November 26, 2013
Tokyo Electric Power Company

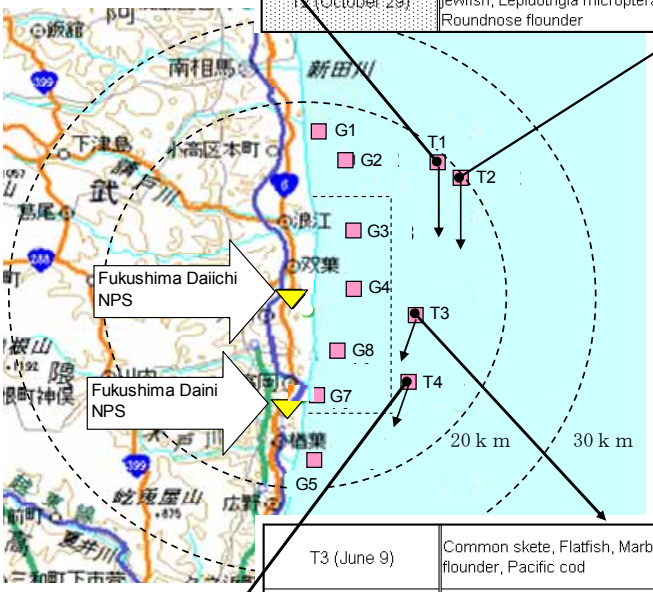
Nuclide Analysis Results of Fish and Shellfish
(The Ocean Area Within 20km Radius of Fukushima Daiichi NPS)

1. Overview of the measurement results by the measurement points

(1) Measurement results of the trawl net measurement point (shaded part is additional data from the previous report)

Measurement point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less, total amount of Cs134 and Cs137 is provided in parentheses (Bq/kg))
T1 (July 23)	Common skete, Microstomus achne, Marbled sole, Flatfish, Littlemouth flounder, Stone flounder, Greenling, Lepidotrigla microptera, Dory, Roundnose flounder
T1 (August 26)	Smooth dogfish, Marbled sole, Common Japanese conger, Flatfish, Lepidotrigla microptera, Roundnose flounder, Littlemouth flounder, Crimson sea bream, Dory
T1 (September 24)	Common skete, Flatfish, Sea robin, Lepidotrigla microptera, Crimson sea bream
T1 (October 29)	Stone flounder, Marbled sole, Smooth dogfish, Lepidotrigla microptera, Flatfish, Common Japanese conger, Littlemouth flounder, Crimson sea bream, Dory, Ridged-eye flounder Common skete (120)

T2 (July 23)	Common skete, Marbled sole, Microstomus achne, Common horse mackerel, Sea robin, Pennahia argentata, Roundnose flounder, Lepidotrigla microptera, Lophius litilon, Flatfish, Littlemouth flounder, Dory
T2 (August 26)	Common skete, Lepidotrigla microptera, Stone flounder, Littlemouth flounder, Dory, Roundnose flounder
T2 (September 24)	Common skete, Sea robin, Flatfish, Dory, Stone flounder, Littlemouth flounder, Gnathophis nystromi nystoromi, Smooth dogfish, Crimson sea bream, Loliginid, Common horse mackerel, Ridged-eye flounder
T2 (October 29)	Marbled sole, Flatfish, Smooth dogfish, Ridged-eye flounder, Greenling, Dory, Gnathophis nystromi nystoromi, Striped jewfish, Lepidotrigla microptera, Pennahia argentata, Crimson sea bream, Yellowtail, Common horse mackerel, Roundnose flounder



T3 (June 9)	Common skete, Flatfish, Marbled sole, Microstomus achne, Greenling, Stone flounder, Littlemouth flounder, Roundnose flounder, Pacific cod
T3 (July 7)	Greenling, Sea bass, Stone flounder, Pagrus major, Flatfish, Littlemouth flounder, Microstomus achne, Marbled sole, Dory Common skete (109)
T3 (August 11)	Smooth dogfish, Pagrus major, Littlemouth flounder, Flatfish, Marbled sole, Lepidotrigla microptera, Stone flounder, Sea robin Common skete (104)
T3 (September 7)	Common skete, Stone flounder, Flatfish, Marbled sole, Smooth dogfish, Lepidotrigla microptera

* The sampling could not be performed due to the weather in October.

