

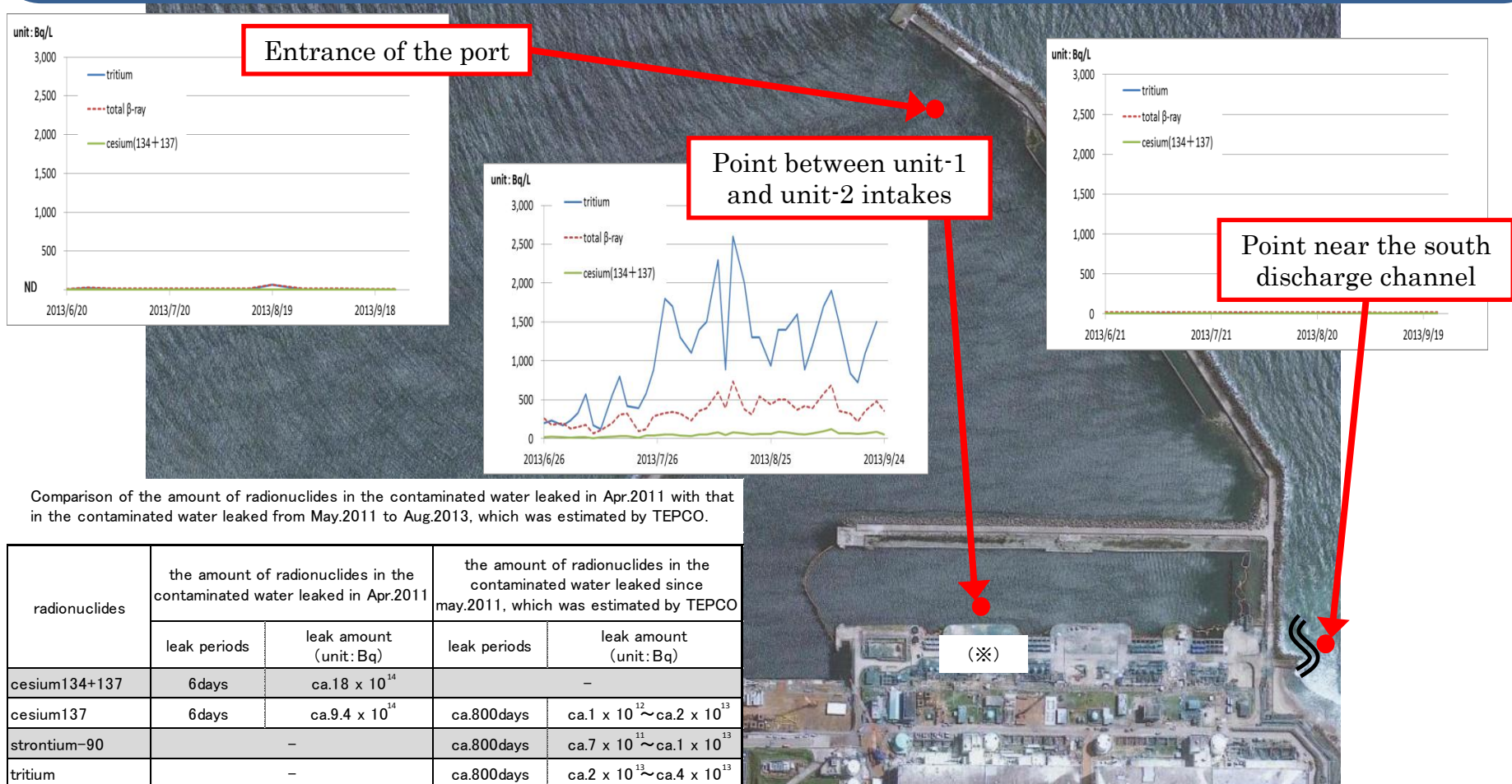
The Leakage of Contaminated Water at TEPCO's Fukushima Daiichi Nuclear Power Station and the Safety of Fishery Products

Nov. 2013

Fisheries Agency of Japan

Influence of the contaminated water in the port of F1NPS

- May 2013, a high level of tritium was detected in ground water at the seawall area between intakes of unit 1 and unit 2 (※) of Fukushima Daiichi Nuclear Power Station (F1NPS). TEPCO investigated this case and confirmed in July 2013 that the contaminated water had leaked into the port of F1NPS.
- Though a certain level of radionuclides was detected in the seawater within the port, the level outside is below detection limit at most points. No significant influence of the contaminated water has been detected outside the port.
- Since Feb. 2013, TEPCO constructed the fence and net at the port entrance, which prevent fishes from moving outside or inside, as well as help reducing the number of fish in the port by catching and removing them(ref. [TEPCO HP](#)).



