Explanation on the safety of fishery products

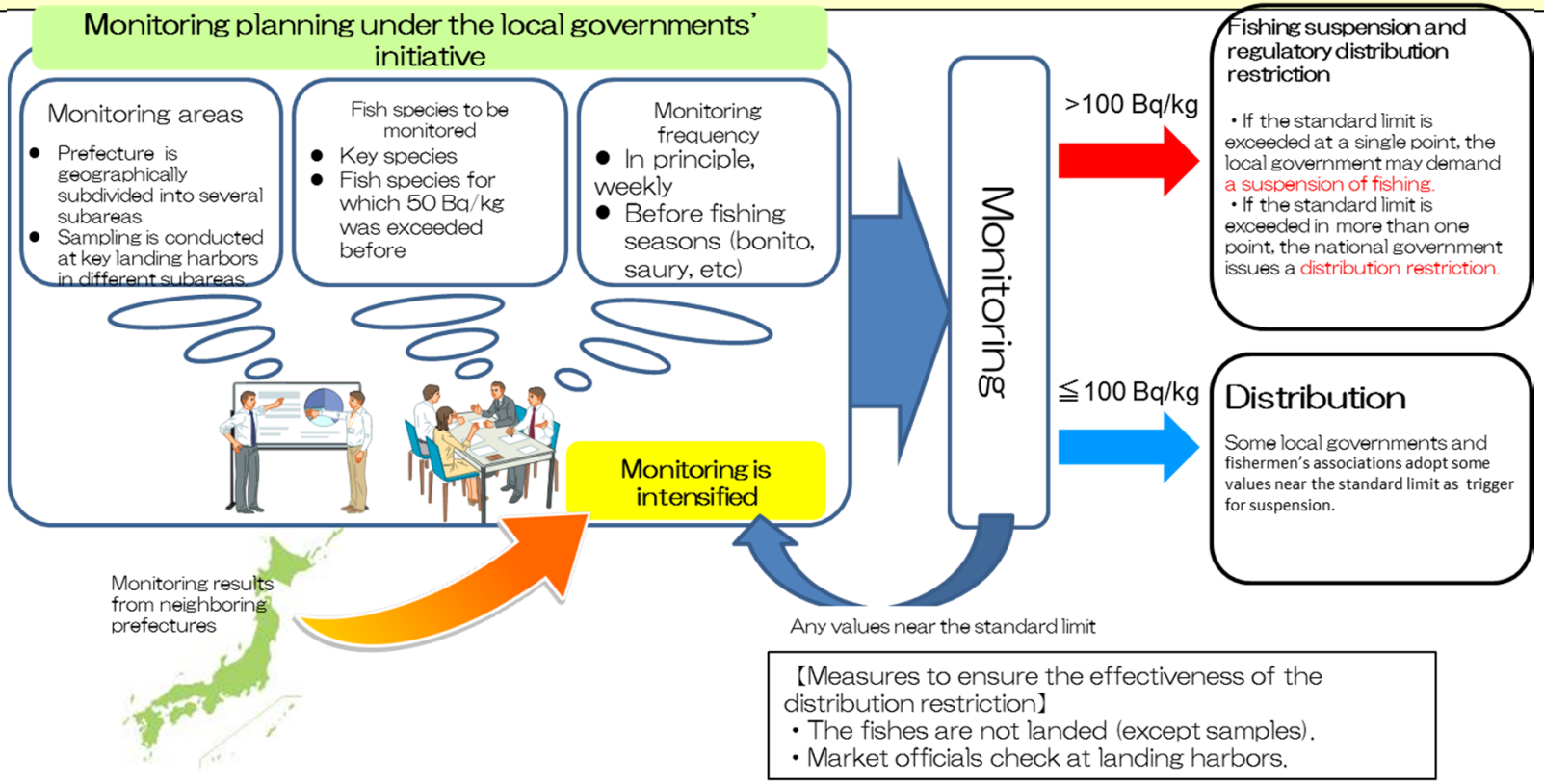
Fisheries Agency of Japan

Ⅰ Measures to secure the safety of fishery products

1. Framework for Securing the Safety of Fishery Products
2. Monitoring Plan of Local Government
3. Actions to be taken in the event that the standard limit is exceeded
4. Inspection Results of Fishery Products
5. Inspection Results for Other Radionuclides than Cesium
6. Radioactive cesium in Ocean Water

1 Framework for Securing the Safety of Fishery Products

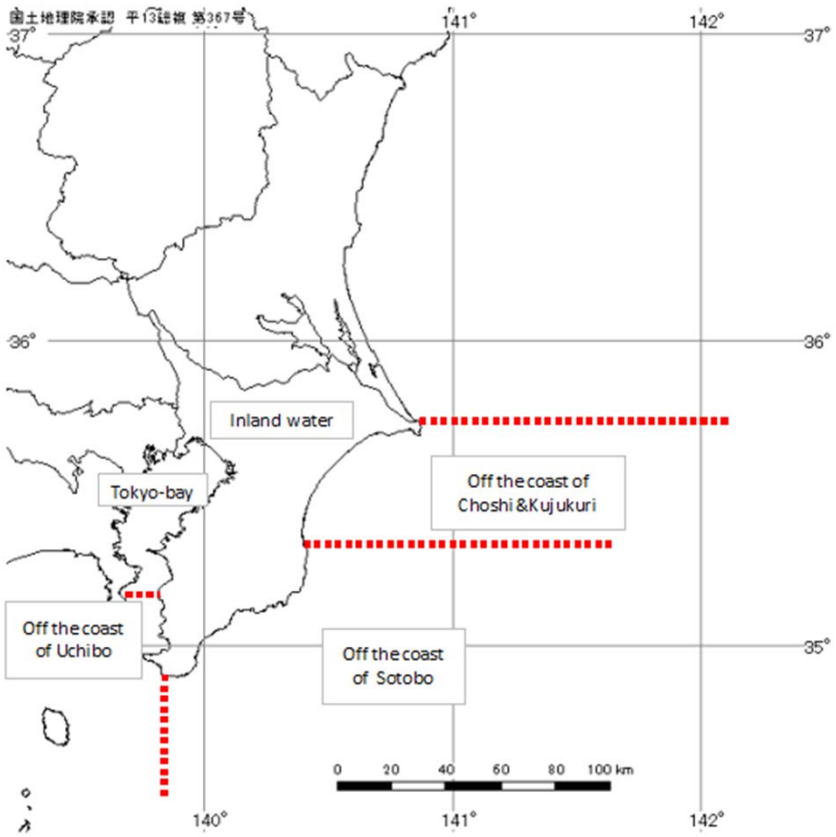
- The Nuclear Emergency Response Headquarter establishes and updates “Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods concerned Applies” (“the Guideline” hereinafter).
- Monitoring is focused on major fish species or those which exceeded 50 Bq/kg in the previous year.
- In cases where the same fishery products at multiple locations exceed the standard limit, the restrictions on their distribution and are imposed by the head of the Nuclear Emergency Response Headquarters.



2 Monitoring Plan of Local Governments

In case of Chiba Prefecture

6 zones: 4 fishing zones, inland fishery and aquaculture



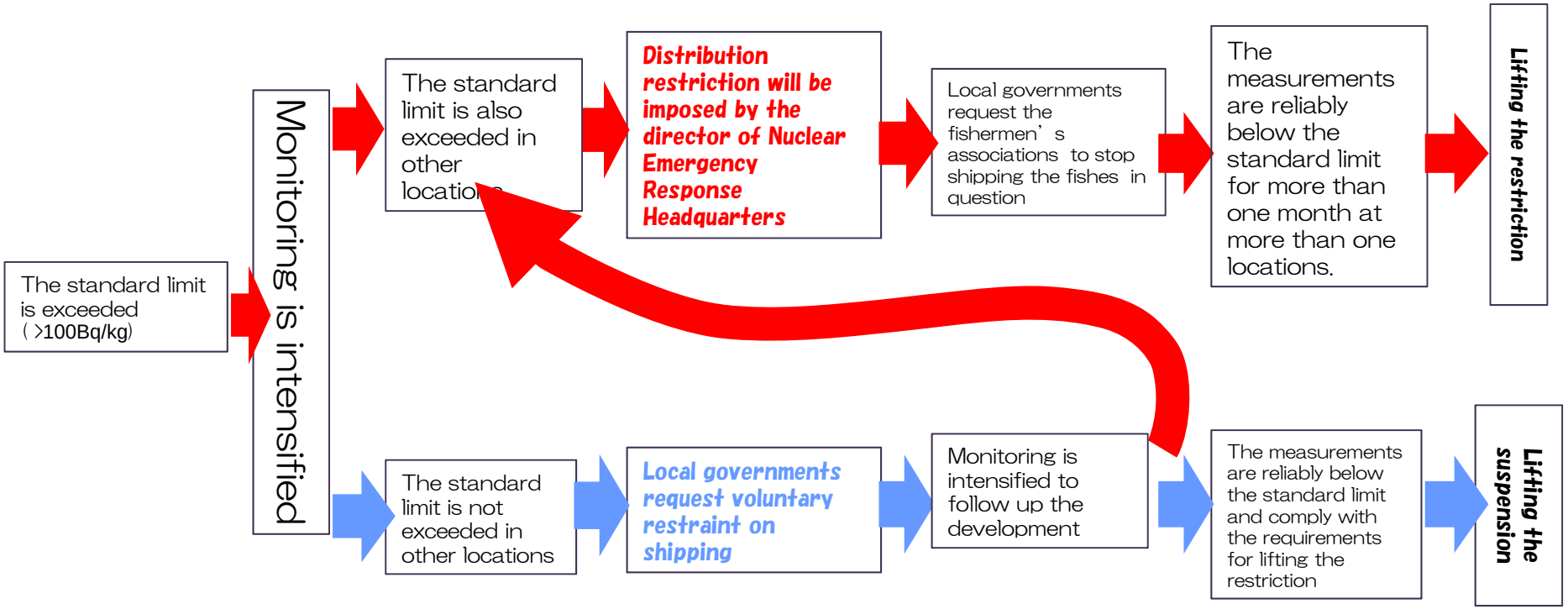
- Each local government establishes Monitoring Plan in accordance with “the Guideline”
- Local governments divide their marine fish areas by taking account of fishing activities or distribution of fish species.
- Monitoring is conducted for each zone based on monitoring plans.
- If radioactive cesium levels exceed or are close to the standard limit, the frequency of monitoring is intensified.

