



環境放射能研究所
INSTITUTE OF ENVIRONMENTAL RADIOACTIVITY

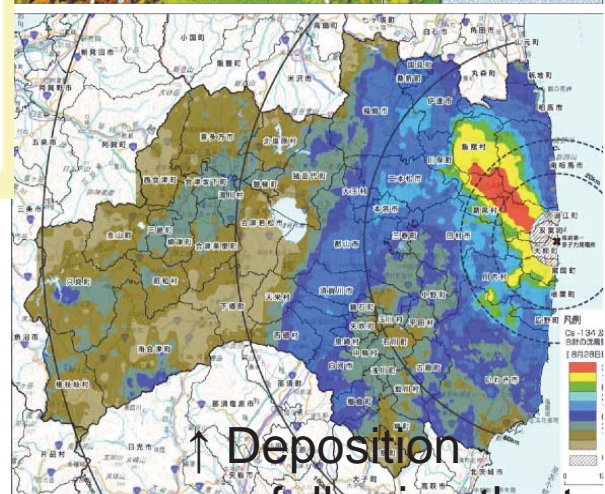
環境放射能研究所の概要

福島大学

共生システム理工学類・
環境放射能研究所

難波謙二

Rivers in Fukushima Pref.



Fish in freshwater rivers/lakes in Fukushima pref. and their feeding habit

- *Ayu* (*Plecoglossus altivelis altivelis*)
Microalgae
- *Wakasagi* (*Hypomesus nipponensis*) ← Lake Hibara etc.
Zooplankton
- *Yamame* (*Oncorhynchus masou masou*)
Aquatic insects, Fallen insects
- *Himemasu* (*Oncorhynchus nerka*) ← Lake Numazawa
Zooplankton, benthic animals, small fish
- *Iwana* (*Salvelinus leucomaenis*)
Animals, Small fish
- *Oikawa* (*Zacco platypus*)
Microalgae, aquatic insects, fallen insects,
- *Koi* (*Cyprinus carpio*) ← Cultured in ponds in Koriyama area
Omnivorous
- *Ginbuna* (*Carassius auratus langsdorffii*)
Zooplankton, benthic algae, benthic animals
- *Ugui* (*Tribolodon hakonensis*) ← Lake Inawashiro etc.
Algae, Aquatic insects
- Black basses (*Micropterus* spp. & Bluegill (*Lepomis macrochirus*))
animals, fish, insects

Ayu (*Plecoglossus altivelis*)



Grazing marks (Abukuma river)→

The fish graze algae attached to rocks.

They may intake clay particles, too, which makes them radio-Cs contaminated.

国からの指示又は県からの要請があった
河川・湖沼(アユ)
(平成24年4月24日現在)

Banned zone for Ayu



福島県

国からの指示又は県からの要請があった
河川・湖沼(ウグイ)
(平成25年5月15日現在)

Banned zone for Ugui



福島県

国からの指示又は県からの要請があった
河川・湖沼(イワナ)
(平成26年9月10日現在)

Banned zone for Iwana



福島県

国からの指示又は県からの要請があった
河川・湖沼(ヤマメ)
(平成25年7月30日現在)

Banned zone for Yamame



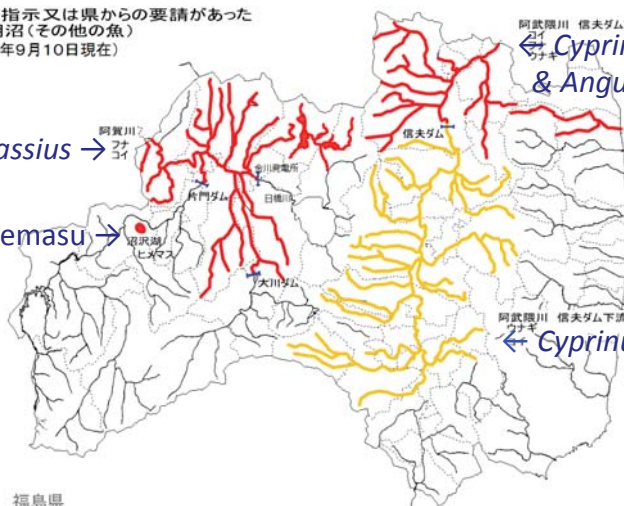
福島県

Banned zone for

国からの指示又は県からの要請があった
河川・湖沼(その他の魚)
(平成26年9月10日現在)

Cyprinus & Carassius →

Himemasu →

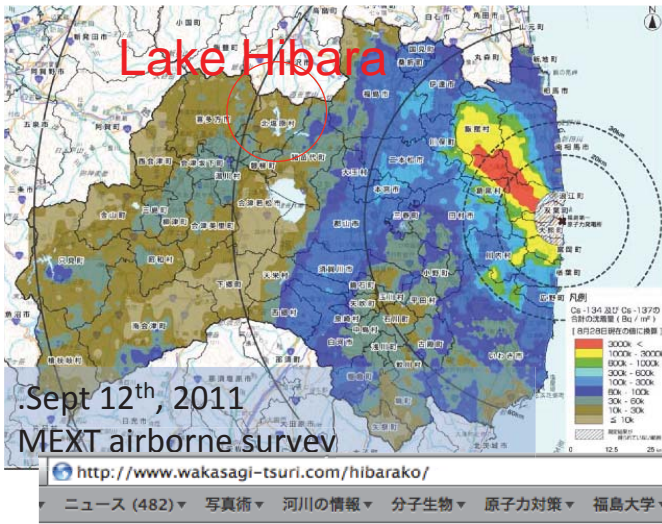


福島県

Cyprinus, Carassius
& Anguilla

Carassius &
& Eriocheir japonica
(Japanese mitten crab)