T4 (June 9)	Microstomus achne, Common skete, Greenling, Flatfish, Pacific cod, Roundnose flounder, Sea raven, Lepidotrigla microptera, Littlemouth flounder
T4 (July 7)	Common skete, Greenling, Microstomus achne, Lophius litilon, Sea raven, Littlemouth flounder, Flatfish, Stone flounder, Octopus (Enteroctopus) dofleini, Roundnose flounder
T4 (August 11)	Common skete, Marbled sole, Smooth dogfish, Roundnose flounder, Stone flounder, Lepidotrigla microptera, Pagrus major, Greenling, Flatfish, Littlemouth flounder
T4 (September 7)	Common skete (104), Marbled sole, Smooth dogfish, Stone flounder, Flatfish, Lepidotrigla microptera, Sea robin, Crimson sea bream, Dory

* The sampling could not be performed due to the weather in October.

(2) Measurement results of the gill net measurement point (shaded part is additional data from the previous report)

Measurement point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less, total amount of Cs134 and Cs137 is provided in parentheses (Bq/kg))
G1 (July 11)	Banded dogfish, Dasyatis matsubarai, Common skete, Greenling, Microstomus achne, Marbled sole, Smooth dogfish, Flatfish, Ovalipes punctatus, Common horse mackerel, Blue crab, Chub mackerel
G1 (August 9)	Common skete, Microstomus achne, Acanthopagrus schlegeli, Greenling, Flatfish, Drumfish, Blue crab, Banded dogfish Stingray (169)
G1 (September 6)	Flatfish, Drumfish, Blue crab, Ovalipes punctatus Common skete (114)
G1 (October 31)	Sea bass, Common skete, Flatfish, Schlegel's black rockfish, Marbled sole, Sea raven, Smooth dogfish, Blue crab

G2 (July 11)	Common skete, Microstomus achne, Stone flounder, Marbled sole, Flatfish, Northern dogfish, Chub mackerel
G2 (August 9)	Flatfish, Dasyatis matsubarai, Pagrus major, Ovalipes punctatus Common skete (146)
G2 (September 6)	Marbled sole, Common skete, Flatfish, Carcharhinus, Smooth dogfish, Ovalipes punctatus, Blue crab
G2 (October 31)	Angel shark, Common skete, Acanthopagrus schlegeli, Flatfish, Common horse mackerel, Banded dogfish, Stingray, Blue crab, Pennahia argentata, Chum salmon

G3 (July 17)	Microstomus achne, Flatfish, Dasyatis matsubarai, Sea robin, Stone flounder, Lepidotrigla microptera, Northern dogfish, Blue crab Common skete (172)
G3 (August 29)	Stingray, Angel shark, Common skete, Flatfish, Drumfish, Blue crab, Ovalipes punctatus
G3 (September 13)	Smooth dogfish, Dory, Sea robin, Flatfish, Drumfish, Pagrus major, Stone flounder, Blue crab Angel shark (104), Common skete (101)
G3 (October 31)	Common skete, Flatfish, Drumfish, Smooth dogfish, Carcharhinus, Ovalipes punctatus, Blue crab Stone flounder (147)

G4 (July 17)	Greenling, Marbled sole, Flatfish, Sea robin, Stone flounder, Lophius litilon, Northern dogfish, Chub mackerel Microstomus achne (160)
G4 (August 29)	Marbled sole, Flatfish, Carcharhinus, Blue crab Angel shark (282), Common skete (176), Microstomus achne (111)
G4 (September 13)	Microstomus achne, Angel shark, Stingray, Flatfish, Pagrus major, Drumfish, Carcharhinus, Blue crab, Dory Common skete (171)
G4 (October 10)	Common skete, Flatfish, Stingray, Pagrus major, Greenling, Carcharhinus, Crimson sea bream, Blue crab

G8 (June 24)	Microstomus achne, Stone flounder, Sea robin, Roundnose flounder, Lepidotrigla microptera, Dasyatis matsubarai, Chub mackerel, Lophius litilon, Northern dogfish Marbled sole (124), Flatfish (109), Common skete (105)
G8 (July 19)	Microstomus achne, Flatfish, Smooth dogfish, Sea robin, Lepidotrigla microptera, Northern dogfish, Ovalipes punctatus, Chub mackerel Common skete (203)
G8 (August 24)	Flatfish, Sea robin, Blue crab Flathead (Platycephalus sp.) (132), Common skete (110)
G8 (October 6)	Flathead (Platycephalus sp.) , Smooth dogfish, Sea robin, Drumfish, Flatfish, Blue crab Common skete (182)

G7 (June 15)	Flatfish Schlegel's black rockfish (670), Marbled sole (218), Microstomus achne (216), Greenling (153)
G7 (July 13)	Smooth dogfish, Sea bass, Flatfish, Ovalipes punctatus, Blue crab Common skete (390)
G7 (August 19)	Flatfish Common skete (235), Banded dogfish (205)
G7 (September 20)	Common skete, Greenling, Flatfish, Marbled sole, Drumfish Sebastes cheni (350)

* The sampling could not be performed due to the weather in October.

