January 28, 2013
Tokyo Electric Power Company

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

[Categorized by the radioactive cesium level (by fish species, Since October 2012)]

- Total amount of radioactive cesium 134 and 137
  Unit: Bq/kg (Raw)
- Sampling period: October 9 - December 21, 2012
- Guideline value (April 1, 2012 and later): 100Bq/kg

〔20km Radius of Fukushima Daiichi NPS (exclude In the Port of Fukushima Daiichi NPS)〕

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Marbled sole	1690	23.7	21 (7)
Schlegel's black rockfish	1470	29	3 (2)
Common skete	780	53	31 (27)
Greenling	450	15	20 (8)
Angel shark	420	8.7	10 (7)
Sea raven	410	136	6 (6)
Banded dogfish	390	270	2 (2)
Flatfish	350	17.2	35 (13)
Microstomus achne	330	20.1	10 (6)
Stone flounder	212	22.6	10 (1)
Stingray	178	6.4	8 (2)
Sea bass	165	35	8 (1)
Spotted halibut	165	–	1 (1)
Flathead (Platycephalus sp.)	138	31.9	5 (3)
Smooth dogfish	121	5.8	14 (1)
Sea robin	76	4.5	12
Acanthopagrus schlegeli	75	–	1
Roundnose flounder	59	5.2	4
Drumfish	57	27.4	9
Takifugu snyderi	48	21.9	3
Ridged-eye flounder	46	5.5	5
Cynoglossus joyneri	34	–	1
Dasyatis matsubarai	34	ND	4
Dory	34	4.2	12
Common Japanese conger	32	13.7	4
Pagrus major	29	ND	7

Fish	Maximum	Minimum	Number of measurements
Lophius litilon	22.6	ND	4
Carcharhinus	20.2	5.6	3
Littlemouth flounder	20	7.4	6
Common horse mackerel	18.9	ND	4
Gnathophis nystromi nystoromi	18.5	–	1
Slippery sole	17.9	–	1
Yellowtail	16.3	ND	6
Pennahia argentata	14.6	8.9	3
Lepidotrigla microptera	13.6	ND	9
Crimson sea bream	12.9	ND	10
Striped jewfish	12.1	ND	3
Oplegnathus punctatus	ND	–	1
Black scraper	ND	–	1
Snailfish	ND	–	4
Southern mackerel	ND	–	1
Arothron hispidus	ND	–	1
Chum salmon	ND	–	1
Squids	Maximum	Minimum	Number of measurements
Loliginid	ND	–	5
Loligo bleekeri	ND	–	2
Octopuses	Maximum	Minimum	Number of measurements
Octopus (Enteroctopus) dofleini	ND	–	3
Crustacea	Maximum	Minimum	Number of measurements
Blue crab	37	ND	18
Ovalipes punctatus	19.9	ND	7

(Remark) ND for Cs134: approx. 3.0Bq/kg, Cs137: approx. 3.1Bq/kg

Number of samples	48
Samples with cesium exceeding 100Bq/kg	15 (31%)
Number of measurements	342
Number of measurement results exceeding 100Bq/kg	87 (25%)

* Figures in parenthesis are ratios over 100 Bq/kg.

[Categorized by the radioactive cesium level (by fish species, March - September)]

- Total amount of radioactive cesium 134 and 137
  Unit: Bq/kg (Raw)
- Sampling period: March 29 - September 19, 2012
- Guideline value (April 1, 2012 and later): 100Bq/kg