Cyprinus & Anguilla



Wakasagi (*Hypomesus nipponensis*)
 Osmeridae
 Zooplankton (Cladocera, Copepods) feeder

photo from Shiga Pref. Museum <<http://www.lbm.go.jp/index.html>>

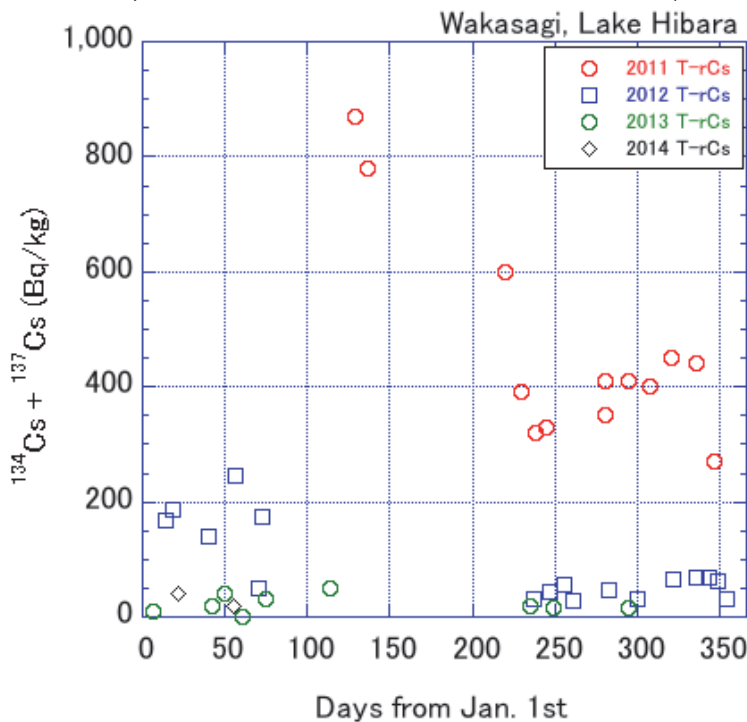


ワカサギの聖地 桜原湖の氷上釣り (1月下旬頃)

ドーム船はご家族連れで手軽に楽しめます!! (G目黒さん)

$^{134}\text{Cs} + ^{137}\text{Cs}$
 in Wakasagi (*Hypomesus nipponensis*) from
 Lake Hibara

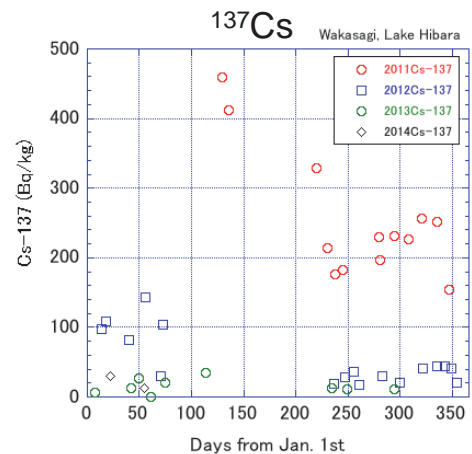
(Data from Fukushima Pref. Fish. Res. Stn.)



Fishing Period : Nov. 1 – Mar. 31

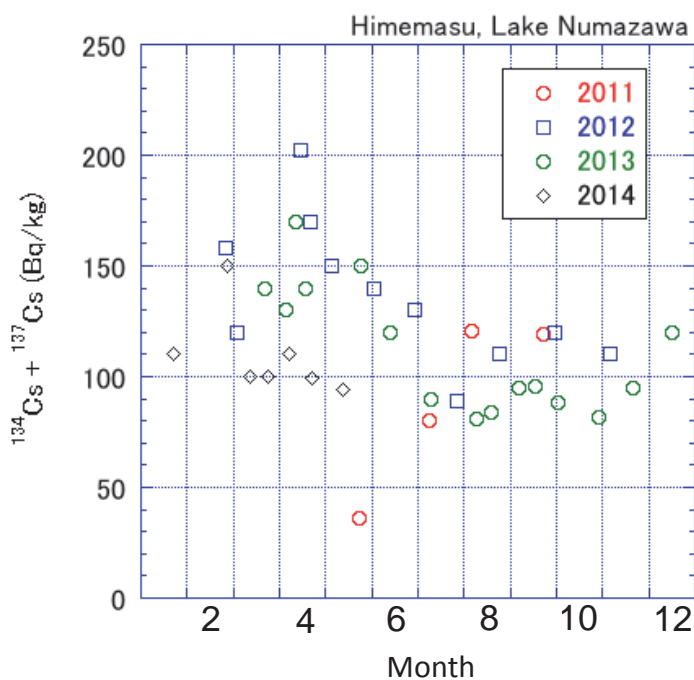
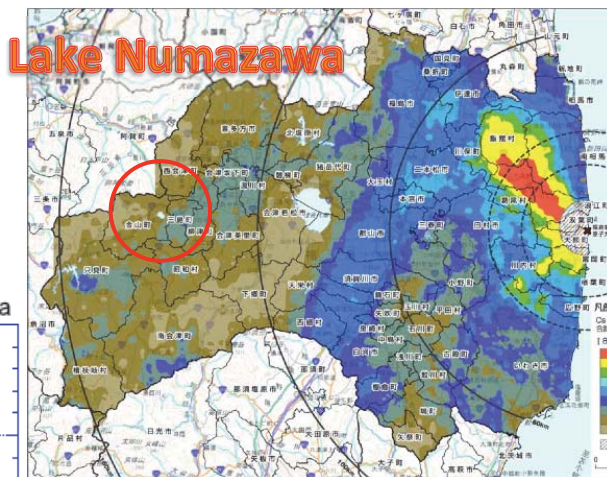
Decrease in 2011 sea