G5 (June 15)	Banded dogfish, Flatfish, Greenling, Smooth dogfish Common skete (189), Microstomus achne (181)
G5 (July 13)	Greenling, Flatfish, Drumfish, Northern dogfish Common skete (265), Microstomus achne (204)
G5 (August 19)	Common skete, Flatfish, Greenling, Blue crab Microstomus achne (140)
G5 (September 20)	Flatfish, Greenling, Drumfish, Pagrus major, Smooth dogfish Banded dogfish (112), Common skete (107)

* The sampling could not be performed due to the weather in October.

(3) Categorized by the radioactive cesium level

Measurement results obtained from August to October 2013 (most recent 3 months)

[Within 20km Radius of Fukushima Daiichi NPS (exclude in the Port of Fukushima Daiichi NPS)]

- Total amount of radioactive cesium 134 and 137
  Unit: Bq/kg (Raw)
- Guideline value (April 1, 2012 and later): 100Bq/kg
- Sampling date: August 9 - October 31, 2013

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Sebastes cheni	350	-	1 (1)
Angel shark	282	60	5 (2)
Common skete	235	24.3	26 (12)
Banded dogfish	205	ND	4 (2)
Stingray	169	4.2	5 (1)
Stone flounder	147	ND	9 (1)
Microstomus achne	140	36	4 (2)
Flathead (Platycephalus sp.)	132	49	2 (1)
Flatfish	91	ND	27
Marbled sole	67	7.9	11
Greenling	65	ND	7
Sea bass	58	-	1
Acanthopagrus schlegeli	33.9	25.4	2
Smooth dogfish	33.8	6.1	14
Sea robin	22.9	ND	7
Dasyatis matsubarai	21.6	-	1
Schlegel's black rockfish	20.5	-	1
Pagrus major	18.5	3.6	7
Drumfish	18.1	5.1	9
Carcharhinus	17.7	6.6	5
Littlemouth flounder	16.4	ND	6
Sea raven	13.2	-	1
Common Japanese conger	12.6	5.9	2
Roundnose flounder	12.1	ND	4
Ovalipes punctatus	10.2	ND	5
Dory	9.7	ND	8
Lepidotrigla microptera	8.9	ND	9
Ridged-eye flounder	7.7	ND	3
Gnathophis nystromi nystromi	7.3	5.3	2
Common horse mackerel	7.1	ND	3
Crimson sea bream	5.7	ND	7
Blue crab	4.6	ND	14
Striped jewfish	ND	-	1
Pennahia argentata	ND	-	1
Chum salmon	ND	-	1
Loliginid	ND	-	1
Yellowtail	ND	-	1

(Remark) ND for Cs-134: approx. 2.4Bq/kg, Cs-137: approx. 2.7Bq/kg

Figure: Transition of the ratio of which the radioactive cesium density exceeded the standard value (number of measurement)

