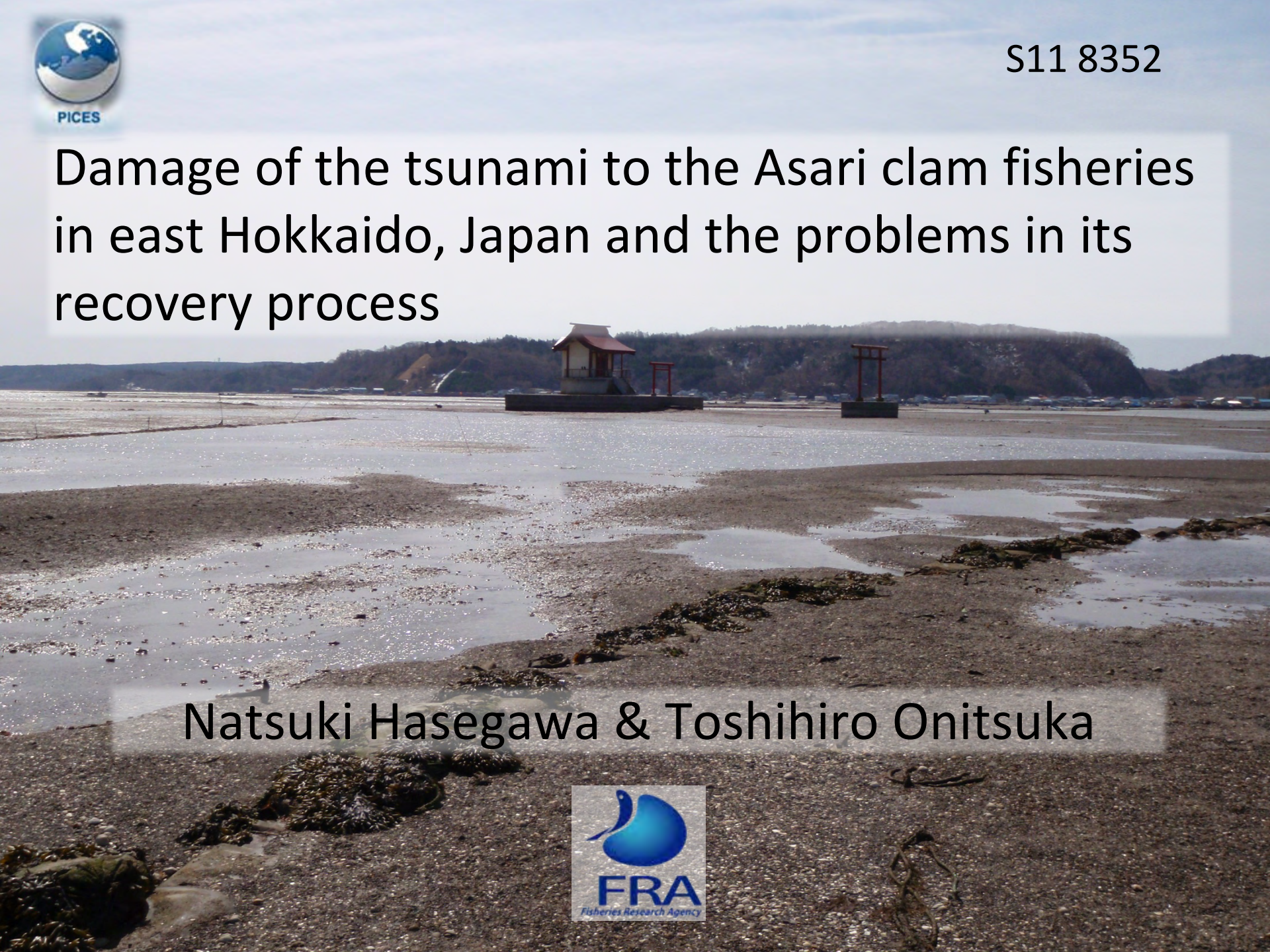
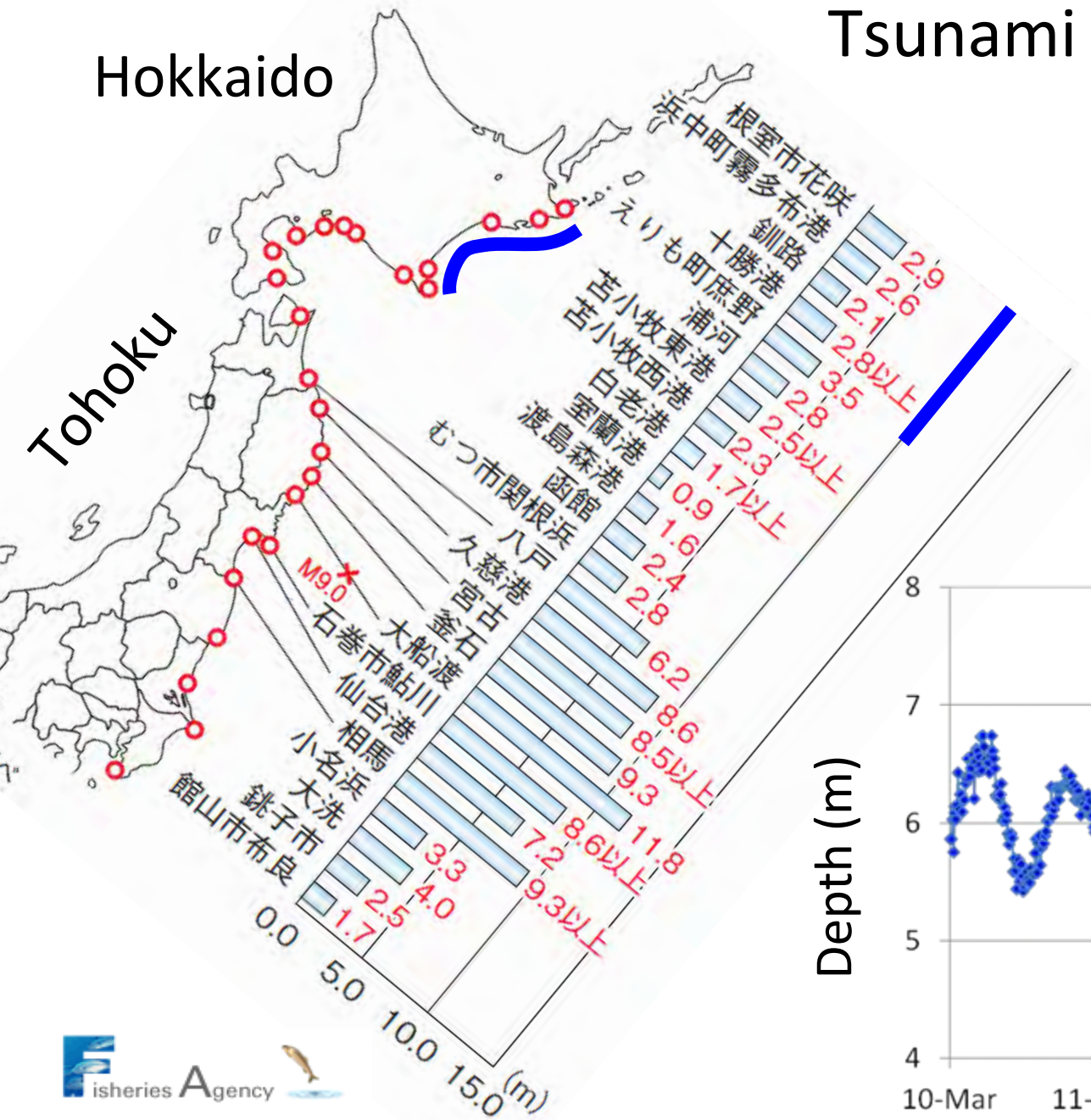
S11 8352

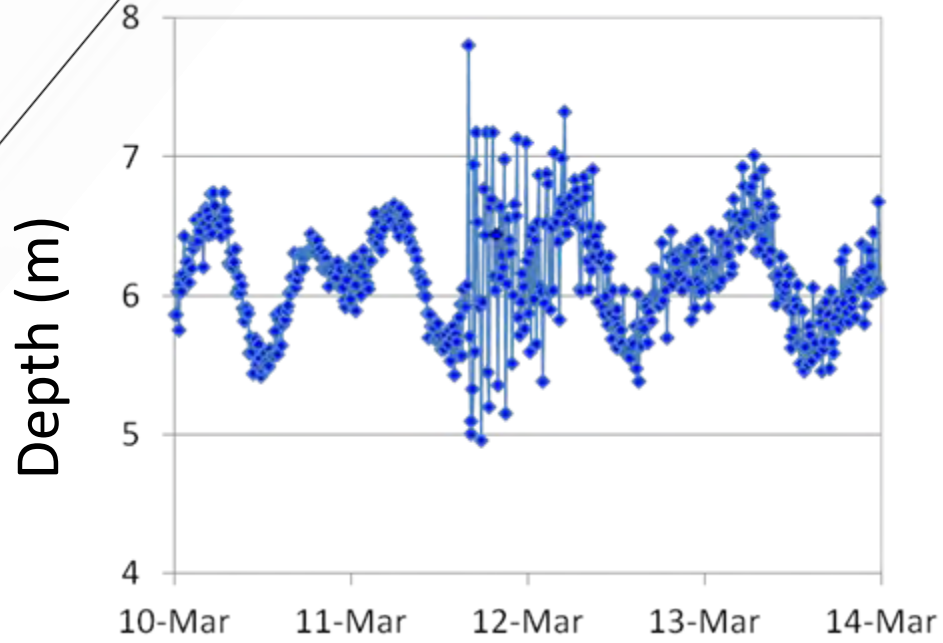
