General report on the projects aided by the PICES/ICES/JSFO fund for fisheries and oceanographic research on the recovery from the Great East Japan Earthquake

Japanese Society of Fisheries Oceanography

Iwate Prefecture Fisheries Technology Institute

International Coastal Research Center of Atmosphere and Ocean Research Institute, The University of Tokyo (Otsuchi, Iwate pref.)

Many local institutions of fisheries and oceanography has been damaged by the earthquake and tsunami.

PICES/ICES/JSFO fund supported to recover their scientific activities especially for research on the effect of the fishing villages and ecosystems of northeastern Japan (Tohoku region).

List of the projects supported by this fund

CD$ 55100 from PICES/ICES and ca. CD$7400 from JSFO

No.	Project Name*	Principal Investigator (Affiliation)	Perticipated Organizations
1	Impact assessment of the Great East Japan Earthquake on the coastal fisheries of Iwate Prefecture and monitoring of fish stocks for rebuilding sustainable fisheries	Tomoaki Goto (Iwate Prefecture Fisheries Technology Institute)	Iwate Prefecture Fisheries Technology Institute
2	Investigation of the impact of the Great East Japan Earthquake on the fisheries resources in the rocky shore of Iwate Prefecture and monitoring of their recovering	Toshiaki Omura (Iwate Prefecture Fisheries Technology Institute)	1) Iwate Prefecture Fisheries Technology Institute 2) Taro-Cho Fisheries Co-operative Association
3	Studies on the relationship between the occurrence of shellfish poisoning in Iwate Prefecture and the tsunami caused by the Great East Japan Earthquake	Toshiyuki Suzuki (National Research Institute of Fisheries Science)	1) National Research Institute of Fisheries Science, Fisheries Research Agency 2) Iwate Prefecture Fisheries Technology Institute
4	Studies on the impacts of the Great East Japan Earthquake on the fishing grounds along the rocky shore coast of Fukushima Prefecture	Naoto Hirakawa (Fukushima Prefectural Fisheries Experimental Station)	1) Fukushima Prefectural Fisheries Experimental Station 2) Tokyo University of Marine Science and Technology
5	Studies on water quality and bottom sediment in Matsukawa-ura Bay, Soma City, Fukushima Prefecture	Kazuyoshi Takasaki (Fukushima Prefectural Fisheries Experimental Station)	Fukushima Prefectural Fisheries Experimental Station
6	Observation of the larval distribution of Pacific oyster for collecting seed for the oyster farming	Mitsuru Morimoto (Miyagi Fisheries High School)	1) Miyagi Fisheries High School 2) Tohoku University
7	Changes in the community structure of microscopic plankton in Ofunato Bay, Iwate Prefecture - Examination of the growing factors of genus Alexandrium, the causative organisms of paralytic shellfish poisoning	Yuuichiro Yamada (Kitasato University)	1) Kitasato University 2) Iwate Prefecture Fisheries Technology Institute
8	Changes in the migration style in amphidromous fishes	Kinuko Ito (Tohoku University)	1) Tohoku University 2) Miyagi Prefecture Fisheries Technology Institute 3) Hirose-Natorigawa Fishries Co-operative Association
9	Monitoring of the recovery process of the lower trophic production in the surface layer in Onagawa Bay, Miyagi Prefecture	Yoshinari Endo (Tohoku University)	Tohoku University
10	Observation of the drifting and deposited marine debris leaked by the Great East Japan Earthquake	Yuji Miyake (Kitasato University)	1) Kitasato University 2) Japan Agency for Marine-Earth Science and Technology 3) Ehime University
11	Studies on the impact of the tsunami on the ecosystem of Otsuchi Bay, Iwate Prefecture, and its recovery process	Hideki Fukuda (International Coastal Research Center, Atmosphere and Ocean Research Insitute, University of Tokyo)	Atmosphere and Ocean Research Insitute, University of Tokyo

These project are categorized to 3 themes

1. Monitoring for the damages of landscape, human society and ecosystem by tsunami

2. Research on the ecosystem change and recovery

3. Monitoring on shellfish poisoning and appearance of its causative organisms

Monitoring for the damages of landscape, human society and ecosystem by tsunami

Studies on the impact of the tsunami on the ecosystem of Otsuchi Bay, Iwate Prefecture, and its recovery process

Hideki Fukuda
(International Coastal Research Center, Atmosphere and Ocean Research Insitute, University of Tokyo)

Distribution of marine debris caused by enormous Tsunami off Sanriku

Hiroshi Miyake
(Kitasato University, Iwate Fisheries Technology Center, JAMSTEC, Ehime University)

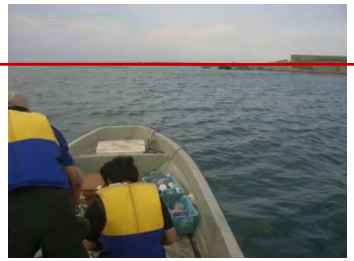
Impact assessment of the Great East Japan Earthquake on the coastal fisheries of Iwate Prefecture and monitoring of fish stocks for rebuilding

