verification, and providing proper information on the safety of fishery products for domestic and international use, Japan shares information and cooperates with international organizations and relevant countries. Following further verification, Japan would gain more faith and trust in its efforts to guarantee the safety of its fishery products.

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Appendix Table Inspection Results for Radioactive Cesium Concentrations in Fishery Products

(March 2011 – March 2014)

The preceding report explains the results of inspections on major fish species. However, there are additional monitoring activities on many additional fish species undertaken by coordinated efforts among national governments, prefectural governments, and relevant organizations. The results for each of these monitoring efforts are published on the Fisheries Agency website:

(http://www.jfa.maff.go.jp/e/inspection/index.html)

The appendix table contains data on the following items, separated into "Fukushima Prefecture" and "other prefecture" categories, and organized by fiscal year and by fish species.

- Number of samples tested
- Number and proportion of readings below the detection limit, and the value of detection limit (Note: detection limit for fiscal year 2011 has not been made available.)
- Number and proportion of readings within 100 Bq/kg (A provisional regulation limit of 500 Bq/kg was used through fiscal year 2011, but for the sake of comparison, the present table uses the standard limit of 100 Bq/kg)
- Maximum value (Bq/kg)
- Median value (Bq/kg)
- Mean value (Bq/kg)

The median and mean values were calculated according to GEMS/Food (*) methods, as below:

Median: Calculated only if the number of readings below the detection limit constituted fewer than 50% of the total. If such readings constituted 50% or more of the total, the median was marked as "-".

Mean: If readings below the detection limit constituted over 60% of the total number of readings, the mean was calculated according to (1) and (2) below. If the proportion of readings below the detection limit was 60% or less, the mean was calculated according to (3).

(1) Set all below-detection-limit readings to 0 and calculate the mean.
(2) Set all below-detection-limit readings to the value of the limit and calculate the mean.
(3) Set all below-detection-limit readings to 1/2 the value of the limit and calculate themean.

It is important to remember that, as stated in the preceding report, inspections are as a general rule performed prior to shipping and distribution. Also, it must be noted that monitoring results include those of items currently under shipping and distribution restrictions and not in active circulation in the market. Therefore, a reading in excess of the standard limit, does not mean that excessive levels of radioactive cesium were found in fishery products actively in circulation.

＊ GEMS/Food

Abbreviation of the World Health Organization's (WHO) Global Environmental Monitoring System/ Food Contamination Monitoring and Assessment Programme. It collects data on chemical contamination in foods, and provide it to governments and Codex Alimentarius Committee etc.
(http://www.who.int/foodsafety/chem/gems/en)

1 Inspection Results for Fishery Products in fukushima prefecture (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
ごく表層 very surface												
1 イシカワシラウオ Ishikawa icefish												
(Salangichthys ishikawae)	～2011	26	2	8%	－	26	100%	94	33	－	－	－
	2012	74	60	81%	11-20	74	100%	34	－	2.6	16	－
	2013	97	86	89%	12-20	97	100%	19	－	1.1	15	－
2 コウナゴ Japanese sandlance												
(Ammodytes personatus)	～2011	21	8	38%	－	9	43%	14,000	320	－	－	－
	2012	62	55	89%	12-20	62	100%	10	－	0.94	15	－
	2013	69	69	100%	12-20	69	100%	<20	－	0	15	－
3 シラウオ Japanese icefish												
(Salangichthys microdon)	～2011	3	1	33%	－	3	100%	67	12	－	－	－
	2012	1	1	100%	16	1	100%	<16	－	0	16	－
4 シラス Whitebait												
	～2011	59	15	25%	－	46	78%	850	30	－	－	－
	2012	118	116	98%	9.5-20	118	100%	7.9	－	0.13	16	－
	2013	199	199	100%	13-20	199	100%	<20	－	0	16	－
5 ノレソレ Conger eel (Juvenile)												
(Conger myriaster)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	3	3	100%	12-16	3	100%	<16	－	0	14	－
	2013	1	1	100%	14	1	100%	<14	－	0	14	－

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
表層 Surface layer												
6 アカカマス Red barracuda												
(Sphyraena pinguis)	～2011	1	0	0%	−	1	100%	50	50	−	−	50
	2013	1	1	100%	15	1	100%	<15	−	0	15	−
7 ウルメイワシ Round herring												
(Etrumeus teres)	～2011	1	0	0%	−	1	100%	23	23	−	−	23
	2012	2	2	100%	15-16	2	100%	<16	−	0	16	−
	2013	5	5	100%	14-17	5	100%	<17	−	0	15	−
8 カタクチイワシ Anchovy												
(Engraulis japonicus)	～2011	12	1	8%	−	11	92%	140	28	−	−	−
	2012	19	19	100%	12-20	19	100%	<20	−	0	16	−
	2013	33	33	100%	14-18	33	100%	<18	−	0	16	−
9 カツオ Skipjack tuna												
(Katsuwonus pelamis)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
10 サヨリ Halfbeak												
(Hemiramphus sajori)	～2011	7	2	29%	−	7	100%	34	9.5	−	−	−
	2012	31	25	81%	13-20	30	97%	120	−	5.7	18	−
	2013	52	47	90%	12-19	52	100%	30	−	1.6	16	−
11 サンマ Pacific saury												
(Cololabis saira)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
12 ダツ Needlefish												
(Belonidae)	2013	1	1	100%	12	1	100%	<12	−	0	12	−
13 ハマトビウオ Coast flyingfish												
(Cypselurus pinnatibarbatus	2012	1	1	100%	15	1	100%	<15	−	0	15	−
japonicus)	2013	1	1	100%	16	1	100%	<16	−	0	16	−
14 マイワシ Japanese sardine												
(Sardinops melanostictus)	～2011	3	1	33%	−	3	100%	30	13	−	−	−
	2012	1	1	100%	14	1	100%	<14	−	0	14	−
	2013	37	37	100%	13-20	37	100%	<20	−	0	16	−

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中層 Intermediate layer												
15 カンパチ Greater amberjack												
(Seriola dumerili)	～2011	5	1	20%	－	5	100%	73	22	－	－	－
	2012	1	1	100%	14	1	100%	<14	－	0	14	－
	2013	3	3	100%	14-17	3	100%	<17	－	0	16	－
16 ギンザケ Coho salmon												
(Oncorhynchus kisutsh)	～2011	1	0	0%	－	1	100%	73	73	－	－	73
17 クロマグロ Bluefin tuna												
(Thunnus thynnus)	～2011	5	0	0%	－	5	100%	41	28	－	－	30
	2012	1	1	100%	16	1	100%	<16	－	0	16	－
18 コノシロ Dotted gizzard shad												
(Konosirus punctatus)	2012	2	2	100%	13-16	2	100%	<16	－	0	15	－
	2013	1	1	100%	17	1	100%	<17	－	0	17	－
19 ゴマサバ Southern mackerel												
(Scomber australasicus)	～2011	9	2	22%	－	9	100%	68	41	－	－	－
	2012	22	22	100%	13-19	22	100%	<19	－	0	16	－
	2013	53	52	98%	13-20	53	100%	6.4	－	0.12	15	－
20 サクラマス Cherry salmon												
(Oncorhynchus masou)	2012	4	3	75%	13-16	3	75%	130	－	33	44	－
	2013	8	7	88%	13-18	8	100%	12	－	1.5	15	－
21 サッパ Japanese shad												
(Sardinella zunasi)	2012	2	1	50%	15	2	100%	11	－	－	－	9.3
22 サワラ Japanese Spanish mackerel												
(Scomberomorus niphonius)	2012	2	2	100%	13-17	2	100%	<17	－	0	15	－
	2013	29	29	100%	13-20	29	100%	<20	－	0	16	－
23 シイラ Mahi-mahi												
(Coryphaena hippurus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	1	100%	13	1	100%	<13	－	0	13	－
24 シロザケ Chum salmon												
(Oncorhynchus keta)	～2011	24	24	100%	－	24	100%	<LOD	－	0	－	－
	2012	51	51	100%	12-20	51	100%	<20	－	0	16	－
	2013	62	62	100%	12-19	62	100%	<19	－	0	16	－
25 スズキ Seabass												
(Lateolabrax japonicus)	～2011	61	0	0%	－	28	46%	2,100	110	－	－	190
	2012	104	10	10%	15-20	75	72%	620	59	－	－	90
	2013	118	34	29%	6.1-20	101	86%	570	15	－	－	55
26 タチウオ Hairtail												
(Trichiurus lepturus)	～2011	1	0	0%	－	1	100%	71	71	－	－	71
	2012	1	0	0%	－	1	100%	44	44	－	－	44
	2013	2	2	100%	12-16	2	100%	<16	－	0	14	－
27 ハガツオ Striped Bonito												
(Sarda orientalis)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
28 ブリ Japanese amberjack												
(Seriola quinqueraduata)	～2011	20	2	10%	－	18	90%	270	34	－	－	－
	2012	34	29	85%	13-20	34	100%	36	－	2.2	16	－
	2013	40	40	100%	11-19	40	100%	<19	－	0	16	－
29 マサバ Chub mackerel												
(Scomber japonicus)	～2011	11	2	18%	－	9	82%	190	53	－	－	－
	2012	20	19	95%	14-18	20	100%	12	－	0.6	15	－
	2013	48	48	100%	13-18	48	100%	<18	－	0	15	－

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底層 Bottom layer												
30 アイナメ Fat greenling												
(Hexagrammos otakii)	～2011	177	6	3%	－	51	29%	3,000	170	－	－	－
	2012	292	24	8%	12-19	173	59%	1,300	77	－	－	150
	2013	336	131	39%	12-20	314	93%	1,700	11	－	－	35
31 アオメエソ(メヒカリ) Greeneyes												
(Chlorophthalmus borealis)	～2011	9	3	33%	－	6	67%	180	33	－	－	－
	2012	62	59	95%	12-20	62	100%	9.2	－	0.39	15	－
	2013	99	98	99%	13-20	99	100%	11	－	0.11	16	－
32 アカエイ Red stingray												
(Dasyatis akajei)	～2011	5	0	0%	－	4	80%	250	91	－	－	110
33 アカガレイ Flathead flounder												
(Hippoglossoides dubius)	～2011	47	29	62%	－	46	98%	120	－	13	－	－
	2012	116	82	71%	11-20	116	100%	83	－	7	18	－
	2013	142	117	82%	12-19	142	100%	66	－	4	17	－
34 アカシタビラメ Red tongue sole												
(Cynoglossus joyneri)	～2011	15	0	0%	－	5	33%	250	150	－	－	140
	2012	14	1	7%	17	11	79%	180	59	－	－	69
	2013	9	2	22%	15-17	9	100%	59	20	－	－	27
35 アカムツ Rosy seabass												
(Doederleinia berycoides)	～2011	4	1	25%	－	4	100%	30	9.1	－	－	－
	2012	13	12	92%	15-20	13	100%	17	－	1.3	16	－
	2013	33	33	100%	12-20	33	100%	<20	－	0	16	－
36 アコウダイ Matsubara`s red rock fish												
(Sebastes matsubarae)	～2011	1	0	0%	－	1	100%	72	72	－	－	72
	2012	4	0	0%	－	4	100%	50	21	－	－	25
37 アブラガレイ Kamchatla flounder												
(Atheresthes evermanni)	～2011	5	3	60%	－	5	100%	8.7	－	－	－	－
	2012	8	8	100%	15-17	8	100%	<17	－	0	16	－
	2013	2	2	100%	16-17	2	100%	<17	－	0	17	－
38 アブラツノザメ Spiny dogfish												
(Squalus acanthias)	～2011	5	1	20%	－	5	100%	62	27	－	－	－
	2012	6	3	50%	14-16	6	100%	45	－	－	－	20
	2013	28	16	57%	14-20	28	100%	45	－	－	－	12
39 イカナゴ Japanese sandlance												
(Ammodytes personatus)	～2011	16	1	6%	－	6	38%	400	120	－	－	－
	2012	11	3	27%	16-17	11	100%	61	25	－	－	29
	2013	2	2	100%	16-17	2	100%	<17	－	0	17	－
40 イシガキダイ Spotted Knifejaw												
(Oplegnathus punctatus)	2012	4	4	100%	14-17	4	100%	<17	－	0	16	－
	2013	1	1	100%	17	1	100%	<17	－	0	17	－
41 イシガレイ Stone flounder												
(Kareius bicoloratus)	～2011	83	0	0%	－	26	31%	1,200	140	－	－	210
	2012	150	20	13%	13-20	99	66%	1,200	54	－	－	100
	2013	164	72	44%	9.7-20	155	95%	310	8.6	－	－	31
42 イシダイ Striped beakfish												
(Oplegnathus fasciatus)	2012	3	1	33%	14	3	100%	22	12	－	－	14
43 イズカサゴ Izu scorpionfish												
(Scorpaena neglecta)	2012	1	1	100%	15	1	100%	<15	－	0	15	－
44 イトヒキダラ Threadfin hakeling												
(Laemonema longipes)	2013	1	1	100%	17	1	100%	<17	－	0	17	－
45 イネゴチ Crocodile flathead												
(Cociella crocodila)	2012	1	1	100%	18	1	100%	<18	－	0	18	－
46 イラコアナゴ Longnose eel												
(Synaphobranchus kaupii)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
47 ウケグチメバル Japanese rockfis												
(Sebastes scythropus)	2012	1	0	0%	－	1	100%	14	14	－	－	14
	2013	1	1	100%	12	1	100%	<12	－	0	12	－
48 ウスバハギ Unicorn leatherjacket												
(Aluterus monoceros)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
49 ウスメバル Goldeye rockfish												
(Sebastes thompsoni)	～2011	20	1	5%	－	3	15%	1,600	300	－	－	－
	2012	48	6	13%	14-18	23	48%	1,500	120	－	－	180
	2013	60	26	43%	13-19	51	85%	280	17	－	－	50
50 ウマヅラハギ Black scraper												
(Thamnaconus modestus)	～2011	2	1	50%	－	2	100%	12	－	－	－	－
	2012	8	7	88%	13-19	8	100%	11	－	1.4	15	－
	2013	7	7	100%	13-17	7	100%	<17	－	0	15	－
51 ウミタナゴ Surfperch												
(Ditrema temmincki)	～2011	2	0	0%	－	0	0%	220	170	－	－	170
	2012	20	2	10%	13-14	17	85%	130	54	－	－	56
	2013	7	5	71%	14-18	7	100%	18	－	4	15	－
52 エゾイソアイナメ Brown hakeling												
(Physiculus maximowiczi)	～2011	92	20	22%	－	59	64%	1,800	61	－	－	－
	2012	146	40	27%	13-19	128	88%	570	14	－	－	52
	2013	212	177	83%	11-20	210	99%	410	－	6.9	20	－
53 オオクチイシナギ Striped jewfish												
(Stereolepis doederleini)	～2011	4	1	25%	－	4	100%	55	32	－	－	－
	2012	13	10	77%	14-18	13	100%	39	－	4.7	17	－
	2013	22	21	95%	13-19	22	100%	10	－	0.45	16	－

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54 カガミダイ Dory												
(Zenopsis nebulosa)	～2011	21	4	19%	－	20	95%	130	51	－	－	－
	2012	19	19	100%	12－20	19	100%	<20	－	0	16	－
	2013	27	27	100%	12－20	27	100%	<20	－	0	15	－
55 カサゴ Scorpion fish												
(Sebastiscus marmoratus)	2012	1	0	0%	－	1	100%	92	92	－	－	92
	2013	1	0	0%	－	0	0%	160	160	－	－	160
56 カナガシラ Redwing searobin												
(Lepidotrigla microptera)	～2011	53	1	2%	－	38	72%	360	59	－	－	－
	2012	129	40	31%	14－19	129	100%	86	9.4	－	－	17
	2013	171	147	86%	12－20	171	100%	25	－	1.4	15	－
57 カワハギ Threadsail filefish												
(Stephanolepis cirrhifer)	～2011	3	2	67%	－	3	100%	6.9	－	2.3	－	－
58 ガンゾウビラメ Cinnamon flounder												
(Pseudorhombus cinnamoneus)	～2011	1	0	0%	－	1	100%	27	27	－	－	27
59 カンテンゲンゲ Jelly eelpout												
(Bothrocara tanakae)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
60 キアンコウ Monkfish												
(Lophius litulon)	～2011	45	10	22%	－	41	91%	400	37	－	－	－
	2012	98	67	68%	13－20	98	100%	78	－	8.3	19	－
	2013	118	101	86%	12－20	118	100%	38	－	2.5	16	－
61 ギス Japanese gissu												
(Pterothrissus gissu)	～2011	6	2	33%	－	6	100%	53	24	－	－	－
	2012	19	16	84%	13－19	19	100%	29	－	3.4	17	－
	2013	42	41	98%	12－19	42	100%	10	－	0.24	16	－
62 キチジ Thornhead												
(Sebastolobus macrochir)	～2011	12	12	100%	－	12	100%	<LOD	－	0	－	－
	2012	13	13	100%	15－19	13	100%	<19	－	0	16	－
	2013	12	12	100%	12－19	12	100%	<19	－	0	16	－
63 キツネメバル Fox jacopever												
(Sebastes vulpes)	～2011	12	6	50%	－	6	50%	1,300	－	－	－	－
	2012	54	18	33%	13－20	34	63%	720	25	－	－	120
	2013	61	29	48%	13－20	54	89%	310	9.4	－	－	44
64 ギンアナゴ Congrid eel												
(Gnathophis nystromi nystoromi)	～2011	3	0	0%	－	1	33%	130	130	－	－	96
	2012	1	0	0%	－	1	100%	24	24	－	－	24
65 クサウオ Snailfishes												
(Liparidae)(Liparis tanakai)	～2011	7	2	29%	－	7	100%	39	7.9	－	－	－
	2012	7	7	100%	13－18	7	100%	<18	－	0	16	－
	2013	5	5	100%	12－18	5	100%	<18	－	0	16	－
66 クロアナゴ Beach conger												
(Conger japonicus)	2012	2	0	0%	－	2	100%	100	95	－	－	95
67 クロウシノシタ Black cow-tongue												
(Paraplagusia japonica)	～2011	13	0	0%	－	6	46%	390	130	－	－	160
	2012	15	0	0%	－	13	87%	270	49	－	－	73
	2013	10	1	10%	19	10	100%	97	21	－	－	34
68 クロソイ Black rockfish												
(Sebastes schlegeli)	～2011	15	3	20%	－	5	33%	2,200	190	－	－	－
	2012	43	7	16%	13－18	28	65%	960	62	－	－	140
	2013	39	15	38%	13－19	35	90%	250	17	－	－	41
69 クロダイ Japanese black porgy												
(Acanthopagrus schlegelii)	～2011	10	0	0%	－	5	50%	240	110	－	－	120
	2012	37	4	11%	15－17	30	81%	2,000	59	－	－	120
	2013	38	6	16%	14－20	34	89%	910	17	－	－	61
70 クロムツ Japanese bluefish												
(Scombrops gilberti)	～2011	1	0	0%	－	1	100%	9	9	－	－	9
	2012	1	1	100%	17	1	100%	<17	－	0	17	－
	2013	1	1	100%	13	1	100%	<13	－	0	13	－
71 クロメバル Rockfish												
(Sebastes ventricosus)	～2011	1	0	0%	－	0	0%	280	280	－	－	280
72 ケムシカジカ Sea raven												
(Hemitripterus villosus)	～2011	42	1	2%	－	32	76%	710	60	－	－	－
	2012	96	9	9%	15－20	82	85%	600	32	－	－	60
	2013	155	95	61%	12－20	155	100%	87	－	7.8	17	－
73 コブシカジカ Darkfin sculpin												
(Malacocottus zonurus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
74 ゴマソイ Snowy rockfish												
(Sebastes nivosus)	～2011	1	0	0%	－	0	0%	150	150	－	－	150
75 コモンカスベ Ocellate spot skate												
(Okamejei kenojei)	～2011	150	0	0%	－	38	25%	1,600	230	－	－	370
	2012	168	0	0%	－	70	42%	850	130	－	－	190
	2013	184	4	2%	13－17	154	84%	320	50	－	－	67
76 コモンフグ Finepatterned puffer												
(Takifugu poecilonotus)	～2011	5	0	0%	－	4	80%	190	60	－	－	86
	2012	12	2	17%	16	12	100%	53	19	－	－	21
	2013	4	4	100%	15－17	4	100%	<17	－	0	16	－
77 サブロウ Poacher												
(Occella iburia)	～2011	8	0	0%	－	2	25%	1,400	910	－	－	800
	2012	11	2	18%	16－19	6	55%	690	88	－	－	190
	2013	16	12	75%	13－18	16	100%	72	－	6	18	－