Note:3.5 Bq/L (6/20 sampling) and 0.36 Bq/L (6/26) for strontium-90 were detected at the entrance of the port and the point near the south discharge channel, respectively.

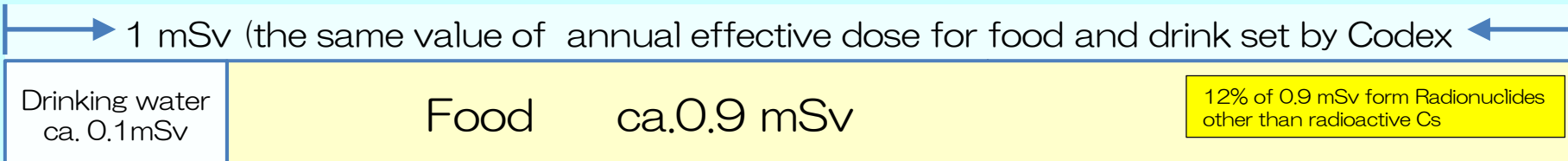
(prepared by Fisheries Agency based on information from TEPCO

Strontium-90

- The influence of strontium-90 in food to human health was fully considered when establishing the current standard limit for radioactive cesium (100Bq/kg-wet).
- Consequently, there is no need to worry about influence of strontium-90 when the level of radioactive cesium is below 100 Bq/kg-wet.

Concept of standard limit

- The current standard limits were established with full consideration of the influence to human health from radionuclides other than Cs-134 and Cs-137 (i.e. Sr-90, Ru-106, Pu), because it takes a lot of time to measure those other radionuclides (ref. [Ministry of Health, Labour and Welfare HP](#)).
- The effective dose from those other radionuclides is assumed to be about 12% of the total effective dose from food (i.e. 0.9mSv/year).



Strontium-90 in fishery products

- In order to ensure the safety, the effective dose from those other radionuclides in fishery product is assumed to be the same as that from radioactive cesium. This assumption is also considered when establishing the cesium standard limit for food, 100 Bq/kg-wet.
- According to the data from the monitoring of fishery products, the effective doses from strontium-90 were from ca. 1/500 to ca. 1/50 of that from radioactive cesium. This result shows the above assumption was more than sufficient for food safety.

Strontium-90 and Tritium

Strontium-90 (half-life: 28.8 years)

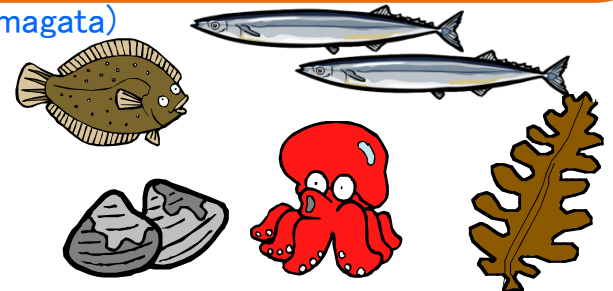
- Conversion factor (Bq to Sv) of effective does for strontium-90 is about 2.2 times higher than cesium-137 (by the factor for adult in ICRP Publication 72).
- The concentration factors(the ratio of the concentration in organism to that in water) for strontium-90 in marine aquatic organisms were sufficiently lower than those for cesium. That indicates that most of strontium-90 taken in organism is hardly absorbed and is excreted out.

Tritium (half-life: 12.3 years)

- The standard limits does not include tritium, because the influence of tritium in food to human health is considered to be sufficiently small compared to the level requiring such inclusion (ref. [Ministry of Health, Labour and Welfare HP](#)).
- Conversion factor of effective does for tritium is ca. 1/700 of that of cesium-137 (by the factor for adult in ICRP Publication 72).
- Tritium mainly exists in nature as water. Therefore, tritium taken in organism is hardly kept in the body and is excreted out promptly. Consequently, the concentration factors for marine organisms are ca. 1.