In 2012 lower than in 2



Himemasu (*O. nerka*) in Lake Numazawa

Zooplankton (Cladocera, Copepods) feeder



← High in spring (Mar, Apr, May)

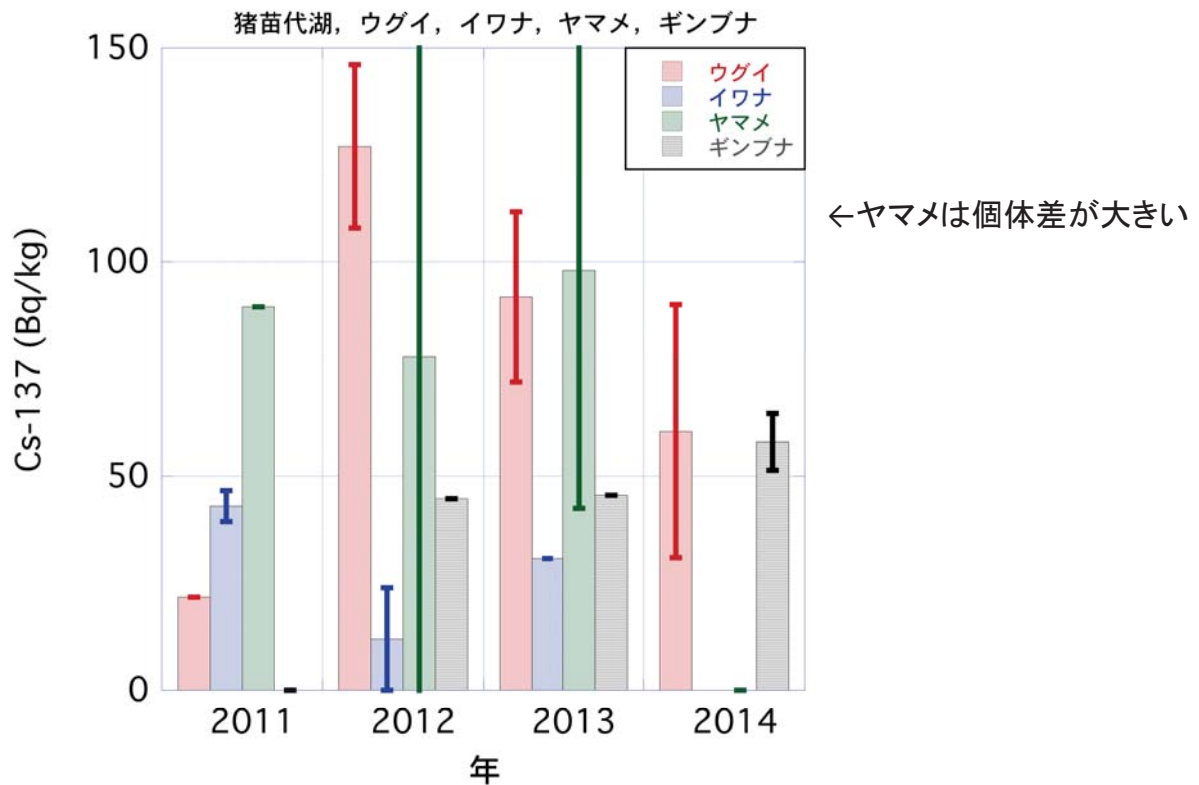
Annual decrease is not as clear as seasonal change.

Lake Inawashiro (すずめやき)とアカハラ(Ugui)の甘露煮

国からの出荷制限指示などにより、現在みられない。
(フナは制限がかけられていないが、自粛?)



猪苗代湖の魚類のCs-137変化

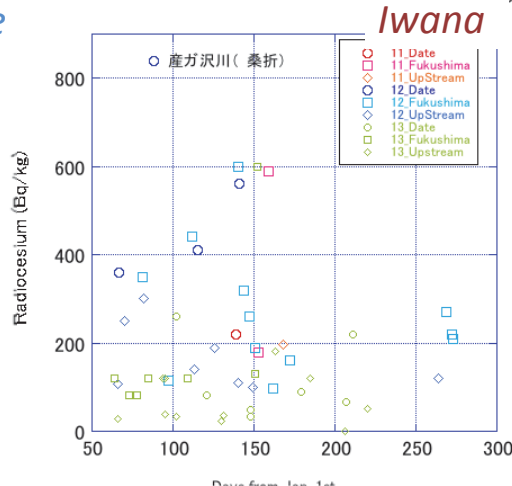
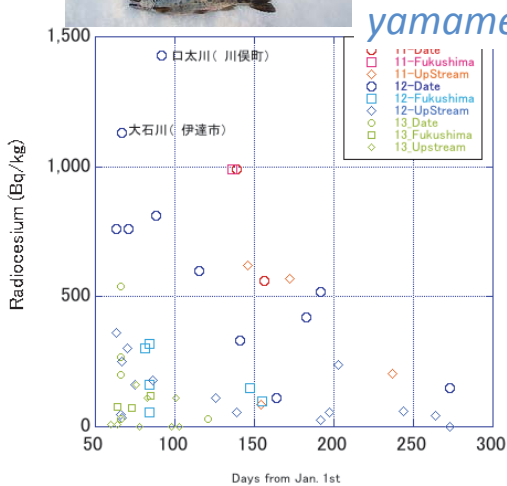
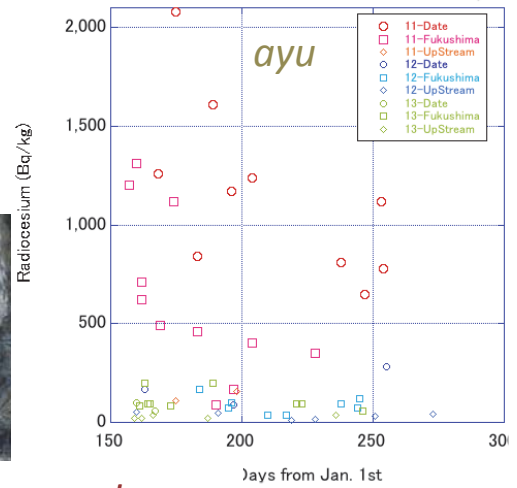


Measurement of radiocesium in river water
(2014/01/28)



Cs-137+Cs-134 in Fish from Abukuma Riv.