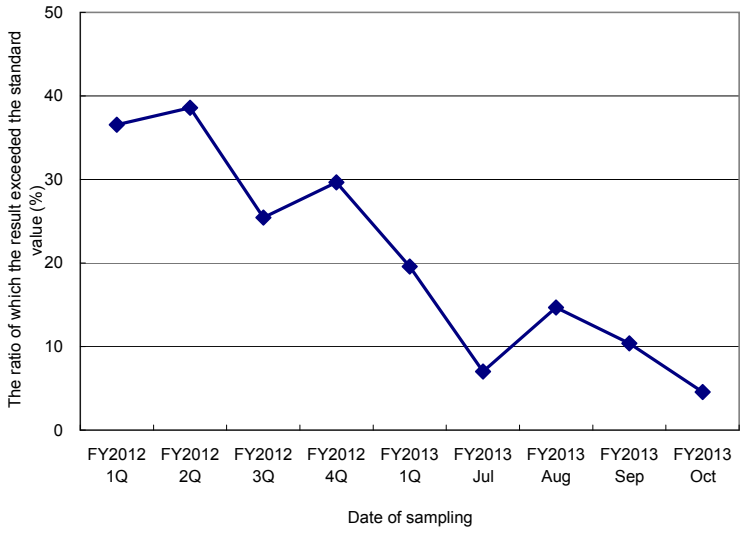
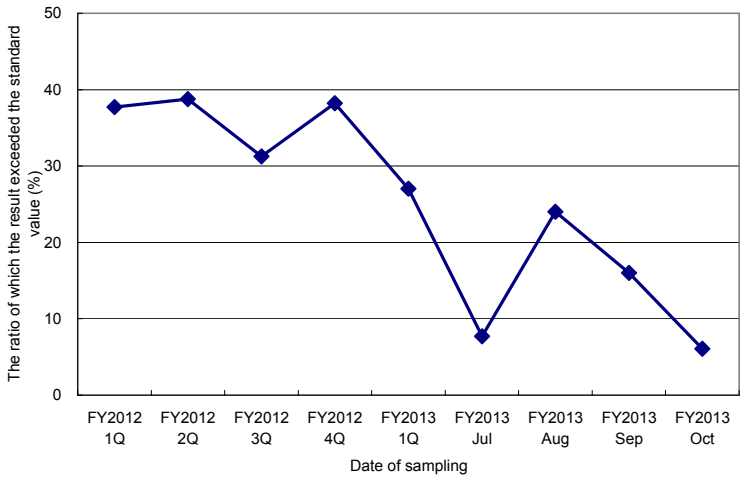


Figure: Transition of the ratio of which the radioactive cesium density exceeded the standard value (fish species)



(4) Change of radioactive cesium density of fish and shellfish over time

Figure 1. Flatfish Measurement Results
(Cs134+137, Bottom Layer Fish)

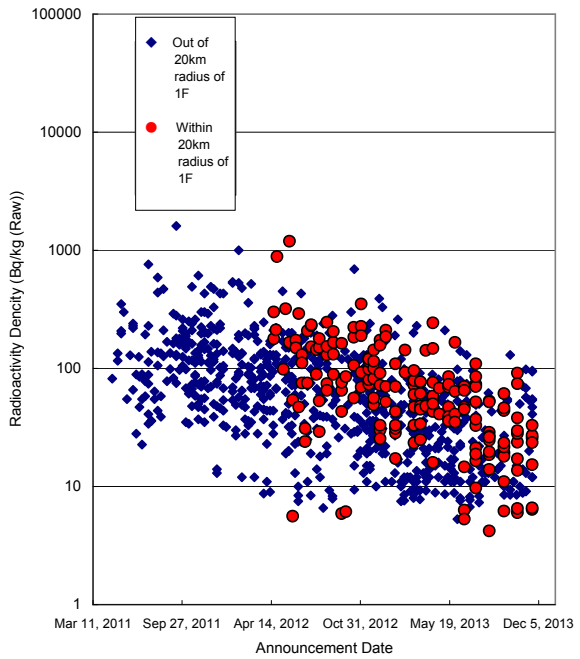


Figure 2. Greenling Measurement Results
(Cs134＋137, Bottom Layer Fish)

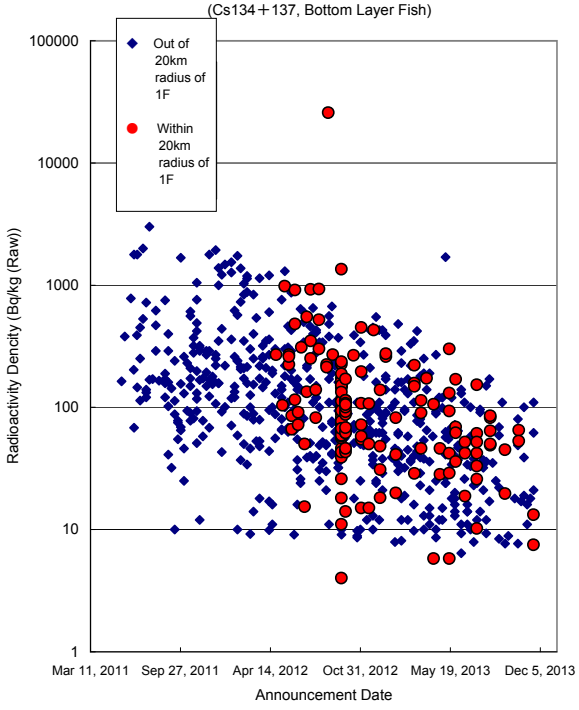


Figure 3. Common Skete Measurement Results
(Cs134+137, Bottom Layer Fish)