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Greenling	25800	ND	86 (44)
Sebastes cheni	1880	540	6 (6)
Barfin flounder	1670	690	2 (2)
Sea bass	1610	33	17 (11)
Banded dogfish	1430	4.4	9 (3)
Microstomus achne	1260	ND	36 (22)
Flatfish	1190	5.6	51 (30)
Common skete	1000	168	47 (47)
Marbled sole	920	21.3	42 (23)
Spotbelly rockfish	830	–	1 (1)
Starry flounder	810	580	2 (2)
Sea raven	670	25	7 (5)
Schlegel's black rockfish	620	410	4 (4)
Stingray	460	55	7 (5)
Stone flounder	390	29	10 (4)
Angel shark	222	66	4 (3)
Dasyatis matsubarai	205	ND	10 (2)
Flathead (Platycephalus sp.)	187	140	3 (3)
Smooth dogfish	169	4.7	10 (2)
Acanthopagrus schlegeli	160	94	2 (1)
Drumfish	127	38	15 (4)
Sea robin	107	19.9	6 (1)
Pacific cod	107	16.7	11 (1)
Littlemouth flounder	103	10	8 (1)
Carcharhinus	93	4.6	8
Pennahia argentata	69	15	7
Common Japanese conger	66	21.4	2
Dory	63	12.5	11
Roundnose flounder	57	4.5	8
Lepidotrigla microptera	53	6.4	21
Ridged-eye flounder	53	–	1
Northern dogfish	50	ND	15
Long shanny	47	16.4	3
Lophius litilon	42	ND	17
Common horse mackerel	38	10.7	5
Pagrus major	38	ND	8
Slippery sole	36	21.6	4
Crimson sea bream	26	ND	4
Salangichthys ishikawae	23	–	1
Shark-skin flounder	17	ND	2

(Remark) ND for Cs134: approx. 3.1Bq/kg, Cs137: approx. 3.3Bq/kg

Fish	Maximum	Minimum	Number of measurements
Chub mackerel	14.3	ND	2
Sand eel	12.9	ND	4
Balloonfish	10.2	ND	2
Pointhead flounder	8.3	4.1	2
Yellowtail	6.5	ND	5
Pelagic thresher	6	–	1
Korean flounder	4.8	ND	2
Flathead flounder	4.1	–	1
Zenopsis nebulosa	ND	–	2
Alaska pollack	ND	–	1
Japanese butterfish	ND	–	1

Squids	Maximum	Minimum	Number of measurements
Andrea cuttlefish	ND	–	5
Loliginid	ND	–	9
Loligo bleekeri	ND	–	3

Octopuses	Maximum	Minimum	Number of measurements
Chestnutoctopus	9.1	ND	6
Octopus (Enteroctopus) dofleini	7.7	ND	13
Common Octopus	ND	–	1

Crustacea	Maximum	Minimum	Number of measurements
Blue crab	40	ND	16
Ovalipes punctatus	26	ND	16

Number of samples	59
Samples with cesium exceeding 100Bg/kg	24 (41%)
Number of measurements	605
Number of measurement results exceeding 100Bg/kg	227 (38%)

* Figures in parenthesis are ratios over 100 Bq/kg.

[Table 1 - 1. Results obtained at Each Measurement Point (1)]