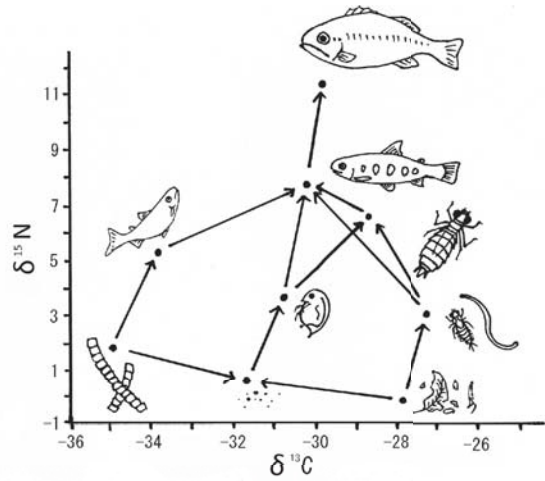
- *ayu* (*Plecoglossus altivelis*)
- *yamame* (landlocked *Oncorhynchus masou masou*)
- *Iwana* (*Salvelinus leucomaenis leucomaenis*)



Difference in radio Cs concentration may rise from:

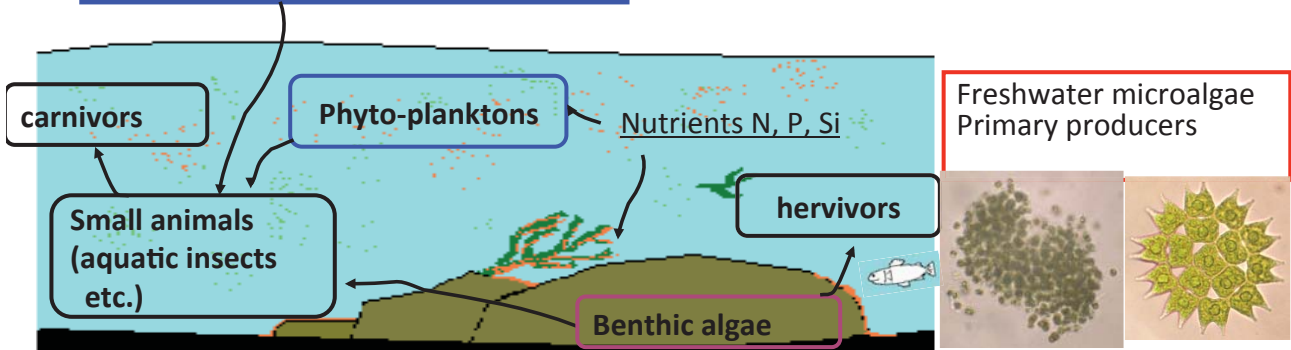
- Nutrition condition
K –deficiency
- Source of food
Terrestrial or Aquatic origin
- Different metabolism
Specificity for K⁺ of enzymes (transporter)

Stable isotopes, a clue to find the source of the radiocesium in fish

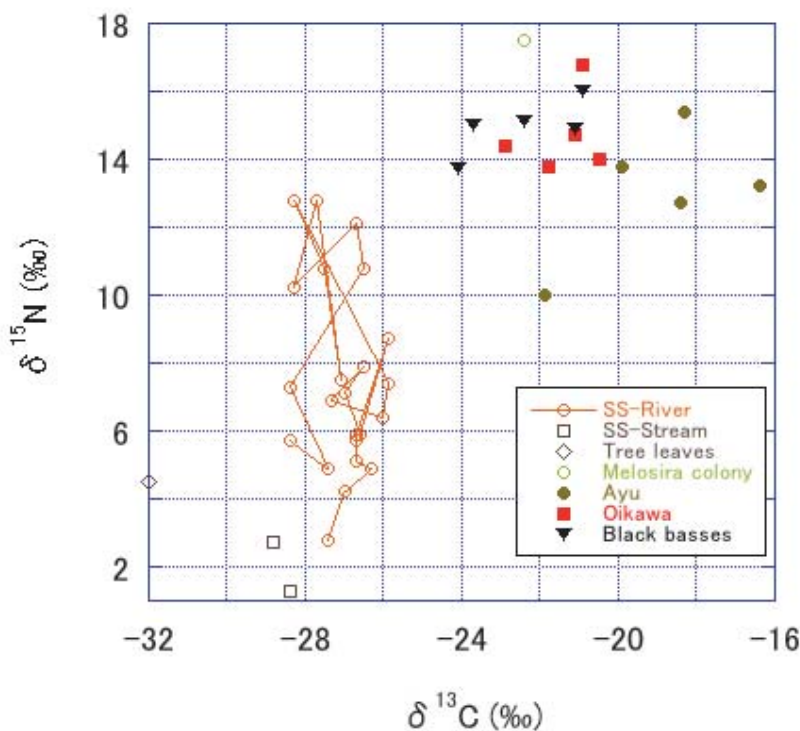


↑ Food chain and stable isotopes

Terrestrial plants (fallen leaves)