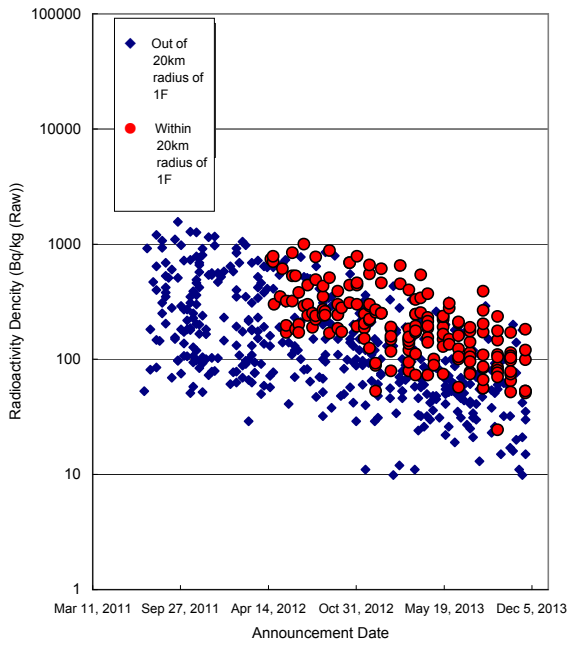
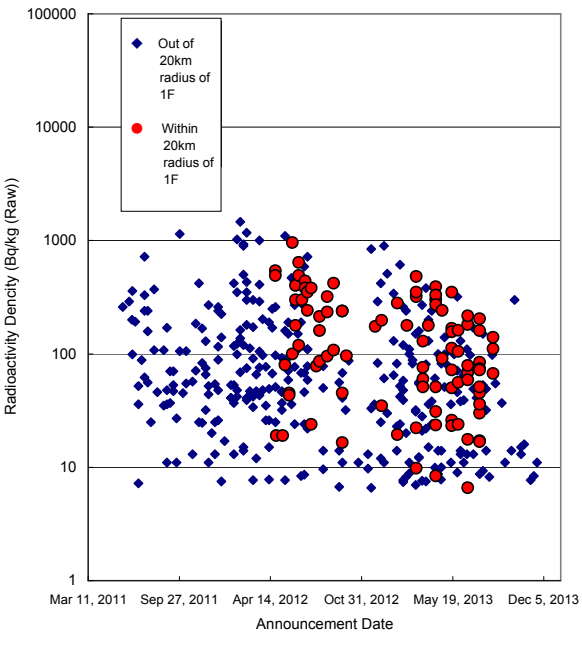


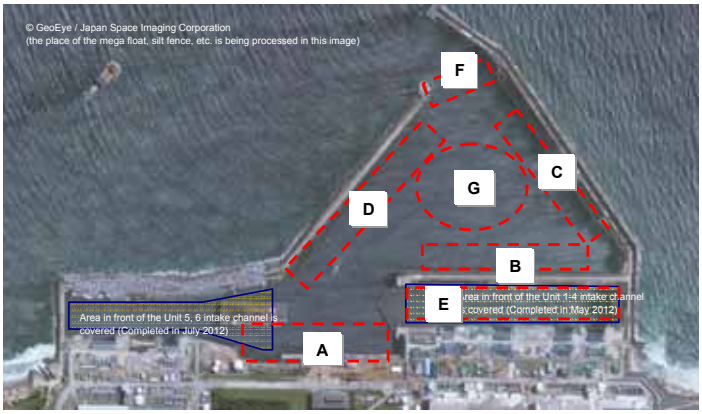
Figure 4. Microstomus Achne Measurement Results
(134＋137, Bottom Layer Fish)



(Remark) The measurement results of "Out of 20km radius of 1F" was obtained from the Japan Meteorological Agency website.