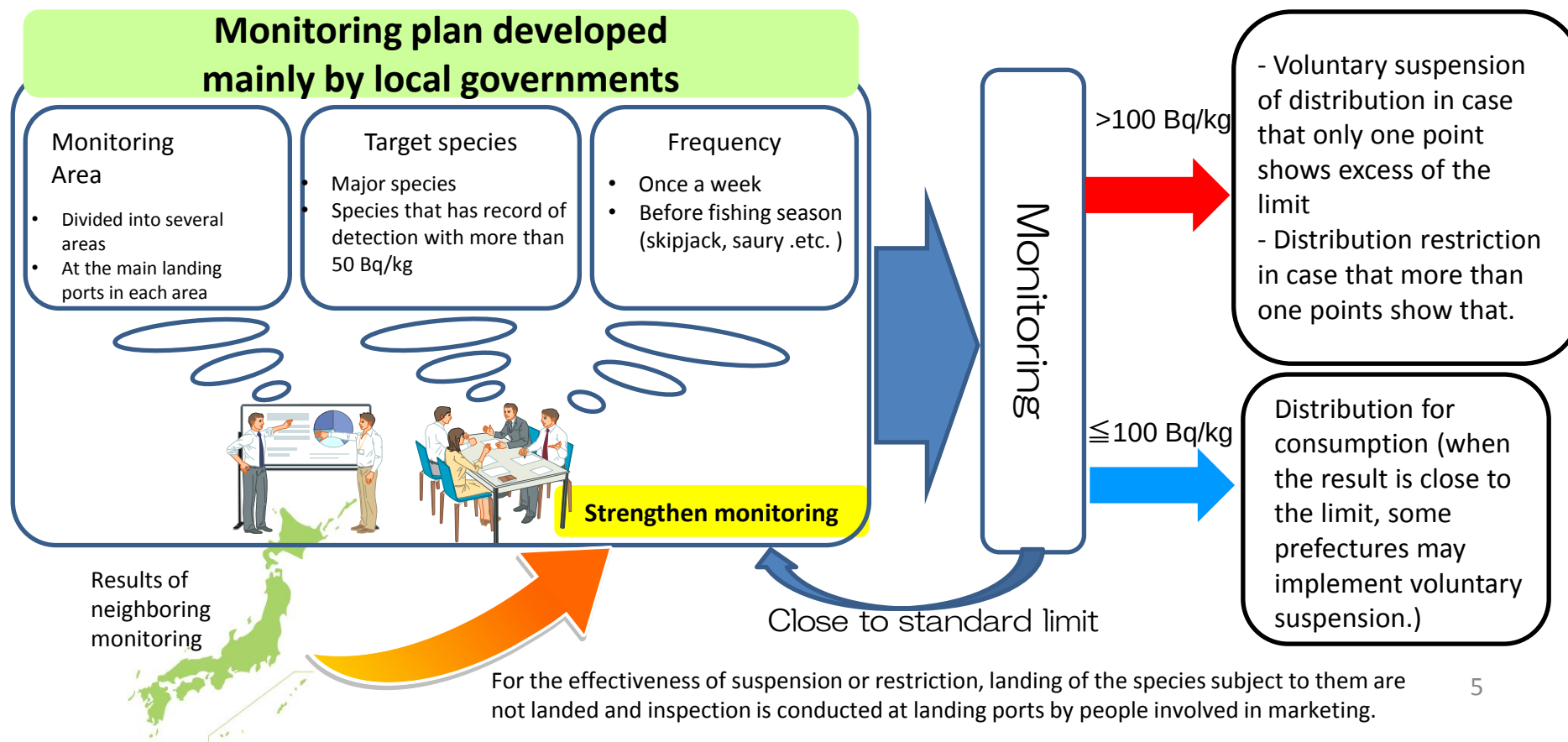
Concentration factor (ref. IAEA TRS 422; Bio-concentration, Edit. N. Yamagata)

	Fish	Molluscs	Macroalgae
Cesium	5 ~ 100	10 ~ 60	10 ~ 50
Strontium	1 ~ 3	1 ~ 10	10
Tritium	1	1	1