Tomoaki Goto
(Iwate Prefecture Fisheries Technology Institute)

Studies on water quality and bottom sediment in Matsukawa-ura Bay, Soma City, Fukushima Prefecture

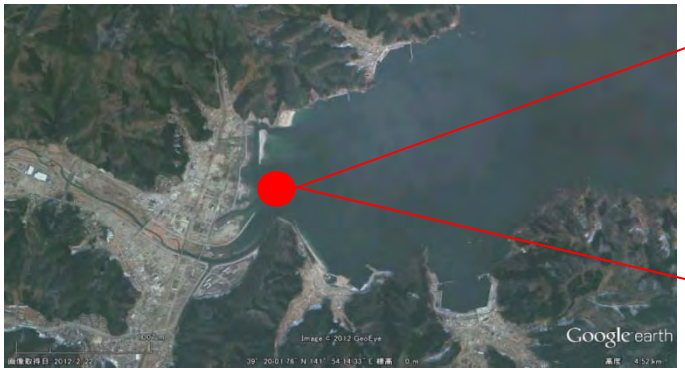
Kazuyoshi Takasaki
(Fukushima Prefectural Fisheries Experimental Station)

Studies on water quality and bottom sediment in Matsukawa-ura Bay, Soma City, Fukushima Prefecture



Studies on the impact of the tsunami on the ecosystem of Otsuchi Bay, Iwate Prefecture, and its recovery process

Before the earthquake (2007.5.10)



River mouth of Unosumai, Iwate pref.

After the earthquake (2012.9.4)
The sand beach disappered completely.

Otsuchi town, Iwate pref.

2011.3.24
This area was decided to be a storage space for debris by the earthquake and tsunami.

2011.8.9
Huge amount of debris were piled up in this storage space

2012.9 Large part of Debris were transported to other areas.

Distribution of marine debris caused by enormous Tsunami off Sanriku

Sanriku-cho, Ofunato city, Iwate prefecture（2011.03.12）

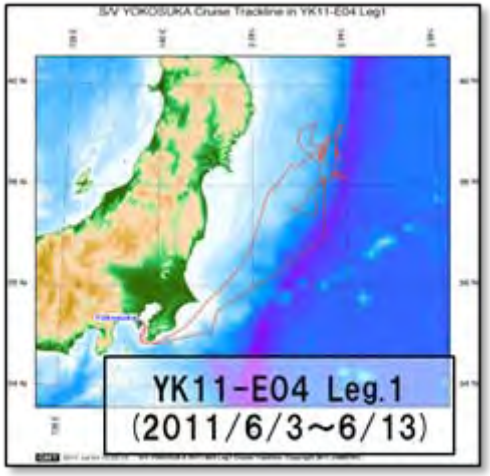
In-situ investigation was necessary to identify kind of floating litter and benthic litter.

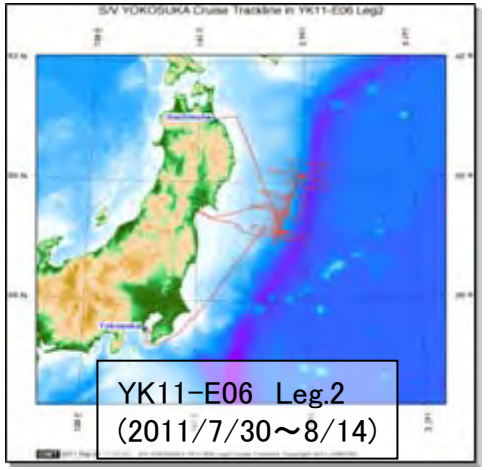
Objectives

- **to observe floating debris and deep-sea debris *in situ***
- **to understand transportation of marine debris to deep-sea floor**

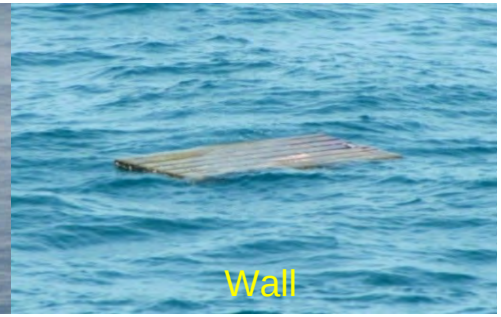
Floating debris

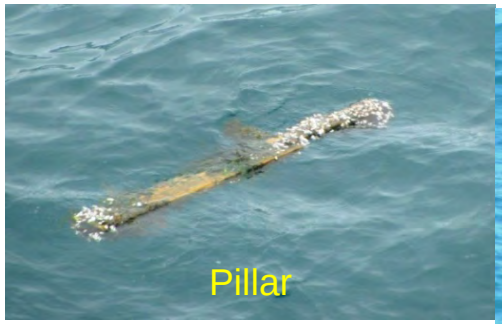
- Video camera was set at navigation bridge deck.
- Type of litter was checked by visual observation.
- Photo images of floating litter were taken.