As of November 25, 2013

2. Fish sampling situation in the port of Fukushima Daiichi NPS (flash report)



A: Around the Shallow Draft Quay
B: Around the East Seawall Break
C: Around the South Breakwater
D: Around the North Breakwater
E: Around the Water Intake Open Conduit at Unit 1-4
F: Around the Port Entrance
G: Around the Center of the Port

(1) Since Feb 8, 2013, silt fence has been installed at point A, and gill net has been installed at point F.
(2) Since Feb 27, 2013, gill nets have been installed continuously at inner side of silt fence at point A and point B.
(3) Since Mar 5, 2013, 35 baskets have been installed continuously at point E. On Mar 13, 15 baskets have been added continuously at point E.
(4) From Mar 7 to Mar 8, 2013, gill net fishing was conducted at point C.
(5) From Mar 12 to Mar 13, 2013, gill net fishing was conducted at point A,B,D.
(6) On Mar 15-16, 2013, gill net fishing will be conducted at point G.
(7) Since May 9, gill net has doubled at the port entrance.

Figure. Place of Sampling

1. Basket fishing

Date of Sampling	Place of Sampling	Number of sampling	Sampling of Highest Cesium Density (Place of Sampling)	Cesium Density (Unit: Bq/kg (Raw))		
				Cs-134	Cs-137	Cesium Amount
October 2012	A	4	Common Japanese conger (A)	5,900	9,600	15,500
December 2012	A,C	29	Spotbelly rockfish (A)	94,000	160,000	254,000
January 2013	A,B,C,D	70	Spotbelly rockfish (B)	75,000	130,000	205,000
February 2013	A,,B,C,D,E*	41	Greenling (E*)	260,000	480,000	740,000
March 2013	A,B,C,D	74	Spotbelly rockfish (D)	69,000	130,000	199,000
April 2013	A,B,C,D	109	Spotbelly rockfish (D)	59,000	110,000	169,000
May 2013	A,B,C,D	69	Spotbelly rockfish (D)	55,000	110,000	165,000
June 2013	A,B,C,D	59	Spotbelly rockfish (D)	72,000	140,000	212,000
July 2013	A,B,C,D	41	Spotbelly rockfish (B)	57,000	120,000	177,000
Aug 6, 2013	A,B,C,D	9	Spotbelly rockfish (B)	60,000	130,000	190,000
Aug 22, 2013	A,B,C,D	6	Common Japanese conger (D)	310	720	1,030
Sep 5, 2013	A,B,C,D	6	Spotbelly rockfish (D)	22,000	47,000	69,000
Sep 25, 2013	A,B,C,D	7	Spotbelly rockfish (A)	960	2,100	3,060
Oct 10, 2013	A,B,C,D	3	Spotbelly rockfish (D)	34,000	76,000	110,000
Oct 31, 2013	A,B,C,D	6	Spotbelly rockfish (D)	22,000	51,000	73,000
Nov 12, 2013	A,B,C,D	6		The samples are currently under radioactivity density measurements		
Nov 20, 2013	A,B,C,D	2				

* Sampled at inner side of silt fence.

2. Gill net fishing in the port

Date of Sampling	Place of Sampling	Number of sampling	Sampling of Highest Cesium Density (Place of Sampling)	Cesium Density (Unit: Bq/kg (Raw))		
				Cs-134	Cs-137	Cesium Amount
March 2013	A,B,C,D,G	124	Spotbelly rockfish (B)	150,000	280,000	430,000
April 2013	A,B,C,D,G	67	Greenling (A)	56,000	110,000	166,000
May 2013	A,B,C,D,G	148	Jacopever (B)	93,000	180,000	273,000
June 2013	A,B,C,D,G	54	Sebastes cheni (A)	39,000	77,000	116,000
July 2013	A,B,C,D,G	63	Spotbelly rockfish (B)	36,000	73,000	109,000
Aug 2, 2013	A,B,D	8	Spotbelly rockfish (B)	43,000	90,000	133,000
Aug 7, 2013	C,G	10	Drumfish (G)	270	570	840
Aug 13, 2013	A,B,D	10	Flatfish (A)	68	240	308
Aug 21, 2013	C,G	11	Jacopever (G)	48,000	100,000	148,000
Aug 29, 2013	A,B,D	2	Flatfish (A)	620	1,400	2,020
Sep 4, 2013	C,G	2	Flathead (Platycephalus sp.) (G)	160	340	500
Sep 10, 2013	A,B,D	8	Flatfish (D)	190	430	620
Sep 20, 2013	C,G	3	Flatfish (C)	210	430	640
Oct 4, 2013	A,B,D	4	Flatfish (B)	320	790	1,110
Oct 9, 2013	C,G	8	Flatfish (G)	970	2,300	3,270
Oct 18, 2013	A,B,D	8	Schlegel's black rockfish (A)	1,100	2,700	3,800
Oct 22, 2013	C,G	4	Schlegel's black rockfish (G)	10,000	24,000	34,000
Oct 29, 2013	A,B,D	9	Scorpion fish (B)	31,000	70,000	101,000
Nov 7, 2013	C,G	5		The samples are currently under radioactivity density measurements		
Nov 14, 2013	A,B,D	10				
Nov 19, 2013	C,G	3				