Measurement Point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less)
T1 (October 25)	Flatfish, Greenling, Marbled sole, Sea robin, Striped jewfish, Dory, Crimson sea bream, Yellowtail Common skete, Stone flounder
T1 (November 16)	Stone flounder, Common skete, Marbled sole, Flatfish, Sea robin, Littlemouth flounder, Lepidotrigla microptera, Crimson sea bream
T1 (November 30)	Common skete, Flatfish, Sea bass, Common Japanese conger, Greenling, Marbled sole, Littlemouth flounder, Dory, Lepidotrigla microptera, Crimson sea bream
T1 (December 21)	Stone flounder, Sea bass, Marbled sole, Microstomus achne, Greenling, Roundnose flounder, Littlemouth flounder, Gnathophis nystromi nystoromi, Ridged-eye flounder, Flatfish, Common Japanese conger, Lepidotrigla microptera, Crimson sea bream, Black scraper, Yellowtail, Common horse mackerel
T2 (October 25)	Flatfish, Marbled sole, Smooth dogfish, Littlemouth flounder, Greenling, Crimson sea bream, Sea robin, Lepidotrigla microptera, Ridged-eye flounder, Striped jewfish, Dory, Loliginid
T2 (November 16)	Stone flounder, Marbled sole, Flatfish, Greenling, Common Japanese conger, Dory, Lepidotrigla microptera, Common horse mackerel, Loliginid, Crimson sea bream, Octopus (Enteroctopus) dofleini, Loligo bleekeri
T2 (November 30)	Sea bass, Common skete, Greenling, Ridged-eye flounder, Flatfish, Marbled sole, Pagrus major, Littlemouth flounder, Crimson sea bream, Smooth dogfish, Dory, Lepidotrigla microptera, Common horse mackerel
T2 (December 21)	Common skete, Marbled sole, Microstomus achne, Ridged-eye flounder, Flatfish, Slippery sole, Common Japanese conger, Littlemouth flounder, Roundnose flounder, Striped jewfish, Blue crab, Lepidotrigla microptera, Loliginid, Crimson sea bream, Octopus (Enteroctopus) dofleini, Loligo bleekeri Sea bass
T3 (September 10)	Microstomus achne, Marbled sole, Dory, Lepidotrigla microptera, Flatfish Common skete
T3 (October 21)	Angel shark, Stone flounder, Stingray Common skete, Flatfish, Marbled sole
T3 (November 5)	Stone flounder, Marbled sole, Flatfish, Sea robin, Dasyatis matsubarai Common skete, Microstomus achne, Angel shark
T3 (December 14)	Microstomus achne, Stone flounder, Sea bass, Flatfish, Takifugu snyderi, Lepidotrigla microptera, Sea robin, Pagrus major, Crimson sea bream, Loliginid Common skete, Marbled sole
T4 (September 10)	Flatfish, Dory, Roundnose flounder, Smooth dogfish, Lepidotrigla microptera, Crimson sea bream, Zenopsis nebulosa, Pagrus major Common skete, Stone flounder, Marbled sole
T4 (October 21)	Marbled sole, Stone flounder, Sea robin, Stingray, Pagrus major Common skete, Flatfish, Angel shark
T4 (November 5)	Marbled sole, Ridged-eye flounder, Takifugu snyderi, Smooth dogfish, Dory, Stone flounder, Dasyatis matsubarai, Sea robin, Pagrus major Common skete, Flatfish
T4 (December 14)	Takifugu snyderi, Greenling, Flatfish, Crimson sea bream, Lepidotrigla microptera, Roundnose flounder, Sea robin, Loliginid Common skete, Microstomus achne
G1 (September 5)	Flatfish, Drumfish, Blue crab Common skete, Stingray, Angel shark
G1 (October 18)	Drumfish, Carcharhinus, Oplegnathus punctatus, Blue crab Common skete, Flatfish, Flathead (Platycephalus sp.)
G1 (November 8)	Blue crab, Ovalipes punctatus Common skete, Sea raven
G1 (December 20)	Flatfish, Ovalipes punctatus Schlegel's black rockfish, Common skete

[Table 1 - 2. Results obtained at Each Measurement Point (2)]