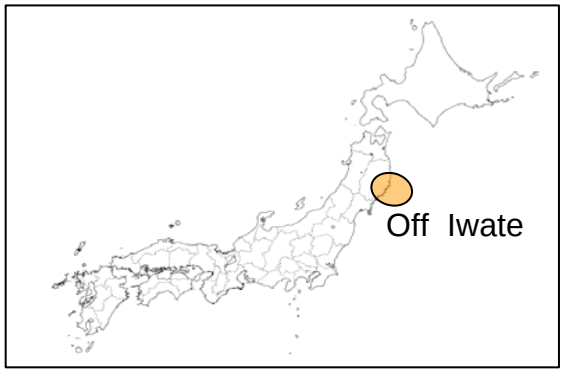
◎Investigated cruise





- Plastic and building materials were massive.
- Debris were gathered on the current rip.
- Large floating debris were observed.
(ex; 2-5m log, pillar, bouy, and so on)

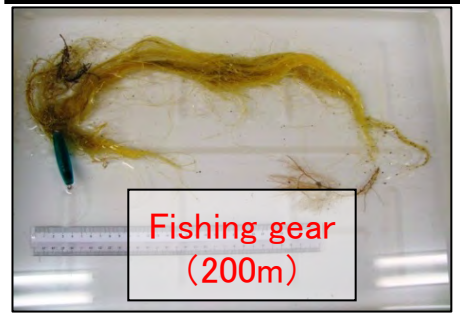
Deep-sea debris

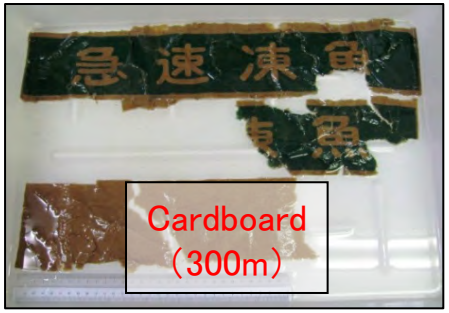


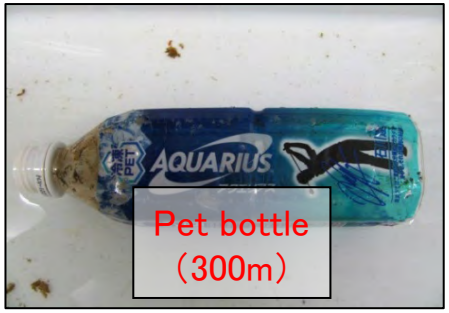
◎Investigated area
Off Iwate
Depth: 200 m – 600 m
18 stations in 2010
16 stations in 2011

- **The towing depth were between 200 and 600 m depths.**
- **Measured the size and weight of each debris and classified by material of the debris.**
- **Density of deep-sea benthic debris was expressed as inds/m^3.**

Before the Earthquake

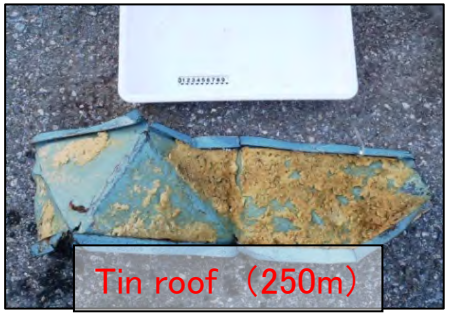


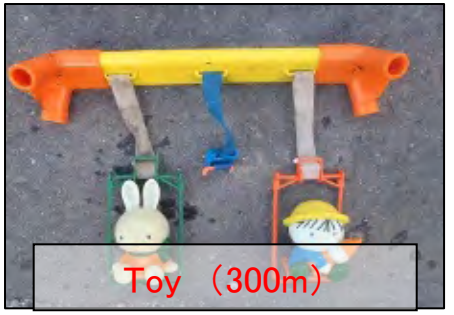




- **Plastic were most frequent, following to fishing gear and metal.**
- **Derived from fishery and our day life.**