1 Inspection Results for Fishery Products in fukushima prefecture (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≦ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
78 サメガレイ Roughscale sole												
(Clidoderma asperrimum)	～2011	16	11	69%	－	15	94%	150	－	20	－	－
	2012	85	74	87%	12-20	85	100%	47	－	3	17	－
	2013	120	116	97%	12-19	120	100%	57	－	0.73	16	－
79 ショウサイフグ Vermiculated puffer												
(Takifugu snyderi)	～2011	14	0	0%	－	5	36%	230	130	－	－	130
	2012	42	10	24%	13-19	41	98%	180	27	－	－	34
	2013	35	23	66%	13-19	35	100%	51	－	6.6	17	－
80 シロウオ Ice goby												
(Leucopsarion petersii)	2012	2	1	50%	17	2	100%	11	－	－	－	9.8
81 シロギス Japanese whiting												
(Sillago japonica)	～2011	2	0	0%	－	1	50%	400	210	－	－	210
82 シログチ Drum												
(Argyrosomus argentatus)	～2011	18	2	11%	－	18	100%	79	41	－	－	－
	2012	61	11	18%	15-18	61	100%	93	15	－	－	21
	2013	43	34	79%	12-18	43	100%	14	－	2.3	15	－
83 シロメバル Rockfish												
(Sebastes cheni)	～2011	46	1	2%	－	8	17%	3,200	420	－	－	－
	2012	120	0	0%	－	25	21%	1,700	250	－	－	350
	2013	85	7	8%	14-19	44	52%	760	100	－	－	160
84 スケソウダラ Alaska pollock												
(Theragra chalcogramma)	～2011	25	16	64%	－	25	100%	97	－	15	－	－
	2012	73	48	66%	13-19	72	99%	110	－	12	23	－
	2013	86	82	95%	13-20	86	100%	31	－	0.65	16	－
85 セトヌメリ Sand dragonet												
(Repomucenus ornatipinnis)	2012	3	2	67%	15-16	3	100%	7.5	－	2.5	13	－
	2013	1	1	100%	15	1	100%	<15	－	0	15	－
86 ソウハチ Sohachi flounder												
(Cleisthenes pinetorum)	～2011	3	0	0%	－	3	100%	31	28	－	－	23
	2012	25	14	56%	13-19	25	100%	33	－	－	－	13
	2013	44	43	98%	13-20	44	100%	7.2	－	0.16	16	－
87 チカメキントキ Bigeye												
(Priacanthus boops)	～2011	1	0	0%	－	1	100%	32	32	－	－	32
88 チダイ Crimson sea bream												
(Evynnis japonica)	～2011	26	5	19%	－	26	100%	91	20	－	－	－
	2012	47	23	49%	13-19	47	100%	44	6.8	－	－	12
	2013	59	56	95%	12-19	59	100%	16	－	0.53	15	－
89 テナガダラ Longarm grenadier												
(Coelorinchus macrochir)	～2011	1	0	0%	－	1	100%	22	22	－	－	22
	2012	4	2	50%	16	4	100%	10	－	－	－	9
90 トラフグ Tiger puffer												
(Takifugu rubripes)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	1	100%	17	1	100%	<17	－	0	17	－
	2013	5	3	60%	15-17	5	100%	26	－	－	－	12
91 ナガヅカ Long shanny												
(Stichaeus grigorjewi)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	0	0%	－	0	0%	320	320	－	－	320
	2013	9	6	67%	15-16	9	100%	26	－	6	16	－
92 ナガレメイタガレイ Flounder												
(Pleuronichthys japonicus)	～2011	16	2	13%	－	16	100%	80	29	－	－	－
	2012	35	23	66%	13-20	35	100%	34	－	4.8	15	－
	2013	50	49	98%	11-19	50	100%	9.3	－	0.19	16	－
93 ニギス Deep-sea smelt												
(Glossanodon semifasciatus)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	4	4	100%	12-18	4	100%	<18	－	0	16	－
	2013	3	3	100%	15-17	3	100%	<17	－	0	16	－
94 ニジカジカ Elkhorn sculpin												
(Alcichthys elongatus)	～2011	1	0	0%	－	1	100%	20	20	－	－	20
95 ニシン Pacific herring												
(Clupea pallasii)	2012	1	1	100%	16	1	100%	<16	－	0	16	－
96 ニベ Nibe croaker												
(Nibea mitsukurii)	～2011	26	0	0%	－	3	12%	390	220	－	－	220
	2012	67	3	4%	13-16	58	87%	170	50	－	－	61
	2013	44	24	55%	13-19	44	100%	34	－	－	－	10
97 ヌマガレイ Starry flounder												
(Platichthys stellatus)	～2011	4	0	0%	－	1	25%	550	140	－	－	210
	2012	5	0	0%	－	3	60%	280	37	－	－	120
	2013	8	2	25%	15-18	7	88%	290	9.8	－	－	51
98 ハツメ Owston's rockfish												
(Sebastes owstoni)	2012	1	0	0%	－	1	100%	8.6	8.6	－	－	8.6
99 ババガレイ Slime flounder												
(Microstomus achne)	～2011	150	28	19%	－	98	65%	1,500	53	－	－	－
	2012	269	104	39%	13-20	215	80%	1,100	14	－	－	84
	2013	346	242	70%	11-20	332	96%	320	－	16	27	－
100 ヒガンフグ Panther puffer												
(Takifugu pardalis)	～2011	9	1	11%	－	5	56%	370	92	－	－	－
	2012	21	6	29%	13-19	21	100%	98	30	－	－	34
	2013	9	7	78%	13-17	9	100%	43	－	5.8	18	－
101 ヒラメ Olive flounder												
(Paralichthys olivaceus)	～2011	258	2	1%	－	126	49%	4,500	110	－	－	－
	2012	387	43	11%	13-19	305	79%	690	41	－	－	66
	2013	412	198	48%	12-20	405	98%	230	7.7	－	－	21

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Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≤ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
102 ヒレグロ Blackfin flounder												
(Glyptocephalus stelleri)	～2011	4	3	75%	–	4	100%	29	–	7.3	–	–
	2012	49	46	94%	12–19	49	100%	18	–	0.65	16	–
	2013	117	117	100%	12–20	117	100%	<20	–	0	15	–
103 ホウボウ Gurnard												
(Chelidonichthys spinosus)	～2011	44	1	2%	–	29	66%	440	79	–	–	–
	2012	85	34	40%	12–19	83	98%	120	9.4	–	–	22
	2013	107	78	73%	12–20	106	99%	150	–	5.9	17	–
104 ホシエイ Pitted stingray												
(Dasyatis matsubarai)	～2011	1	0	0%	–	1	100%	100	100	–	–	100
	2012	1	0	0%	–	1	100%	99	99	–	–	99
105 ホシガレイ Spotted halibut												
(Verasper variegatus)	～2011	5	0	0%	–	4	80%	340	58	–	–	120
	2012	11	2	18%	16	9	82%	570	41	–	–	92
	2013	23	17	74%	13–18	23	100%	48	–	5.1	17	–
106 ホシザメ Starspotted smooth-hound												
(Mustelus manazo)	～2011	17	0	0%	–	16	94%	110	51	–	–	54
	2012	16	2	13%	20	15	94%	180	37	–	–	50
	2013	24	8	33%	15–19	23	96%	130	11	–	–	23
107 ホッケ Arabesque greenling												
(Pleurogrammus azonus)	～2011	2	2	100%	–	2	100%	<LOD	–	0	–	–
	2012	5	5	100%	12–17	5	100%	<17	–	0	14	–
	2013	1	1	100%	18	1	100%	<18	–	0	18	–
108 ホテイウオ Smooth lumpsucker												
(Aptocyclus ventricosus)	～2011	1	1	100%	–	1	100%	<LOD	–	0	–	–
109 マアジ Japanese jack mackerel												
(Trachurus japonicas)	～2011	42	8	19%	–	35	83%	270	48	–	–	–
	2012	72	43	60%	12–18	72	100%	59	–	–	–	13
	2013	101	99	98%	12–20	101	100%	24	–	0.33	16	–
110 マアナゴ Conger eel												
(Conger myriaster)	～2011	57	13	23%	–	50	88%	180	27	–	–	–
	2012	139	49	35%	13–19	124	89%	360	11	–	–	40
	2013	169	133	79%	12–20	169	100%	52	–	2.5	15	–
111 マガレイ Littlemouth flounder												
(Pleuronectes herzensteini)	～2011	106	4	4%	–	84	79%	420	62	–	–	–
	2012	203	36	18%	13–18	198	98%	150	18	–	–	28
	2013	299	187	63%	7.4–20	299	100%	69	–	6	16	–
112 マコガレイ Marbled flounder												
(Pleuronectes yokohamae)	～2011	151	2	1%	–	80	53%	2,600	96	–	–	–
	2012	217	16	7%	12–20	168	77%	1,300	43	–	–	91
	2013	232	86	37%	13–20	228	98%	180	11	–	–	21
113 マゴチ Flathead												
(Platycephalus sp.)	～2011	21	0	0%	–	9	43%	290	170	–	–	160
	2012	34	0	0%	–	26	76%	650	64	–	–	120
	2013	29	4	14%	15–18	28	97%	110	28	–	–	38
114 マダイ Red seabream												
(Pagrus major)	～2011	8	1	13%	–	8	100%	83	31	–	–	–
	2012	35	14	40%	13–18	35	100%	62	10	–	–	18
	2013	19	15	79%	13–18	19	100%	18	–	2.9	15	–
115 マダラ Pacific cod												
(Gadus macrocephalus)	～2011	103	10	10%	–	72	70%	300	68	–	–	–
	2012	216	43	20%	13–19	199	92%	490	26	–	–	41
	2013	252	149	59%	12–20	250	99%	200	–	–	–	15
116 マツカワ Barfin flounder												
(Verasper moseri)	～2011	2	1	50%	–	2	100%	56	–	–	–	–
	2012	20	16	80%	13–18	19	95%	140	–	18	30	–
	2013	14	11	79%	13–17	14	100%	30	–	3.9	16	–
117 マトウダイ John Dory												
(Zeus faber)	～2011	51	4	8%	–	46	90%	380	39	–	–	–
	2012	64	27	42%	12–20	64	100%	89	8.8	–	–	16
	2013	54	43	80%	13–20	54	100%	29	–	2.3	15	–
118 マフグ Globefish												
(Takifugu porphyreus)	～2011	7	0	0%	–	6	86%	130	70	–	–	81
	2012	26	22	85%	13–19	26	100%	13	–	1.5	15	–
	2013	16	16	100%	12–18	16	100%	<18	–	0	15	–
119 ミギガレイ Rikuzen flounder												
(Dexistes rikuzenius)	～2011	37	20	54%	–	37	100%	31	–	–	–	–
	2012	164	140	85%	7.7–20	164	100%	27	–	1.6	15	–
	2013	217	211	97%	12–20	217	100%	12	–	0.24	16	–
120 ムシガレイ Shotted halibut												
(Eopsetta grigorjewi)	～2011	35	7	20%	–	30	86%	180	50	–	–	–
	2012	119	47	39%	13–20	113	95%	580	11	–	–	38
	2013	147	112	76%	12–19	146	99%	120	–	5.7	17	–
121 ムラソイ Brassblotched rockfish												
(Sebastes pachycephalus	～2011	7	0	0%	–	0	0%	870	180	–	–	280
pachycephalus)	2012	29	0	0%	–	8	28%	1,100	140	–	–	230
	2013	25	0	0%	–	23	92%	160	37	–	–	48
122 メイタガレイ Ridged-eye flounder												
(Pleuronichthys cornutus)	～2011	23	0	0%	–	17	74%	470	43	–	–	89
	2012	38	3	8%	16–18	34	89%	190	28	–	–	43
	2013	44	28	64%	12–20	44	100%	37	–	6.7	17	–

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Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
123 メダイ Pacific barrelfish												
(Hyperoglyphe japonica)	～2011	7	3	43%	−	7	100%	22	7.2	−	−	−
	2012	12	12	100%	13−18	12	100%	<18	−	0	16	−
	2013	15	15	100%	13−18	15	100%	<18	−	0	16	−
124 ヤナギムシガレイ Willowy flounder												
(Tanakius kitaharai)	～2011	54	14	26%	−	54	100%	96	18	−	−	−
	2012	130	62	48%	12−20	130	100%	82	7.1	−	−	13
	2013	185	149	81%	12−20	185	100%	49	−	2.5	15	−
125 ユメカサゴ Hilgendorf' saucord												
(Helicolenus hilgendorfi)	～2011	9	3	33%	−	9	100%	72	11	−	−	−
	2012	116	92	79%	12−20	116	100%	46	−	3.4	16	−
	2013	293	276	94%	11−20	292	100%	110	−	0.93	16	−

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
無脊椎 Invertebrate												
126 アサリ Japanese littleneck clam												
(Venerupis (Ruditapes)	～2011	4	2	50%	－	4	100%	96	－	－	－	－
philippinarum)	2012	29	18	62%	13-20	29	100%	27	－	4.9	15	－
	2013	32	26	81%	13-20	32	100%	52	－	3.8	17	－
127 アワビ Abalone												
(Haliotis sp.)	～2011	24	3	13%	－	15	63%	480	80	－	－	－
	2012	52	45	87%	14-20	52	100%	32	－	1.8	16	－
	2013	67	67	100%	12-20	67	100%	<20	－	0	16	－
128 イイダコ Ocellated Octopus												
(Octopus ocellatus)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
	2012	6	6	100%	14-18	6	100%	<18	－	0	16	－
129 イガイ Hard-shelled mussel												
(Mytilus coruscus)	～2011	1	0	0%	－	0	0%	160	160	－	－	160
	2012	1	1	100%	17	1	100%	<17	－	0	17	－
130 イセエビ Japanese spiny lobster												
(Panulirus japonicus)	～2011	2	0	0%	－	1	50%	140	85	－	－	85
	2012	2	2	100%	17-18	2	100%	<18	－	0	18	－
131 イワガキ Japanese rock oyster												
(Crassostrea nippona)	～2011	1	0	0%	－	1	100%	61	61	－	－	61
	2012	1	1	100%	16	1	100%	<16	－	0	16	－
132 ウバガイ(ホッキガイ) Surf clam												
(Pseudocardium sachalinense)	～2011	39	0	0%	－	14	36%	940	170	－	－	220
	2012	33	19	58%	14-20	33	100%	45	－	－	－	14
	2013	32	32	100%	12-18	32	100%	<18	－	0	16	－
133 エゾハリイカ Andrea cuttlefish												
(Sepia andreana)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
	2012	9	9	100%	15-19	9	100%	<19	－	0	17	－
	2013	11	11	100%	13-19	11	100%	<19	－	0	16	－
134 エゾボラモドキ Double sculptured neptune												
(Neptunea intersculpta)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	27	27	100%	13-19	27	100%	<19	－	0	16	－
	2013	27	27	100%	7.6-19	27	100%	<19	－	0	15	－
135 オキナマコ Sea cucumber												
(Parastichopus gripunctatus)	～2011	6	5	83%	－	6	100%	34	－	5.7	－	－
	2012	9	9	100%	14-18	9	100%	<18	－	0	16	－
	2013	55	55	100%	13-19	55	100%	<19	－	0	16	－
136 ガザミ Swimming crab												
(Portunus trituberculatus)	～2011	13	8	62%	－	13	100%	55	－	13	－	－
	2012	21	19	90%	12-20	21	100%	26	－	1.7	16	－
	2013	27	27	100%	13-19	27	100%	<19	－	0	16	－
137 キシエビ Kishi velvet shrimp												
(Metapenaeopsis dalei)	～2011	2	0	0%	－	2	100%	55	37	－	－	37
138 キタムラサキウニ Northern sea urchin												
(Strongylocentrotus nudus)	～2011	26	0	0%	－	4	15%	1,700	290	－	－	420
	2012	52	8	15%	13-19	48	92%	270	42	－	－	53
	2013	54	40	74%	13-20	54	100%	15	－	2.8	14	－
139 クルマエビ Japanese tiger shrimp												
(Marsupenaeus japonicus)	～2011	1	0	0%	－	1	100%	12	12	－	－	12
140 ケガニ Horsehair crab												
(Erimacrus isenbeckii)	～2011	6	6	100%	－	6	100%	<LOD	－	0	－	－
	2012	71	71	100%	12-19	71	100%	<19	－	0	16	－
	2013	73	73	100%	12-20	73	100%	<20	－	0	16	－
141 ケンサキイカ Swordtip squid												
(Photololigo edulis)	～2011	9	7	78%	－	9	100%	23	－	3.4	－	－
	2012	7	7	100%	14-18	7	100%	<18	－	0	16	－
142 コウイカ Golden cuttlefish												
(Sepia esculenta)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
143 コタマガイ Clam												
(Gomphina melanegis)	2012	3	3	100%	13-16	3	100%	<16	－	0	14	－
	2013	12	12	100%	12-20	12	100%	<20	－	0	17	－
144 サルエビ Cocktail shrimp												
(Trachypenaeus curvirostris)	～2011	3	1	33%	－	2	67%	170	85	－	－	－
	2012	1	1	100%	15	1	100%	<15	－	0	15	－
145 シャコ Mantis shrimp												
(Oratosquilla oratoria)	～2011	2	0	0%	－	2	100%	50	35	－	－	35
	2012	1	1	100%	17	1	100%	<17	－	0	17	－
146 シライトマキバイ Japanese whelk												
(Buccinum isaotakii)	～2011	5	5	100%	－	5	100%	<LOD	－	0	－	－
	2012	44	44	100%	13-20	44	100%	<20	－	0	16	－
	2013	32	32	100%	13-19	32	100%	<19	－	0	16	－
147 ジンドウイカ Japanese dwarf squid												
(Loligo japonica)	～2011	19	16	84%	－	19	100%	82	－	6.9	－	－
	2012	44	44	100%	13-20	44	100%	<20	－	0	16	－
	2013	56	56	100%	12-19	56	100%	<19	－	0	15	－
148 スルメイカ Japanese flying squid												
(Todarodes pacificus)	～2011	19	17	89%	－	19	100%	49	－	2.8	－	－
	2012	69	69	100%	11-19	69	100%	<19	－	0	15	－
	2013	119	119	100%	12-20	119	100%	<20	－	0	16	－