Measurement Point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less)
G2 (September 5)	Dasyatis matsubarai, Flatfish, Drumfish, Dory, Carcharhinus, Ovalipes punctatus, Blue crab, Chub mackerel Sebastes cheni, Common skete
G2 (October 18)	Flatfish, Drumfish, Dasyatis matsubarai, Carcharhinus, Blue crab, Arothron hispidus Stingray, Greenling
G2 (November 8)	Sea bass, Flatfish, Drumfish, Dory, Ovalipes punctatus, Smooth dogfish, Blue crab, Chum salmon Sea raven, Common skete
G2 (December 20)	Microstomus achne, Greenling, Marbled sole, Flatfish, Stingray, Lophius litilon, Snailfish Sea raven, Common skete
G3 (September 19)	Carcharhinus, Banded dogfish, Blue crab Common skete, Greenling, Flatfish, Marbled sole
G3 (October 13)	Flathead (Platycephalus sp.) , Sea bass, Drumfish, Blue crab, Cynoglossus joyneri, Smooth dogfish, Pagrus major Common skete, Flatfish, Spotted halibut
G3 (November 21)	Smooth dogfish, Pennahia argentata, Yellowtail, Dory, Blue crab Common skete, Microstomus achne, Flatfish, Angel shark
G3 (December 13)	Flatfish, Smooth dogfish, Sea bass, Stingray, Sea robin, Ovalipes punctatus, Blue crab, Snailfish, Yellowtail Marbled sole, Common skete, Sea raven
G4 (September 19)	Marbled sole, Drumfish, Flatfish, Carcharhinus, Dasyatis matsubarai Stingray, Common skete
G4 (October 13)	Flatfish, Drumfish, Pagrus major, Common horse mackerel, Angel shark, Dasyatis matsubarai, Carcharhinus, Ovalipes punctatus, Yellowtail, Blue crab, Chum salmon Marbled sole, Greenling, Common skete
G4 (November 21)	Flatfish, Stone flounder, Marbled sole, Pagrus major, Sea robin, Yellowtail, Smooth dogfish, Blue crab Microstomus achne, Common skete, Greenling
G4 (December 13)	Flatfish, Smooth dogfish, Schlegel's black rockfish, Lophius litilon, Blue crab, Snailfish Marbled sole, Greenling, Common skete, Microstomus achne
G5 (September 15)	Drumfish, Blue crab Common skete, Stingray, Angel shark, Flathead (Platycephalus sp.) , Flatfish
G5 (October 15)	Drumfish, Blue crab Common skete, Flatfish, Banded dogfish
G5 (November 15)	Pennahia argentata Common skete, Flatfish, Marbled sole
G5 (December 9)	Angel shark, Dory Marbled sole, Common skete, Banded dogfish, Microstomus achne, Greenling, Flatfish
G6 (March 29)	Sand eel
G6 (April 7)	Northern dogfish, Pacific cod, Shark-skin flounder Flatfish, Marbled sole, Sea raven
G6 (April 11)	Northern dogfish Marbled sole, Microstomus achne, Common skete, Pacific cod
G7 (September 15)	Drumfish, Carcharhinus, Blue crab Banded dogfish, Common skete, Flatfish
G7 (October 15)	Acanthopagrus schlegeli, Drumfish, Smooth dogfish, Dory, Blue crab Schlegel's black rockfish, Common skete, Greenling, Flatfish
G7 (November 15)	Flatfish, Stingray, Blue crab Common skete, Greenling, Angel shark
G7 (December 9)	Lophius litilon, Dory Common skete, Flatfish, Angel shark
G8 (October 14)	Stingray, Flatfish, Drumfish, Flathead (Platycephalus sp.) , Ovalipes punctatus, Pennahia argentata, Blue crab Common skete, Smooth dogfish
G8 (November 10)	Flatfish, Smooth dogfish, Drumfish, Blue crab, Ovalipes punctatus Sea raven, Common skete, Stingray, Flathead (Platycephalus sp.) , Angel shark
G8 (November 19)	Sea robin, Smooth dogfish, Dory, Blue crab, Southern mackerel, Chum salmon Sea raven, Flatfish, Flathead (Platycephalus sp.)
G8 (December 17)	Roundnose flounder, Sea robin, Marbled sole, Smooth dogfish, Lophius litilon, Blue crab, Snailfish, Octopus (Enteroctopus) dofleini Common skete, Angel shark, Flatfish