^{15}N and ^{13}C of tree leaves, SS, algae and fish

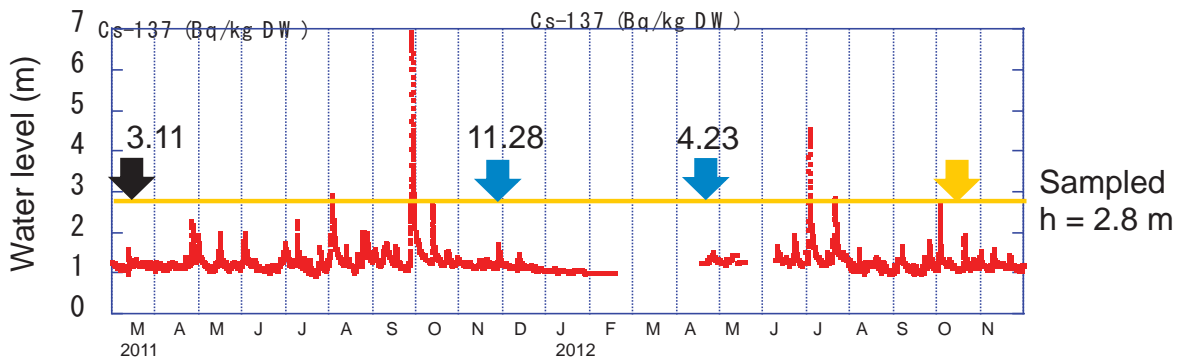
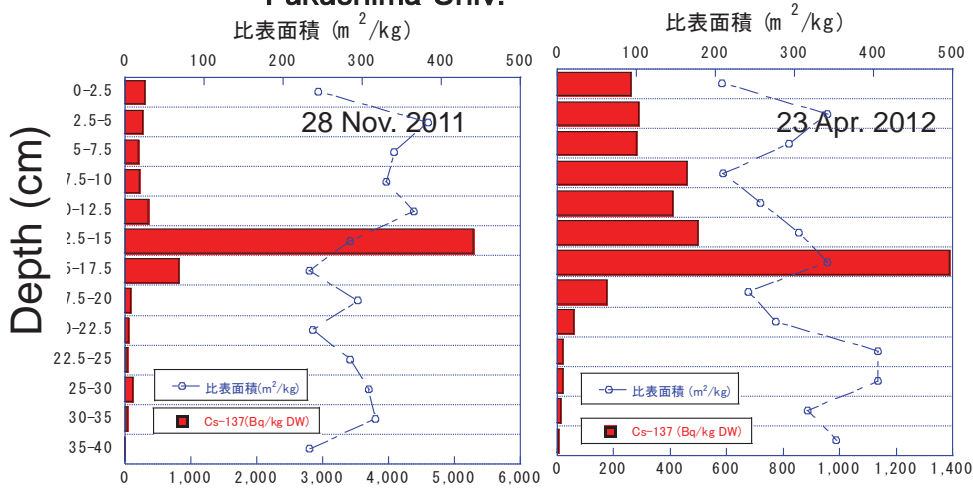


SS :
Mixture of tree leaves/algae

Fish : showing the difference
According to the feeding habitat of 3 groups

Vertical profile of Cs-137 and specific surface area of sediments on dry riverbed by Fukushima Univ.

(Nanba, 2012. <2nd rept. 2-315 .. 2-325>)



Radio Cs measurement of stream in Fukushima city.



Institute of Environmental Radioactivity at Fukushima University (IER)

Helping the residents, farmers,
administration (decision making, managing environment ...)

Sharing the experience and findings among experts of relevant
field of science from various countries.

(In order to

- * Promote restoration of Fukushima
- * And to prepare for a future emergency situation that may happen somewhere in the world)



Investigation of environmental radioactive by IER ②



Hydrology Discharge of radioactive substance from land to aquatic system

プロジェクト・リーダー: 恩田裕一 (副所長, 筑波大学)

- ① 小流域における陸域からの放射性物質の移行状況の把握とメカニズム解明
- ② 浜通り諸河川における放射性物質の移行状況の把握とモデル化
- ③ 河川水の溶存体の原位置測定法の開発と河川水の放射性物質濃度の連続モニタリング

Forest Long-term behavior of radioceasium in forest environment

プロジェクト・リーダー: 難波謙二 (副所長, 福島大学), 恩田裕一 (副所長, 筑波大学)

- ① 放射性物質の移行と蓄積に関する長期的観測とそのメカニズム解明
- ② 森林における放射性核種の移行予測モデル開発とパラメータの収集・整理
- ③ 森林生物の被ばく線量評価の高精度化と放射線影響評価

Marine Radioceasium in near shore marine ecosystem off Fukushima coast

プロジェクト・リーダー: 石丸隆 (連携研究員, 東京海洋大学)

- ① 放射性物質の海底および海洋生物への移行過程の解明
- ② 河川から海域への放射性物質の流入過程の解明

Ecosystem Radioactive substance in Ecosystem and its influence on organisms

プロジェクト・リーダー: 難波謙二 (副所長, 福島大学)

- ① 農業および河川・湖沼環境における生物への放射性物質移行メカニズム解明
- ② 放射線の生物への影響に関する研究

Development of new technique New measurement and sampling system

プロジェクト・リーダー: 高橋隆行 (所長, 福島大学)