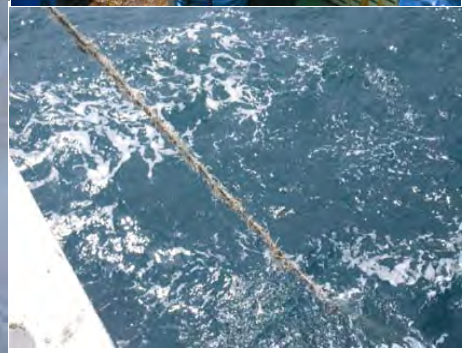
After the Earthquake

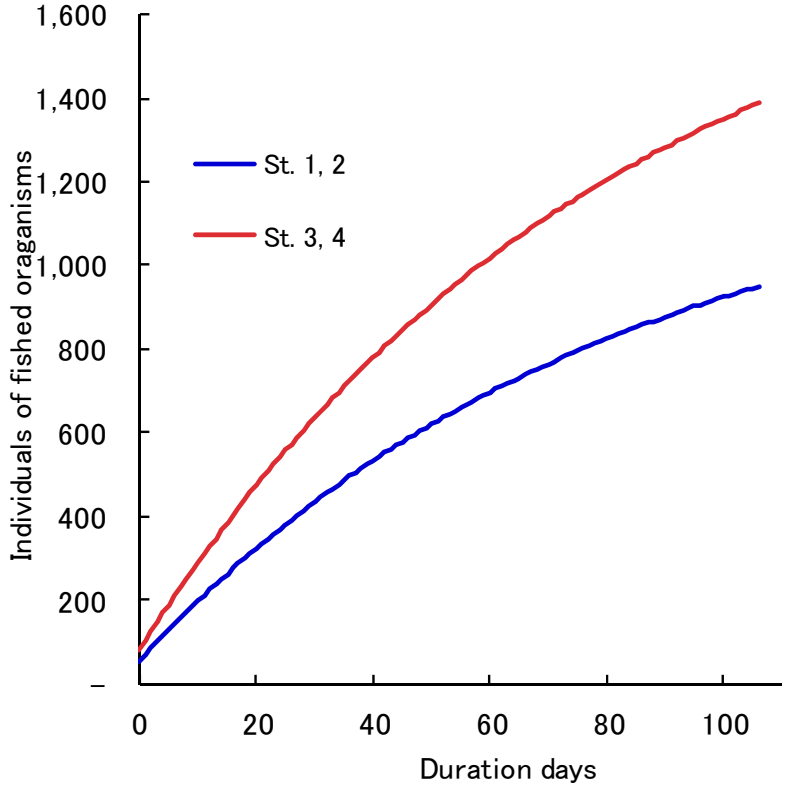




- **Much of debris were derived from Tsunami.**

Impact assessment of the Great East Japan Earthquake on the coastal fisheries of Iwate Prefecture and monitoring of fish stocks for rebuilding





The result of ghost fishing research

Research on the ecosystem change and recovery

Investigation of the impact of the Great East Japan Earthquake on the fisheries resources in the rocky shore of Iwate Prefecture and monitoring of their recovering

Toshiaki Omura
(Iwate Prefecture Fisheries Technology Institute, Taro-Cho Fisheries Co-operative Association)

Monitoring of the recovery process of the lower trophic production in the surface layer in Onagawa Bay, Miyagi Prefecture

Yoshinari Endo
(Tohoku University)

Changes in the migration style in amphidromous fishes

Kinuko Ito
(Tohoku University, Miyagi Prefecture Fisheries Technology Institute, Hirose-Natorigawa Fishries Co-operative Association)

Studies on the impacts of the Great East Japan Earthquake on the fishing grounds along the rocky shore coast of Fukushima Prefecture

Naoto Hirakawa
(Fukushima Prefectural Fisheries Experimental Station, Tokyo University of Marine Science and Technology)

Observation of the larval distribution of Pacific oyster for collecting seed for the oyster farming

Mitsuru Morimoto
(Miyagi Fisheries High School, Tohoku University)

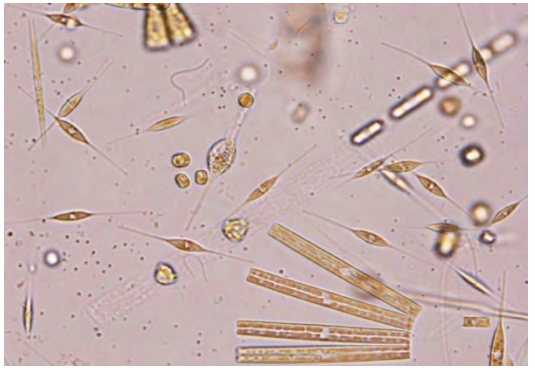
Investigation of the impact of the Great East Japan Earthquake on the fisheries resources in the rocky shore of Iwate Prefecture and monitoring of their recovering

Taro city, Iwate pref.

Field Research for rock shore flora and fauna on 2011.10.5

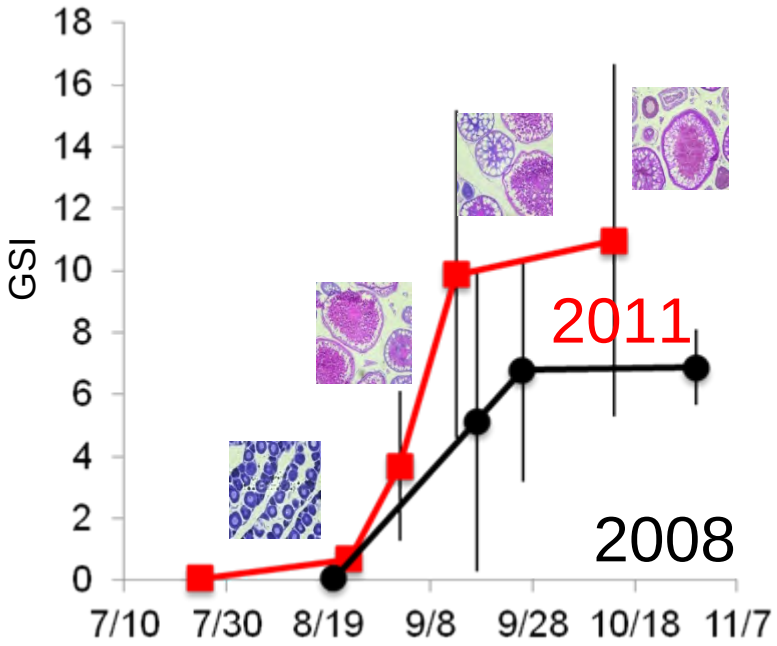
Monitoring of the recovery process of the lower trophic production in the surface layer in Onagawa Bay, Miyagi Prefecture

Onagawa city, Miyagi pref.