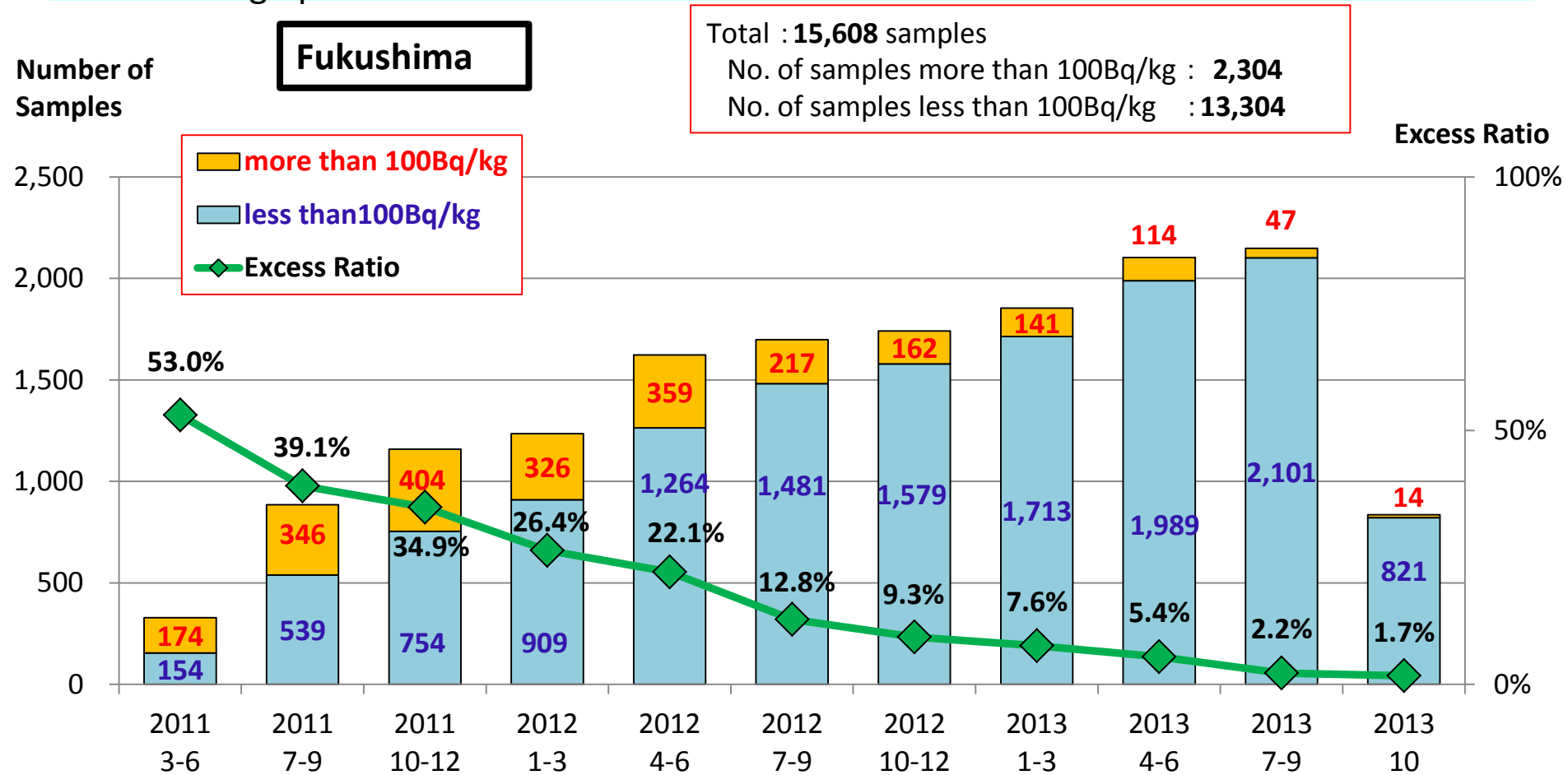
Framework for Radioactive Cesium Monitoring for Fishery Products

- Target species : Major commercial species and species that has record of detection with more than 50 Bq/kg. Due consideration is given to, inter alia: ① living layers of species (surface, mid water and bottom), ② fishing season, ③ results of neighboring prefectures' monitoring
- Monitoring is strengthened when detecting levels of contamination close to the standard limit (100 Bq/kg) , or detecting more than the limit in the neighboring prefectures.
- In case of exceeding the limit, a relevant local government require voluntary suspension of distribution of the relevant species and/or the Nuclear Emergency Response Headquarters requires distribution restriction of the species.