3 Actions to be taken in the event that the standard limit is exceeded

○The lot containing the product for which the standard limit is exceeded will be recalled pursuant to the Food Sanitation Act.

○Voluntary distribution suspension will be requested by local governments, or distribution restriction will be imposed by the director of Nuclear Emergency Response Headquarters (Prime Minister).

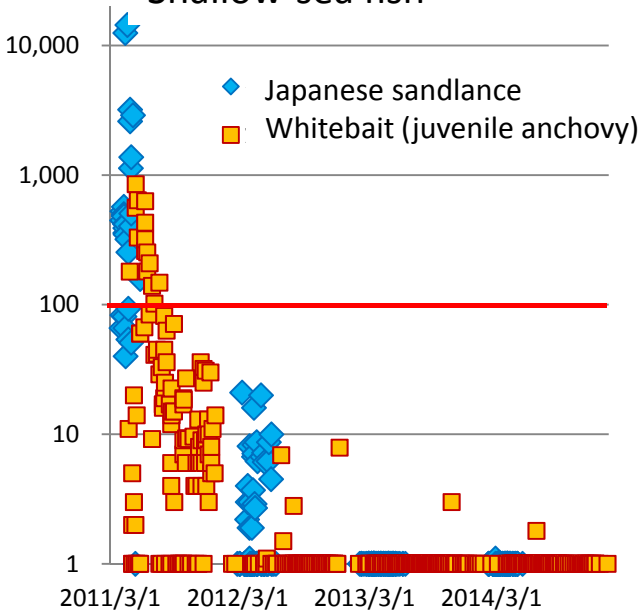
Workflow for voluntary distribution suspension or regulatory shipping restriction for sea fish.

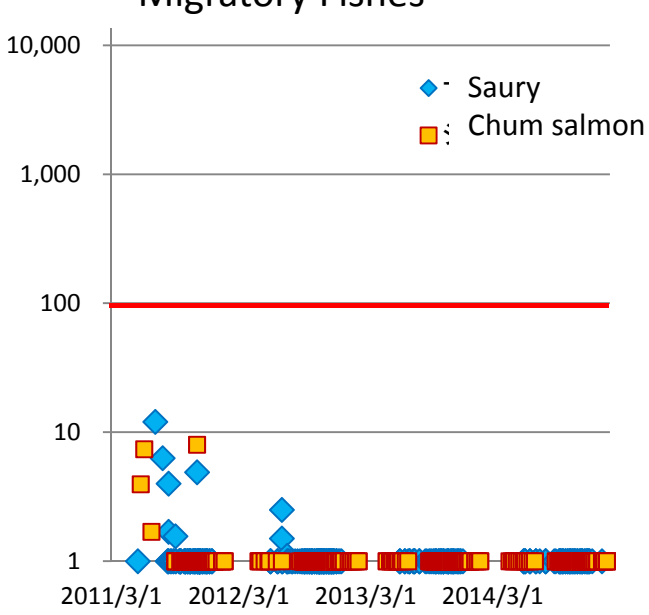


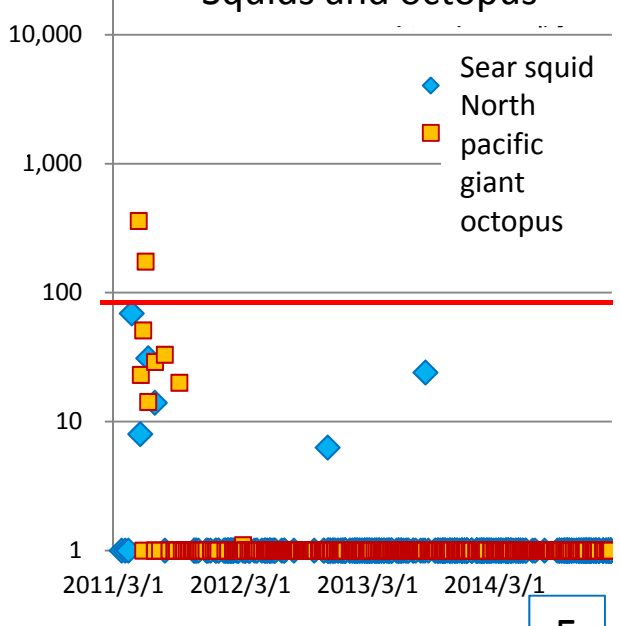
Note: Local governments and fishermen's associations have their own criteria and requirements in place for voluntary distribution suspension. The chart only shows a typical example.

4 Inspection Results of Fishery Products(1)

- Since the accident, about 66,500 samples of more than 400 fish species were inspected.
- Those inspection results were summarized by each fish species and fishing ground.
  - Shallow-sea fishes, Squid and Octopus:
    While radioactive cesium concentrations were high in the immediate post-accident period, the levels dropped off quickly.
  - Migratory fishes: No sample has ever exceeded 100 Bq/kg.







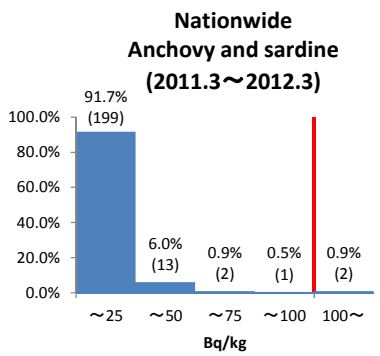
Inspection Results of Fishery Products(2)

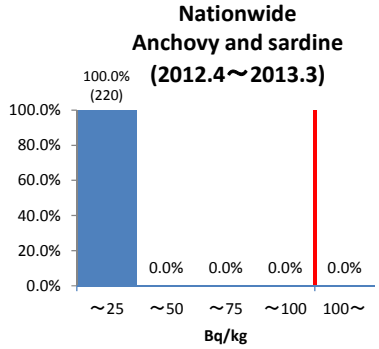
- In FY 2014, high readings (above 50 Bq/kg) were rarely observed in main fishery species and major export species, including bottom fish.
- Anchovy/Sardines and Mackerels, which are major fisheries species in the Pacific off the East Coast of Japan, have shown no high readings (above 25 Bq/kg) since FY 2012.

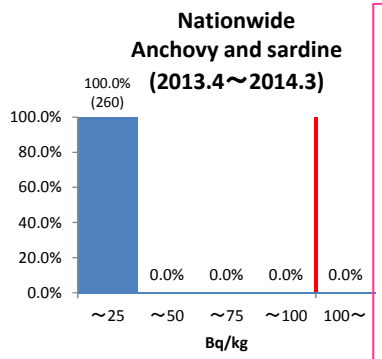
Surface Layer

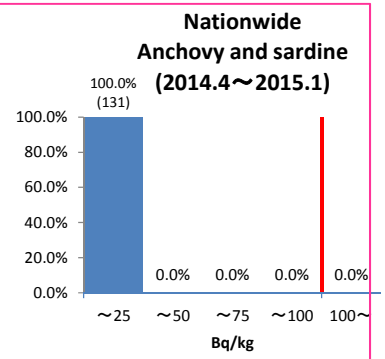
Anchovy and Sardine (Nationwide)

Export in 2014
13,786 t, ¥1,335 million,
Destination : Thailand, Vietnam, Malaysia etc.