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
149 ズワイガニ Snow crab												
(Chionoecetes opilio)	～2011	20	20	100%	−	20	100%	<LOD	−	0	−	−
	2012	42	42	100%	12−19	42	100%	<19	−	0	15	−
	2013	11	11	100%	13−18	11	100%	<18	−	0	15	−
150 チヂミエゾボラ Whelk												
(Neptunea constricta)	～2011	8	8	100%	−	8	100%	<LOD	−	0	−	−
	2012	13	13	100%	12−18	13	100%	<18	−	0	14	−
	2013	6	6	100%	16−19	6	100%	<19	−	0	17	−
151 ツノナシオキアミ North Pacific krill												
(Euphausia pacifica)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
152 トゲクリガニ Helmet crab												
(Telmessus cheiragonus)	～2011	1	0	0%	−	1	100%	41	41	−	−	41
153 ドスイカ Schoolmaster gonate squid												
(Berryteutbis magister)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2013	1	1	100%	17	1	100%	<17	−	0	17	−
154 ナガバイ Whelk												
(Beringius polynematicus)	～2011	5	5	100%	−	5	100%	<LOD	−	0	−	−
	2012	3	3	100%	15−19	3	100%	<19	−	0	17	−
	2013	1	1	100%	17	1	100%	<17	−	0	17	−
155 ネジヌキバイ Hirose's japelion												
(Japelion hirasei)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
156 ヒゴロモエビ Higoromo Shrimp												
(Pandalopsis coccinata)	～2011	3	3	100%	−	3	100%	<LOD	−	0	−	−
	2012	3	3	100%	13−16	3	100%	<16	−	0	14	−
	2013	4	4	100%	13−19	4	100%	<19	−	0	16	−
157 ビノスガイ Stimpson's hard clam												
(Mercenaria stimpsoni)	～2011	1	0	0%	−	0	0%	110	110	−	−	110
158 ヒメエゾボラ Whelk												
(Neptunea arthritica arthritica)	～2011	4	4	100%	−	4	100%	<LOD	−	0	−	−
	2012	11	11	100%	15−19	11	100%	<19	−	0	17	−
	2013	1	1	100%	19	1	100%	<19	−	0	19	−
159 ヒラツメガニ Sand crab												
(Ovalipes punctatus)	～2011	23	9	39%	−	19	83%	360	8	−	−	−
	2012	36	27	75%	12−19	36	100%	28	−	3.4	15	−
	2013	42	40	95%	13−20	42	100%	10	−	0.42	16	−
160 ベニズワイガニ Red snow crab												
(Chionoecetes japonicus)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	14	1	100%	<14	−	0	14	−
	2013	5	5	100%	14−19	5	100%	<19	−	0	16	−
161 ホタテガイ Scallop												
(Mizuhopecten yessoensis)	～2011	1	0	0%	−	1	100%	19	19	−	−	19
162 ボタンエビ Botan shrimp												
(Pandalus nipponesis)	2012	3	3	100%	16−19	3	100%	<19	−	0	18	−
163 ホッコクアカエビ Alaskan pink shrimp												
(Pandalus eous)	～2011	6	6	100%	−	6	100%	<LOD	−	0	−	−
	2012	8	8	100%	13−17	8	100%	<17	−	0	15	−
	2013	3	3	100%	15−17	3	100%	<17	−	0	16	−
164 マガキ Pacific oyster												
(Crassostrea gigas)	～2011	2	2	100%	−	2	100%	<LOD	−	0	−	−
	2012	1	1	100%	19	1	100%	<19	−	0	19	−
165 マダコ Common octopus												
(Octopus vulgaris)	～2011	24	21	88%	−	24	100%	27	−	2.5	−	−
	2012	43	42	98%	12−19	43	100%	31	−	0.72	16	−
	2013	56	56	100%	13−19	56	100%	<19	−	0	16	−
166 マナマコ Japanese common sea cucumber												
(Stichopus japonicus)	～2011	12	10	83%	−	12	100%	29	−	3.5	−	−
	2012	10	9	90%	12−19	10	100%	11	−	1.1	15	−
	2013	17	17	100%	12−19	17	100%	<19	−	0	16	−
167 マボヤ Common sea squirt												
(Halocynthia roretzi)	～2011	3	2	67%	−	3	100%	11	−	3.7	−	−
	2012	1	1	100%	19	1	100%	<19	−	0	19	−
	2013	7	7	100%	14−19	7	100%	<19	−	0	16	−
168 ミズダコ Giant Pacific octopus												
(Paroctopus dofleini)	～2011	42	34	81%	−	40	95%	360	−	17	−	−
	2012	120	120	100%	12−20	120	100%	<20	−	0	16	−
	2013	117	117	100%	12−19	117	100%	<19	−	0	16	−
169 ムラサキイガイ Mediterranean mussel												
(Mytilus galloprovincialis)	～2011	6	1	17%	−	3	50%	650	110	−	−	−
170 モスソガイ Paper whelk												
(Volutharpa ampullacea)	～2011	3	2	67%	−	3	100%	11	−	3.7	−	−
	2012	6	6	100%	14−19	6	100%	<19	−	0	18	−
171 ヤナギダコ Chestnut octopus												
(Octopus conispadiceus)	～2011	41	37	90%	−	41	100%	40	−	2.4	−	−
	2012	137	137	100%	12−20	137	100%	<20	−	0	16	−
	2013	226	226	100%	12−20	226	100%	<20	−	0	16	−
172 ヤリイカ Spear squid												
(Loligo bleekeri)	～2011	14	14	100%	−	14	100%	<LOD	−	0	−	−
	2012	63	62	98%	12−19	63	100%	6.3	−	0.1	16	−
	2013	110	109	99%	11−19	110	100%	24	−	0.22	16	−

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
海藻類 Seaweeds												
173 アラメ Arame seaweed												
(Eisenia bicyclis)	～2011	24	5	21%	－	10	42%	970	160	－	－	－
	2012	2	2	100%	11－18	2	100%	<18	－	0	15	－
	2013	1	1	100%	9.8	1	100%	<9.8	－	0	9.8	－
174 コンブ Sea tangle												
(Laminaria)	～2011	3	1	33%	－	2	67%	110	95	－	－	－
	2013	1	1	100%	9.9	1	100%	<9.9	－	0	9.9	－
175 ヒジキ Hijiki seaweed												
(Hizikia fusiformis)	～2011	2	0	0%	－	0	0%	1,100	610	－	－	610
	2013	1	1	100%	7.4	1	100%	<7.4	－	0	7.4	－
176 ヒトエグサ(養殖) Green laver (farmed)												
(Monostroma nitidum)	～2011	10	7	70%	－	10	100%	47	－	9.7	－	－
	2012	19	16	84%	6.3－19	19	100%	12	－	1.3	10	－
	2013	17	12	71%	5.2－10	17	100%	21	－	2.2	7.1	－
177 マツモ Rigid Hornwort												
(Ceratophyllum demersum)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2013	1	0	0%	－	1	100%	3.3	3.3	－	－	3.3
178 ワカメ Wakame seaweed												
(Undaria pinnatifida)	～2011	9	2	22%	－	7	78%	1,200	56	－	－	－
	2013	1	1	100%	6.7	1	100%	<6.7	－	0	6.7	－

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淡水 Freshwater												
179 アユ Ayu sweetfish (wild)												
(Plecoglossus altivelis)	～2011	74	6	8%	−	34	46%	4,400	120	−	−	−
	2012	59	30	51%	13−18	55	93%	280	−	−	−	34
	2013	49	25	51%	12−18	48	98%	200	−	−	−	29
180 アユ(養殖) Ayu sweetfish (farmed)												
(Plecoglossus altivelis)	～2011	4	2	50%	−	4	100%	17	−	−	−	−
	2012	4	4	100%	15−17	4	100%	<17	−	0	16	−
	2013	2	1	50%	14	2	100%	93	−	−	−	50
181 イワナ Whitespotted char (wild)												
(Salvelinus leucomaenis)	～2011	44	3	7%	−	23	52%	590	91	−	−	−
	2012	161	48	30%	13−19	132	82%	840	28	−	−	68
	2013	177	48	27%	13−19	162	92%	600	16	−	−	38
182 イワナ(養殖) Whitespotted char (farmed)												
(Salvelinus leucomaenis)	～2011	90	80	89%	−	90	100%	30	−	2.1	−	−
	2012	98	98	100%	12−19	98	100%	<19	−	0	16	−
	2013	98	97	99%	12−20	98	100%	7.3	−	0.074	16	−
183 ウグイ Japanese dace (wild)												
(Tribolodon hakonensis)	～2011	46	3	7%	−	31	67%	2,500	83	−	−	−
	2012	64	9	14%	14−19	51	80%	420	26	−	−	66
	2013	75	36	48%	13−19	70	93%	390	7.4	−	−	29
184 ウチダザリガニ Signal crayfish												
(Pacifastacus leniusculus)	～2011	2	0	0%	−	0	0%	290	250	−	−	250
185 ウナギ Japanese eel (wild)												
(Anguilla japonica)	～2011	3	1	33%	−	1	33%	140	110	−	−	−
	2012	3	0	0%	−	1	33%	390	140	−	−	190
	2013	2	0	0%	−	1	50%	110	84	−	−	84
186 ギンブナ Silver crucian carp (wild)												
(Carassius langsdorfii)	～2011	18	2	11%	−	13	72%	190	67	−	−	−
	2012	13	0	0%	−	9	69%	310	77	−	−	95
	2013	17	1	6%	19	12	71%	310	52	−	−	89
187 ゲンゴロウブナ Japanese crucian carp (wild)												
(Carassius cuvieri)	～2011	3	0	0%	−	2	67%	200	34	−	−	88
	2012	1	0	0%	−	0	0%	170	170	−	−	170
	2013	2	0	0%	−	1	50%	120	94	−	−	94
188 コイ Common carp (wild)												
(Cyprinus carpio)	～2011	13	2	15%	−	10	77%	160	56	−	−	−
	2012	23	4	17%	15−17	21	91%	280	29	−	−	57
	2013	17	1	6%	17	15	88%	110	30	−	−	47
189 コイ(養殖) Common carp (farmed)												
(Cyprinus carpio)	～2011	14	6	43%	−	14	100%	77	17	−	−	−
	2012	10	8	80%	14−19	10	100%	7.5	−	1.5	15	−
	2013	12	11	92%	14−20	12	100%	7.6	−	0.63	16	−
190 コクチバス Smallmouth bass												
(Micropterus dolomieu)	～2011	5	0	0%	−	3	60%	330	93	−	−	120
191 シロザケ(淡水域) Chum salmon (Freshwater)												
(Oncorhynchus keta)	～2011	40	39	98%	−	40	100%	8	−	0.2	−	−
192 タニシ Mud snail												
(Cyclophorus spp.)	～2011	2	2	100%	−	2	100%	<LOD	−	0	−	−
	2013	2	2	100%	14−17	2	100%	<17	−	0	16	−
193 ドジョウ Oriental weather loach (wild)												
(Misgurnus anguillicaudatus)	～2011	4	0	0%	−	4	100%	83	47	−	−	50
	2012	1	0	0%	−	1	100%	9.7	9.7	−	−	9.7
	2013	1	1	100%	16	1	100%	<16	−	0	16	−
194 ドジョウ(養殖) Oriental weather loach (farmed)												
(Misgurnus anguillicaudatus)	～2011	1	0	0%	−	0	0%	280	280	−	−	280
	2012	1	0	0%	−	0	0%	240	240	−	−	240
195 ニゴイ Barbel steed												
(Hemibarbus barbus)	～2011	2	0	0%	−	1	50%	110	97	−	−	97
196 ニジマス Rainbow trout (wild)												
(Oncorhynchus mykiss)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	17	1	100%	<17	−	0	17	−
197 ニジマス(養殖) Rainbow trout (farmed)												
(Oncorhynchus mykiss)	～2011	17	13	76%	−	17	100%	35	−	3.8	−	−
	2012	21	21	100%	14−20	21	100%	<20	−	0	16	−
	2013	24	22	92%	13−18	24	100%	16	−	1.1	16	−
198 ヒメマス Kokanee (wild)												
(Oncorhyunchus nerka)	～2011	6	0	0%	−	2	33%	160	120	−	−	110
	2012	10	0	0%	−	1	10%	200	140	−	−	140
	2013	17	0	0%	−	9	53%	170	100	−	−	110
199 ホンモロコ(養殖) Willow gudgeon (farmed)												
(Gnathopogon caerulescens)	～2011	1	0	0%	−	0	0%	1,300	1,300	−	−	1,300
200 マシジミ Freshwater clam												
(Corbicula leana)	～2011	2	1	50%	−	2	100%	27	−	−	−	−
	2013	2	2	100%	14−19	2	100%	<19	−	0	17	−
201 モクズガニ Japanese mitten crab												
(Eriocheir japonica)	～2011	2	0	0%	−	0	0%	1,900	1,100	−	−	1,100
202 モツゴ(養殖) Topmouth gudgeon (farmed)												
(Pseudorasbora parva)	～2011	3	0	0%	−	2	67%	120	85	−	−	89

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203 ヤマメ Land-locked salmon (wild)												
(Oncorhynchus masou)	～2011	69	6	9%	－	32	46%	19,000	110	－	－	－
	2012	120	31	26%	13-19	97	81%	1,400	29	－	－	88
	2013	145	56	39%	11-19	126	87%	570	11	－	－	46
204 ヤマメ(養殖) Land-locked salmon (farmed)												
(Oncorhynchus masou)	～2011	29	24	83%	－	29	100%	35	－	3	－	－
	2012	21	20	95%	12-19	21	100%	24	－	1.1	16	－
	2013	18	18	100%	14-19	18	100%	<19	－	0	16	－
205 ワカサギ Japanese smelt (wild)												
(Hypomesus nipponensis)	～2011	41	2	5%	－	4	10%	870	240	－	－	－
	2012	29	3	10%	15-19	29	100%	76	44	－	－	44
	2013	13	2	15%	13-15	13	100%	76	19	－	－	29
206 会津ユキマス Peled whitefish												
(Coregonus peled)	2012	2	2	100%	13-16	2	100%	<16	－	0	15	－
207 会津ユキマス(養殖) Peled whitefish (farmed)												
(Coregonus peled)	～2011	12	10	83%	－	12	100%	9.3	－	1.4	－	－
	2012	12	11	92%	14-18	12	100%	10	－	0.83	15	－
	2013	10	10	100%	15-19	10	100%	<19	－	0	16	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
ごく表層 very surface												
1 イシカワシラウオ Ishikawa icefish												
(Salangichthys ishikawae)	～2011	5	1	20%	－	5	100%	4.5	3.3	－	－	－
	2012	14	8	57%	0.98-15	14	100%	7.2	－	－	－	3.3
	2013	3	1	33%	0.98	3	100%	4	0.71	－	－	1.7
2 コウナゴ Japanese sandlance												
(Ammodytes personatus)	～2011	31	9	29%	－	20	65%	1,400	66	－	－	－
	2012	34	19	56%	0.72-13	34	100%	6.7	－	－	－	3.6
	2013	26	22	85%	0.98-15	26	100%	1.1	－	0.11	6.6	－
3 シラウオ Japanese icefish												
(Salangichthys microdon)	～2011	26	1	4%	－	25	96%	290	8	－	－	－
	2012	15	11	73%	3.6-14	15	100%	9	－	1.7	5.6	－
	2013	9	4	44%	4-20	9	100%	3.6	0.82	－	－	3.1
4 シラス Whitebait												
	～2011	61	16	26%	－	60	98%	180	6	－	－	－
	2012	23	17	74%	0.88-20	23	100%	2.8	－	0.24	5.9	－
	2013	67	51	76%	0.52-11	67	100%	3	－	0.16	2.1	－
5 ノレソレ Conger eel (Juvenile)												
(Conger myriaster)	～2011	5	0	0%	－	5	100%	21	12	－	－	11
	2012	4	4	100%	1.1-5.4	4	100%	<5.4	－	0	3.5	－
	2013	2	2	100%	4.7-5	2	100%	<5	－	0	4.9	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
表層 Surface layer												
6 アカカマス Red barracuda												
(Sphyraena pinguis)	～2011	8	1	13%	−	8	100%	43	5.1	−	−	−
	2012	13	10	77%	4.9−14	13	100%	1.7	−	0.3	7	−
	2013	25	13	52%	0.98−13	25	100%	1.8	−	−	−	2.1
7 アカマンボウ Opah												
(Lampris guttatus)	～2011	1	0	0%	−	1	100%	2.4	2.4	−	−	2.4
8 ウルメイワシ Round herring												
(Etrumeus teres)	～2011	3	1	33%	−	3	100%	5.5	0.75	−	−	−
	2012	7	4	57%	1.1−8.3	7	100%	2.3	−	−	−	1.8
	2013	10	8	80%	0.87−6.2	10	100%	1.3	−	0.2	2	−
9 オオメナツトビ Limpid-wing flyingfish												
(Cypselurus unicolor)	2012	20	18	90%	1.2−16	20	100%	0.58	−	0.057	9	−
	2013	9	9	100%	7.6−13	9	100%	<13	−	0	10	−
10 カタクチイワシ Anchovy												
(Engraulis japonicus)	～2011	95	10	11%	−	94	99%	170	2.5	−	−	−
	2012	115	58	50%	0.6−13	115	100%	8.6	−	−	−	1.2
	2013	111	96	86%	0.62−10	111	100%	1.7	−	0.099	1.3	−
11 カツオ Skipjack tuna												
(Katsuwonus pelamis)	～2011	97	48	49%	−	97	100%	33	1.4	−	−	−
	2012	221	200	90%	0.48−20	221	100%	1.7	−	0.061	13	−
	2013	159	95	60%	0.6−12	159	100%	3.3	−	−	−	0.67
12 カマス Barracuda												
(Sphyraena pinguis)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	9.4	1	100%	<9.4	−	0	9.4	−
	2013	2	2	100%	8.3−8.6	2	100%	<8.6	−	0	8.5	−
13 クロシビカマス Black tuna												
(Promethichthys prometheus)	2013	1	1	100%	9.5	1	100%	<9.5	−	0	9.5	−
14 サヨリ Halfbeak												
(Hemiramphus sajori)	～2011	26	4	15%	−	26	100%	16	3.5	−	−	−
	2012	28	14	50%	0.91−8	28	100%	9.8	−	−	−	2.3
	2013	24	20	83%	0.68−15	24	100%	27	−	1.4	7.2	−
15 サンマ Pacific saury												
(Cololabis saira)	～2011	108	89	82%	−	108	100%	12	−	0.35	−	−
	2012	131	125	95%	0.53−13	131	100%	2.5	−	0.058	1.4	−
	2013	70	70	100%	0.55−1.7	70	100%	<1.7	−	0	1	−
16 シュモクザメ Hammerhead shark												
	2012	2	0	0%	−	2	100%	7.6	4.2	−	−	4.2
17 スマ Mackerel tuna												
(Euthynnus affinis)	2013	1	1	100%	14	1	100%	<14	−	0	14	−
18 チカ Japanese surfsmelt												
(Hypomesus japonicus)	2013	1	1	100%	10	1	100%	<10	−	0	10	−
19 ツクシトビウオ Mediterranean flyingfish												
(Cheilopogon heterurus)	2013	3	3	100%	1−14	3	100%	<14	−	0	7.3	−
20 トビウオ Flyingfish												
(Cypselurus agoo)	2012	6	6	100%	8.7−14	6	100%	<14	−	0	11	−
	2013	4	4	100%	0.9−15	4	100%	<15	−	0	8.6	−
21 ハマトビウオ Coast flyingfish												
(Cypselurus pinnatibarbatus	～2011	2	1	50%	−	2	100%	0.94	−	−	−	−
japonicus)	2012	1	1	100%	10	1	100%	<10	−	0	10	−
	2013	3	3	100%	5.5−10	3	100%	<10	−	0	8.5	−
22 ヒラソウダ Frigate tuna												
(Auxis thazard thazard)	～2011	1	0	0%	−	1	100%	12	12	−	−	12
	2012	1	0	0%	−	1	100%	4.6	4.6	−	−	4.6
23 マイワシ Japanese sardine												
(Sardinops melanostictus)	～2011	107	8	7%	−	107	100%	41	7.4	−	−	−
	2012	85	62	73%	0.6−13	85	100%	3.5	−	0.39	2.1	−
	2013	79	66	84%	0.61−10	79	100%	1	−	0.084	2.1	−
24 ヤマトカマス Japanese barracuda												
(Sphyraena japonica)	～2011	4	0	0%	−	4	100%	19	4.9	−	−	7.7
	2012	2	2	100%	5.9−6.3	2	100%	<6.3	−	0	6.1	−
	2013	2	2	100%	8.4−9.8	2	100%	<9.8	−	0	9.1	−