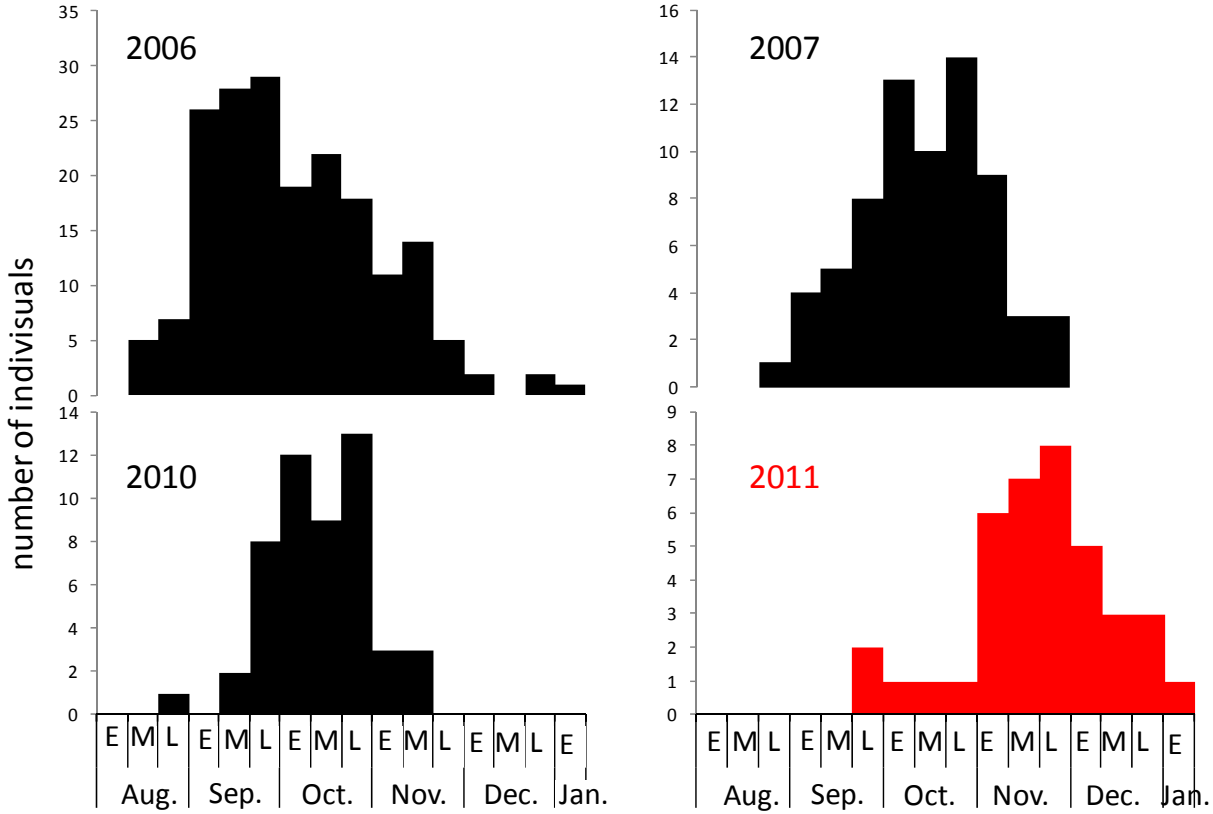


Field research for collecting plankton

Changes in the migration style in amphidromous fishes

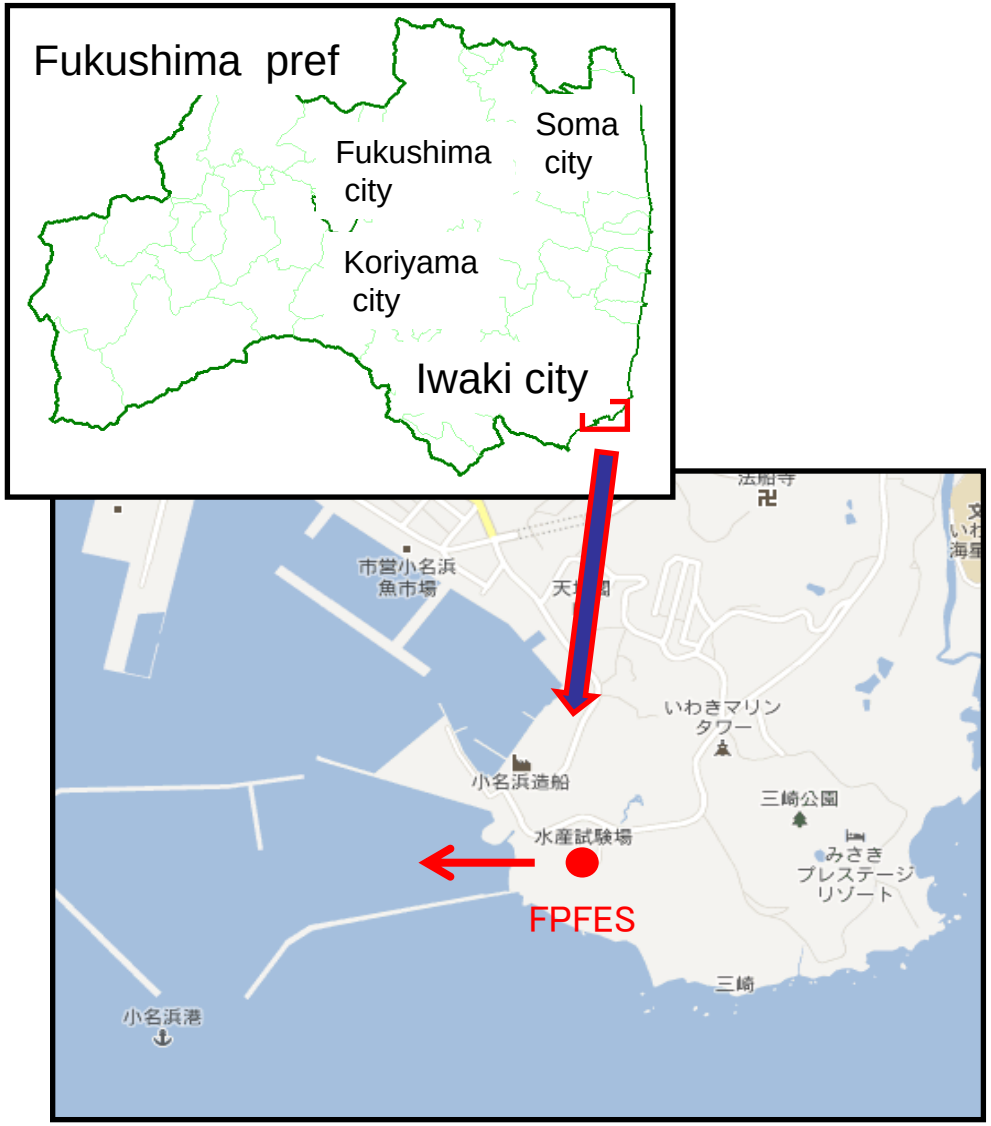


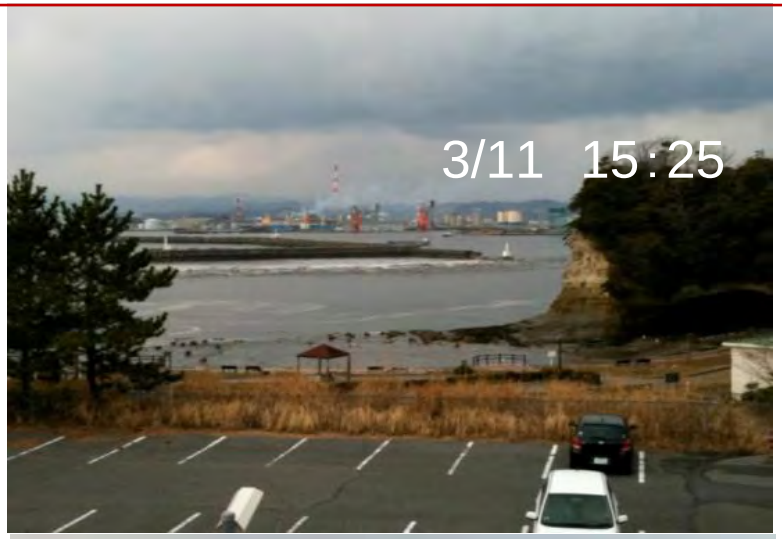