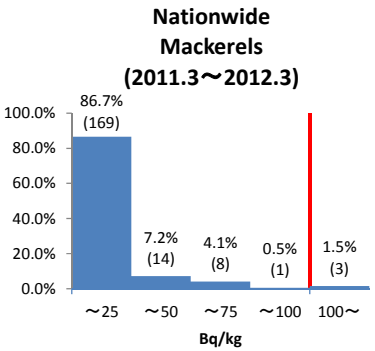


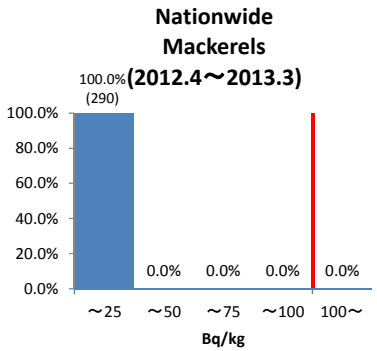


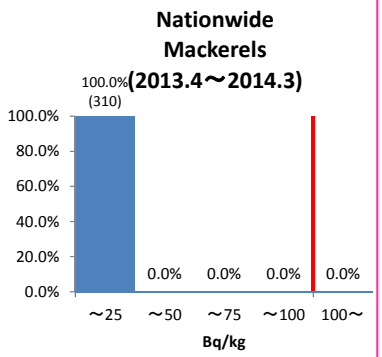
Intermediate Layer

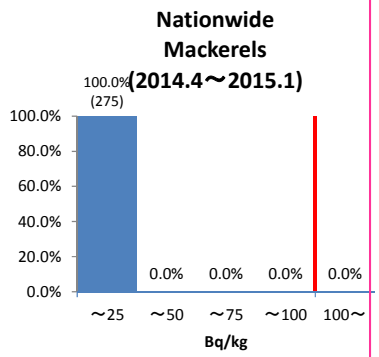
Mackerels (Nationwide)

Export in 2014
105,906 t, ¥11,513 million, Destination : Thailand, Egypt, Vietnam etc.









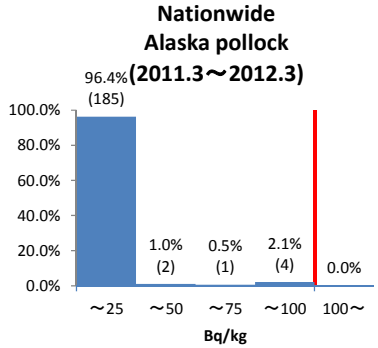
Inspection Results of Fishery Products(3)

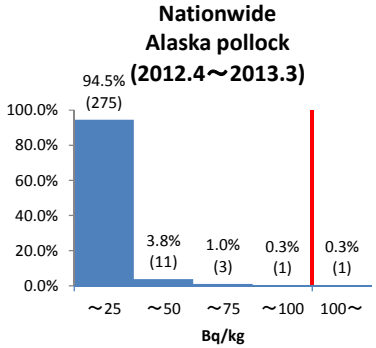
In bottom fish, the trend varies with species. For some species, we observed almost no readings in excess of the standard limit since immediately after the accident.

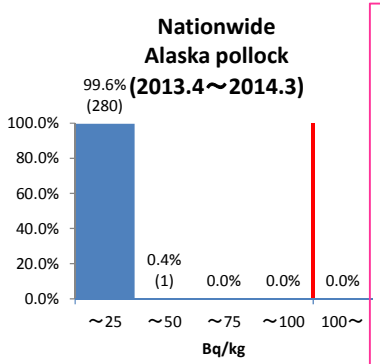
Bottom layer

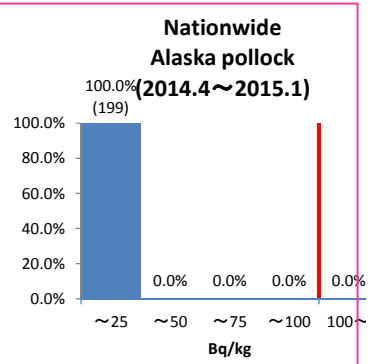
Alaska pollock (Nationwide)

Export in 2014
41,445t, ¥4,610 million,
Destination : China, Korea, Russia etc.

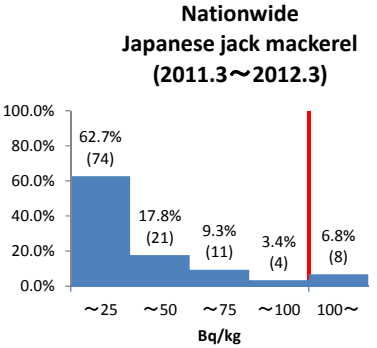


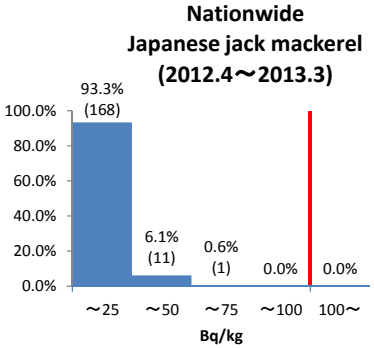


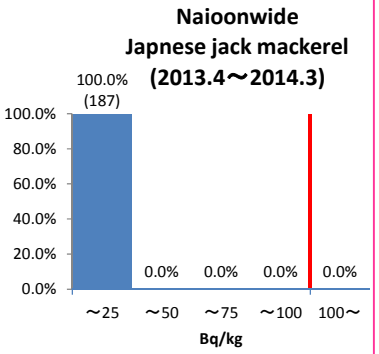


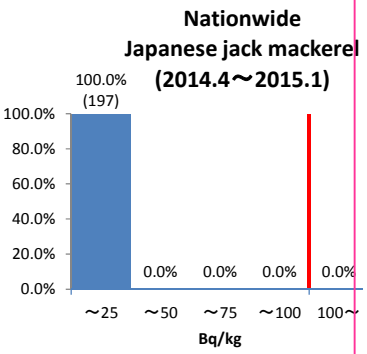


Japanese jack mackerel (Nationwide)



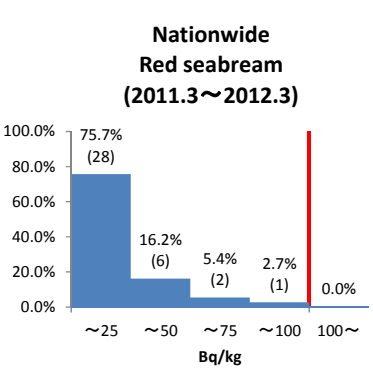


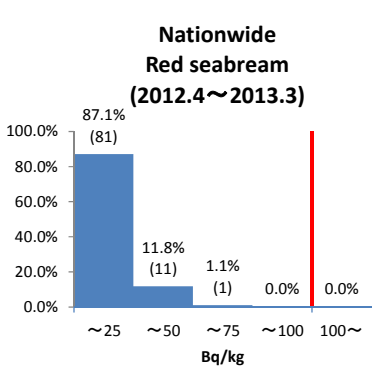


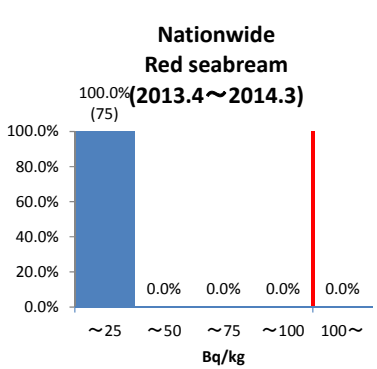


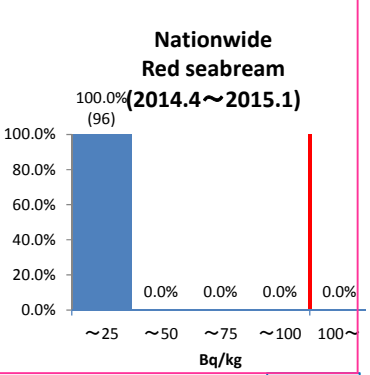
Red seabream (wild) (Nationwide)

Export in 2014
(live) 1,869t, ¥1,311 million, Destination : Korea etc.
Mainly farmed fish is exported.







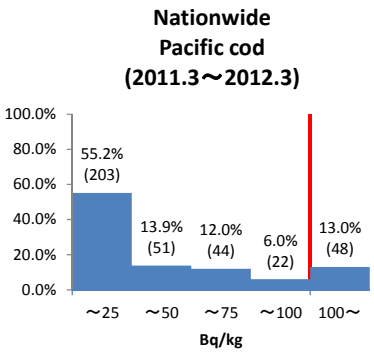


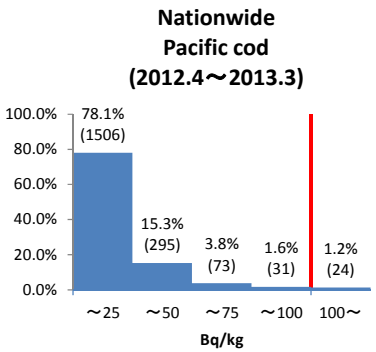
Inspection Results of Fishery Products(4)

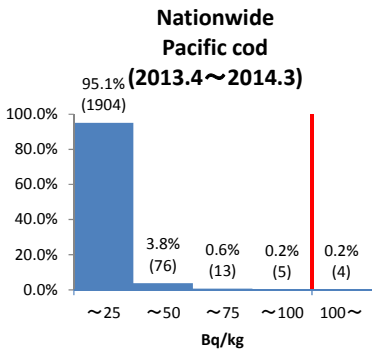
Bottom layer

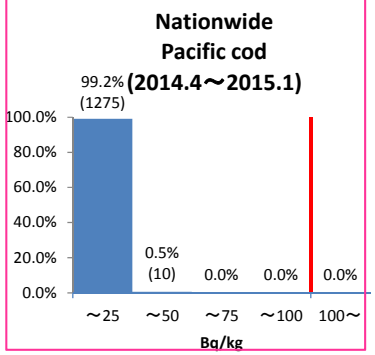
Pacific cod (Nation wide)

Export in 2014
3,045t, ¥658 million,
Destination : NZ, China Hong Kong etc.