- ① 放射性核種の高速分析システムの開発
- ② 水・大気の実験計測システムの開発
- ③ 水中での放射線計測システムの開発
- ④ 標準資料の作成

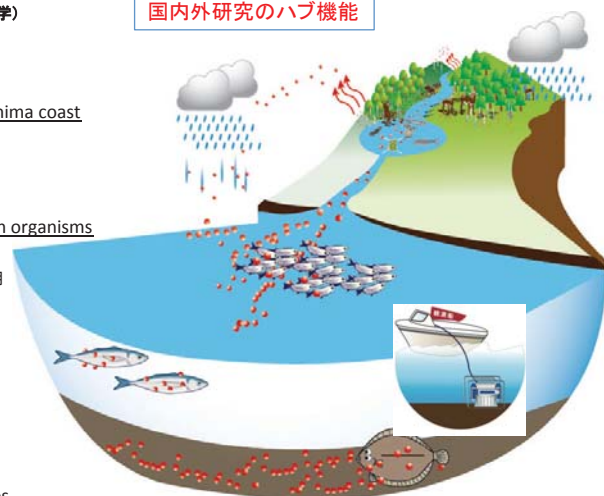
Morphology Physicochemical morphology of radioactive substances

プロジェクト・リーダー: 塚田祥文 (福島大学)

- ① 土壌における放射性セシウムの存在形態から植物やイノシシへの移行過程の解明に関する研究
- ② 河川水や灌漑水中における存在形態別放射性セシウムに関する研究
- ③ 土壌-作物間における放射性核種の移行に関する研究

環境放射能の広い分野を統合し
実際のフィールドを活用した環境放射能の
先端的総合研究を行う唯一の研究機関を目指す

国内外研究のハブ機能



環境試料中における放射性核種の物理化学的
存在形態を明らかにし、挙動の解明に迫る

IER の研究員

Director
Takahashi, Takayuki

Robotics
 Development of Sampling / measuring instruments

Deputy director
Nanba, Kenji

Environmental Microbiology
 Transfer of rCs in freshwater system

Deputy director
Onda, Yuichi

Hydrology
 Transfer in forest and aquatic system

Professor
Tsukada, Hirofumi

Radioecology
 Agricultural env. and products

Professor
Aoyama, Michio

Marine
 physics and chemistry

Project professor
Alexei Konoplev

Radiochemistry and radiobiology

Project professor
Sergii Kivva

Statistics and Hydrology
 Environmental modeling

Project professor
Mark Zheleznyak

Hydrology
 Modeling of nuclear transfer in Water system

Project professor
Beata Varga

Radiochemistry
 QA reference material

Project professor
Vasily Yoschenko

Radioecology
 Forest ecology and products

Project professor
Valentine Golosov

Geomorphology
 Nuclear transfer in the environment

Project associate professor
Takase, Tsugiko

Physical chemistry
 Development of analytical technique

Project assistant professor
Olena Parenuik

Radiobiology
 Soil microbiology

Project assistant professor
Okuda, Kei

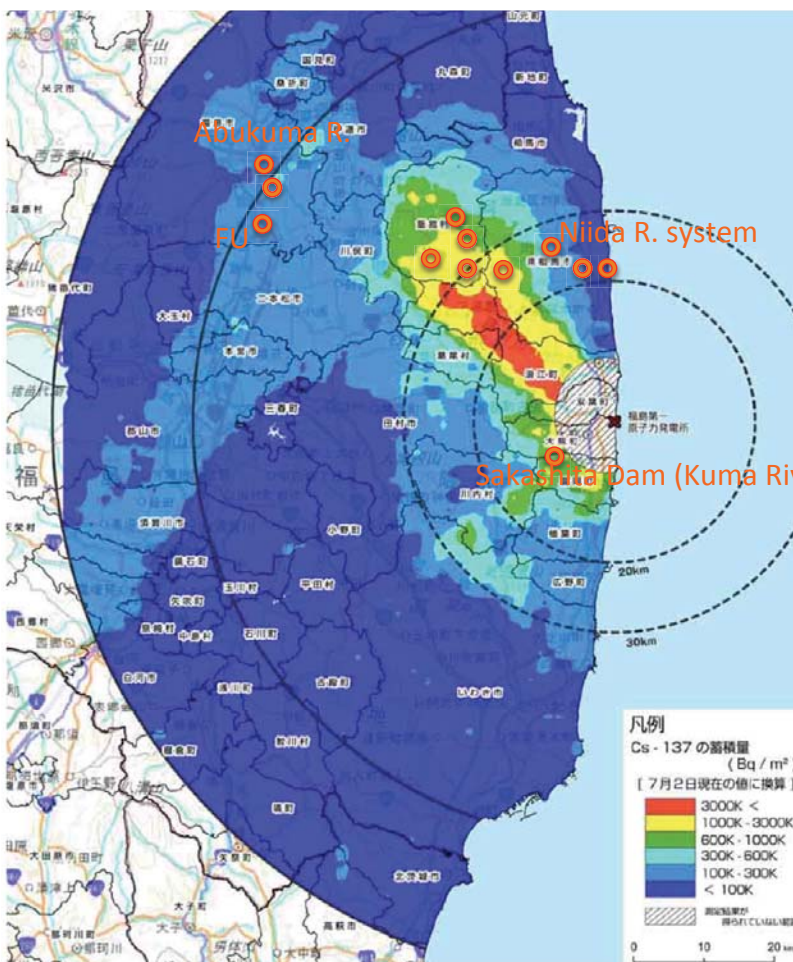
Zoology
 Radioecology of wild mammals

Cooperative researcher
Ishimaru, Takashi

Marine ecology

Cooperative researchers
Oguri, Emiko Botany Hiroshima Univ.
Shoukamy Ibrahim Mahmoud Ibrahim Zoology Hiroshima Univ.
Mitsutake, Norisato Nagasaki Univ.
Ogi, Tomoo Nagasaki Univ.

Participating profs from SSS Fukushima Univ.
Watanabe, Akira Meteorology
Yamguchi, Katsuhiko Physics
Takagai, Yoshitaka Analytical chemistry
Yokoo, Yoshi Hydrology · Civil engineering
Kawagoe, Seiki Hydrology of watershed



Hydrological and aquatic radioecological study

FU: Fukushima Univ.

○ : Sites

Abukuma Riv. 阿武隈川
 Harai Riv.