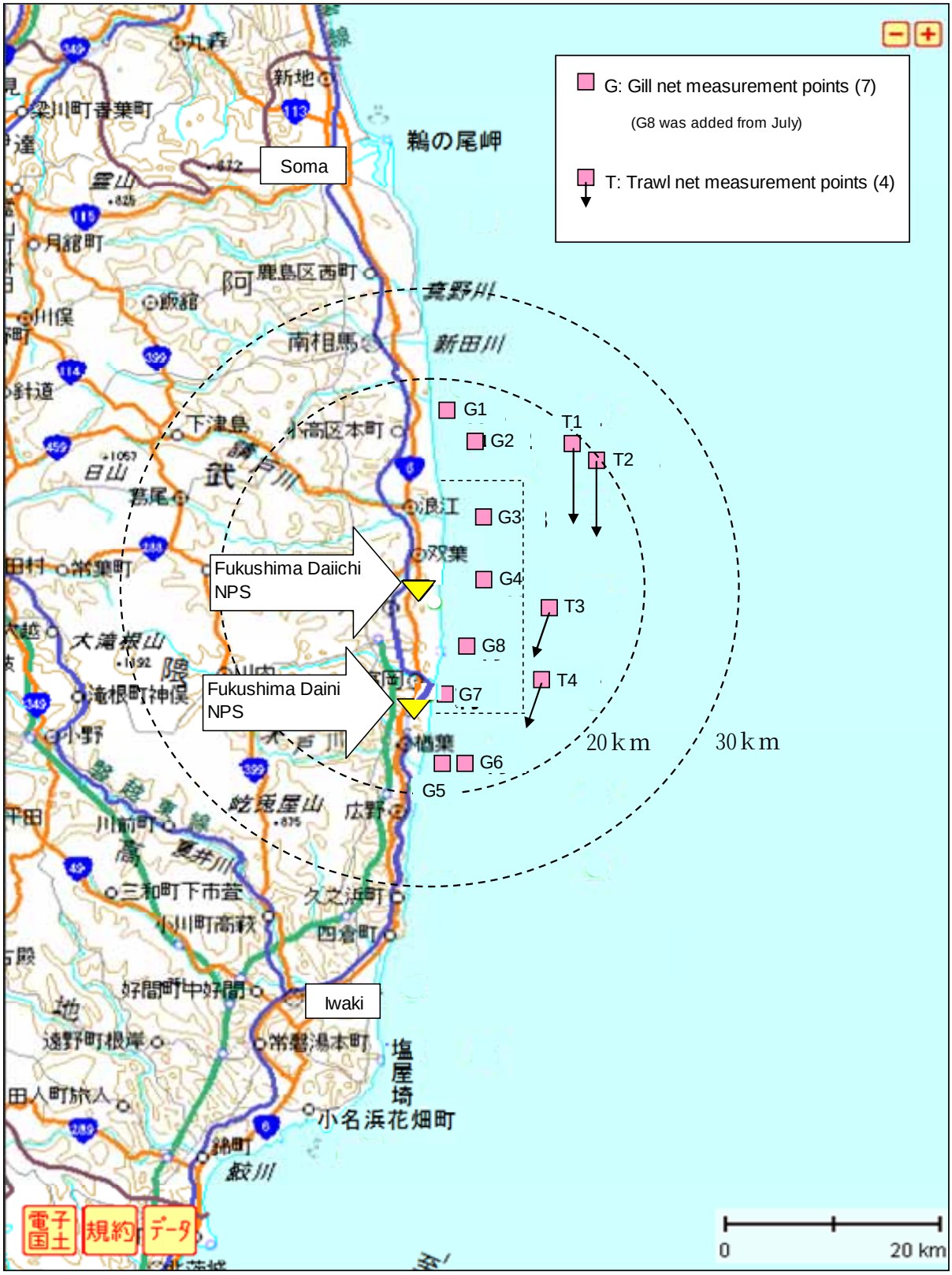
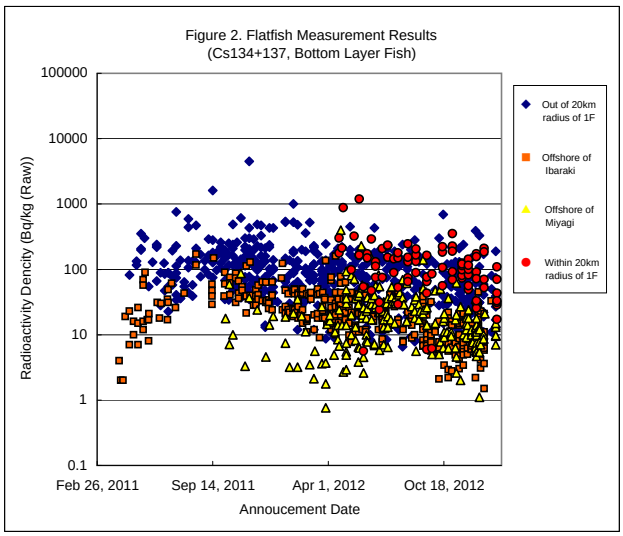
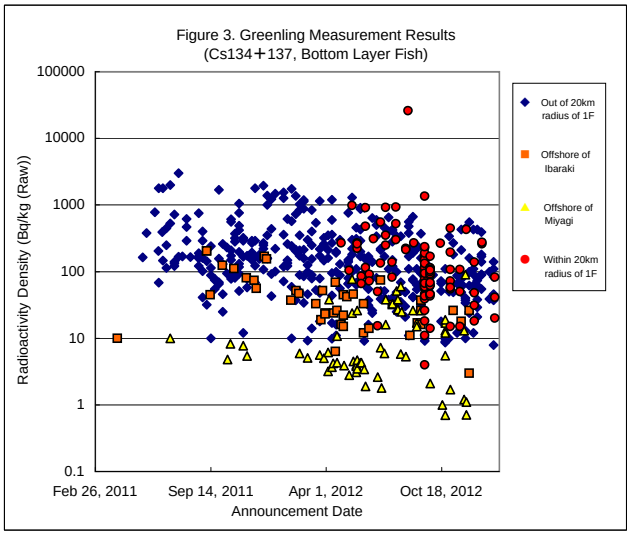