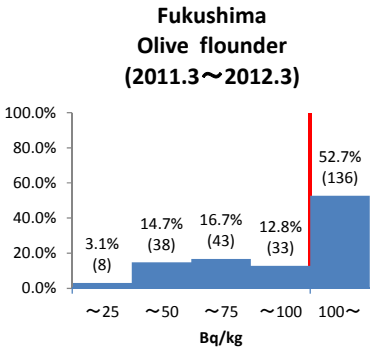


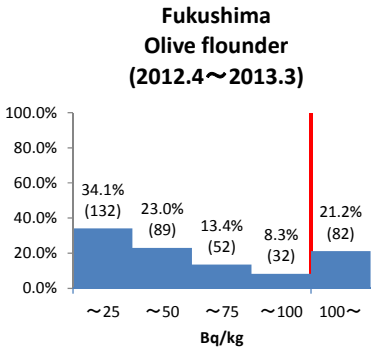


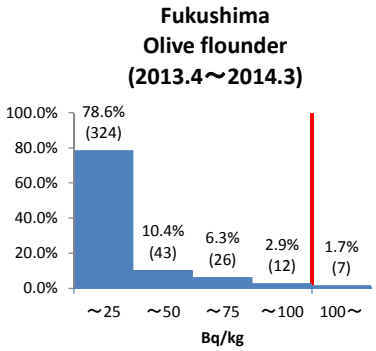


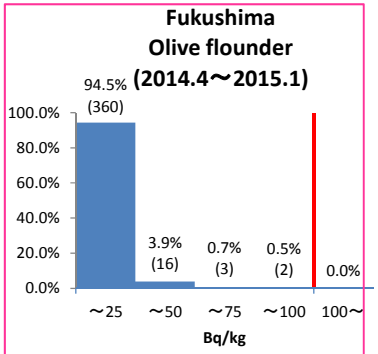
Pacific cod: In FY 2012, readings in excess of the standard limit were observed in a comparatively broad range. The level has declined since FY 2013. In FY 2014, no sample exceeded the standard limit, including those taken in Fukushima offshore. In January 2015, distribution restriction of pacific cod captured in Fukushima offshore was cancelled.

Olive flounder (Fukushima)









Olive flounder in Fukushima: 52.7% (in FY 2011) and 21.1% (in FY 2012) of the samples exceeded 100 Bq/kg. The level has substantially declined since FY 2013. In FY 2014, all samples were within 100 Bq/kg.

Inspection Results of Fishery Products（5）

Almost none of migratory species has shown high value since immediately after the accident.

Migratory fish

Tunas and marlins（Nationwide）

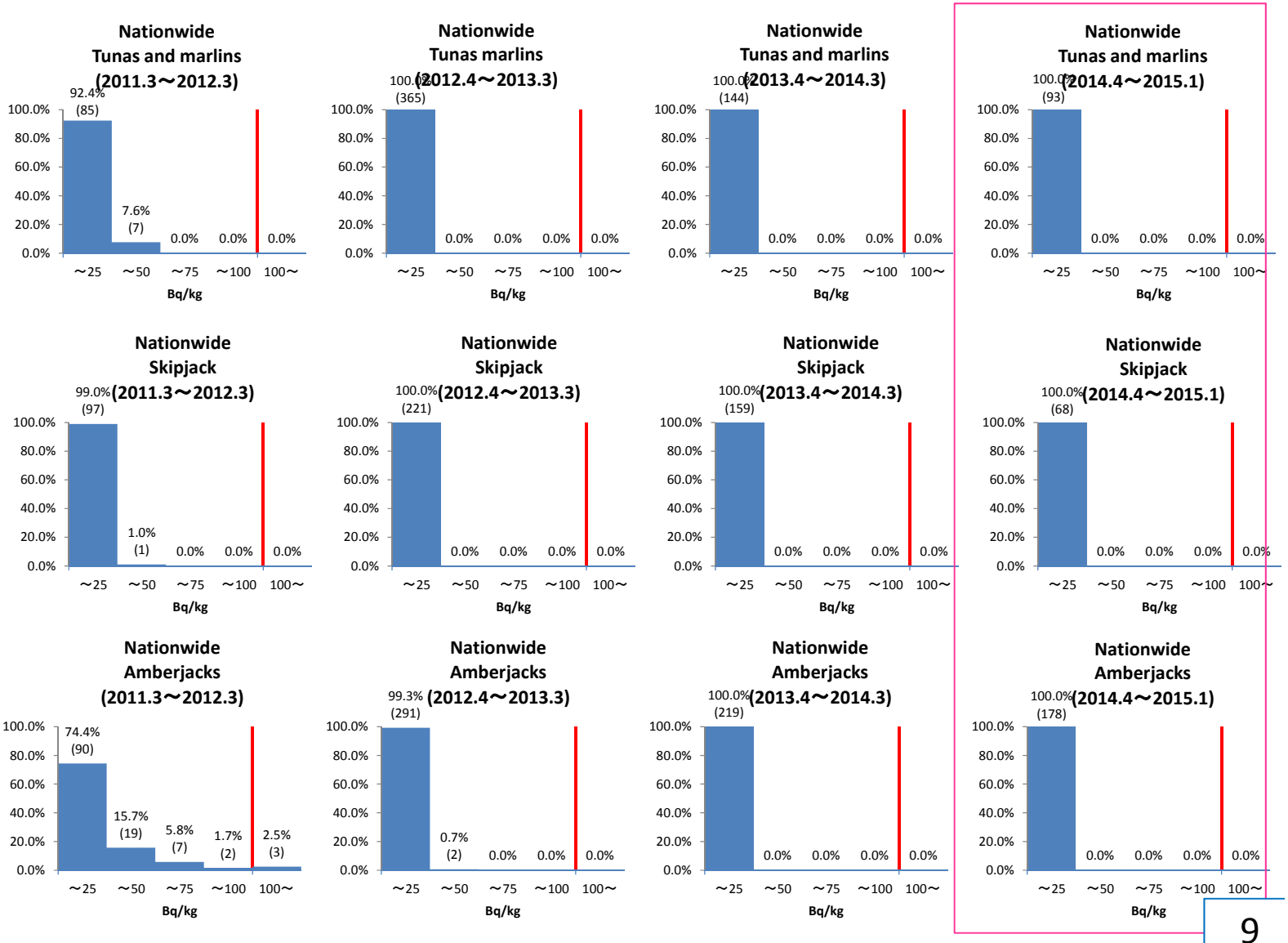
Export in 2014
28,068t, ¥10,344 million
Destination : Thailand, Guam, Vietnam etc.

Skipjack（Nationwide）

Export in 2014
35,422t, ¥5,438 million,
Destination : Thailand, Indonesia, China etc.

Amberjacks（Nationwide）

Export in 2014
6,323t, ¥10,012 million,
Destination : USA, Hong Kong ,Thailand etc.

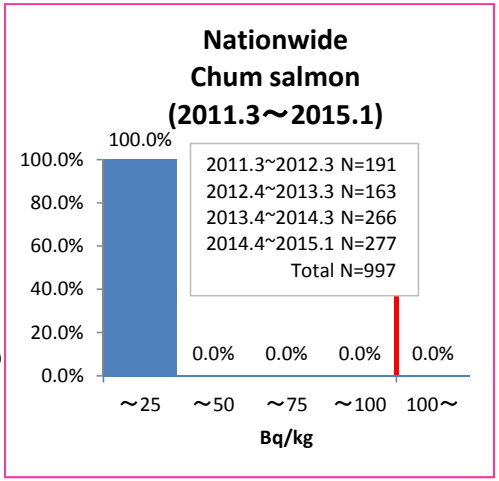


Inspection Results of Fishery Products(6)

Migratory fish

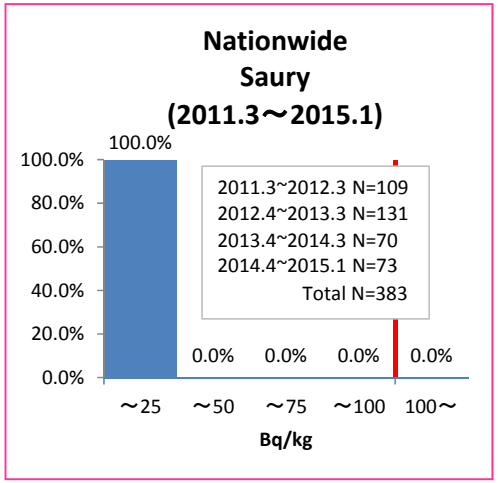
Chum salmon（Nationwide）

Export in 2014年
37,870t, ¥11,445 millio
Destination: China,
Thailand , Vietnam etc.