Niida riv. 新田川
 Kuma Riv. 熊川

Lakes Inawashiro, Hibara, and Numazawa

Influence on Wildlife



Wildbores increasing in no. in evacuated area

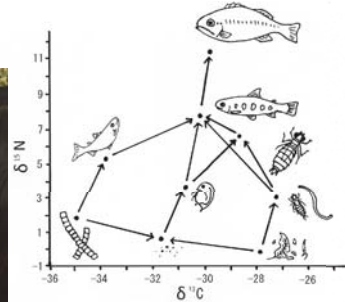
Exceeding standard value.
Banned for consumption (県北・双相)
Or shipment(2014.Sep).



They do harm on agriculture

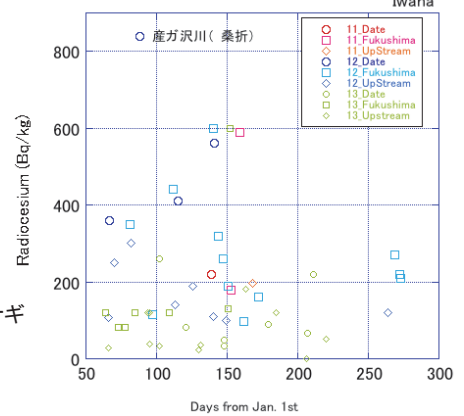


↑ Wild mushrooms are banned for shipment for consumption in Fukushima Prefecture.



↑ 放射性セシウム移行経路解明のための食物連鎖の推定

イワナ



→ イワナ, ヤマメ, ウグイ, ウナギは阿武隈川県内全域で採捕・出荷制限(2014.Sep)

Influence on organisms

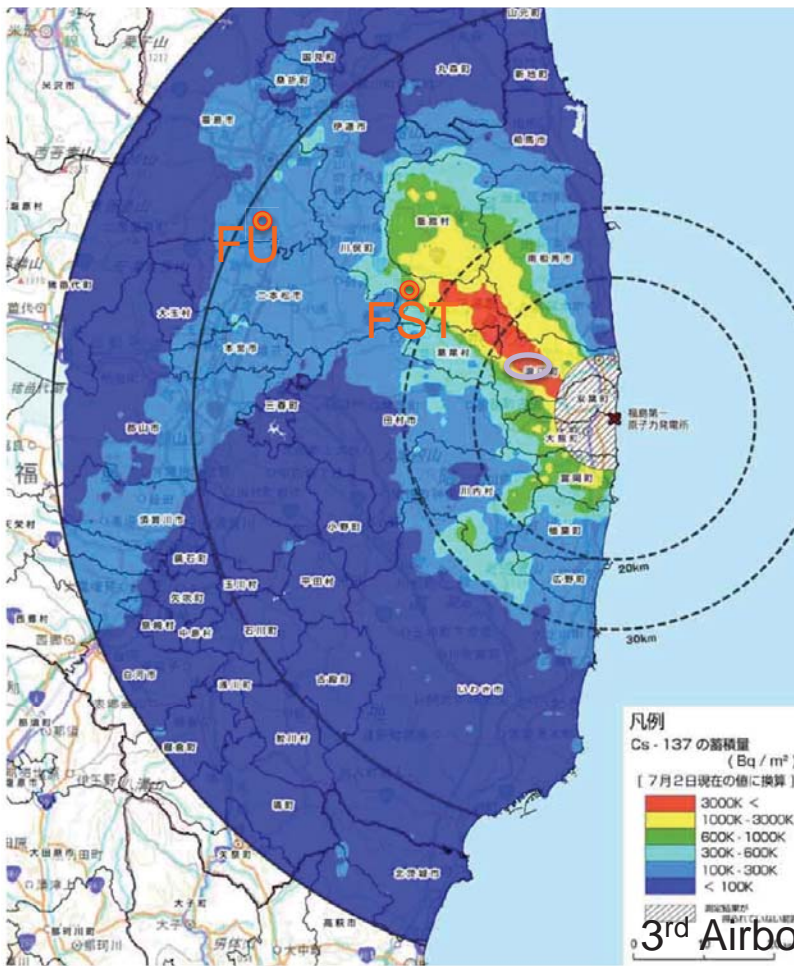
- Community
- Population
- Individual
- Cytological
- Molecular biological

IER Yamakiya Observatory site

Yamakiya, Kawamata town
 Cs-137 inventory 600 -1,000 kBq/m²



140905-06



Forest site of IER

FU: Fukushima Univ.

FST: Yamakiya site

○ : Forest investigation in Namie

Decontamination
from temporary storage to
interim storage (for 30 y)

On 30 Aug. 2014
Prefectural gov. agreed on the
construction of interim storage site

IER will also target on the
environmental issues
associated with temporary and
interim storage and
decommission.



Yamakiya Jul. 22, 2012
(FAIRDO-Mission)