GSI and gonad development

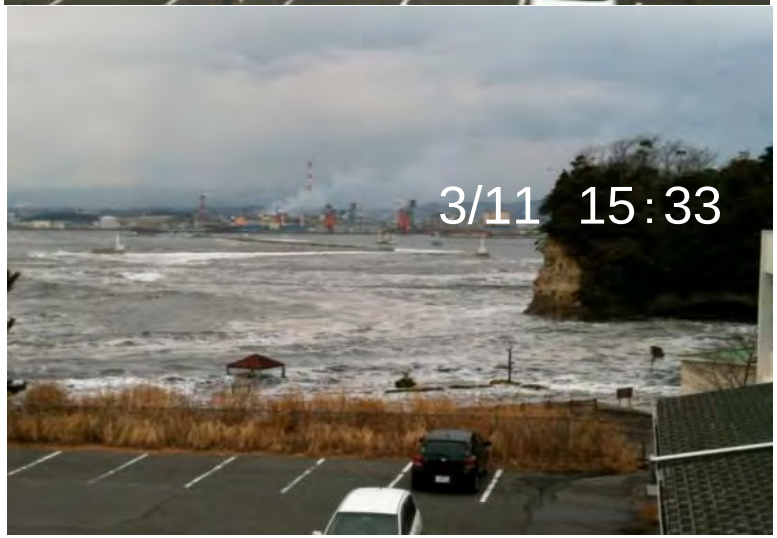


Hatch date composition

Studies on the impacts of the Great East Japan Earthquake on the fishing grounds along the rocky shore coast of Fukushima Prefecture