Saury（Nationwide）

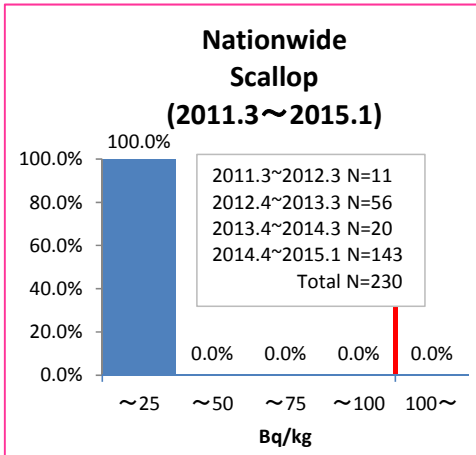
Export in 2014
9,495t, ¥1,183million
Destination：Russia, China,
Thailand etc.



Farmed species

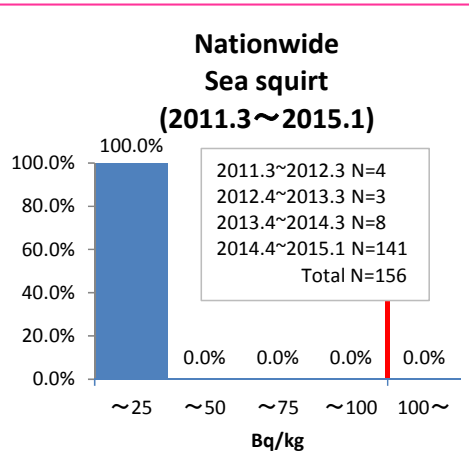
Main farmed species have consistently displayed low readings.

Scallop（Nationwide）



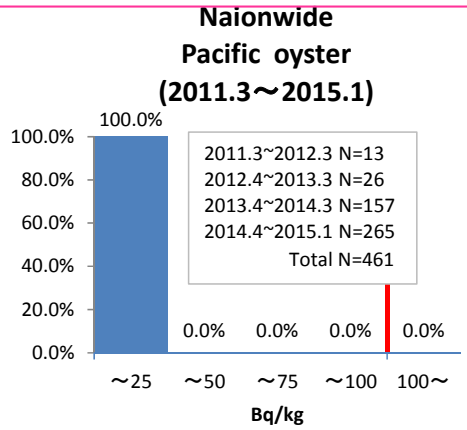
Export in 2014
56,012t, ¥44,670million
Destination：USA, China, Vietnam etc.

Sea squirt（Nationwide）



Export in 2014
1552t, ¥456million
Destination:　Korea

Pacific oyster（Nationwide）



Inspection Results of Fishery Products(7)

○ Importing countries have detected no sample in excess of the standard limit from fishery products exported from Japan at their boarder inspection.

→ confirm effectiveness of safety management framework of Japan

In response to the Fukushima Dai-ichi NPS accident, some countries/regions introduced import restrictions (requirement of test certificate of radioactive material, strengthened inspection at the boarder etc.)

○Test results of Japanese fishery products in Korea

Period	Not detected		Trace detection (clear customs)		Trace detection (Ship back)	
	Number	Weight(t)	Number	Weight(t)	Number	Weight(t)
2011.3.14～12.31	4,126	15,993	21	149	—	—
2012.1.1～12.31	4,729	20,526	101	2,704	—	—
2013.1.1～12.31	5,328	20,543	9	160	(*1) 1	0
2014.1.1～12.31	5,290	18,265	—	—	(*2) 4	20
2015.1.1～2.26	1,067	3,672	—	—	—	—
Fishery product Total	20,540	78,999	131	3,013	5	20

*1：1Bq/kg, *2：1Bq/kg, 1Bq/kg, 3Bq/kg, 2Bq/kg

5 Inspection for Other Radionuclides than Cesium

○ A total of 67 samples from 2011 to 2014 were inspected for radioactive strontium, and 5 samples were inspected for plutonium. The concentrations were largely at the same levels as before the accident*. Furthermore, the effective dose of radioactive strontium was significantly less than that of radioactive cesium. Thus, the assumption** that was made in calculating the limits was sufficiently safe.

** The effective dose of other radionuclides would be equal to that of radioactive cesium for marine species.

○ In FY 2014, further testing are being conducted for scallop, mackerel, sea squirt etc.（results will be made public by the end of FY 2014）

The concentrations of radioactive strontium in fishery products (between 04/11/2011 and 11/24/2013)

Nuclides	# of samples	< LOD		Range (Bq/kg)	Notes：Cs134+137 (Bq/kg)
		# of samples	LOQ (Bq/kg)		
Sr90	67	58	0.0077-0.04	0.016-1.2	ND-970
Pu238	5	5	0.00053-0.00093	-	0.054-0.248
Pu239＋240	5	4	0.00085-0.00093	0.0011	

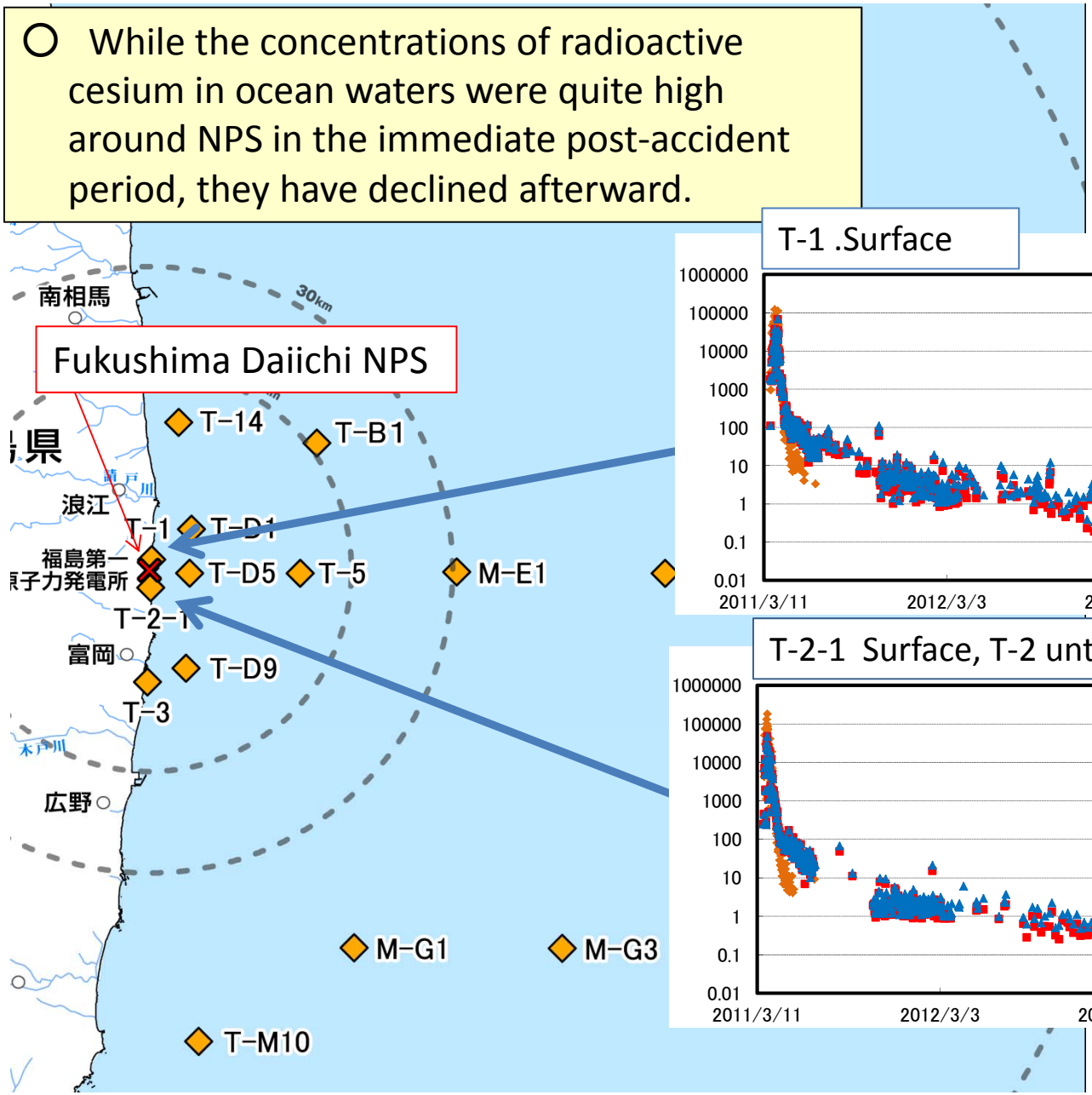
*** Ranges of radionuclides' levels observed before the accident**