3. Gill net in the port entrance

Date of Sampling	Place of Sampling	Number of sampling	Sampling of Highest Cesium Density (Place of Sampling)	Cesium Density (Unit: Bq/kg (Raw))		
				Cs-134	Cs-137	Cesium Amount
February 2013	F	307	Greenling	180,000	330,000	510,000
March 2013	F	180	Greenling	150,000	280,000	430,000
April 2013	F	36	Sebastes cheni	31,000	59,000	90,000
May 2013	F	359	Sebastes cheni	110,000	210,000	320,000
June 2013	F	182	Sebastes cheni	45,000	90,000	135,000
July 2013	F	223	Jacopever	60,000	120,000	180,000
Aug 1, 2013	F	4	Stingray	3,300	6,700	10,000
Aug 5, 2013	F	15	Marbled sole	5,400	12,000	17,400
Aug 9, 2013	F	15	Sebastes cheni	15,000	31,000	46,000
Aug 13, 2013	F	21	Stingray	20,000	42,000	62,000
Aug 19, 2013	F	18	Marbled sole	510	1,100	1,610
Aug 23, 2013	F	37	Stingray	9,000	19,000	28,000
Aug 28, 2013	F	33	Stingray	820	1,700	2,520
Sep 3, 2013	F	18	Spotted halibut	680	1,300	1,980
Sep 9, 2013	F	20	Spotted halibut	240	490	730
Sep 13, 2013	F	15	Flatfish	42	55	97
Sep 18, 2013	F	15	Flatfish	140	320	460
Sep 19, 2013	F	4	Flatfish	48	140	188
Sep 21, 2013	F	5	Marbled sole	11,000	25,000	36,000
Oct 3, 2013	F	12	Stingray	1,000	2,100	3,100
Oct 7, 2013	F	14	Flatfish	420	950	1,370
Oct 8, 2013	F	2	Flatfish	110	240	350
Oct 11, 2013	F	20	Marbled sole	330	650	980
Oct 17, 2013	F	9	Acanthopagrus schlegeli	870	2,000	2,870
Oct 19, 2013	F	8	Marbled sole	5,800	13,000	18,800
Oct 22, 2013	F	18	Acanthopagrus schlegeli	50	79	129
Oct 29, 2013	F	13	Jacopever	26,000	58,000	84,000
Oct 30, 2013	F	5	Chum salmon	ND (11**)	14	14
Nov 5, 2013	F	32				
Nov 8, 2013	F	3				
Nov 13, 2013	F	17				
Nov 18, 2013	F	23				
Nov 21, 2013	F	15				

The samples are currently under radioactivity density measurements

**; Detection limit value

Total amount of sampling	Approx. 2,800

3. Measures to Prevent Fish From Moving to Outside the Port at Fukushima Daiichi Nuclear Power Station (Implementation Status)

Measures currently being implemented

① Preventing fish from moving out
- ①-1: Installation of gill net at the port entrance
- ①-2: Installation of block fence at the port entrance
- ①-3: Installation of partition net inside the breakwater
- ①-4: Installation of silt fence and gill net at shallow draft quay

② Sampling of fish
- ②-1: Basket fishing
- ②-2: Gill net in the port entrance

[Note]

1. Change in location of gill net at the port entrance
   Location of gill net, etc. around shallow draft quay has changed since October 14.
   ←No significant change has been found in number of sampling.

2. Damage of fence due to the typhoon installed around north and south breakwater in order to prevent fish from moving out
   ←Measures are being considered (No abnormality has been found on doubled gill net at the port entrance and block fence)
   Degree of damage in fence was confirmed to be increased at the site (the cause is estimated to be the effect of waves).

(1) Fence installed at around south breakwater: Damage was found on September 30, 2013

(2) Fence installed at around north breakwater: Damage was found on October 17, 2013