Tsunami attacked to the Fukushima Prefectural Fisheries Experimental Station

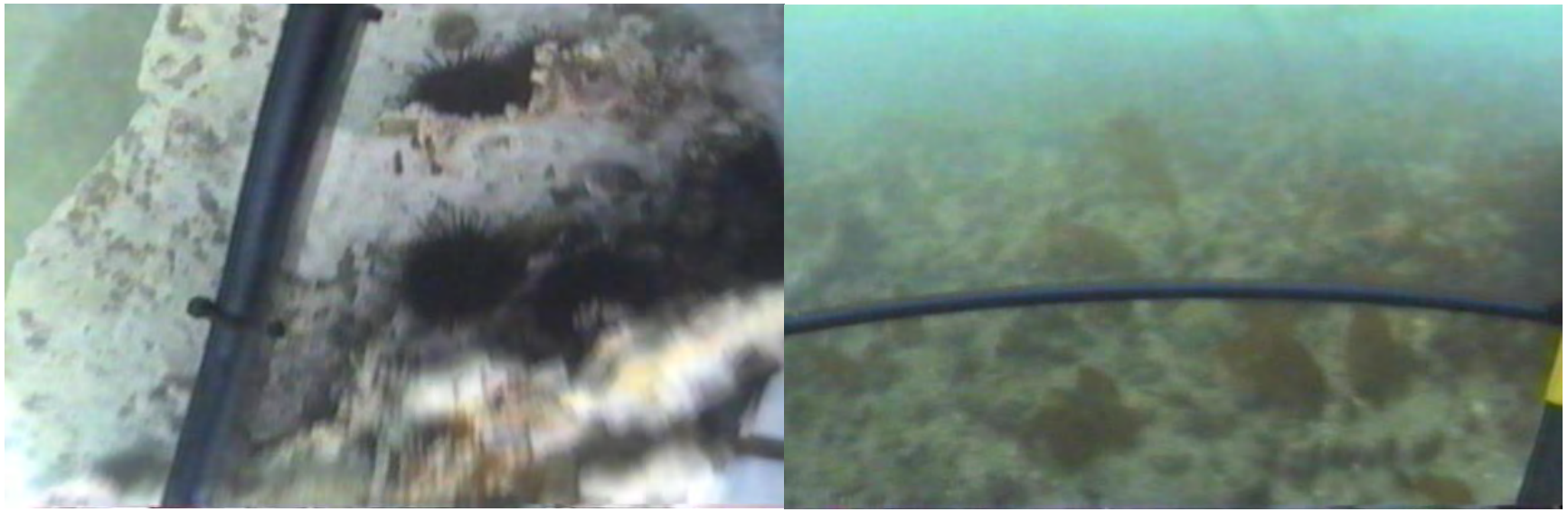
Coastal area of southern Fukushima

Before the tsunami

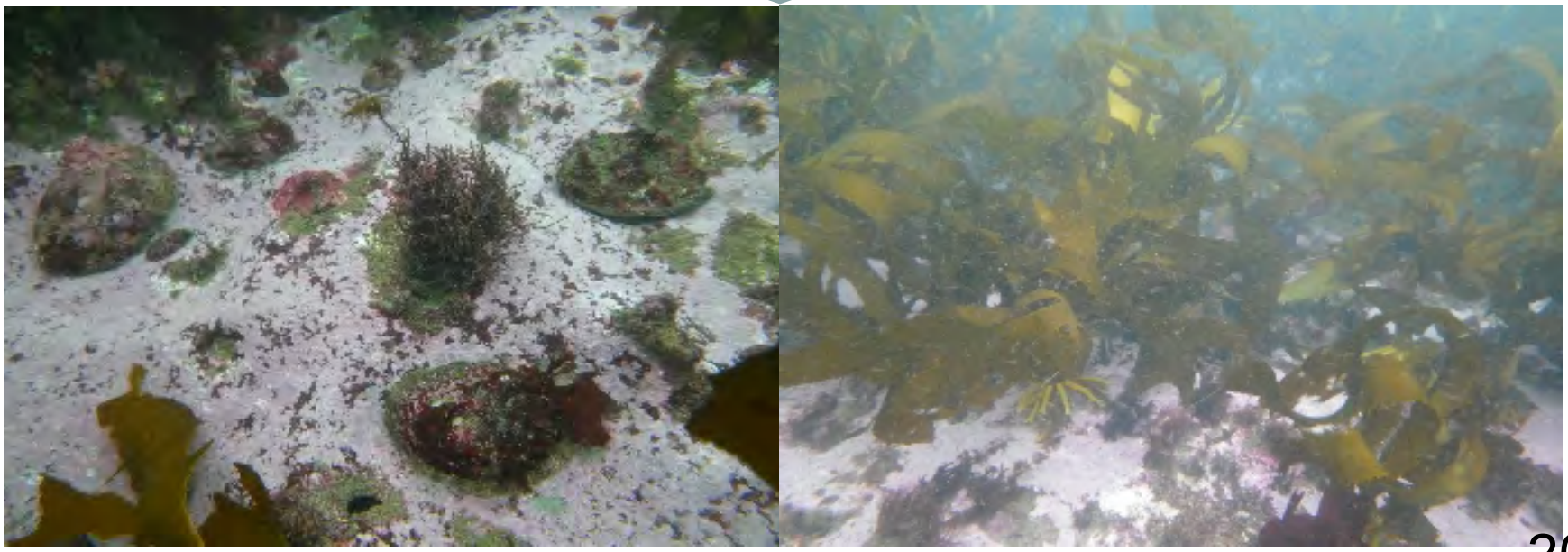
After the tsunami

2011.6.28

Recovery of the fauna and flora of rocky shore area



2011.6



2011.12

Observation of the larval distribution of Pacific oyster for collecting seed for the oyster farming

Sea grass grows on debris

Larval oysters settles on the shell

Monitoring on shellfish poisoning and appearance of its causative organisms

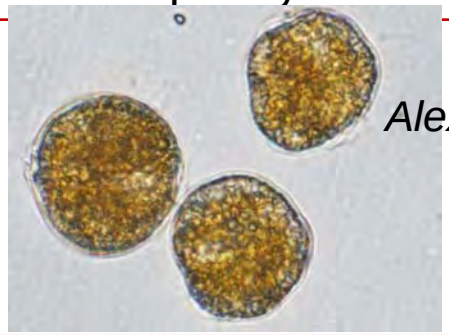
Changes in the community structure of microscopic plankton in Ofunato Bay, Iwate Prefecture - Examination of the growing factors of genus *Alexandrium*, the causative organisms of paralytic shellfish poisoning

Yuuichiro Yamada
(Kitasato University, Iwate Prefecture Fisheries Technology Institute)

Studies on the relationship between the occurrence of shellfish poisoning in Iwate Prefecture and the tsunami caused by the Great East Japan Earthquake

Toshiyuki Suzuki
(National Research Institute of Fisheries Science FRA, Iwate Prefecture Fisheries Technology Institute)

Changes in the community structure of microscopic plankton in Ofunato Bay, Iwate Prefecture - Examination of the growing factors of genus *Alexandrium*, the causative organisms of paralytic shellfish poisoning



Alexandrium tamarense, dinoflagellate

Studies on the relationship between the occurrence of shellfish poisoning in Iwate Prefecture and the tsunami caused by the Great East Japan Earthquake