Sr90	<LOD-0.26 Bq/kg
Pu238	<LOD-0.0016 Bq/kg
Pu239+240	<LOD-0.073 Bq/kg

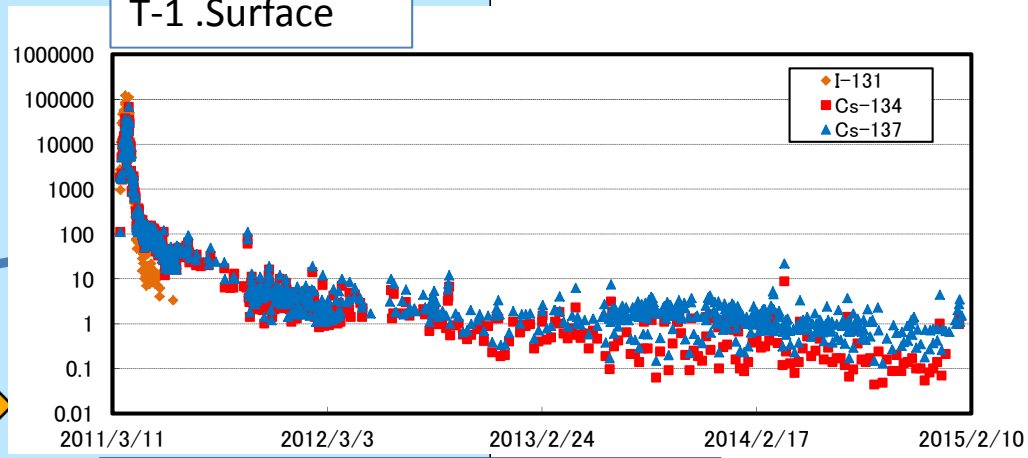
(Source: Nuclear Regulation Authority (http://search.kankyo-hoshano.go.jp/servlet/search.top))

6 Radioactive Cesium in Ocean Water

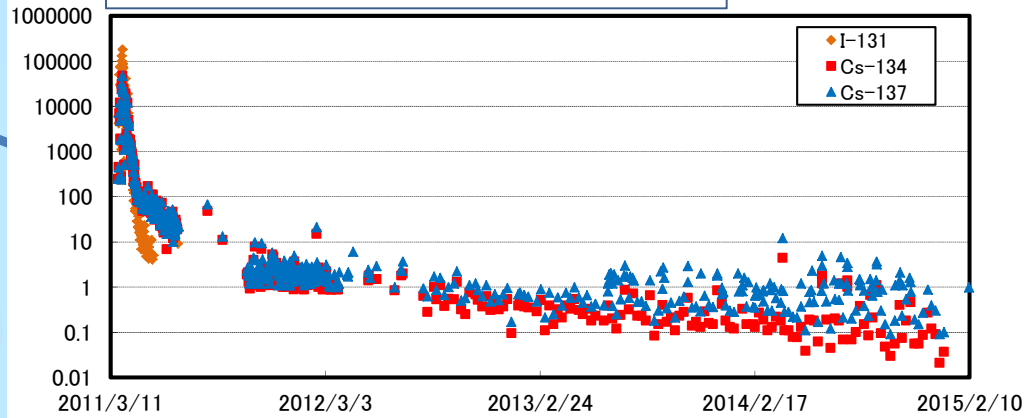
○ While the concentrations of radioactive cesium in ocean waters were quite high around NPS in the immediate post-accident period, they have declined afterward.



T-1 .Surface



T-2-1 Surface, T-2 until Nov 2012

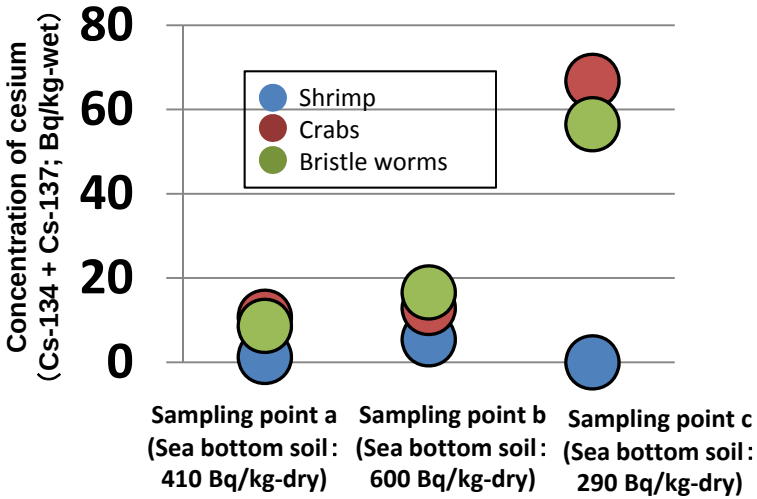


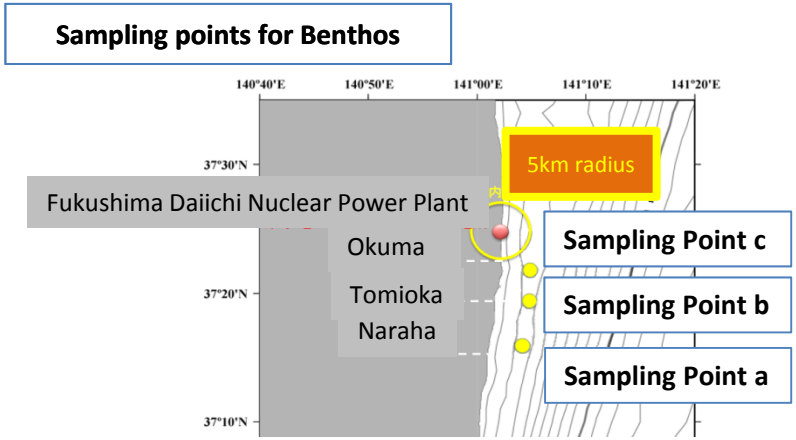
Ⅱ　Research Activity

Research Activity(1)

○ New findings have been obtained on the mechanism by which radionuclides are transferred to fishery products.

(1) No correlation was found between the radioactive cesium concentrations of benthos and those of marine soils.

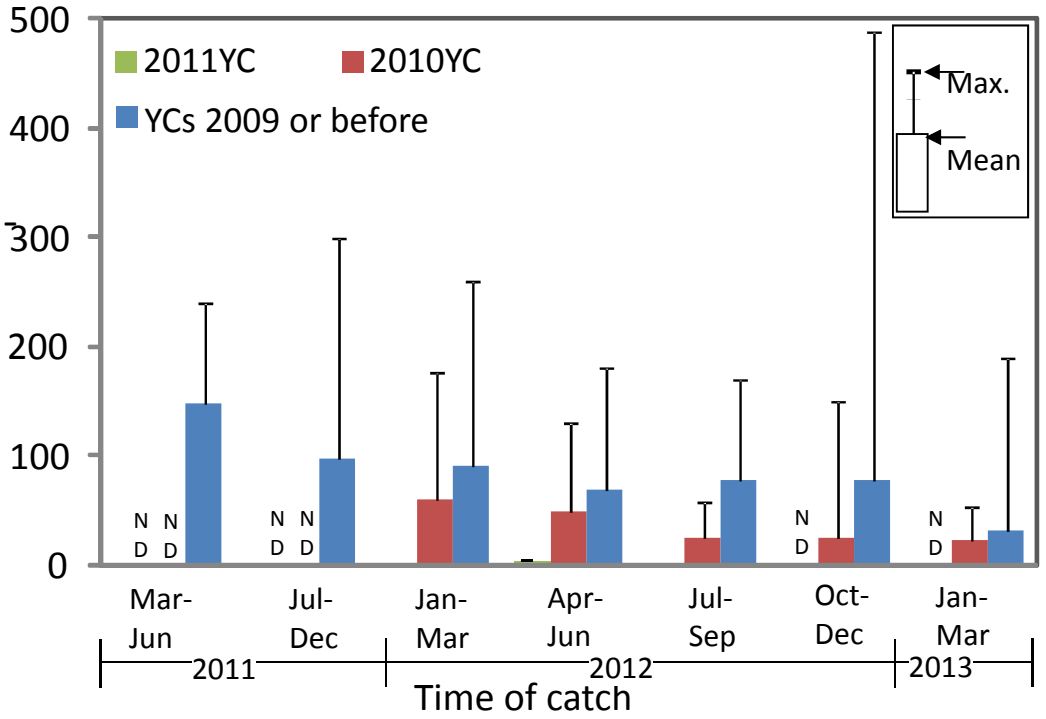




(2) For Olive flounder and Pacific cod;

① Little radioactive cesium was taken in by the birth year classes born after the accident (2011 or later).

② Little intake of radioactive materials took place in the winter of 2012 or later.