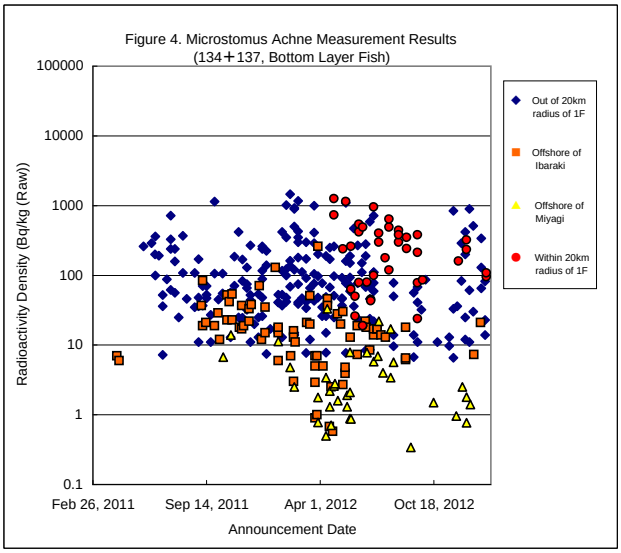
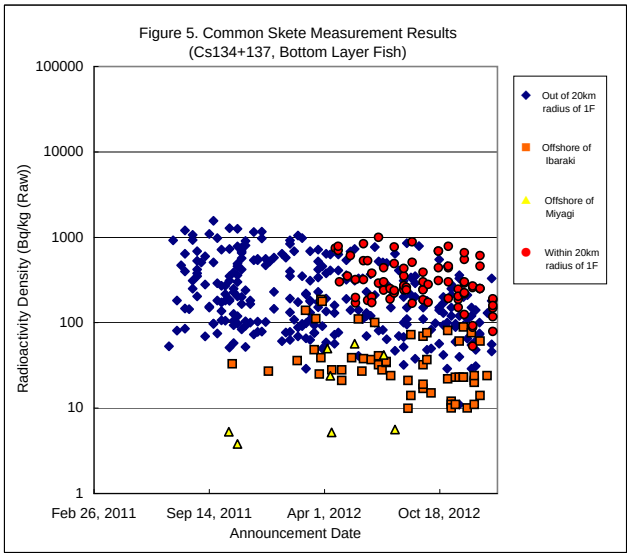