Monitoring Results for Fishery Products in Fukushima

- In Fukushima, Mar.–Jun. 2011, excess ratio (No. of samples more than 100Bq/kg/Total No. of samples) was 53% but reduced by half in 1st quarter 2012. After 2nd quarter 2012, monitoring has been focusing on species that have records more than 50Bq/kg. Its excess ratio still shows constant decrease down to 1.7% in 2013 October.
- Coastal fishing and trawl fishing in Fukushima have been voluntarily suspended except trial fishing operation.



Monitoring Results for Fishery Products in Other Prefectures

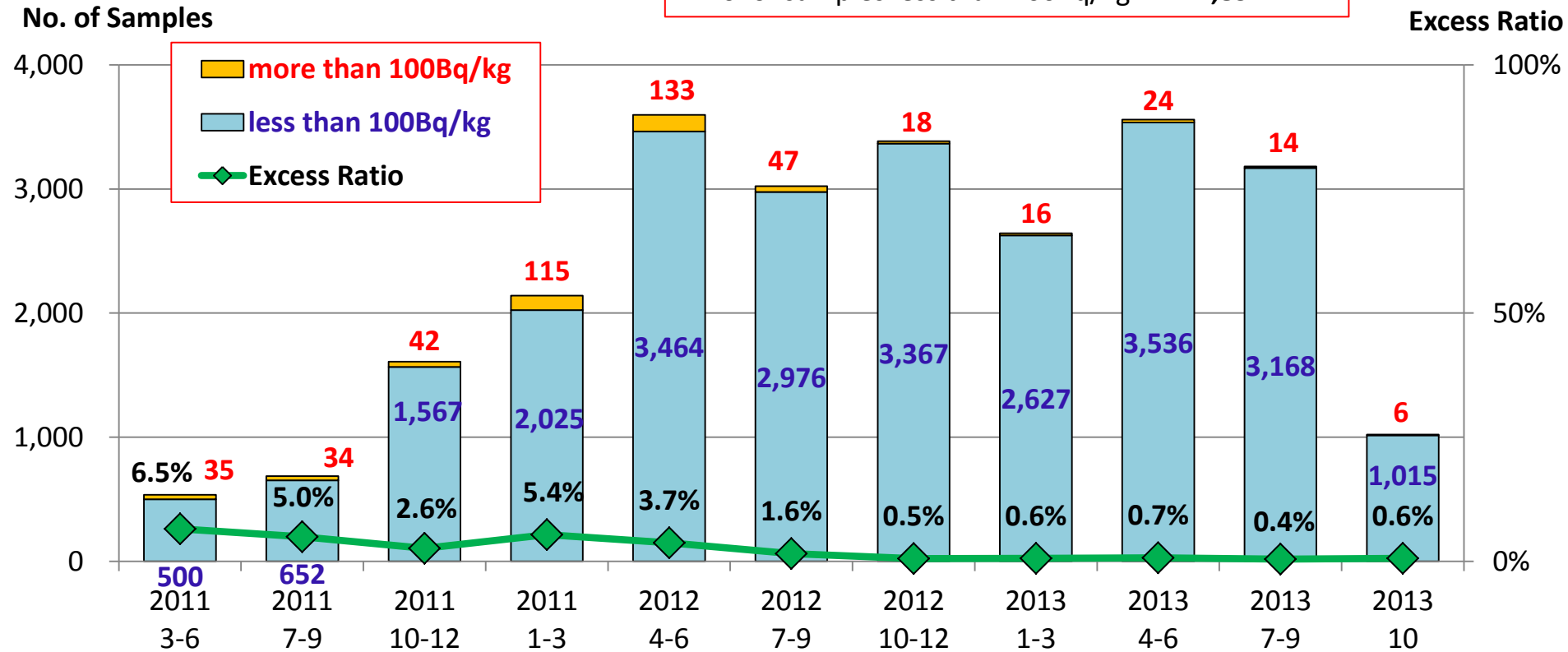
- In other prefectures, excess ratio (No. of samples more than 100Bq/kg/Total No. of samples) has been gradually decreasing to under 1% in first quarter 2012. And it reached 0.6% in 2013 October.
- Distribution restriction directed by the central government would be imposed on the fishery products if their monitoring results exceeded more than the Standard Limit, which prevents those products from being marketed.