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中層 Intermediate layer												
25 アオザメ Shortfin mako shark												
(Isurus oxyrinchus)	～2011	3	0	0%	－	3	100%	22	4	－	－	8.9
	2012	21	0	0%	－	21	100%	36	4.5	－	－	7.4
	2013	8	1	13%	1	8	100%	3	1.8	－	－	1.7
26 イタチザメ Tiger shark												
(Galeocerdo cuvier)	2012	1	0	0%	－	1	100%	0.79	0.79	－	－	0.79
27 オナガザメ Thresher shark												
(Alopias sp.)	2012	2	0	0%	－	2	100%	0.9	0.78	－	－	0.78
28 カマスサワラ Wahoo												
(Acanthocybium solandri)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	0	0%	－	1	100%	0.45	0.45	－	－	0.45
29 カラフトマス Pink Salmon												
(Oncorhynchus gorbuscha)	～2011	4	0	0%	－	4	100%	77	7.9	－	－	24
	2012	11	1	9%	8.9	11	100%	2	0.62	－	－	1.2
	2013	25	19	76%	0.62-14	25	100%	3	－	0.25	3.6	－
30 カンパチ Greater amberjack												
(Seriola dumerili)	～2011	5	0	0%	－	5	100%	59	12	－	－	21
	2012	20	18	90%	0.82-20	20	100%	3.2	－	0.19	11	－
	2013	6	5	83%	6-9.9	6	100%	0.54	－	0.09	7	－
31 カンパチ(養殖) Greater amberjack (farmed)												
(Seriola dumerili)	～2011	3	3	100%	－	3	100%	<LOD	－	0	－	－
32 キハダ Yellowfin tuna												
(Thunnus albacares)	～2011	11	3	27%	－	11	100%	10	2.2	－	－	－
	2012	22	14	64%	0.79-12	22	100%	3.4	－	0.52	1.7	－
	2013	2	2	100%	0.9-1.1	2	100%	<1.1	－	0	1	－
33 ギンザケ Coho salmon												
(Oncorhynchus kisutsh)	～2011	3	0	0%	－	2	67%	110	11	－	－	42
34 ギンザケ(養殖) Coho salmon (farmed)												
(Oncorhynchus kisutsh)	2012	16	15	94%	0.78-15	16	100%	0.71	－	0.044	8.4	－
	2013	11	11	100%	0.79-14	11	100%	<14	－	0	8.3	－
35 クサカリツボダイ North Pacific Armorhead												
(Pseudopentaceros wheeleri)	2012	2	2	100%	0.91-1.1	2	100%	<1.1	－	0	1	－
36 クロカジキ Blue marlin												
(Makaira mazara)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
37 クロマグロ Bluefin tuna												
(Thunnus thynnus)	～2011	5	0	0%	－	5	100%	33	26	－	－	25
	2012	17	8	47%	1.1-14	17	100%	3.4	0.69	－	－	2.5
	2013	9	4	44%	1.2-13	9	100%	0.74	0.42	－	－	2
38 コノシロ Dotted gizzard shad												
(Konosirus punctatus)	～2011	2	0	0%	－	2	100%	24	13	－	－	13
	2012	11	5	45%	1.2-8.7	11	100%	10	0.36	－	－	3.5
	2013	14	8	57%	1.1-12	14	100%	0.95	－	－	－	2.2
39 ゴマサバ Southern mackerel												
(Scomber australasicus)	～2011	110	12	11%	－	110	100%	31	6	－	－	－
	2012	152	117	77%	0.66-16	152	100%	13	－	0.31	7.2	－
	2013	123	117	95%	0.64-15	123	100%	2	－	0.038	6.8	－
40 サクラマス Cherry salmon												
(Oncorhynchus masou)	～2011	7	7	100%	－	7	100%	<LOD	－	0	－	－
	2012	32	25	78%	0.86-14	32	100%	4.6	－	0.54	7.1	－
	2013	19	17	89%	0.89-14	19	100%	1.1	－	0.091	8	－
41 サワラ Japanese Spanish mackerel												
(Scomberomorus niphonius)	～2011	15	12	80%	－	15	100%	3.1	－	0.37	－	－
	2012	37	30	81%	0.88-15	37	100%	48	－	3.6	10	－
	2013	38	26	68%	0.77-14	38	100%	4	－	0.51	4.5	－
42 シイラ Mahi-mahi												
(Coryphaena hippurus)	～2011	6	0	0%	－	6	100%	21	8.5	－	－	8.7
	2012	6	3	50%	0.93-1.2	6	100%	4.2	－	－	－	1.2
	2013	4	4	100%	0.74-12	4	100%	<12	－	0	5.5	－
43 シマガツオ Pacific pomfret												
(Brama japonica)	2012	3	1	33%	11	3	100%	3.3	0.64	－	－	3.1
	2013	5	5	100%	0.9-9.6	5	100%	<9.6	－	0	7.4	－
44 シロザケ Chum salmon												
(Oncorhynchus keta)	～2011	167	163	98%	－	167	100%	7.4	－	0.081	－	－
	2012	212	206	97%	0.53-15	212	100%	0.58	－	0.012	6.2	－
	2013	204	203	100%	0.58-15	204	100%	0.77	－	0.0038	5.3	－
45 スズキ Seabass												
(Lateolabrax japonicus)	～2011	68	1	1%	－	53	78%	360	55	－	－	－
	2012	385	26	7%	4.6-14	368	96%	600	27	－	－	38
	2013	500	29	6%	1.2-17	498	100%	1,000	12	－	－	17
46 タカベ Yellowstriped butterfish												
(Labracoglossa argentiventris)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	1	100%	0.95	1	100%	<0.95	－	0	0.95	－
	2013	1	1	100%	8.1	1	100%	<8.1	－	0	8.1	－
47 タチウオ Hairtail												
(Trichiurus lepturus)	～2011	4	1	25%	－	4	100%	19	5.2	－	－	－
	2012	4	4	100%	5.2-11	4	100%	<11	－	0	8.8	－
	2013	3	3	100%	4.7-9.6	3	100%	<9.6	－	0	6.7	－
48 ネズミザメ Salmon shark												
(Lamna ditropis)	～2011	3	0	0%	－	3	100%	40	36	－	－	27
	2012	29	3	10%	0.8-13	29	100%	21	9.3	－	－	8.9
	2013	11	4	36%	0.74-1.2	11	100%	6.6	0.94	－	－	1.9

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49 ハマチ、ブリ（養殖) Japanese amberjack (farmed)												
(Seriola quinqueraduata)	～2011	20	20	100%	－	20	100%	<LOD	－	0	－	－
	2012	3	3	100%	12-20	3	100%	<20	－	0	15	－
50 ヒラスズキ Blackfin seabass												
(Lateolabrax latus katayama)	2013	1	0	0%	－	1	100%	1.6	1.6	－	－	1.6
51 ヒラマサ Yellowtail amberjack												
(Seriola lalandi)	2012	11	8	73%	0.85-20	11	100%	4.2	－	0.71	8.4	－
	2013	16	6	38%	1-13	16	100%	3.9	0.75	－	－	2.1
52 ヒラマサ(養殖) Yellowtail amberjack (farmed)												
(Seriola lalandi)	2012	1	1	100%	20	1	100%	<20	－	0	20	－
53 ヒレジロマンザイウオ Taractichthys steindachneri□												
	～2011	1	0	0%	－	1	100%	0.66	0.66	－	－	0.66
54 ビンナガ Albacore												
(Thunnus alalunga)	～2011	29	10	34%	－	29	100%	10	1.7	－	－	－
	2012	192	130	68%	0.86-20	192	100%	3	－	0.4	13	－
	2013	114	60	53%	0.71-1.4	114	100%	1.1	－	－	－	0.55
55 ブリ Japanese amberjack												
(Seriola quinqueraduata)	～2011	91	9	10%	－	90	99%	110	12	－	－	－
	2012	227	97	43%	0.73-15	227	100%	28	1.3	－	－	4.4
	2013	154	82	53%	0.63-15	154	100%	5.2	－	－	－	2.5
56 マカジキ Striped marlin												
(Kajikia audax)	～2011	8	1	13%	－	8	100%	9.3	2.4	－	－	－
	2012	14	6	43%	0.95-14	14	100%	5.5	0.53	－	－	1.7
	2013	1	1	100%	1.3	1	100%	<1.3	－	0	1.3	－
57 マサバ Chub mackerel												
(Scomber japonicus)	～2011	65	6	9%	－	64	98%	110	8.7	－	－	－
	2012	96	53	55%	0.82-15	96	100%	8.7	－	－	－	2.6
	2013	86	74	86%	0.65-14	86	100%	1.3	－	0.099	3.7	－
58 マルアジ Japanese scad												
(Decapterus maruadsi)	～2011	6	5	83%	－	6	100%	0.56	－	0.093	－	－
	2012	18	16	89%	0.85-20	18	100%	52	－	3	12	－
	2013	10	10	100%	0.79-12	10	100%	<12	－	0	5.5	－
59 マルソウダ Bullet tuna												
(Auxis rochei)	～2011	4	2	50%	－	4	100%	9	－	－	－	－
	2012	19	13	68%	0.83-16	19	100%	2	－	0.43	6.6	－
	2013	15	13	87%	1.2-12	15	100%	2.2	－	0.25	7.9	－
60 マルタ Pacific redfin												
(Tribolodon brandtii)	2013	5	1	20%	9.4	5	100%	4	3.3	－	－	3.8
61 マンボウ Ocean sunfish												
(Mola mola)	2012	2	1	50%	11	2	100%	0.57	－	－	－	3
	2013	3	3	100%	8.6-10	3	100%	<10	－	0	9.3	－
62 ムロアジ Amberstripe scad												
(Decapterus muroadsi)	～2011	1	0	0%	－	1	100%	7	7.2	－	－	7.2
	2012	1	1	100%	11	1	100%	<11	－	0	11	－
	2013	2	2	100%	9.7-11	2	100%	<11	－	0	10	－
63 メアジ Bigeye scad												
(Selar crumenophthalmus)	～2011	1	0	0%	－	1	100%	0.65	0.65	－	－	0.65
	2013	2	1	50%	8.4	2	100%	0.48	－	－	－	2.3
64 メカジキ Swordfish												
(Xiphias gladius)	～2011	11	3	27%	－	11	100%	4.2	1.6	－	－	－
	2012	22	8	36%	0.74-10	22	100%	3.6	0.69	－	－	1.3
	2013	9	3	33%	1.2-9	9	100%	1.8	0.74	－	－	1.3
65 メジロザメ Requiem shark												
	2012	1	0	0%	－	1	100%	1.4	1.4	－	－	1.4
66 メバチ Bigeye tuna												
(Thunnus obesus)	～2011	22	2	9%	－	22	100%	9.9	2.9	－	－	－
	2012	97	68	70%	0.68-20	97	100%	2.9	－	0.3	12	－
	2013	9	3	33%	1-7.7	9	100%	1.1	0.47	－	－	1
67 ヨシキリザメ Blue shark												
(Prionace glauca)	～2011	12	4	33%	－	12	100%	5	2.5	－	－	－
	2012	27	12	44%	0.82-13	27	100%	2.9	0.61	－	－	1.3
	2013	10	5	50%	0.73-1.1	10	100%	0.81	－	－	－	0.5

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底層 Bottom layer												
68 アイナメ Fat greenling												
(Hexagrammos otakii)	～2011	42	9	21%	－	36	86%	200	11	－	－	－
	2012	189	80	42%	0.96-15	189	100%	90	1.8	－	－	12
	2013	183	138	75%	0.72-15	183	100%	41	－	2.1	9.6	－
69 アオメエソ(メヒカリ) Greeneyes												
(Chlorophthalmus borealis)	～2011	21	0	0%	－	21	100%	38	16	－	－	17
	2012	12	7	58%	3.2-14	12	100%	8.5	－	－	－	4.4
	2013	15	13	87%	1.1-14	15	100%	0.66	－	0.077	7.6	－
70 アカアマダイ Horsehead tilefish												
(Branchiostegus japonicus)	2012	3	3	100%	8.6-10	3	100%	<10	－	0	9.5	－
	2013	3	3	100%	8.1-10	3	100%	<10	－	0	9.1	－
71 アカエイ Red stingray												
(Dasyatis akajei)	～2011	4	2	50%	－	4	100%	88	－	－	－	－
	2012	32	3	9%	8.8-12	32	100%	72	12	－	－	22
	2013	34	13	38%	8.4-14	34	100%	54	5.5	－	－	9.9
72 アカガレイ Flathead flounder												
(Hippoglossoides dubius)	～2011	43	9	21%	－	43	100%	38	4.9	－	－	－
	2012	47	19	40%	0.84-14	47	100%	32	3	－	－	5.5
	2013	20	19	95%	0.72-15	20	100%	6.8	－	0.34	7.7	－
73 アカシタビラメ Red tongue sole												
(Cynoglossus joyneri)	～2011	6	2	33%	－	6	100%	66	14	－	－	－
	2012	10	5	50%	5-15	10	100%	8.9	－	－	－	5.6
	2013	19	16	84%	5.2-15	19	100%	19	－	1.3	8.9	－
74 アカタナゴ Surfperch												
(Ditrema temmincki temmincki)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
75 アカムツ Rosy seabass												
(Doederleinia berycoides)	～2011	5	2	40%	－	5	100%	27	1.8	－	－	－
	2012	3	2	67%	5.2-7.2	3	100%	6.1	－	2	6.2	－
	2013	2	2	100%	9.4-12	2	100%	<12	－	0	11	－
76 アカメバル Rockfish												
(Sebastes inermis)	2012	1	1	100%	13	1	100%	<13	－	0	13	－
	2013	1	0	0%	－	1	100%	18	18	－	－	18
77 アコウダイ Matsubara`s red rock fish												
(Sebastes matsubarae)	2013	1	1	100%	1.2	1	100%	<1.2	－	0	1.2	－
78 アサバガレイ Dusky sole												
(Lepidopsetta mochigarei)	～2011	5	4	80%	－	5	100%	2.7	－	0.54	－	－
	2012	4	4	100%	0.8-1.1	4	100%	<1.1	－	0	0.91	－
	2013	3	3	100%	0.95-1.3	3	100%	<1.3	－	0	1.2	－
79 アブラガレイ Kamchatla flounder												
(Atheresthes evermanni)	～2011	23	13	57%	－	23	100%	4.9	－	－	－	－
	2012	28	16	57%	0.74-15	28	100%	6.5	－	－	－	3.6
	2013	20	20	100%	1-14	20	100%	<14	－	0	9.2	－
80 アブラツノザメ Spiny dogfish												
(Squalus acanthias)	～2011	11	6	55%	－	11	100%	37	－	－	－	－
	2012	18	9	50%	0.94-15	18	100%	25	－	－	－	5.4
	2013	5	3	60%	0.86-11	5	100%	4.5	－	－	－	2.4
81 アブラボウズ Skilfish												
(Erilepis zonifer (Lockington))	2012	1	0	0%	－	1	100%	1	1	－	－	1
82 アラメヌケ Rougheye rockfish												
(Sebastes aleutianus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
83 アンコウ Monkfish												
(Lophius litulon)	～2011	36	7	19%	－	36	100%	73	12	－	－	－
	2012	3	2	67%	10-11	3	100%	30	－	10	17	－
	2013	1	0	0%	－	1	100%	3.2	3.2	－	－	3.2
84 イカナゴ Japanese sandlance												
(Ammodytes personatus)	～2011	4	0	0%	－	4	100%	61	35	－	－	35
	2012	21	9	43%	1.8-9.6	21	100%	15	4.4	－	－	5.6
	2013	15	6	40%	1.2-8.2	15	100%	4.5	1.2	－	－	3
85 イサキ Chicken grunt												
(Parapristipoma trilineatum)	～2011	8	7	88%	－	8	100%	0.85	－	0.11	－	－
	2012	6	6	100%	1-15	6	100%	<15	－	0	9	－
	2013	2	2	100%	13	2	100%	<13	－	0	13	－
86 イサキ(養殖) Chicken grunt (farmed)												
(Parapristipoma trilineatum)	2012	2	2	100%	20	2	100%	<20	－	0	20	－
87 イシガキダイ Spotted Knifejaw												
(Oplegnathus punctatus)	2012	4	4	100%	5.6-11	4	100%	<11	－	0	9	－
	2013	1	1	100%	9.3	1	100%	<9.3	－	0	9.3	－
88 イシガレイ Stone flounder												
(Kareius bicoloratus)	～2011	57	3	5%	－	55	96%	180	24	－	－	－
	2012	163	24	15%	1.3-14	159	98%	230	9.7	－	－	19
	2013	165	62	38%	0.71-14	165	100%	46	2.4	－	－	6.7
89 イシダイ Striped beakfish												
(Oplegnathus fasciatus)	～2011	3	2	67%	－	3	100%	4	－	1.3	－	－
	2012	1	1	100%	14	1	100%	<14	－	0	14	－
90 イシモチ Drum												
(Argyrosomus argentatus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
91 イトヒキアジ African pompano												
(Alectis ciliaris)	2013	1	1	100%	6.6	1	100%	<6.6	－	0	6.6	－