Appearance of poisonous ingredient corrected from A. tamarense and the mid-gut gland of mussel

Specimens	*A. tamarense*		Mid-gut gland of mussel	
Sampling date	4th, May		1st, June	
	fmol/cell	(mol%)	nmol/g	(mol%)
C1,2	100.1	(15.6)	46.0 ± 36.9	(7.3 ± 2.8)
GTX1,4	486.8	**(75.7)**	340.8 ± 161.8	**(61.9 ± 5.8)**
GTX2,3	56.0	(8.7)	112.4 ± 55.7	(20.8 ± 5.5)
dcGTX2,3	—	(—)	6.3 ± 3.3	(1.1 ± 0.2)
neoSTX	—	(—)	41.5 ± 15.8	(7.8 ± 1.3)
dcSTX	—	(—)	5.8 ± 2.5	(1.1 ± 0.3)
STX	—	(—)	—	(—)
Total	642.9		552.8 ± 251.6	

After the earthquake and tsunami, poisonous mussels were highly appeared in Ofunato Bay, Iwate prefecture.

This fund supported just a small part of their research. They are still continuing their research activities.

The detail of these research was and will be appeared in somewhere.

Effects of the earthquake disaster with huge tsunami in March 2011 on marine environment and fisheriy resources in the coastal waters off Iwate, Pacific coast of northern Japan. Kaiyo 44: 328-335. (in Japanese)

etc.

Some of them are presented in this annual meeting.

GP-12: Effects of Great Earthquake and Tsunami on the Upstream Running, Growth and Maturation of ayu, *Plecoglossus altivelis* altivelis, in the Natori and Hirose Rivers, near Sendai, Northeastern Japan.
Shizuka,K., Ito,K., Sasaki,K. and Katayama,S. (Tohoku Univ.), Yusa,K. (Miyagi Prefecture Fisheries Technology Institute)

etc.

We are deeply grateful to PICES, ICES and world's people for their kind support and sympathy .

Let's hang in there together!!