Other prefectures

Total No. of samples: **25,381**

No. of samples more than 100Bq/kg: **484**

No. of samples less than 100Bq/kg : **24,897**



Monitoring Results for Fishery Products

Results of radioactive cesium monitoring confirm following fishery products are under the Standard Limit in whole country including Fukushima. : Fish in surface water (Juvenile Japanese sand lance, Juvenile anchovy, etc.), Skipjack, Tunas, Chum Salmon, Saury, Squid/Octopus, Crustacean, Mollusks, Algae, etc.

Algae (Wakame, Nori, Hijiki, etc.), Mollusks (Scallop, Oyster, Abalone, etc.), Squid/Octopus (Japanese Common Squid, Spear Squid, Common Octopus, North Pacific Giant Octopus, etc.) , Crustacean (Euphausia pacifica, Hairy Club, Blue Club, etc.), Horse Mackerel (Jack Mackerel, Amberfish, etc.), Mackerel (Chub Mackerel, Spotted Mackerel, etc.), Sardines (Japanese Anchovy, Sardine, etc.), Saury, Swordfish, Skipjack, Tunas, Whale, Coho Salmon, Juvenile Japanese Sand lance, Juvenile Anchovy, Chum Salmon, Japanese Amberjack, Red Bream (Beryx splendens), Mako Shark, Blue Shark, Blackthroat Seaperch, Chlorophthalmus albatrossis, Striped Beakfish, Threadfin Hakeling, Black Scraper, Barracuda, Amberjack, Broadbanded Thornyhead (Sebastolobus macrochir), konoshiro gizzard shad, Japanese Spanish Mackerel, Mahi mahi, Capelin, Crimson Sea Bream, Flying Fish, Tiger Puffer, Herring, Yellowtail Amberjack, Yellowfin Goby, Purple Puffer, Sea Pineapple, Dexises rikuzenius

The list of fishery products and area subject to distribution restriction as of 31 October 2013

Species		Panther Puffer	Olive flounder	Stone flounder	Ocellate spot alate, Rockfish, Nibe croaker, Pacific Cod	Japanese black porgy	Seabass
Part of Iwate Prefecture ^(b)						×	×
Miyagi Prefecture	North of Kinkazan					×	×
	South of Kinkazan	×				×	×
Fukushima Prefecture ^(c)		×	×	×	×	×	×
Ibaraki Prefecture	Northern Area ^(d)		×	×	×		×
					×		×

Notice a) × : Species and Area subject to distribution restriction by the Director General for the Nuclear Emergency Response Headquarters

b) South of the latitude of the boundary between Iwate Prefecture and Miyagi Prefecture

c) Off Fukushima Prefecture, 41 marine species including above 9 species are subject to distribution restriction by the Director General for the Nuclear Emergency Response Headquarters.

d) Area of north of the latitude 36° 38' North

Efforts toward the Food Safety of Fishery Products in Waters off Fukushima Prefecture

The State of the fishery offshore Fukushima Prefecture

- After the Great East Japan Earthquake, voluntary suspension was imposed on all the Coastal and trawl fisheries off Fukushima Prefecture.
- Fukushima prefectural government conducts 150 sampling inspections of major marine species every week.
- 41 marine species of Fukushima Prefecture were issued on distribution restriction by the Director General for the Nuclear Emergency Response Headquarters as of October 31, 2013.
- Fish species and ocean area covered by the trial fishing operation must be determined after confirming that: 1) the species is not issued on distribution restriction by the Director General for the Nuclear Emergency Response Headquarters; 2) the levels of radioactive cesium remain lower than the Official Restriction Value for a certain time period; and 3) the food safety of the fish products is ensured based on results of additional intensive inspections of candidate species.

Responses to the recent Water Leakage

- In response to recent leakage of contaminated water from F1NPS, the trial fishing operation for actual human consumption had been suspended tentatively since 1 September 2013.
- Fukushima prefectural government has monitored water samples of coastal sea off Fukushima prefecture and confirmed that the level of either radioactive cesium or all beta density remained in water samples is the same level before and after the information of water leakage as well as level of radioactive cesium in fishery by analyzing monitoring data.
- After the confirmation of Fukushima prefectural government, the trial fishing operation for actual human consumption was resumed in offshore bottom trawling fishery on 25 September 2013.

Future measures for trial fishing operation

- Fukushima Prefectural Federation of Fisheries Co-operative Association intends to expand both species and areas of the trial fishing operation for actual human consumption by confirming the food safety of the fish products.