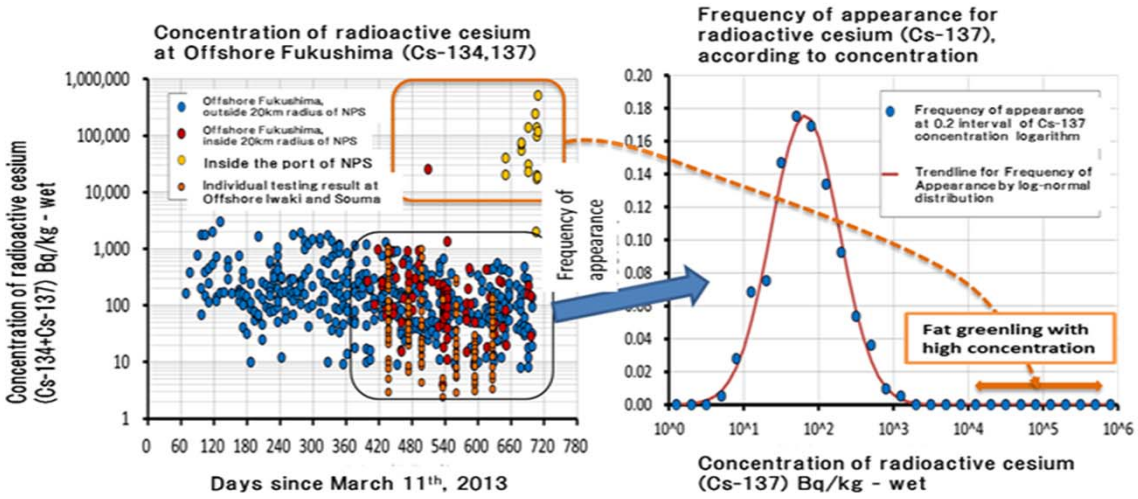


Chronological trend in concentration of cesium in Pacific cod (Gadus macrocephalus) caught off Fukushima according to birth year class

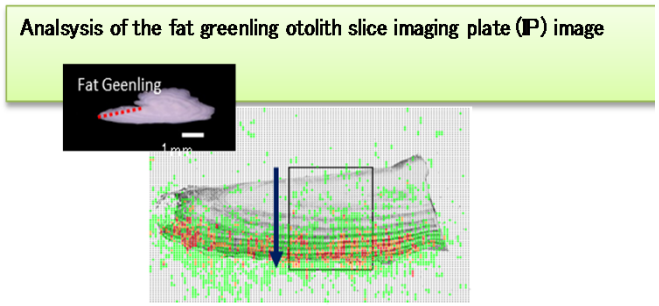
Research Activity(2)

- In August 2012 a highly contaminated fat greenling, with radioactive Cs level of 25,800Bq/kg, was taken at the mouth of the Ota River, approx. 20 km from the Fukushima Daiichi NPS.
- Analysis of the otolith 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.
- In light of the improved situation of pollution around the Fukushima Daiichi Nuclear Power Plant, it is important to prevent marine organism from expanding from the inside of the port. TEPCO has installed nets at the port entrance and carries out exterminations inside the port.
- The study was published in the Scientific Reports of the Nature: **"Radiocesium contamination of greenlings (*Hexagrammos otakii*) off the coast of Fukushima"** (Scientific Reports 4, Article number: 6851)

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



Analysis of the Highly-Contaminated Fat Greenling's Otolith



IP measurement image of a slice (red line in the picture represents the cross-section location) of the highly-contaminated fat greenling otolith from the mouth of the Ota River. The colors represent the size of response, from largest to smallest: black, green, orange, red.

Research Activity (3)

- Estimation of possibility that Cs level in fishery products exceeds 100Bq/kg
- With regard to 68 fish species targeted, analysis were conducted using exponential model/Weibull model (appropriate for the current situation (long-tailed distribution of radioactive Cs level)) .
- The result estimated that, the possibility as of January 1st 2015, in effect, is equal to zero for almost all analysis (by species and by prefectures).

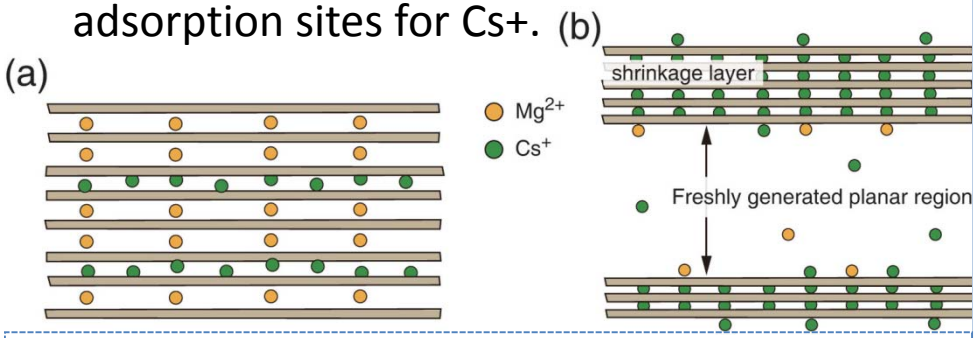
Possibility of exceeding 100 Bq/kg estimated by the analysis using model

Prefecture	Species		Probability of exceeding 100Bq (Cs(134+137))/kg
Aomori	Japanese amberjack	*(Seriola quinqueraduata)*	3.4882×10^{-21}
	Scallop	*(Mizuhopecten yessoensis)*	6.94116×10^{-21}
	Chub mackerel	*(Scomber japonicus)*	5.9547×10^{-237}
	Giant Pacific octopus	*(Paroctopus dofleini)*	1.18851×10^{-34}
	Alaska pollock	*(Theragra chalcogramma)*	2.35602×10^{-13}
	Japanese flying squid	*(Todarodes pacificus)*	5.62473×10^{-36}
Iwate	Japanese amberjack	*(Seriola quinqueraduata)*	1.52425×10^{-18}
	Scallop	*(Mizuhopecten yessoensis)*	6.65241×10^{-07}
	Common sea squirt	*(Halocynthia roretzi)*	1.25716×10^{-34}
	Chub mackerel	*(Scomber japonicus)*	2.13012×10^{-06}
	Giant Pacific octopus	*(Paroctopus dofleini)*	8.75712×10^{-37}
	Alaska pollock	*(Theragra chalcogramma)*	9.10936×10^{-16}
	Japanese flying squid	*(Todarodes pacificus)*	5.24519×10^{-38}
Miyagi	Japanese amberjack	*(Seriola quinqueraduata)*	8.32267×10^{-16}
	Scallop	*(Mizuhopecten yessoensis)*	2.077×10^{-14}
	Skipjack tuna	*(Katsuwonus pelamis)*	9.43538×10^{-46}
	Common sea squirt	*(Halocynthia roretzi)*	3.4291×10^{-07}
	Chub mackerel	*(Scomber japonicus)*	8.72196×10^{-40}
	Swordfish	*(Xiphias gladius)*	3.76391×10^{-11}
	Pacific saury	*(Cololabis saira)*	2.88765×10^{-18}
	Alaska pollock	*(Theragra chalcogramma)*	3.49347×10^{-17}
	Blue shark	*(Prionace glauca)*	3.76575×10^{-19}
Fukushima	Japanese amberjack	*(Seriola quinqueraduata)*	7.19234×10^{-15}
	Chub mackerel	*(Scomber japonicus)*	6.20653×10^{-07}
	Common octopus	*(Octopus vulgaris)*	1.59228×10^{-06}
	Giant Pacific octopus	*(Paroctopus dofleini)*	4.97467×10^{-12}
	Alaska pollock	*(Theragra chalcogramma)*	1.23724×10^{-14}
	Japanese flying squid	*(Todarodes pacificus)*	2.09859×10^{-11}
	Spear squid	*(Loligo bleekeri)*	6.75928×10^{-09}
Ibaraki	Japanese amberjack	*(Seriola quinqueraduata)*	9.68549×10^{-14}
	Common octopus	*(Octopus vulgaris)*	1.99523×10^{-10}
	Chub mackerel	*(Scomber japonicus)*	0.001926779
	Alaska pollock	*(Theragra chalcogramma)*	3.34136×10^{-53}
	Spear squid	*(Loligo bleekeri)*	7.31853×10^{-30}
Chiba	Japanese amberjack	*(Seriola quinqueraduata)*	3.94779×10^{-21}
	Skipjack tuna	*(Katsuwonus pelamis)*	2.6043×10^{-33}
	Chub mackerel	*(Scomber japonicus)*	1.44714×10^{-68}
	Bigeye tuna	*(Thunnus obesus)*	4.17322×10^{-12}
	Japanese flying squid	*(Todarodes pacificus)*	2.09794×10^{-25}
	Spear squid	*(Loligo bleekeri)*	1.67349×10^{-19}

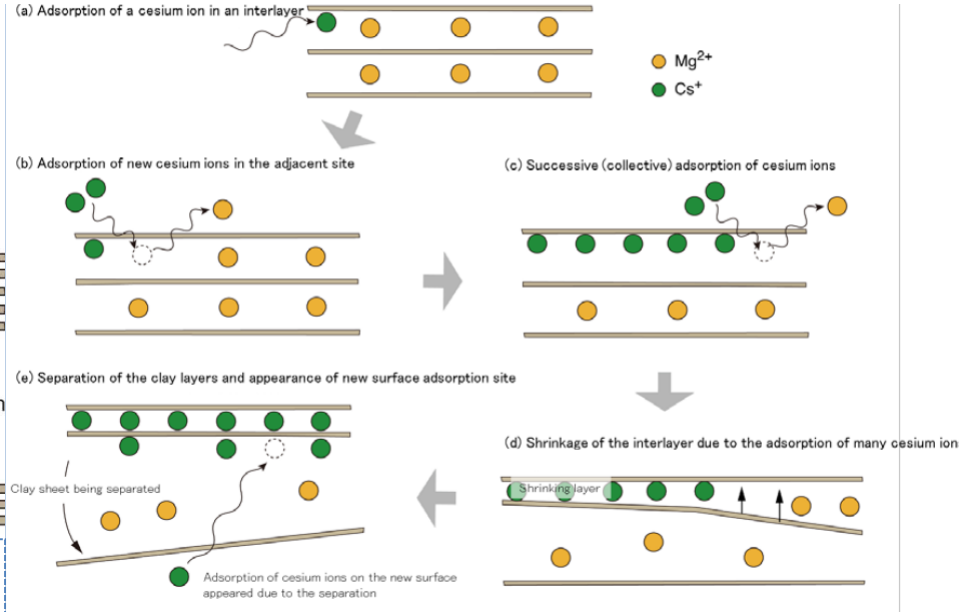
Research Activity(4)

- New report on the mechanism of Cs absorption onto soil clay, that is well-studied in land-based studies
- Structural change in vermiculite (one of clay minerals) at the absorption of Cs-ion were observed using a method called “Small Angle X-ray Scattering”.
- **The study was published in the Scientific Report (2014) of the Nature: “Collective Structural Changes in Vermiculite Clay Suspensions Induced by Cesium Ions” (Scientific Reports 4, Article number: 6585）***

- Schematic illustrations of the crystal domain of vermiculite clay with Cs+. (a) Collective intercalation (localization) of Cs+ in the selective layer spaces and (b) segmentation of the crystal domain of vermiculite clay, providing fresh planar adsorption sites for Cs+.