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Item	Fiscal year	Number of samples	< Limit of Detection			≦ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
92 イトヒキダラ Threadfin hakeling												
(Laemonema longipes)	～2011	6	5	83%	－	6	100%	1.8	－	0.3	－	－
	2012	14	9	64%	0.7-8.2	14	100%	1.9	－	0.36	1.5	－
	2013	3	3	100%	7.9-14	3	100%	<14	－	0	10	－
93 イヌノシタ Robust tonguefish												
(Cynoglossus robustus)	2012	6	6	100%	10	6	100%	<10	－	0	10	－
	2013	4	4	100%	10	4	100%	<10	－	0	10	－
94 イバラヒゲ Pacific grenadier												
(Coryphaenoides acrolepis)	2012	3	3	100%	0.66-12	3	100%	<12	－	0	4.6	－
95 イボダイ Japanese butterfish												
(Psenopsis anomala)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	2	2	100%	4.8-10	2	100%	<10	－	0	7.4	－
	2013	3	3	100%	4.5-6.3	3	100%	<6.3	－	0	5.4	－
96 イラコアナゴ Longnose eel												
(Synaphobranchus kaupii)	～2011	7	3	43%	－	7	100%	3	0.42	－	－	－
	2012	10	8	80%	0.59-13	10	100%	0.62	－	0.11	3.8	－
	2013	3	2	67%	1.1-11	3	100%	0.39	－	0.13	4.2	－
97 ウサギアイナメ Rock greenling												
(Hexagrammos lagocephalus)	～2011	5	4	80%	－	5	100%	0.53	－	0.11	－	－
	2012	13	12	92%	0.74-1.3	13	100%	0.54	－	0.042	0.88	－
	2013	4	4	100%	0.76-9.3	4	100%	<9.3	－	0	6.9	－
98 ウスバハギ Unicorn leatherjacket												
(Aluterus monoceros)	2012	1	1	100%	3.9	1	100%	<3.9	－	0	3.9	－
	2013	5	5	100%	3.8-9.5	5	100%	<9.5	－	0	7.2	－
99 ウスメバル Goldeye rockfish												
(Sebastes thompsoni)	～2011	9	0	0%	－	7	78%	130	68	－	－	71
	2012	56	21	38%	1.1-14	56	100%	90	9.9	－	－	20
	2013	25	17	68%	6-14	25	100%	14	－	2.2	9.3	－
100 ウマヅラハギ Black scraper												
(Thamnaconus modestus)	～2011	7	2	29%	－	7	100%	29	3	－	－	－
	2012	17	13	76%	4.6-14	17	100%	24	－	3.3	11	－
	2013	18	17	94%	4.7-15	18	100%	0.49	－	0.027	9.5	－
101 ウミタナゴ Surfperch												
(Ditrema temmincki)	～2011	4	2	50%	－	4	100%	5.5	－	－	－	－
	2012	40	37	93%	4.8-14	40	100%	2	－	0.12	9.4	－
	2013	51	51	100%	1.1-15	51	100%	<15	－	0	9.5	－
102 ウロコメガレイ Scalyeye plaice												
(Acanthopsetta nadeshnyi)	2013	2	2	100%	7.6-8.7	2	100%	<8.7	－	0	8.2	－
103 エゾイソアイナメ Brown hakeling												
(Physiculus maximowiczi)	～2011	30	3	10%	－	28	93%	540	17	－	－	－
	2012	109	60	55%	0.84-15	109	100%	61	－	－	－	11
	2013	62	60	97%	1.2-15	62	100%	7	－	0.22	9.8	－
104 エゾクサウオ Agassiz's snailfish												
(Liparis agassizii)	2013	3	3	100%	6.9-7.5	3	100%	<7.5	－	0	7.2	－
105 エゾメバル White-edged rockfish												
(Sebastes taczanowskii)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	2	2	100%	11	2	100%	<11	－	0	11	－
106 オアカムロ Indian scad												
(Decapterus russellii)	2013	1	1	100%	11	1	100%	<11	－	0	11	－
107 オウゴンムラソイ Rockfish												
(Sebastes pachycephalus nudus)	2012	4	4	100%	7.3-14	4	100%	<14	－	0	10	－
	2013	9	9	100%	6.9-13	9	100%	<13	－	0	9.6	－
108 オオクチイシナギ Striped jewfish												
(Stereolepis doederleini)	2012	1	1	100%	8.4	1	100%	<8.4	－	0	8.4	－
	2013	4	4	100%	11-15	4	100%	<15	－	0	13	－
109 オキアジ White-tongued crevalle												
(Uraspis helvola)	2012	1	1	100%	1.1	1	100%	<1.1	－	0	1.1	－
110 オキカサゴ Scorpion fish												
(Halicolenus avius)	2012	1	1	100%	0.9	1	100%	<0.9	－	0	0.9	－
111 オキタナゴ Neoditrema ransonneti												
	2012	2	2	100%	9.9-11	2	100%	<11	－	0	10	－
112 オキヒイラギ Offshore ponyfish												
(Equulites rivulatus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
113 オクカジカ Plain sculpin												
(Myoxocephalus jaok)	2012	1	1	100%	0.85	1	100%	<0.85	－	0	0.85	－
	2013	1	1	100%	9.4	1	100%	<9.4	－	0	9.4	－
114 オニカジカ Antlered sculpin												
(Enophrys diceraus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
115 オニヒゲ Grenadier												
(Caelorinchus gilberti)	2012	2	2	100%	12-14	2	100%	<14	－	0	13	－
116 オヒョウ Pacific halibut												
(Hippoglossus stenolepis)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	1	100%	1.1	1	100%	<1.1	－	0	1.1	－
117 カガミダイ Dory												
(Zenopsis nebulosa)	～2011	10	0	0%	－	10	100%	39	24	－	－	25
	2012	11	11	100%	4-14	11	100%	<14	－	0	9.2	－
	2013	7	7	100%	5.5-14	7	100%	<14	－	0	9.6	－
118 カゴカキダイ Stripey												
(Microcanthus strigatus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－

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119 カサゴ Scorpion fish												
(Sebastiscus marmoratus)	～2011	3	1	33%	－	3	100%	6.8	5.6	－	－	－
	2012	5	2	40%	4.9-10	5	100%	17	0.16	－	－	7.9
	2013	1	0	0%	－	1	100%	0.21	0.21	－	－	0.21
120 カナガシラ Redwing searobin												
(Lepidotrigla microptera)	～2011	26	0	0%	－	26	100%	48	27	－	－	28
	2012	84	26	31%	5-15	84	100%	61	8.1	－	－	12
	2013	98	89	91%	5.1-15	98	100%	8.5	－	0.6	9.9	－
121 カワハギ Threadsail filefish												
(Stephanolepis cirrhifer)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
	2012	3	3	100%	5.1-13	3	100%	<13	－	0	8.1	－
	2013	1	1	100%	4.5	1	100%	<4.5	－	0	4.5	－
122 ガンギエイ Rajiformes												
	～2011	5	5	100%	－	5	100%	<LOD	－	0	－	－
	2012	3	3	100%	9.7-11	3	100%	<11	－	0	10	－
	2013	6	6	100%	6.3-13	6	100%	<13	－	0	10	－
123 ガンゾウビラメ Cinnamon flounder												
(Pseudorhombus cinnamoneus)	2012	1	1	100%	0.83	1	100%	<0.83	－	0	0.83	－
	2013	2	2	100%	1.1-1.3	2	100%	<1.3	－	0	1.2	－
124 カンテンゲンゲ Jelly eelpout												
(Bothrocara tanakae)	～2011	1	0	0%	－	1	100%	3	3	－	－	3
	2012	1	1	100%	9.1	1	100%	<9.1	－	0	9.1	－
125 キアンコウ Monkfish												
(Lophius litulon)	～2011	24	15	63%	－	24	100%	5.2	－	0.78	－	－
	2012	85	36	42%	0.85-16	85	100%	49	0.85	－	－	7.5
	2013	42	33	79%	0.78-16	42	100%	12	－	1.2	7.7	－
126 ギス Japanese gissu												
(Pterothrissus gissu)	～2011	5	3	60%	－	5	100%	6	－	－	－	－
	2012	11	9	82%	5.7-14	11	100%	5.7	－	1	9.1	－
	2013	9	9	100%	4.2-14	9	100%	<14	－	0	8.9	－
127 ギスカジカ Flog sculpin												
(Myoxocephalus stelleri Tilesius)	～2011	1	0	0%	－	1	100%	0.53	0.53	－	－	0.53
	2012	1	1	100%	1.3	1	100%	<1.3	－	0	1.3	－
128 キチジ Thornhead												
(Sebastolobus macrochir)	～2011	27	13	48%	－	27	100%	20	0.76	－	－	－
	2012	27	23	85%	0.64-15	27	100%	10	－	0.58	7	－
	2013	16	16	100%	0.61-15	16	100%	<15	－	0	10	－
129 キチヌ(キビレ) Yellowfin porgy												
(Acanthopagrus latus)	2013	1	1	100%	6.6	1	100%	<6.6	－	0	6.6	－
130 キツネメバル Fox jacopever												
(Sebastes vulpes)	～2011	7	4	57%	－	7	100%	4.6	－	－	－	－
	2012	63	52	83%	5.7-15	63	100%	81	－	4.9	14	－
	2013	56	51	91%	6.1-15	56	100%	58	－	1.5	11	－
131 ギンアナゴ Congrid eel												
(Gnathophis nystromi nystoromi)	2013	1	1	100%	9.4	1	100%	<9.4	－	0	9.4	－
132 ギンポ Tidepool gunnel												
(Pholis nebulosa)	～2011	1	0	0%	－	1	100%	19	19	－	－	19
	2012	1	1	100%	5.4	1	100%	<5.4	－	0	5.4	－
	2013	1	1	100%	7.3	1	100%	<7.3	－	0	7.3	－
133 キンメダイ Alfonsino												
(Beryx splendens)	～2011	33	10	30%	－	33	100%	9.8	0.97	－	－	－
	2012	56	8	14%	1.2-14	56	100%	13	2	－	－	2.7
	2013	37	20	54%	0.82-15	37	100%	1.4	－	－	－	2.1
134 クサウオ Snailfishes												
(Liparidae)(Liparis tanakai)	2013	3	2	67%	7.3-12	3	100%	0.57	－	0.19	6.6	－
135 クサフグ Grass puffer												
(Takifugu niphobles)	2013	1	0	0%	－	1	100%	8.6	8.6	－	－	8.6
136 クロアナゴ Beach conger												
(Conger japonicus)	2012	2	0	0%	－	2	100%	4.9	4.3	－	－	4.3
137 クロウシノシタ Black cow-tongue												
(Paraplagusia japonica)	～2011	4	0	0%	－	4	100%	33	23	－	－	21
	2012	10	4	40%	6.6-15	10	100%	15	3.4	－	－	6.8
	2013	9	8	89%	1.1-12	9	100%	0.52	－	0.058	5.6	－
138 クロソイ Black rockfish												
(Sebastes schlegeli)	～2011	12	3	25%	－	11	92%	230	5.7	－	－	－
	2012	84	60	71%	6.3-15	83	99%	400	－	9.6	17	－
	2013	52	44	85%	0.63-15	52	100%	23	－	1.4	9.8	－
139 クロソイ(養殖) Black rockfish (farmed)												
(Sebastes schlegeli)	2012	1	1	100%	9.9	1	100%	<9.9	－	0	9.9	－
140 クロダイ Japanese black porgy												
(Acanthopagrus schlegelii)	～2011	3	0	0%	－	3	100%	42	29	－	－	25
	2012	38	10	26%	7.5-14	28	74%	3,300	26	－	－	220
	2013	66	16	24%	4.8-14	60	91%	310	11	－	－	30
141 クロメバル Rockfish												
(Sebastes ventricosus)	～2011	8	0	0%	－	7	88%	110	48	－	－	50
	2012	3	1	33%	11	3	100%	51	30	－	－	29
	2013	4	3	75%	7.4-14	4	100%	12	－	3	10	－
142 ケムシカジカ Sea raven												
(Hemitripterus villosus)	～2011	4	3	75%	－	4	100%	17	－	4.3	－	－
	2012	27	10	37%	8-14	27	100%	38	5.8	－	－	11
	2013	21	15	71%	6.3-15	21	100%	10	－	1.5	9	－

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Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≦ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
143 ゲンコ Genko sole												
(Cynoglossus interruptus)	2012	1	0	0%	−	1	100%	16	16	−	−	16
144 コショウダイ Crescent sweetlips												
(Plectorhinchus cinctus)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	3	3	100%	5.7−11	3	100%	<11	−	0	7.7	−
	2013	4	4	100%	5.2−5.5	4	100%	<5.5	−	0	5.4	−
145 コマイ Saffron cod												
(Eleginus gracilis)	～2011	13	13	100%	−	13	100%	<LOD	−	0	−	−
	2012	14	14	100%	0.63−7.1	14	100%	<7.1	−	0	1.4	−
	2013	10	10	100%	0.78−1.2	10	100%	<1.2	−	0	0.96	−
146 ゴマフグ Spottyback puffer												
(Takifugu stictonotus)	2012	2	2	100%	10−13	2	100%	<13	−	0	12	−
147 コモンカスベ Ocellate spot skate												
(Okamejei kenojei)	～2011	14	1	7%	−	10	71%	190	35	−	−	−
	2012	84	5	6%	10−15	83	99%	110	24	−	−	33
	2013	102	42	41%	6−16	101	99%	520	5.2	−	−	20
148 コモンフグ Finepatterned puffer												
(Takifugu poecilonotus)	～2011	6	0	0%	−	5	83%	150	88	−	−	90
	2012	18	5	28%	9.5−15	18	100%	74	10	−	−	18
	2013	37	24	65%	5.3−14	37	100%	18	−	2.4	8.9	−
149 サメガレイ Roughscale sole												
(Clidoderma asperrimum)	～2011	25	16	64%	−	25	100%	17	−	2.2	−	−
	2012	36	33	92%	0.62−15	36	100%	4.7	−	0.24	6.2	−
	2013	31	31	100%	0.61−14	31	100%	<14	−	0	8.5	−
150 シシャモ Shishamo												
(Spirinchus lanceolatus)	～2011	8	8	100%	−	8	100%	<LOD	−	0	−	−
	2012	7	7	100%	0.67−1.2	7	100%	<1.2	−	0	0.99	−
	2013	6	6	100%	0.66−1.2	6	100%	<1.2	−	0	0.92	−
151 シマアジ(養殖) Striped jack (farmed)												
(Pseudocaranx dentex)	2012	2	2	100%	20	2	100%	<20	−	0	20	−
152 シマソイ Threesstripe rockfish												
(Sebastes trivittatus)	～2011	5	3	60%	−	5	100%	0.65	−	−	−	−
153 ショウサイフグ Vermiculated puffer												
(Takifugu snyderi)	～2011	25	1	4%	−	21	84%	190	48	−	−	−
	2012	78	16	21%	1−15	78	100%	65	7.4	−	−	12
	2013	116	62	53%	0.74−15	116	100%	12	−	−	−	4.3
154 シロギス Japanese whiting												
(Sillago japonica)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	4	3	75%	5.4−11	4	100%	7	−	1.8	8.2	−
	2013	5	5	100%	0.82−8.7	5	100%	<8.7	−	0	4.9	−
155 シログチ Drum												
(Argyrosomus argentatus)	～2011	16	3	19%	−	16	100%	68	12	−	−	−
	2012	44	17	39%	5.2−15	44	100%	47	6.2	−	−	13
	2013	61	43	70%	0.74−15	61	100%	8.7	−	1.4	7.9	−
156 シロメバル Rockfish												
(Sebastes cheni)	～2011	2	0	0%	−	2	100%	68	65	−	−	65
	2012	31	3	10%	9−14	29	94%	240	38	−	−	51
	2013	15	4	27%	7.9−13	15	100%	33	12	−	−	12
157 スケソウダラ Alaska pollock												
(Theragra chalcogramma)	～2011	167	51	31%	−	167	100%	56	0.99	−	−	−
	2012	218	133	61%	0.61−15	218	100%	13	−	0.96	4.7	−
	2013	195	168	86%	0.64−15	195	100%	2	−	0.1	4.9	−
158 スミクイウオ Blackmouth												
(Synagrops japonicus)	2013	1	1	100%	0.82	1	100%	<0.82	−	0	0.82	−
159 ソウハチ Sohachi flounder												
(Cleisthenes pinetorum)	～2011	9	7	78%	−	9	100%	1.9	−	0.32	−	−
	2012	29	17	59%	0.83−13	29	100%	35	−	−	−	7.6
	2013	30	30	100%	0.76−15	30	100%	<15	−	0	9.2	−
160 タヌキメバル Banded jacopever												
(Sebastes zonatus)	2012	3	2	67%	7.9−9.3	3	100%	1.3	−	0.43	6.2	−
	2013	5	5	100%	8.5−13	5	100%	<13	−	0	10	−
161 ダルマガレイ Largescale flounder												
(Engyprosopon grandisquama)	～2011	1	0	0%	−	1	100%	4.5	4.5	−	−	4.5
162 チカメキントキ Bigeye												
(Priacanthus boops)	2013	1	1	100%	13	1	100%	<13	−	0	13	−
163 チダイ Crimson sea bream												
(Evynnis japonica)	～2011	18	2	11%	−	18	100%	46	19	−	−	−
	2012	106	37	35%	3.9−16	106	100%	40	5.2	−	−	7.9
	2013	76	61	80%	3.4−15	76	100%	8.3	−	0.65	8.4	−
164 ツマリカスベ Browneye skate												
(Okamejei schmidti)	～2011	2	1	50%	−	2	100%	9	−	−	−	−
	2012	1	0	0%	−	1	100%	30	30	−	−	30
165 テナガダラ Longarm grenadier												
(Coelorinchus macrochir)	～2011	1	0	0%	−	1	100%	2.7	2.7	−	−	2.7
	2012	3	2	67%	10−11	3	100%	2.8	−	0.93	7.9	−
166 テングカスベ Long-nosed ray												
(Dipturus tengu)	2013	1	1	100%	9.5	1	100%	<9.5	−	0	9.5	−
167 トクビレ Sailfin poacher												
(Podothecus sachi)	2012	1	1	100%	8.2	1	100%	<8.2	−	0	8.2	−
	2013	1	1	100%	14	1	100%	<14	−	0	14	−