<Reference> The State of the Trial Fishing Operation for Actual Human Consumption in Fukushima Prefecture

The Development of Trial

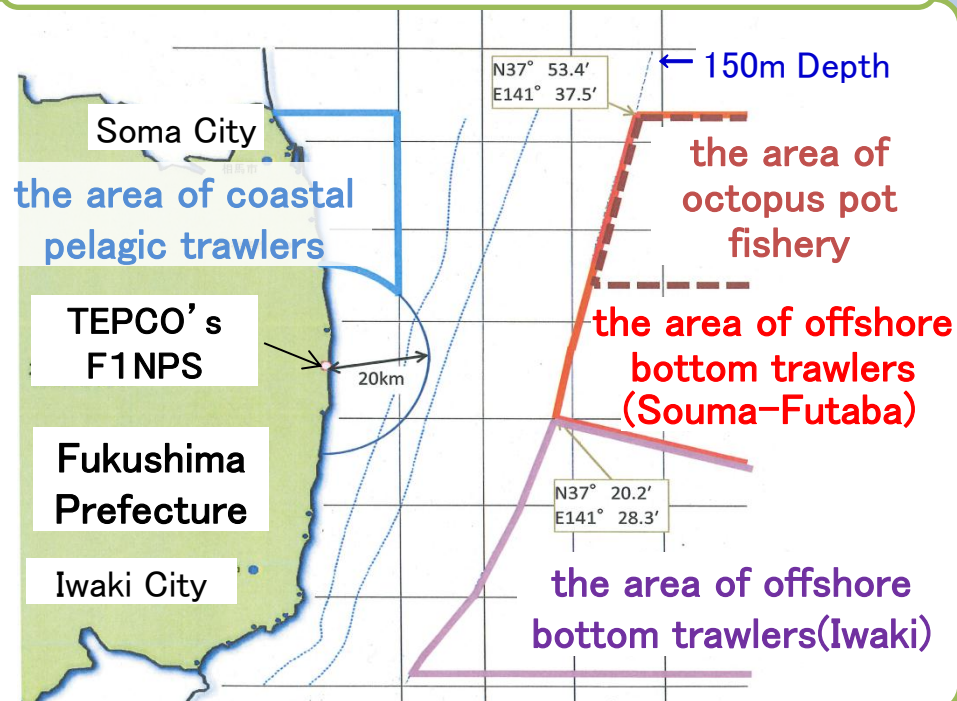
- June 2012~ · The trial fishing operation for actual human consumption started in offshore bottom trawling fishery and octopus pot fishery in the Souma-Futaba area with 3 species as the targets (North Pacific giant octopus, Chestnut octopus, a species of sea whelk (*Buccinum isaotakii*)).
- Sept 2012~ · Step by step expansion of both species and areas of the trial fishing operation for actual human consumption.
- March 2013 · The trial fishing operation for actual human consumption started in surface trawling fishery in the Souma-Futaba area with Kounago (Juvenile of Japanese sandlance).
- Sept 2013 · In response to new leakage of contaminated water from F1NPS, the trial fishing operation for actual human consumption was suspended tentatively on 1 September .
- Fukushima prefectural government confirmed that the level of either radioactive cesium or all beta density remained in water samples is the same level before and after the information of water leakage as well as level of radioactive cesium in fishery by analyzing monitoring data.
 - The trial fishing operation for actual human consumption was resumed in offshore bottom trawling fishery in the Souma-Futaba area on 25 September.
- Oct 2013 · The trial fishing operation for actual human consumption started in surface trawling fishery in the Souma-Futaba area with Whitebait (Juvenile Anchovy) on 11 October.
- The trial fishing operation for actual human consumption started in offshore bottom trawling fishery in the Iwaki area on 18 October.

Distribution of the fish products

- Since June 2012 to October 2013, 852 products(fresh or boiled) are inspected for radioactive cesium after being landed, at result, the maximum rate were 3.6Bq/kg.
- These results are put on the home page of Fukushima Prefectural Federation of Fisheries Co-operative Association.(Japanese only)
<http://www.jf-net.ne.jp/fsgyoren/>

The area of trial fishing operation

as of 31 October 2013



Inspection of radioactive materials and the distribution management of the fish products are conducted under the initiative of the Fukushima Prefectural Federation of Fishery Cooperative Association.