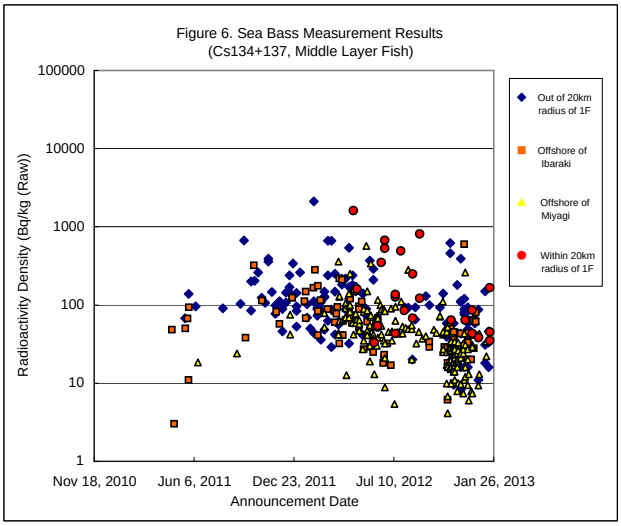
Figure 1. Fish and Shell Fish Measurement Points (As of December 2012)

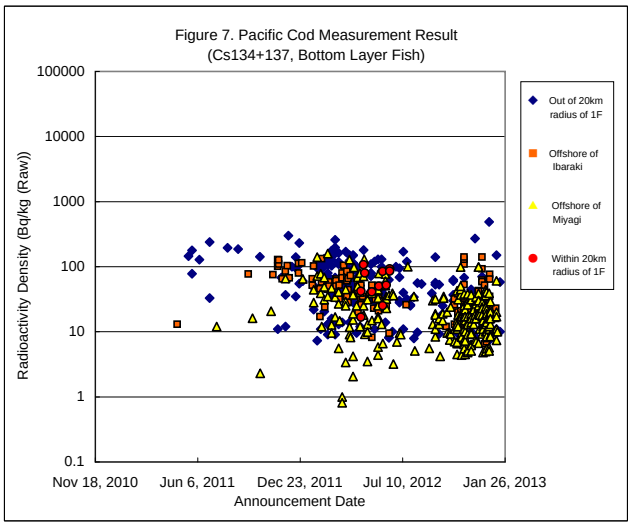






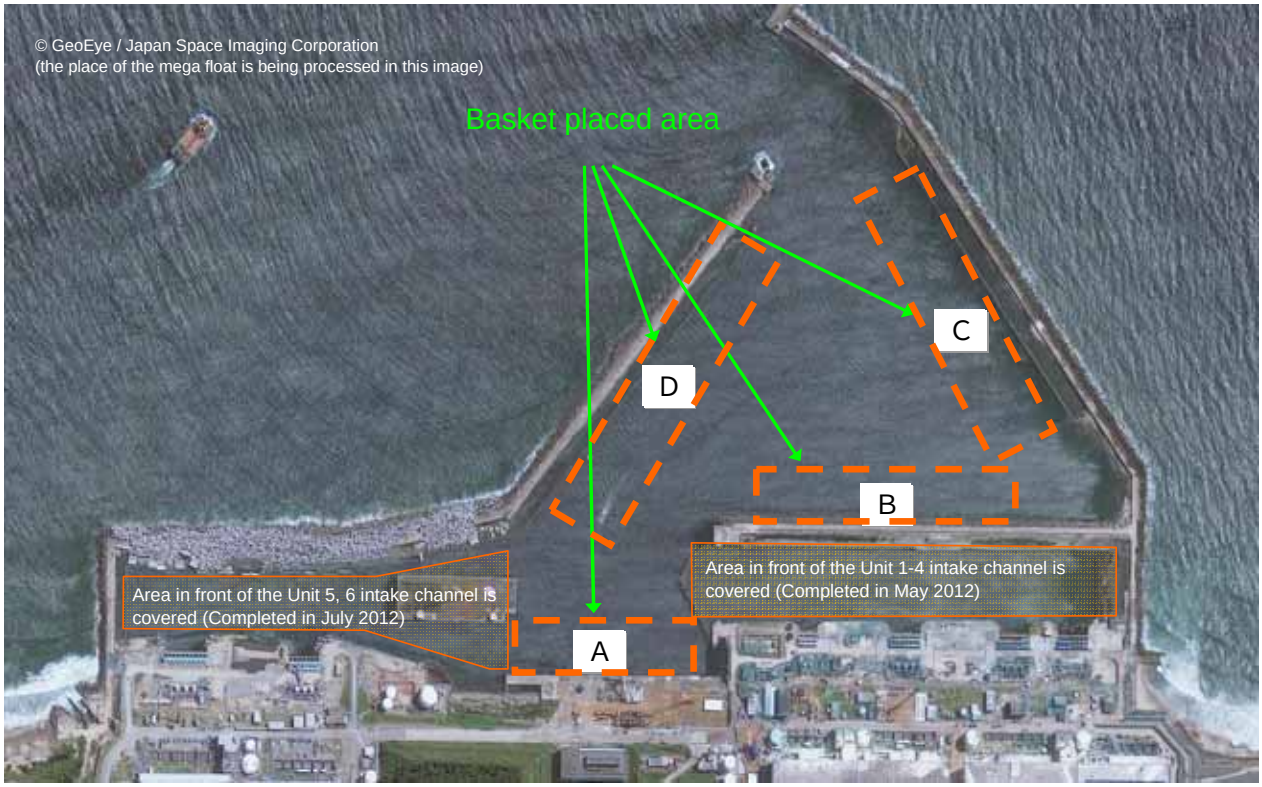






(Remark) The measurement results of "Out of 20km radius of 1F", "Offshore of Ibaraki" and "Offshore of Miyagi" was obtained from the Japan Meteorological Agency website.

Sampling (extermination) using fishing baskets in the port of Fukushima Daiichi NPS



<Preliminary Report> Sampling situation on January 18, 2013 (Sampling at Area A to D)

Fish	Number of Sampling
Greenling	6
Common Japanese conger	5
Brown hakeling	26
Schlegel's black rockfish	1
Spotbelly rockfish	3
Scorpion fish	1
Amount	42

Chart: Nuclide Analysis Results of Fish in the Port

Name of Sample (Region)	Date of Sampling	Cesium Density (Unit: Bq/kg (Raw))			Place of Sampling
		Cs-134	Cs-137	Cesium Amount	
Brown hakeling (Muscle)	Oct 10, 2012	1,600	2,600	4,200	A
Schlegel's black rockfish (Muscle) No.1		660	1,100	1,760	A
Schlegel's black rockfish (Muscle) No.2		830	1,400	2,230	A
Common Japanese conger (Muscle)		5,900	9,600	15,500	A
Greenling (Muscle) No.1	Dec 20, 2012	15,000	25,000	40,000	A
Greenling (Muscle) No.2		7,300	13,000	20,300	A
Brown hakeling (Muscle) No.1		1,400	2,500	3,900	A
Brown hakeling (Muscle) No.2		310	530	840	C
Brown hakeling (Muscle) No.3		270	500	770	C
Jacopever (Muscle)		37,000	64,000	101,000	C
Common Japanese conger (Muscle) No.1		760	1,400	2,160	A
Common Japanese conger (Muscle) No.2		310	560	870	A
Common Japanese conger (Muscle) No.3		670	1,200	1,870	C
Spotbelly rockfish (Muscle) No.1		5,700	9,800	15,500	A
Spotbelly rockfish (Muscle) No.2		94,000	160,000	254,000	A
Spotbelly rockfish (Muscle) No.3		51,000	89,000	140,000	A
Spotbelly rockfish (Muscle) No.4		19,000	30,000	49,000	A