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≦ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
168 トゲカジカ Great Sculpin												
(Myoxocephalus	～2011	9	8	89%	−	9	100%	0.46	−	0.051	−	−
polyacanthocephalus)	2012	3	3	100%	1.1−11	3	100%	<11	−	0	7.1	−
	2013	2	2	100%	5.4−8.3	2	100%	<8.3	−	0	6.9	−
169 トビヌメリ Kitefin dragonet												
(Repomucenus beniteguri)	2013	1	1	100%	11	1	100%	<11	−	0	11	−
170 トラフグ Tiger puffer												
(Takifugu rubripes)	2012	8	2	25%	8.6−9.9	8	100%	37	9.1	−	−	14
	2013	2	1	50%	10	2	100%	11	−	−	−	8
171 トラフグ(養殖) Tiger puffer (farmed)												
(Takifugu rubripes)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	5	5	100%	10−18	5	100%	<18	−	0	15	−
	2013	3	3	100%	10−20	3	100%	<20	−	0	16	−
172 ナガヅカ Long shanny												
(Stichaeus grigorjewi)	～2011	4	3	75%	−	4	100%	14	−	3.5	−	−
	2012	2	1	50%	13	2	100%	14	−	−	−	10
	2013	5	5	100%	7.9−14	5	100%	<14	−	0	11	−
173 ナガレメイタガレイ Flounder												
(Pleuronichthys japonicus)	～2011	1	0	0%	−	1	100%	5.4	5.4	−	−	5.4
	2013	3	3	100%	0.93−9.5	3	100%	<9.5	−	0	6.4	−
174 ニギス Deep-sea smelt												
(Glossanodon semifasciatus)	～2011	7	2	29%	−	7	100%	61	4	−	−	−
	2012	3	2	67%	1.1−10	3	100%	0.5	−	0.17	3.9	−
	2013	8	8	100%	4.4−9.6	8	100%	<9.6	−	0	8.1	−
175 ニザダイ Scalpel sawtail												
(Prionurus scalprum)	2012	2	2	100%	1−10	2	100%	<10	−	0	5.5	−
176 ニジカジカ Elkhorn sculpin												
(Alcichthys elongatus)	～2011	2	2	100%	−	2	100%	<LOD	−	0	−	−
	2012	5	5	100%	7.2−16	5	100%	<16	−	0	11	−
	2013	1	1	100%	9.8	1	100%	<9.8	−	0	9.8	−
177 ニシン Pacific herring												
(Clupea pallasii)	～2011	5	3	60%	−	5	100%	0.65	−	−	−	−
	2012	8	6	75%	0.69−14	8	100%	5.1	−	0.88	3.2	−
	2013	6	6	100%	0.73−13	6	100%	<13	−	0	3	−
178 ニベ Nibe croaker												
(Nibea mitsukurii)	～2011	10	0	0%	−	5	50%	150	100	−	−	95
	2012	25	4	16%	3.6−15	23	92%	130	42	−	−	49
	2013	69	34	49%	1.2−15	69	100%	15	0.97	−	−	6
179 ヌタウナギ Inshore hagfish												
(Eptatretus burgeri)	～2011	7	7	100%	−	7	100%	<LOD	−	0	−	−
180 ヌマガレイ Starry flounder												
(Platichthys stellatus)	～2011	2	0	0%	−	2	100%	25	18	−	−	18
	2012	13	2	15%	11−12	13	100%	34	19	−	−	19
	2013	23	4	17%	5−16	23	100%	32	4.1	−	−	5.8
181 ネズミゴチ Richardson's dragonet												
(Repomucenus curvicornis)	2013	1	1	100%	11	1	100%	<11	−	0	11	−
182 ハタハタ Japanese sandfish												
(Arctoscopus japonicus)	～2011	6	6	100%	−	6	100%	<LOD	−	0	−	−
	2012	4	4	100%	1.1−11	4	100%	<11	−	0	5.8	−
	2013	6	6	100%	1.3−10	6	100%	<10	−	0	7.8	−
183 ハチビキ Bonnetmouth												
(Erythrocles schlegeli)	2013	1	1	100%	13	1	100%	<13	−	0	13	−
184 ハツメ Owston's rockfish												
(Sebastes owstoni)	2013	1	1	100%	11	1	100%	<11	−	0	11	−
185 ババガレイ Slime flounder												
(Microstomus achne)	～2011	91	38	42%	−	89	98%	260	3	−	−	−
	2012	170	109	64%	0.52−15	170	100%	46	−	3.4	9.2	−
	2013	138	117	85%	0.77−15	138	100%	48	−	1.7	9.5	−
186 ハマダイ Flame snapper												
(Etelis coruscans)	～2011	1	0	0%	−	1	100%	0.68	0.68	−	−	0.68
	2012	2	1	50%	8.3	2	100%	0.58	−	−	−	2.4
	2013	2	2	100%	5.6−13	2	100%	<13	−	0	9.3	−
187 ハモ Daggertooth pike-conger												
(Muraenesox cinereus)	2012	1	1	100%	10	1	100%	<10	−	0	10	−
188 バラメヌケ Baramenuke rockfish												
(Sebastes baramenuke)	～2011	1	0	0%	−	1	100%	13	13	−	−	13
	2012	1	0	0%	−	1	100%	7.3	7.3	−	−	7.3
189 ヒガンフグ Panther puffer												
(Takifugu pardalis)	～2011	2	0	0%	−	2	100%	75	64	−	−	64
	2012	90	20	22%	7.6−16	88	98%	150	22	−	−	32
	2013	119	55	46%	5.8−15	119	100%	36	3	−	−	7.4
190 ヒメダイ Crimson snapper												
(Pristipomoides sieboldii)	2012	2	2	100%	0.93−11	2	100%	<11	−	0	6	−
191 ヒモダラ filamented grenadier												
(Coryphaenoides longifilis)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
192 ヒラメ Olive flounder												
(Paralichthys olivaceus)	～2011	213	17	8%	−	206	97%	170	23	−	−	−
	2012	746	173	23%	0.79−15	741	99%	400	7.8	−	−	14
	2013	764	301	39%	0.63−16	763	100%	110	2.2	−	−	6.8
193 ヒラメ(養殖) Olive flounder (farmed)												
(Paralichthys olivaceus)	2012	2	1	50%	20	2	100%	1.5	−	−	−	5.75
	2013	1	1	100%	0.9	1	100%	<0.9	−	0	0.9	−

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection Number	< Limit of Detection (%)	< Limit of Detection LOD (Bq/kg)	≤ 100 Bq/kg Number	≤ 100 Bq/kg (%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
194 ヒレグロ Blackfin flounder												
(Glyptocephalus stelleri)	～2011	26	17	65%	－	26	100%	4.2	－	0.93	－	－
	2012	39	30	77%	0.71-14	39	100%	21	－	1.2	6.4	－
	2013	21	21	100%	0.67-15	21	100%	<15	－	0	7.2	－
195 ヘダイ Sparus sarba												
(Rhabdosargus sarba)	2012	1	1	100%	13	1	100%	<13	－	0	13	－
196 ホウボウ Gurnard												
(Chelidonichthys spinosus)	～2011	39	1	3%	－	36	92%	150	20	－	－	－
	2012	85	25	29%	0.75-15	85	100%	50	7.1	－	－	14
	2013	90	67	74%	0.8-14	90	100%	18	－	1.2	7.4	－
197 ホシガレイ Spotted halibut												
(Verasper variegatus)	2012	2	1	50%	13	2	100%	5.2	－	－	－	5.9
	2013	1	1	100%	6.8	1	100%	<6.8	－	0	6.8	－
198 ホシザメ Starspotted smooth-hound												
(Mustelus manazo)	～2011	1	0	0%	－	1	100%	7.8	7.8	－	－	7.8
	2012	2	0	0%	－	2	100%	34	32	－	－	32
	2013	5	4	80%	8-14	5	100%	6	－	1.2	9.5	－
199 ホッケ Arabesque greenling												
(Pleurogrammus azonus)	～2011	17	13	76%	－	17	100%	1	－	0.16	－	－
	2012	9	9	100%	0.59-14	9	100%	<14	－	0	6.7	－
	2013	12	12	100%	1-14	12	100%	<14	－	0	9	－
200 ホテイウオ Smooth lumpsucker												
(Aptocyclus ventricosus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	2	2	100%	0.8-0.87	2	100%	<0.87	－	0	0.84	－
	2013	6	6	100%	0.72-9	6	100%	<9	－	0	2.2	－
201 ボラ Flathead mullet												
(Mugil cephalus)	2012	3	0	0%	－	3	100%	53	48	－	－	45
	2013	3	1	33%	8.4	3	100%	48	35	－	－	29
202 マアジ Japanese jack mackerel												
(Trachurus japonicas)	～2011	76	30	39%	－	75	99%	250	7.9	－	－	－
	2012	108	36	33%	0.047-20	108	100%	31	1.8	－	－	4.6
	2013	86	56	65%	0.74-16	86	100%	2.9	－	0.42	5.1	－
203 マアナゴ Conger eel												
(Conger myriaster)	～2011	34	5	15%	－	34	100%	43	13	－	－	－
	2012	84	38	45%	0.58-15	84	100%	33	0.64	－	－	6
	2013	67	47	70%	0.85-15	67	100%	40	－	1.3	7.1	－
204 マガレイ Littlemouth flounder												
(Pleuronectes herzensteini)	～2011	48	5	10%	－	46	96%	140	16	－	－	－
	2012	88	28	32%	0.82-14	88	100%	41	5.6	－	－	10
	2013	68	40	59%	1.1-15	68	100%	13	－	－	－	4.8
205 マコガレイ Marbled flounder												
(Pleuronectes yokohamae)	～2011	153	26	17%	－	139	91%	210	15	－	－	－
	2012	292	119	41%	0.84-16	292	100%	64	5.3	－	－	12
	2013	283	181	64%	0.97-15	283	100%	52	－	2.9	9	－
206 マゴチ Flathead												
(Platycephalus sp.)	～2011	3	1	33%	－	3	100%	36	3	－	－	－
	2012	24	3	13%	5.2-9.6	24	100%	55	27	－	－	26
	2013	48	15	31%	5.3-14	48	100%	26	7	－	－	8.8
207 マダイ Red seabream												
(Pagrus major)	～2011	29	9	31%	－	29	100%	39	19	－	－	－
	2012	58	31	53%	1.1-20	58	100%	40	－	－	－	9.2
	2013	56	39	70%	0.92-15	56	100%	8.4	－	0.74	7.5	－
208 マダイ(養殖) Red seabream (farmed)												
(Pagrus major)	～2011	5	5	100%	－	5	100%	<LOD	－	0	－	－
	2012	15	14	93%	20	15	100%	0.63	－	0.042	18	－
209 マダラ Pacific cod												
(Gadus macrocephalus)	～2011	265	60	23%	－	254	96%	160	11	－	－	－
	2012	1713	465	27%	0.51-18	1706	100%	140	9.8	－	－	16
	2013	1750	777	44%	0.55-16	1748	100%	130	1	－	－	6.9
210 マツカワ Barfin flounder												
(Verasper moseri)	～2011	3	2	67%	－	3	100%	0.77	－	0.26	－	－
	2012	10	9	90%	0.62-1.3	10	100%	0.43	－	0.043	0.96	－
	2013	3	3	100%	0.74-9.2	3	100%	<9.2	－	0	3.6	－
211 マツダイ Tripletail												
(Lobotes surinamensis)	2012	2	2	100%	8.8-10	2	100%	<10	－	0	9.4	－
	2013	12	1	8%	1	12	100%	2.3	0.84	－	－	1
212 マトウダイ John Dory												
(Zeus faber)	～2011	16	2	13%	－	16	100%	71	22	－	－	－
	2012	77	21	27%	5.6-15	77	100%	46	9.4	－	－	11
	2013	91	78	86%	4-15	91	100%	17	－	1	9.9	－
213 マハゼ Yellowfin Goby												
(Acanthogobius flavimanus)	2012	5	3	60%	6.4-9.5	5	100%	22	－	－	－	7.8
214 マフグ Globefish												
(Takifugu porphyreus)	～2011	9	4	44%	－	9	100%	49	2	－	－	－
	2012	8	8	100%	6.9-16	8	100%	<16	－	0	10	－
	2013	6	6	100%	8.3-9.8	6	100%	<9.8	－	0	9.2	－
215 マルアオメエソ Round Greeneyes												
(Chlorophthalmus borealis)	2012	4	0	0%	－	4	100%	2.2	1.3	－	－	1.4
216 ミギガレイ Rikuzen flounder												
(Dexistes rikuzenius)	～2011	23	3	13%	－	23	100%	13	7	－	－	－
	2012	31	15	48%	4.8-14	31	100%	7.9	0.97	－	－	4.9
	2013	19	19	100%	4-15	19	100%	<15	－	0	9.8	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
217 ムシガレイ Shotted halibut												
(Eopsetta grigorjewi)	～2011	43	8	19%	－	43	100%	63	19	－	－	－
	2012	71	34	48%	0.96-15	71	100%	33	3.8	－	－	9.1
	2013	84	64	76%	0.94-15	84	100%	19	－	1.5	9.1	－
218 ムツ Gnomefish												
(Scombrops boops)	～2011	3	1	33%	－	3	100%	9.3	1.2	－	－	－
	2012	1	1	100%	11	1	100%	<11	－	0	11	－
	2013	2	2	100%	8.9-11	2	100%	<11	－	0	10	－
219 ムネダラ Giant grenadier												
(Albatrossia pectoralis)	2013	1	1	100%	14	1	100%	<14	－	0	14	－
220 ムラソイ Brassblotched rockfish												
(Sebastes pachycephalus	～2011	3	1	33%	－	3	100%	34	1.8	－	－	－
pachycephalus)	2012	4	0	0%	－	4	100%	33	32	－	－	28
	2013	16	2	13%	0.95-8.5	16	100%	96	12	－	－	23
221 メイタガレイ Ridged-eye flounder												
(Pleuronichthys cornutus)	～2011	14	1	7%	－	14	100%	26	15	－	－	－
	2012	25	13	52%	1-14	25	100%	11	－	－	－	5.6
	2013	25	17	68%	0.96-14	25	100%	8.9	－	1.2	7.4	－
222 メガネカスベ Mottled skate												
(Raja pulchra)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	5	5	100%	0.65-15	5	100%	<15	－	0	5.7	－
	2013	6	6	100%	0.59-14	6	100%	<14	－	0	7.1	－
223 メゴチ Big-eyed flathead												
(Suggrundus meerdervoortii)	～2011	1	0	0%	－	1	100%	20	20	－	－	20
224 メジナ Largescale blackfish												
(Girella punctata)	～2011	2	0	0%	－	2	100%	6.3	4.8	－	－	4.8
	2012	3	2	67%	5-14	3	100%	1.8	－	0.6	6.9	－
	2013	2	1	50%	5.6	2	100%	4.1	－	－	－	3.5
225 メダイ Pacific barrelfish												
(Hyperoglyphe japonica)	～2011	3	2	67%	－	3	100%	1.3	－	0.43	－	－
	2012	7	5	71%	0.62-0.97	7	100%	0.6	－	0.17	0.78	－
	2013	12	11	92%	0.69-11	12	100%	0.45	－	0.038	4.3	－
226 メバル Rockfish												
(Sebastes sp.)	～2011	3	0	0%	－	3	100%	9.1	6.7	－	－	6.7
227 ヤナギノマイ Yellow-body rockfish												
(Sebastes steindachneri)	～2011	2	1	50%	－	2	100%	0.4	－	－	－	－
228 ヤナギムシガレイ Willowy flounder												
(Tanakius kitaharai)	～2011	30	6	20%	－	30	100%	40	12	－	－	－
	2012	44	13	30%	7-15	44	100%	60	6.5	－	－	11
	2013	37	31	84%	4.9-15	37	100%	9.3	－	1.2	9.4	－
229 ヤリヌメリ Spear dragonet												
(Repomucenus huguenini)	2013	1	1	100%	6.9	1	100%	<6.9	－	0	6.9	－
230 ユメカサゴ Hilgendorf' saucord												
(Helicolenus hilgendorfi)	～2011	14	0	0%	－	14	100%	50	14	－	－	21
	2012	8	3	38%	8.5-14	8	100%	18	4.6	－	－	7.9
	2013	18	13	72%	5.6-15	18	100%	6.4	－	1.1	8.8	－
231 ヨリトフグ Blunthead puffer												
(Sphoeroides pachygaster)	2012	1	1	100%	9.3	1	100%	<9.3	－	0	9.3	－
	2013	1	1	100%	9.8	1	100%	<9.8	－	0	9.8	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≤ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
無脊椎 Invertebrate												
232 アオリイカ Bigfin Reef Squid												
(Sepioteuthis lessoniana)	2012	4	4	100%	5.8-9.8	4	100%	<9.8	-	0	7.9	-
	2013	1	1	100%	8.9	1	100%	<8.9	-	0	8.9	-
233 アカイカ Neon Flying Squid												
(Ommastrephes bartramii)	～2011	10	9	90%	-	10	100%	0.57	-	0.057	-	-
	2012	19	19	100%	0.66-13	19	100%	<13	-	0	5.2	-
	2013	14	14	100%	0.65-14	14	100%	<14	-	0	4.6	-
234 アカガイ Bloody clam												
(Anadara broughtoni)	～2011	7	5	71%	-	7	100%	4	-	0.86	-	-
	2012	10	9	90%	0.89-8.9	10	100%	7.9	-	0.79	-	-
	2013	15	13	87%	0.63-8.2	15	100%	1	-	0.091	3.1	-
235 アサリ Japanese littleneck clam												
(Venerupis (Ruditapes)	～2011	30	22	73%	-	30	100%	15	-	2.2	-	-
philippinarum)	2012	52	51	98%	0.44-15	52	100%	11	-	0.21	3.4	-
	2013	54	54	100%	0.51-13	54	100%	<13	-	0	2.9	-
236 アヤボラ Oregon Triton												
(Fusitriton oregonensis)	～2011	1	1	100%	-	1	100%	<LOD	-	0	-	-
237 アワビ Abalone												
(Haliotis sp.)	～2011	2	1	50%	-	2	100%	4	-	-	-	-
	2012	2	2	100%	7.5-13	2	100%	<13	-	0	10	-
	2013	11	11	100%	11-20	11	100%	<20	-	0	18	-
238 イセエビ Japanese spiny lobster												
(Panulirus japonicus)	～2011	9	7	78%	-	9	100%	58	-	9.3	-	-
	2012	19	16	84%	2.9-15	19	100%	3.9	-	0.34	9.2	-
	2013	12	11	92%	4-13	12	100%	0.099	-	0.0083	9.1	-
239 イワガキ Japanese rock oyster												
(Crassostrea nippona)	～2011	4	1	25%	-	4	100%	45	24	-	-	-
	2012	10	10	100%	1.2-17	10	100%	<17	-	0	9.4	-
	2013	6	6	100%	6.7-15	6	100%	<15	-	0	11	-
240 ウチムラサキ Purple Washington clam												
(Saxidonus purpuratus)	2012	2	2	100%	0.88-7.1	2	100%	<7.1	-	0	4	-
	2013	1	1	100%	0.81	1	100%	<0.81	-	0	0.81	-
241 ウバガイ(ホッキガイ) Surf clam												
(Pseudocardium sachalinense)	～2011	15	6	40%	-	15	100%	30	4	-	-	-
	2012	19	17	89%	0.65-14	19	100%	36	-	2.4	6	-
	2013	26	25	96%	0.69-14	26	100%	1.6	-	0.062	5.4	-
242 エゾアワビ Ezo abalone												
(Haliotis discus hannai)	～2011	16	0	0%	-	14	88%	290	24	-	-	53
	2012	20	12	60%	1.6-16	20	100%	5	-	-	-	2.5
	2013	17	17	100%	0.89-12	17	100%	<12	-	0	5.5	-
243 エゾバフンウニ Short-spined sea urchin												
(Strongylocentrotus intermediu	～2011	1	1	100%	-	1	100%	<LOD	-	0	-	-
	2012	5	5	100%	0.65-0.8	5	100%	<0.8	-	0	0.72	-
	2013	3	3	100%	0.72-0.83	3	100%	<0.83	-	0	0.78	-
244 エゾボラモドキ Double sculptured neptune												
(Neptunea intersculpta)	2013	2	2	100%	1.2-7.6	2	100%	<7.6	-	0	4.4	-
245 オオカラフトバイ Verkruze's whelk												
(Buccinum verkruzeni)	～2011	4	4	100%	-	4	100%	<LOD	-	0	-	-
	2012	8	8	100%	0.71-1	8	100%	<1	-	0	0.84	-
	2013	9	9	100%	0.71-0.94	9	100%	<0.94	-	0	0.81	-
246 ガザミ Swimming crab												
(Portunus trituberculatus)	2012	11	10	91%	7.3-13	11	100%	1.6	-	0.15	8.9	-
	2013	32	31	97%	5.8-13	32	100%	4.8	-	0.15	9.3	-
247 キタムラサキウニ Northern sea urchin												
(Strongylocentrotus nudus)	～2011	12	3	25%	-	10	83%	370	22	-	-	-
	2012	16	11	69%	0.72-13	16	100%	26	-	3	7.9	-
	2013	11	11	100%	0.76-13	11	100%	<13	-	0	6.8	-
248 クロアワビ Japanese abalone												
(Haliotis discus)	～2011	4	4	100%	-	4	100%	<LOD	-	0	-	-
	2012	6	6	100%	0.56-1	6	100%	<1	-	0	0.81	-
	2013	2	2	100%	0.89-1.1	2	100%	<1.1	-	0	1	-
249 クロアワビ(養殖) Japanese abalone (farmed)												
(Haliotis discus)	2012	2	2	100%	1.1-5.3	2	100%	<5.3	-	0	3.2	-
250 ケガニ Horsehair crab												
(Erimacrus isenbeckii)	～2011	18	18	100%	-	18	100%	<LOD	-	0	-	-
	2012	27	27	100%	0.86-16	27	100%	<16	-	0	8.5	-
	2013	18	18	100%	0.72-14	18	100%	<14	-	0	7.6	-
251 ケンサキイカ Swordtip squid												
(Photololigo edulis)	～2011	1	1	100%	-	1	100%	<LOD	-	0	-	-
	2012	1	1	100%	0.9	1	100%	<0.9	-	0	0.9	-
	2013	1	1	100%	0.7	1	100%	<0.7	-	0	0.7	-
252 コウイカ Golden cuttlefish												
(Sepia esculenta)	～2011	3	3	100%	-	3	100%	<LOD	-	0	-	-
	2012	6	6	100%	4.9-11	6	100%	<11	-	0	7.3	-
	2013	3	3	100%	0.87-4.8	3	100%	<4.8	-	0	2.2	-
253 コタマガイ Clam												
(Gomphina melanegis)	～2011	2	1	50%	-	2	100%	3.8	-	-	-	-
	2012	3	1	33%	15	3	100%	17	5.6	-	-	10
	2013	2	2	100%	5.9-6.8	2	100%	<6.8	-	0	6.4	-
254 サクラエビ Sakura shrimp												
(Sergia lucens)	2013	1	0	0%	-	1	100%	0.11	0.11	-	-	0.11