- Adsorption of cesium one after another like Domino Topping and schematics of structural change of vermiculate



* the group of Dr. Ryuhei Motokawa (Assistant Principal Researcher, JAEA), Dr Tsuyoshi Yaita (Unit Manager, JAEA), Dr. Hitoshi Endo (Associate Professor, High Energy Accelerator Research Organization), Dr. Shingo Yokoyama (Principal Research Scientist, Central Research Institute of the Electric Power Industry), and Dr. Shotaro Nishitsuji (Assistant Professor, Graduate School of Science and Engineering, Yamagata University

TOPICS Fukushima 26 Jan 2015 No. 58Japan Atomic Energy Agency (JAEA)
http://fukushima.jaea.go.jp/english/topics/pdf/topics-fukushima058e.pdf

Ⅲ　Provision of information, Domestically and Internationally

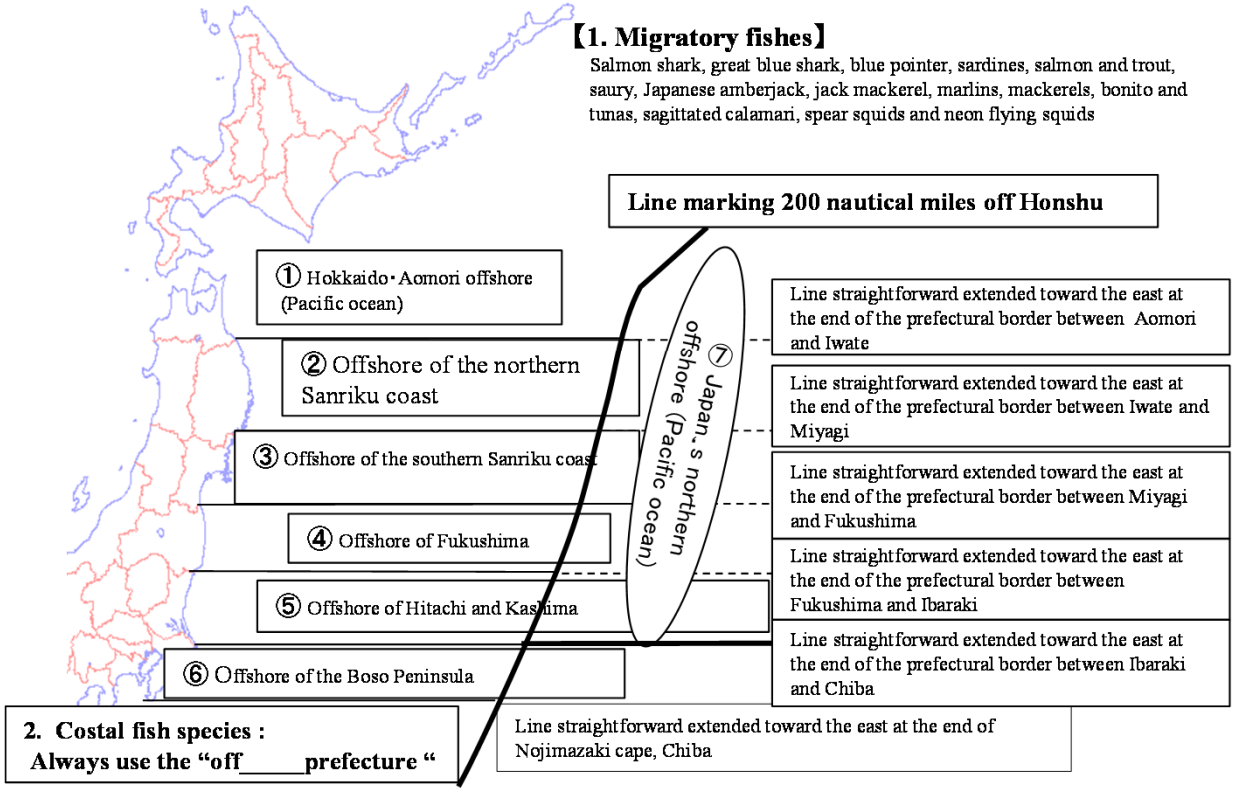
1　Labelling of Harvest Area

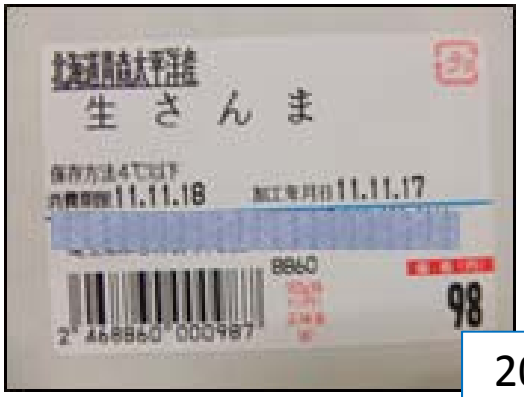
2　Risk Communication and Current Situation of Import Restriction

1 Labelling of Harvest Area

- In accordance with the Labelling Standard for the Quality of Fresh Food, which is based on the Act for Standardization and Proper Labeling of Agricultural and Forestry Products, harvest area shall be indicated, but in case that it is difficult, port of landing or the prefecture where the port is located can be indicated alternatively.
- Fisheries Agency recommended that the detailed mark of origin program indicating the geographical fishery areas and their designations for raw fishery products from the east coast of Honshu, Japan, should be started in October 2011.
- Harvest area is clarified even for those species which migrate beyond prefectures such as mackerel, *pacific saury etc.*.

How eastern Japan's sea production zone names are displayed





2 Risk Communication and Current Situation of Import Restriction

【 Domestic consumer awareness】

- According to the survey by the Consumer Affairs Agency on consumer awareness, 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, although this figure fell to 15.3% in February 2014.

【Import regulations 】

- Some countries imposed import restrictions on Japanese fishery products (e.g. requirement for test certificate of radionuclides, ban on import of all fishery products from certain prefectures).
- 13 countries lifted restrictions (e.g. Vietnam (Sep. 2013), Australia (Jan. 2014)). Some of other countries eased restrictions as follows.

  EU: Test certificate of radioactive material - 10 prefectures => 8 prefectures (Jan. 2014)

  Thailand: Test certificate of radioactive material - 8 prefectures => 3 prefectures (Nov. 2014)

Example of Website

【Monitoring results】

Item	Radioactive Caesium (Bq/kg) Total		
English	Standard limit for Radioactive Cesium in fish: 100Bq/kg	Radioactive Caesium (Bq/kg) Cesium-134	Radioactive Caesium (Bq/k Cesium-137
Saffron cod *(Eleginus gracilis)*	Not detectable	Not detectable (<0.369)	Not detectable (<0.407)
Alaska pollock *(Theragra chalcogramma)*	Not detectable	Not detectable (<0.563)	Not detectable (<0.564)
Pacific cod *(Gadus macrocephalus)* (over 1 kg)	Not detectable	Not detectable (<0.409)	Not detectable (<0.457)
Pacific cod *(Gadus macrocephalus)* (over 1 kg,Liver part)	Not detectable	Not detectable (<4.65)	Not detectable (<5.59)

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

Future Challenges

- Sufficient measures have been taken for ensuring safety of fishery products.

- For provision of safe fishery products, to continue monitoring and other efforts such as elucidation of mechanism for contamination.

- To provide appropriate information domestically and internationally, sweep away unfounded reputational damages and misinformation, and encourage regulating countries to lift import restrictions.

Update of the Report by FAJ (scheduled at the end of March)

- Since the Fukushima Daiichi NPS accident in March 2011, the Japanese government, local governments and relevant organizations have worked cooperatively for ensuring safety of fishery products.
- The report gave a summary of knowledge obtained, in order to promote accurate understanding of Japanese fishery products domestically/internationally

  → The report was published in May 2014
- Almost four years have passed since the accident. The level of radioactive Cs in fishery products has declined substantially.
- Concerns still remain among some consumers. Also, in some instances of relaxation of import restriction on foods, fishery products were not included. It implies that strong concern on fishery products still remain.

  → Update of the Report is Planned