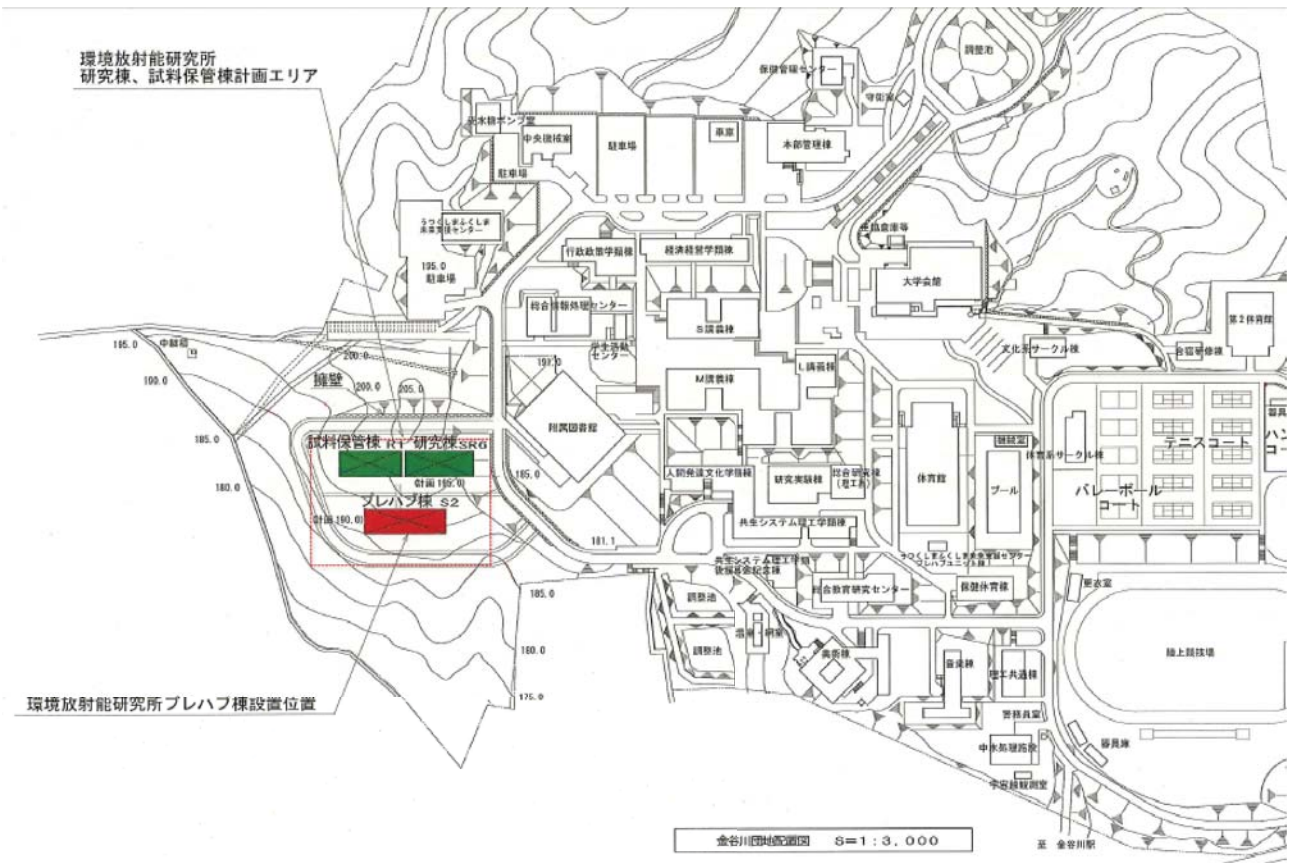
Ogunt Date, Jul. 20, 2012



Yamakiya Jul. 08, 2014

Temporary storage

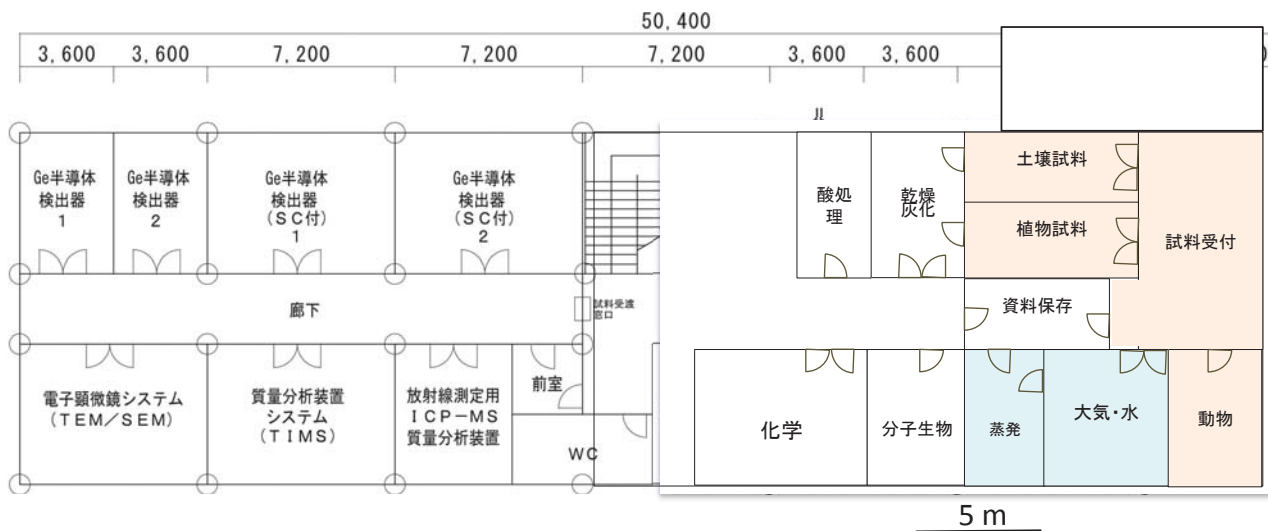
IER Buildings: Build for analyses(R) ▪ Main (G)



IER facilities

Building for analyses (~1400 m²) ... Opened in Jul. 2014
 Sample prep., analyses

Main Building (~5000 m²) ... Open in Mar. 2016
 Sample archive, Laboratories



Thank you for your attention.

Thanks To:

- MEXT, JAEA, Nuc. Regul. Authority and Prof. Onda
- Fukushima River and National Highway Office, MLIT
- Fukushima Prefectural Freshwater Fisheries Research Station
- Abukuma river, Hibara and Numazawa Fisheries Cooperative Association

▪ people in the Laboratory (↓) and IER (↓→)