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
255 サザエ Horned turban												
(Turbo cornutus)	～2011	6	6	100%	−	6	100%	<LOD	−	0	−	−
	2012	6	5	83%	8.3−13	6	100%	0.059	−	0.0098	8.9	−
	2013	6	5	83%	7.4−13	6	100%	0.033	−	0.0055	8.3	−
256 サルエビ Cocktail shrimp												
(Trachypenaeus curvirostris)	～2011	2	0	0%	−	2	100%	12	7.7	−	−	7.7
	2012	2	2	100%	12−13	2	100%	<13	−	0	13	−
	2013	3	3	100%	7.5−9	3	100%	<9	−	0	8	−
257 シバエビ Shiba shrimp												
(Metapenaeus joyneri)	2013	2	2	100%	0.87−1.2	2	100%	<1.2	−	0	1	−
258 シャコ Mantis shrimp												
(Oratosquilla oratoria)	～2011	1	0	0%	−	1	100%	6	6	−	−	6
	2012	7	7	100%	7.2−12	7	100%	<12	−	0	10	−
	2013	8	8	100%	6.5−14	8	100%	<14	−	0	10	−
259 シライトマキバイ Japanese whelk												
(Buccinum isaotakii)	～2011	13	13	100%	−	13	100%	<LOD	−	0	−	−
	2012	14	14	100%	0.82−14	14	100%	<14	−	0	6.9	−
	2013	21	21	100%	4.7−14	21	100%	<14	−	0	9.5	−
260 シリヤケイカ Japanese spineless cuttlefish												
(Sepiella japonica)	～2011	2	1	50%	−	2	100%	5.5	−	−	−	−
	2012	5	5	100%	0.84−5.2	5	100%	<5.2	−	0	4.3	−
	2013	21	21	100%	0.56−13	21	100%	<13	−	0	3.9	−
261 ジンドウイカ Japanese dwarf squid												
(Loligo japonica)	～2011	16	11	69%	−	16	100%	14	−	1.1	−	−
	2012	9	8	89%	0.81−15	9	100%	0.35	−	0.039	4	−
	2013	15	15	100%	0.78−8	15	100%	<8	−	0	4.6	−
262 スジイカ Luminous flying squid												
(Eucleoteuthis Luminosa)	2012	1	1	100%	1.2	1	100%	<1.2	−	0	1.2	−
263 スルメイカ Japanese flying squid												
(Todarodes pacificus)	～2011	145	143	99%	−	145	100%	2	−	0.017	−	−
	2012	169	169	100%	0.54−16	169	100%	<16	−	0	4.8	−
	2013	145	145	100%	0.58−15	145	100%	<15	−	0	5	−
264 ズワイガニ Snow crab												
(Chionoecetes opilio)	～2011	4	4	100%	−	4	100%	<LOD	−	0	−	−
	2012	1	1	100%	8.5	1	100%	<8.5	−	0	8.5	−
	2013	3	3	100%	6.8−10	3	100%	<10	−	0	8.9	−
265 タコ(種不明) Octopas (species unidentified)												
	2012	1	0	0%	−	1	100%	0.096	0.096	−	−	0.096
	2013	1	0	0%	−	1	100%	0.097	0.097	−	−	0.097
266 ダンベイキサゴ button shell												
(Umbonium giganteum)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
267 チヂミエゾボラ Whelk												
(Neptunea constricta)	2013	4	4	100%	8.5−15	4	100%	<15	−	0	12	−
268 チョウセンハマグリ Clam												
(Meretrix lamarckii)	～2011	7	7	100%	−	7	100%	<LOD	−	0	−	−
	2012	8	8	100%	1.2−14	8	100%	<14	−	0	7.3	−
	2013	11	11	100%	0.8−14	11	100%	<14	−	0	6.9	−
269 ツノナシオキアミ North Pacific krill												
(Euphausia pacifica)	～2011	19	17	89%	−	19	100%	5	−	0.29	−	−
	2012	48	43	90%	0.85−14	48	100%	1.1	−	0.08	8.1	−
	2013	40	40	100%	0.52−14	40	100%	<14	−	0	8.7	−
270 テナガダコ Long-armed octopus												
(Octopus minor)	2012	1	1	100%	5	1	100%	<5	−	0	5	−
	2013	1	1	100%	6.2	1	100%	<6.2	−	0	6.2	−
271 トゲクリガニ Helmet crab												
(Telmessus cheiragonus)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	9.8	1	100%	<9.8	−	0	9.8	−
	2013	3	3	100%	7.2−9.1	3	100%	<9.1	−	0	8.4	−
272 トヤマエビ Corn-stripe shrimp												
(Pandalus hypsinotus)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	3	3	100%	1−9.8	3	100%	<9.8	−	0	4	−
	2013	3	3	100%	0.96−1.1	3	100%	<1.1	−	0	1	−
273 トリガイ Japanese cockle												
(Fulvia mutica)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	4	4	100%	5.2−14	4	100%	<14	−	0	9.7	−
	2013	1	1	100%	11	1	100%	<11	−	0	11	−
274 ナマコ Sea cucumber												
(Stich)us japonicus)	～2011	7	6	86%	−	7	100%	1.7	−	0.24	−	−
	2012	1	1	100%	0.071	1	100%	<0.071	−	0	0.071	−
	2013	1	1	100%	0.083	1	100%	<0.083	−	0	0.083	−
275 ナミガイ Japanese geoduck												
(Panopea japonica)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	5.9	1	100%	<5.9	−	0	5.9	−
	2013	1	1	100%	10	1	100%	<10	−	0	10	−
276 バイ(貝) Japanese ivory shell												
(Babylonia japonica)	2012	1	1	100%	8.7	1	100%	<8.7	−	0	8.7	−
	2013	3	3	100%	8.3−10	3	100%	<10	−	0	9	−
277 バカガイ Chinese mactra clam												
(Mactra chinensis)	～2011	3	3	100%	−	3	100%	<LOD	−	0	−	−
	2012	13	13	100%	0.67−14	13	100%	<14	−	0	6.2	−
	2013	5	5	100%	0.57−7	5	100%	<7	−	0	1.9	−

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			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
278 バナメイエビ(養殖) Whiteleg shrimp (farmed)												
(Litopenaeus vannamei)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	1	1	100%	4.9	1	100%	<4.9	−	0	4.9	−
	2013	1	1	100%	9.3	1	100%	<9.3	−	0	9.3	−
279 ハマグリ Common orient clam												
(Meretrix lusoria)	～2011	23	14	61%	−	23	100%	34	−	3.2	−	−
	2012	11	10	91%	0.9−14	11	100%	0.1	−	0.0091	8.5	−
	2013	9	9	100%	0.62−8.5	9	100%	<8.5	−	0	2.5	−
280 ヒメエゾボラ Whelk												
(Neptunea arthritica arthritica)	～2011	1	0	0%	−	1	100%	3.6	3.6	−	−	3.6
	2012	4	4	100%	1.2−9.9	4	100%	<9.9	−	0	5.6	−
	2013	1	1	100%	6	1	100%	<6	−	0	6	−
281 ヒメコウイカ Kobi cuttlefish												
(Sepia kobiensis)	～2011	12	11	92%	−	12	100%	0.4	−	0.033	−	−
	2013	2	2	100%	10−14	2	100%	<14	−	0	12	−
282 ヒラツメガニ Sand crab												
(Ovalipes punctatus)	～2011	6	0	0%	−	6	100%	19	6	−	−	7.1
	2012	12	12	100%	1.2−14	12	100%	<14	−	0	7.2	−
	2013	2	2	100%	0.81−8.7	2	100%	<8.7	−	0	4.8	−
283 フクトコブシ Fukutokobushi abalone												
(Haliotis diversicolor diversicolor)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
284 ベニズワイガニ Red snow crab												
(Chionoecetes japonicus)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
285 ボウシュウボラ Trumpet shell												
(Charonia lampas sauliae)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
286 ホタテガイ Scallop												
(Mizuhopecten yessoensis)	～2011	10	10	100%	−	10	100%	<LOD	−	0	−	−
	2012	37	36	97%	0.59−8.5	37	100%	0.82	−	0.022	3.3	−
	2013	20	20	100%	0.63−8.4	20	100%	<8.4	−	0	1.5	−
287 ホタテガイ(養殖) Scallop (farmed)												
(Mizuhopecten yessoensis)	2012	19	19	100%	20	19	100%	<20	−	0	20	−
288 ボタンエビ Botan shrimp												
(Pandalus nipponesis)	～2011	18	7	39%	−	17	94%	130	0.65	−	−	−
	2012	5	5	100%	0.83−14	5	100%	<14	−	0	5.1	−
	2013	5	5	100%	5.3−10	5	100%	<10	−	0	7.6	−
289 ホッコクアカエビ Alaskan pink shrimp												
(Pandalus eous)	～2011	5	5	100%	−	5	100%	<LOD	−	0	−	−
	2012	3	3	100%	1.4−10	3	100%	<10	−	0	5.4	−
	2013	2	2	100%	4.8−11	2	100%	<11	−	0	7.9	−
290 ホンビノスガイ Hard Clam												
(Mercenaria mercenaria)	2012	9	9	100%	0.69−1.2	9	100%	<1.2	−	0	0.88	−
	2013	11	11	100%	0.64−12	11	100%	<12	−	0	2.8	−
291 マガキ Pacific oyster												
(Crassostrea gigas)	2012	3	3	100%	0.15−5.7	3	100%	<5.7	−	0	2.2	−
	2013	14	14	100%	0.12−8.9	14	100%	<8.9	−	0	1.3	−
292 マガキ(養殖) Pacific oyster (farmed)												
(Crassostrea gigas)	～2011	11	10	91%	−	11	100%	4	−	0.36	−	−
	2012	22	22	100%	0.56−13	22	100%	<13	−	0	5.3	−
	2013	143	143	100%	10−20	143	100%	<20	−	0	20	−
293 マダカアワビ Giant abalone												
(Haliotis (Nordotis) madaka)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
294 マダコ Common octopus												
(Octopus vulgaris)	～2011	22	8	36%	−	22	100%	3	0.5	−	−	−
	2012	20	19	95%	0.67−10	20	100%	2.5	−	0.13	5	−
	2013	40	40	100%	0.54−13	40	100%	<13	−	0	4.8	−
295 マナマコ Japanese common sea cucumber												
(Stichopus japonicus)	～2011	4	3	75%	−	4	100%	17	−	4.3	−	−
	2012	15	14	93%	0.46−13	15	100%	1.3	−	0.087	2.3	−
	2013	13	13	100%	0.65−9.5	13	100%	<9.5	−	0	2.6	−
296 マボヤ Common sea squirt												
(Halocynthia roretzi)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2012	2	2	100%	8.4−9.8	2	100%	<9.8	−	0	9.1	−
	2013	1	1	100%	9.6	1	100%	<9.6	−	0	9.6	−
297 ミズダコ Giant Pacific octopus												
(Paroctopus dofleini)	～2011	45	42	93%	−	45	100%	1.1	−	0.058	−	−
	2012	92	91	99%	0.52−14	92	100%	0.41	−	0.0045	3.2	−
	2013	99	98	99%	0.57−14	99	100%	0.42	−	0.0042	5.2	−
298 ミルクイ Keen's gaper												
(Tresus keenae)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
299 ムラサキイガイ Mediterranean mussel												
(Mytilus galloprovincialis)	2012	1	0	0%	−	1	100%	0.055	0.055	−	−	0.055
	2013	1	0	0%	−	1	100%	0.07	0.07	−	−	0.07
300 メガイアワビ Siebold's abalone												
(Nordotis gigantea)	～2011	1	1	100%	−	1	100%	<LOD	−	0	−	−
	2013	1	1	100%	11	1	100%	<11	−	0	11	−
301 モスソガイ Paper whelk												
(Volutharpa ampullacea)	～2011	2	2	100%	−	2	100%	<LOD	−	0	−	−
302 ヤナギダコ Chestnut octopus												
(Octopus conispadiceus)	～2011	47	41	87%	−	47	100%	13	−	0.56	−	−
	2012	45	44	98%	0.53−15	45	100%	0.37	−	0.0082	3	−
	2013	38	38	100%	0.63−15	38	100%	<15	−	0	5.4	−

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011–Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
303 ヤリイカ Spear squid												
(Loligo bleekeri)	～2011	36	32	89%	－	36	100%	69	－	3.4	－	－
	2012	31	30	97%	0.64–15	31	100%	0.95	－	0.031	4.3	－
	2013	30	30	100%	0.73–12	30	100%	<12	－	0	6.4	－
304 ワスレガイ Clam												
(Cyclosunetta menstrualis)	2012	1	1	100%	14	1	100%	<14	－	0	14	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≦ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
海藻類 Seaweeds												
305 アオノリ Green laver												
(Ulva spp.)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
306 アカモク Sargassum horneri												
(Sargassum horneri)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
	2012	2	2	100%	1.3-6.5	2	100%	<6.5	－	0	3.9	－
	2013	2	2	100%	8.4-10	2	100%	<10	－	0	9.2	－
307 アラメ Arame seaweed												
(Eisenia bicyclis)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2013	1	1	100%	0.93	1	100%	<0.93	－	0	0.93	－
308 エゴノリ Egonori Seaweed												
(Campylaephora hypnaeoides)	2012	1	1	100%	1.2	1	100%	<1.2	－	0	1.2	－
309 コトジツノマタ Kotoji-tsunomata seaweed												
(Chondrus elatus)	2012	1	1	100%	1.6	1	100%	<1.6	－	0	1.6	－
	2013	1	1	100%	1.1	1	100%	<1.1	－	0	1.1	－
310 コンブ Sea tangle												
(Laminaria)	～2011	4	4	100%	－	4	100%	<LOD	－	0	－	－
	2012	4	4	100%	1.2-6.8	4	100%	<6.8	－	0	2.7	－
	2013	2	2	100%	0.94-7.9	2	100%	<7.9	－	0	4.4	－
311 コンブ(養殖) Sea tangle (farmed)												
(Laminaria)	2012	1	1	100%	1.6	1	100%	<1.6	－	0	1.6	－
312 スジアオノリ(原藻) Green laver												
(Enteromorpha prolifera)	2013	1	1	100%	10	1	100%	<10	－	0	10	－
313 ツノマタ Carageen moss												
(Chondrus ocellatus Holmes)	2012	1	1	100%	1.8	1	100%	<1.8	－	0	1.8	－
314 テングサ Tengusa seaweed												
(Gelidium sp.)	～2011	7	7	100%	－	7	100%	<LOD	－	0	－	－
	2012	4	4	100%	1.4-2.8	4	100%	<2.8	－	0	1.9	－
	2013	4	4	100%	9.3-20	4	100%	<20	－	0	14	－
315 トサカノリ Tosakanori seaweed												
(Meristotheca papulosa)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	1	1	100%	1.2	1	100%	<1.2	－	0	1.2	－
	2013	1	1	100%	10	1	100%	<10	－	0	10	－
316 ハバノリ Habanori seaweed												
(Petalonia binghamiae)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	4	4	100%	0.78-1.1	4	100%	<1.1	－	0	1	－
	2013	3	3	100%	0.89-6.2	3	100%	<6.2	－	0	2.7	－
317 ヒジキ Hijiki seaweed												
(Hizikia fusiformis)	～2011	17	17	100%	－	17	100%	<LOD	－	0	－	－
	2012	10	9	90%	1.4-16	10	100%	6	－	0.6	4.6	－
	2013	6	6	100%	1.5-1.9	6	100%	<1.9	－	0	1.7	－
318 フクロフノリ Gloiopeltis furcata												
(Gloiopeltis fucata)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
319 フノリ Funori seaweed												
(Gloiopeltis sp.)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	3	3	100%	1.2-1.8	3	100%	<1.8	－	0	1.5	－
	2013	1	1	100%	1.1	1	100%	<1.1	－	0	1.1	－
320 ホソメコンブ kelp												
	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
321 マクサ Makusa seaweed												
(Gelidium elegans)	2012	1	1	100%	1.4	1	100%	<1.4	－	0	1.4	－
322 マコンブ Sea tangle												
(Laminaria)	2012	3	3	100%	1.3-19	3	100%	<19	－	0	7.2	－
	2013	2	2	100%	0.92-1.5	2	100%	<1.5	－	0	1.2	－
323 マツモ Rigid Hornwort												
(Ceratophyllum demersum)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	1	1	100%	1.2	1	100%	<1.2	－	0	1.2	－
324 ワカメ Wakame seaweed												
(Undaria pinnatifida)	～2011	35	31	89%	－	35	100%	1.6	－	0.15	－	－
	2012	7	6	86%	1-9	7	100%	2	－	0.29	4.5	－
	2013	6	5	83%	0.091-4.5	6	100%	0.045	－	0.0075	2.3	－
325 ワカメ(養殖) Wakame seaweed (farmed)												
(Undaria pinnatifida)	～2011	94	93	99%	－	94	100%	0.54	－	0.0057	－	－
	2012	7	7	100%	1.1-11	7	100%	<11	－	0	5	－
	2013	62	62	100%	1.1-20	62	100%	<20	－	0	19	－
326 岩のり rock seaweed												
	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
327 生のり(養殖) Laver (wet)												
(Porphyra yezoensis)	～2011	6	6	100%	－	6	100%	<LOD	－	0	－	－
328 生フノリ marine alga of the genus Gloiopeltis (raw)												
(Endocladiaceae)	2013	1	1	100%	20	1	100%	<20	－	0	20	－