January 28, 2013
Tokyo Electric Power Company

Outline Process (Draft) of the Countermeasures for Fish in the Port at Fukushima Daiichi NPS

① Preventing fish from moving out
② Sampling (extermination) of fish
③ Improving environment of the marine soil in the port (dredging)

		FY 2012						FY 2013								
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Overall Schedule		Sampling (extermination) of fish, Preventing fish from moving to outside the port of Fukushima Daiichi NPS, etc. (Trend monitoring the number and the radioactivity level of fish and review the countermeasures accordingly.)														
1	Preventing fish from moving out															
	<Placement of gill net at the port entrance of Fukushima Daiichi NPS>				(Preparation for implement)											
	<Placement of partition net inside the embankment>				Arrangement of the net			Construction to place the net			Preventing fish from moving by partition net					
2	Sampling (extermination) of fish															
	<Basket fishing> 1 sampling point (Shallow draft quay)	10														
	2 sampling points (Shallow draft quay, south breakwater)			20												
	5 sampling points (Shallow draft quay, south and north breakwater, east seawall bank, in the Water Intake Open Conduit at Unit 1-4)				Conduct basket fishing (around 3 times a month)											
	<Gill net fishing> In the port of Fukushima Daiichi NPS			(Under discussion toward implement)												
	<Gill net fishing> 2 points in north and south sea area outside the port of Fukushima Daiichi NPS			(Under discussion toward implement)												
3	Improving environment of the marine soil in the port															
	<Dredging the ocean lane and the anchorage>													Dredging, covering the soil		