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
淡水 Freshwater												
329 アマゴ Amago salmon												
(Oncorhynchus masou ishikawae)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	9	9	100%	5.1－14	9	100%	<14	－	0	9.2	－
330 アマゴ(養殖) Amago salmon (farmed)												
(Oncorhynchus masou ishikawae)	2012	6	6	100%	4.7－20	6	100%	<20	－	0	11	－
	2013	3	3	100%	6.1－9.6	3	100%	<9.6	－	0	8.3	－
331 アメリカナマズ Channel catfish (wild)												
(Ictalurus punctatus)	～2011	4	0	0%	－	2	50%	120	97	－	－	95
	2012	21	0	0%	－	2	10%	320	160	－	－	160
	2013	5	0	0%	－	4	80%	150	95	－	－	94
332 アメリカナマズ(養殖) Channel catfish (farmed)												
(Ictalurus punctatus)	～2011	2	1	50%	－	2	100%	15	－	－	－	－
	2012	3	0	0%	－	3	100%	8.7	6.8	－	－	6.9
	2013	3	1	33%	10	3	100%	7.9	6.3	－	－	6.4
333 アユ Ayu sweetfish (wild)												
(Plecoglossus altivelis)	～2011	69	10	14%	－	44	64%	460	84	－	－	－
	2012	426	231	54%	0.96－20	425	100%	110	－	－	－	－
	2013	216	113	52%	4.6－18	213	99%	140	－	－	－	13
334 アユ(養殖) Ayu sweetfish (farmed)												
(Plecoglossus altivelis)	～2011	16	16	100%	－	16	100%	<LOD	－	0	－	－
	2012	69	66	96%	5.3－20	69	100%	16	－	0.39	16	－
	2013	31	30	97%	6.3－20	31	100%	4.2	－	0.14	15	－
335 イサザアミ Opossum shrimp												
(Neomysis awatschensis)	2013	1	0	0%	－	1	100%	12	12	－	－	12
336 イワナ Whitespotted char (wild)												
(Salvelinus leucomaenis)	～2011	44	9	20%	－	30	68%	770	46	－	－	－
	2012	186	74	40%	4.5－16	137	74%	530	18	－	－	－
	2013	230	116	50%	6.5－15	216	94%	260	－	－	－	26
337 イワナ(養殖) Whitespotted char (farmed)												
(Salvelinus leucomaenis)	～2011	14	13	93%	－	14	100%	5	－	0.36	－	－
	2012	81	75	93%	1.3－20	81	100%	21	－	0.68	12	－
	2013	53	53	100%	5.2－20	53	100%	<20	－	0	12	－
338 ウグイ Japanese dace (wild)												
(Tribolodon hakonensis)	～2011	32	1	3%	－	22	69%	740	70	－	－	－
	2012	345	85	25%	5－20	322	93%	420	19	－	－	－
	2013	272	166	61%	5.1－16	271	100%	110	－	6.3	13	－
339 ウグイ(養殖) Japanese dace (farmed)												
(Tribolodon hakonensis)	～2011	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2012	3	3	100%	18－20	3	100%	<20	－	0	19	－
	2013	2	2	100%	12－13	2	100%	<13	－	0	13	－
340 ウナギ Japanese eel (wild)												
(Anguilla japonica)	～2011	4	0	0%	－	4	100%	100	52	－	－	56
	2012	88	5	6%	11－14	72	82%	200	59	－	－	61
	2013	672	327	49%	5.8－17	668	99%	150	3.8	－	－	11
341 ウナギ(養殖) Japanese eel (farmed)												
(Anguilla japonica)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	1	1	100%	7.5	1	100%	<7.5	－	0	7.5	－
342 オイカワ Freshwater minnow												
(Zacco platypus)	2012	4	4	100%	8.5－15	4	100%	<15	－	0	11	－
343 オオクチバス Black bass												
(Micropterus salmoides)	～2011	1	0	0%	－	1	100%	66	66	－	－	66
	2012	7	0	0%	－	6	86%	110	98	－	－	97
	2013	1	0	0%	－	1	100%	57	57	－	－	57
344 カワマス Brook trout												
(Salvelinus fountinalis)	2012	51	0	0%	－	44	86%	200	27	－	－	48
	2013	8	4	50%	7.4－9.1	8	100%	20	－	－	－	6.9
345 カワヤツメ Japanese lamprey												
(Lampetra japonica)	2012	1	1	100%	6	1	100%	<6	－	0	6	－
	2013	2	2	100%	8.6－18	2	100%	<18	－	0	13	－
346 ギンザケ(養殖) Coho salmon (farmed)												
(Oncorhynchus kisutsh)	～2011	3	3	100%	－	3	100%	<LOD	－	0	－	－
347 ギンブナ Silver crucian carp (wild)												
(Carassius langsdorfii)	～2011	5	0	0%	－	5	100%	78	70	－	－	58
	2012	72	7	10%	2.4－12	62	86%	240	35	－	－	54
	2013	67	2	3%	6.2－6.3	61	91%	210	32	－	－	44
348 ギンブナ(養殖) Silver crucian carp (farmed)												
(Carassius langsdorfii)	～2011	1	0	0%	－	1	100%	97	97	－	－	97
	2012	1	0	0%	－	1	100%	17	17	－	－	17
349 ゲンゴロウブナ Japanese crucian carp (wild)												
(Carassius cuvieri)	～2011	5	0	0%	－	4	80%	120	100	－	－	100
	2012	11	0	0%	－	11	100%	100	22	－	－	44
	2013	19	1	5%	8.8	19	100%	55	32	－	－	32
350 ゲンゴロウブナ(養殖) Japanese crucian carp (farmed)												
(Carassius cuvieri)	～2011	1	0	0%	－	1	100%	92	92	－	－	92
	2012	1	0	0%	－	1	100%	30	30	－	－	30
351 コイ Common carp (wild)												
(Cyprinus carpio)	～2011	7	1	14%	－	7	100%	89	40	－	－	－
	2012	32	9	28%	4.9－14	31	97%	330	14	－	－	－
	2013	32	10	31%	7.1－13	27	84%	220	10	－	－	46

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≦ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
352 コイ(養殖) Common carp (farmed)												
(Cyprinus carpio)	～2011	16	7	44%	－	16	100%	38	7.5	－	－	－
	2012	18	10	56%	6.9-20	18	100%	58	－	－	－	11
	2013	20	17	85%	6.4-19	20	100%	6.1	－	0.81	11	－
353 サクラマス Cherry salmon												
(Oncorhynchus masou)	2012	9	6	67%	10-19	9	100%	22	－	6	－	－
	2013	9	8	89%	2.6-15	9	100%	3.2	－	0.36	9.4	－
354 シジミ Brackish-water Clam												
(Corbicula japonica)	2012	1	1	100%	11	1	100%	<11	－	0	11	－
355 シナノユキマス(養殖) Maraena whitefish												
(Coregonus lavaretus maraena	2012	1	1	100%	7.5	1	100%	<7.5	－	0	7.5	－
356 ジュズカケハゼ Chestnut goby												
(Gymnogobius castaneus)	2012	3	3	100%	10-14	3	100%	<14	－	0	12	－
	2013	3	3	100%	8.7-12	3	100%	<12	－	0	11	－
357 シラウオ Japanese icefish												
(Salangichthys microdon)	～2011	9	0	0%	－	9	100%	63	46	－	－	46
	2012	58	24	41%	5.8-15	58	100%	38	11	－	－	15
	2013	41	28	68%	5.8-14	41	100%	26	－	5.2	12	－
358 シロザケ(淡水域) Chum salmon (freshwater)												
(Oncorhynchus keta)	～2011	12	12	100%	－	12	100%	<LOD	－	0	－	－
359 スジエビ Lake prawn												
(Palaemon paucidens)	～2011	4	0	0%	－	4	100%	95	75	－	－	67
	2012	33	6	18%	7.9-14	33	100%	93	9.8	－	－	18
	2013	23	5	22%	8.1-15	23	100%	71	9	－	－	18
360 スッポン(養殖) Chinese softshell												
(Pelodiscus sinensis)	2012	1	1	100%	9.1	1	100%	<9.1	－	0	9.1	－
361 テナガエビ Oriental river prawn (wild)												
(Macrobrachium nipponense)	～2011	6	0	0%	－	6	100%	88	49	－	－	50
	2012	37	0	0%	－	37	100%	91	29	－	－	31
	2013	13	0	0%	－	13	100%	34	21	－	－	20
362 ドジョウ Oriental weather loach(wild)												
(Misgurnus anguillicaudatus)	2012	1	1	100%	10	1	100%	<10	－	0	10	－
363 ナマズ Japanese catfish												
(Silurus asotus)	2012	2	1	50%	14	1	50%	130	－	－	－	69
	2013	2	1	50%	14	2	100%	13	－	－	－	10
364 ナマズ(養殖) Japanese catfish (farmed)												
(Silurus asotus)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	4	3	75%	5.3-13	4	100%	7.6	－	1.9	9.7	－
	2013	3	3	100%	8.8-11	3	100%	<11	－	0	9.7	－
365 ニジマス Rainbow trout (wild)												
(Oncorhynchus mykiss)	～2011	9	7	78%	－	8	89%	170	－	22	－	－
	2012	52	23	44%	6.3-15	51	98%	150	4.7	－	－	20
	2013	22	18	82%	7.3-14	21	95%	120	－	6.9	16	－
366 ニジマス(養殖) Rainbow trout (farmed)												
(Oncorhynchus mykiss)	～2011	40	34	85%	－	40	100%	17	－	1.3	－	－
	2012	97	92	95%	1.7-20	97	100%	18	－	0.52	12	－
	2013	80	80	100%	6.1-20	80	100%	<20	－	0	12	－
367 ヌマチチブ Dusky tripletooth goby												
(Tridentiger obscurus)	～2011	1	0	0%	－	1	100%	47	47	－	－	47
	2012	1	0	0%	－	1	100%	18	18	－	－	18
	2013	2	0	0%	－	2	100%	26	26	－	－	26
368 ヒメマス Kokanee												
(wild)(Oncorhyunchus nerka)	～2011	5	0	0%	－	4	80%	200	54	－	－	73
	2012	53	11	21%	5.3-13	46	87%	180	14	－	－	31
	2013	14	6	43%	6.3-14	13	93%	110	4	－	－	18
369 ヒメマス(養殖) Kokanee (farmed)												
(Oncorhyunchus nerka)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	5	5	100%	17-20	5	100%	<20	－	0	19	－
	2013	3	3	100%	13-17	3	100%	<17	－	0	16	－
370 フナ Crucian carp												
(Carassius sp.)	～2011	3	0	0%	－	2	67%	400	38	－	－	150
	2012	20	5	25%	6.1-11	20	100%	67	14	－	－	－
	2013	6	2	33%	11	6	100%	43	7.1	－	－	17
371 フナ(養殖) Crucian carp (farmed)												
(Carassius sp.)	～2011	1	1	100%	－	1	100%	<LOD	－	0	－	－
	2012	2	2	100%	13-15	2	100%	<15	－	0	14	－
372 ブラウントラウト Brown trout												
(Salmo trutta)	～2011	1	0	0%	－	0	0%	280	280	－	－	280
	2012	7	0	0%	－	0	0%	250	160	－	－	180
	2013	2	0	0%	－	0	0%	190	160	－	－	160
373 ボラ(淡水域) Flathead mullet(freshwater)												
(Mugil cephalus)	～2011	1	0	0%	－	1	100%	28	28	－	－	28
374 ホンマス Honmasu salmon												
(Oncorhynchus masou subsp.)	2012	17	0	0%	－	17	100%	37	14	－	－	15
	2013	4	2	50%	9.2-10	4	100%	6.3	－	－	－	5.2
375 ホンモロコ(養殖) Willow gudgeon (farmed)												
(Gnathopogon caerulescens)	～2011	7	4	57%	－	7	100%	9.9	－	－	－	－
	2012	22	21	95%	6.4-20	22	100%	19	－	0.86	12	－
	2013	26	26	100%	7.2-15	26	100%	<15	－	0	11	－
376 マハゼ Yellowfin Goby												
(Acanthogobius flavimanus)	～2011	1	0	0%	－	1	100%	10	10	－	－	10

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection Number	(%)	LOD (Bq/kg)	≦ 100 Bq/kg Number	(%)	Maximum (Bq/kg)	Median (Bq/kg)	Mean(1) (Bq/kg)	Mean(2) (Bq/kg)	Mean(3) (Bq/kg)
377 モクズガニ Japanese mitten crab												
(Eriocheir japonica)	2012	16	6	38%	5-11	16	100%	25	6.9	-	-	10
	2013	13	8	62%	7.7-15	13	100%	10	-	2.7	9.6	-
378 モツゴ Topmouth gudgeon												
(wild)(Pseudorasbora parva)	～2011	7	0	0%	-	4	57%	170	94	-	-	94
	2012	62	6	10%	6.3-15	61	98%	110	17	-	-	20
	2013	36	9	25%	7.3-12	36	100%	61	8.1	-	-	19
379 ヤシオマス(養殖) Yashiomasu trout (farmed)												
(Oncorhynchus mykiss)	2012	26	26	100%	15-20	26	100%	<20	-	0	18	-
	2013	21	21	100%	13-20	21	100%	<20	-	0	17	-
380 ヤツメウナギ Lamprey eel												
(Liobagrus reini Hilgendorf)	～2011	2	2	100%	-	2	100%	<LOD	-	0	-	-
381 ヤマトシジミ Brackish-water Clam												
(Corbicula japonica)	～2011	23	7	30%	-	23	100%	68	8	-	-	-
	2012	80	79	99%	5.3-15	80	100%	4.1	-	0.051	10	-
	2013	101	98	97%	3.4-15	101	100%	20	-	0.44	11	-
382 ヤマメ Land-locked salmon (wild)												
(Oncorhynchus masou)	～2011	147	38	26%	-	116	79%	490	42	-	-	-
	2012	422	244	58%	4.9-20	410	97%	270	-	-	-	-
	2013	402	230	57%	4-16	399	99%	120	-	-	-	12
383 ヤマメ(養殖) Land-locked salmon (farmed)												
(Oncorhynchus masou)	～2011	11	10	91%	-	11	100%	3	-	0.27	-	-
	2012	47	44	94%	1.2-19	47	100%	7.2	-	0.28	11	-
	2013	34	34	100%	6.1-20	34	100%	<20	-	0	12	-
384 ヨシノボリ Amur goby												
(Rhinogbius brunneus)	2013	1	0	0%	-	1	100%	33	33	-	-	33
385 ワカサギ Japanese smelt (wild)												
(Hypomesus nipponensis)	～2011	71	19	27%	-	54	76%	650	42	-	-	-
	2012	138	52	38%	1.1-19	131	95%	430	18	-	-	-
	2013	122	62	51%	0.86-17	111	91%	200	-	-	-	33
386 奥多摩ヤマメ(養殖) Okutama yamame trout												
(Oncorhynchus masou)	～2011	1	1	100%	-	1	100%	<LOD	-	0	-	-
387 信州サーモン(養殖) Shinshu salmon (farmed)												
(hybrid of brown trout and	～2011	1	1	100%	-	1	100%	<LOD	-	0	-	-
rainbow trout)	2012	3	3	100%	7.7-8.4	3	100%	<8.4	-	0	8	-
388 稚アユ Ayu sweetfish												
(Plecoglossus altivelis)	2012	2	1	50%	3.7	2	100%	2.1	-	-	-	2

2 Inspection Results for Fishery Products in other prefectures than Fukushima (Mar.2011-Mar.2014)

Item	Fiscal year	Number of samples	< Limit of Detection			≤ 100 Bq/kg		Maximum	Median	Mean(1)	Mean(2)	Mean(3)
			Number	(%)	LOD (Bq/kg)	Number	(%)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)	(Bq/kg)
哺乳類 Mammalia												
389 イワシクジラ Sei whale												
(Balaenoptera borealis)	～2011	3	3	100%	－	3	100%	<LOD	－	0	－	－
	2012	10	3	30%	－	10	100%	9.8	3.2	－	－	－
	2013	5	0	0%	－	5	100%	2.2	1.2	－	－	1.3
390 ツチクジラ Baird's beaked whale												
(Berardius bairdii)	～2011	13	13	100%	－	13	100%	<LOD	－	0	－	－
	2012	12	11	92%	0.91-1.4	12	100%	0.31	－	0.026	1.1	－
	2013	10	9	90%	0.81-0.96	10	100%	0.57	－	0.057	0.85	－
391 ニタリクジラ Bryde's whale												
(Balaenoptera bryde)	～2011	3	1	33%	－	3	100%	7.1	6.5	－	－	－
	2012	3	0	0%	－	3	100%	4.2	2.9	－	－	2.9
	2013	4	0	0%	－	4	100%	1.1	0.94	－	－	0.92
392 マッコウクジラ Sperm whale												
(Physeter macrocephalus)	2012	2	2	100%	－	2	100%	<LOD	－	0	－	－
	2013	1	1	100%	0.74	1	100%	<0.74	－	0	0.74	－
393 ミンククジラ Minke whale												
(Balaenoptera acutorostrata)	～2011	15	8	53%	－	15	100%	31	－	－	－	－
	2012	17	5	29%	1.4-1.5	17	100%	16	3.1	－	－	－
	2013	9	2	22%	0.84-0.96	9	100%	3.5	0.6	－	－	1.4