Damage of the tsunami to the Asari clam fisheries in east Hokkaido, Japan and the problems in its recovery process



Natsuki Hasegawa & Toshihiro Onitsuka

Tsunami in East Hokkaido

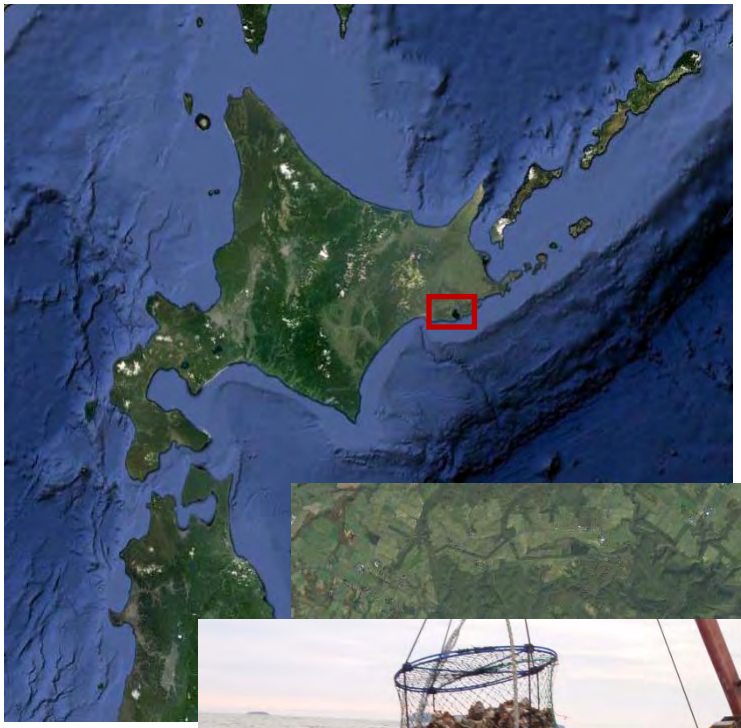


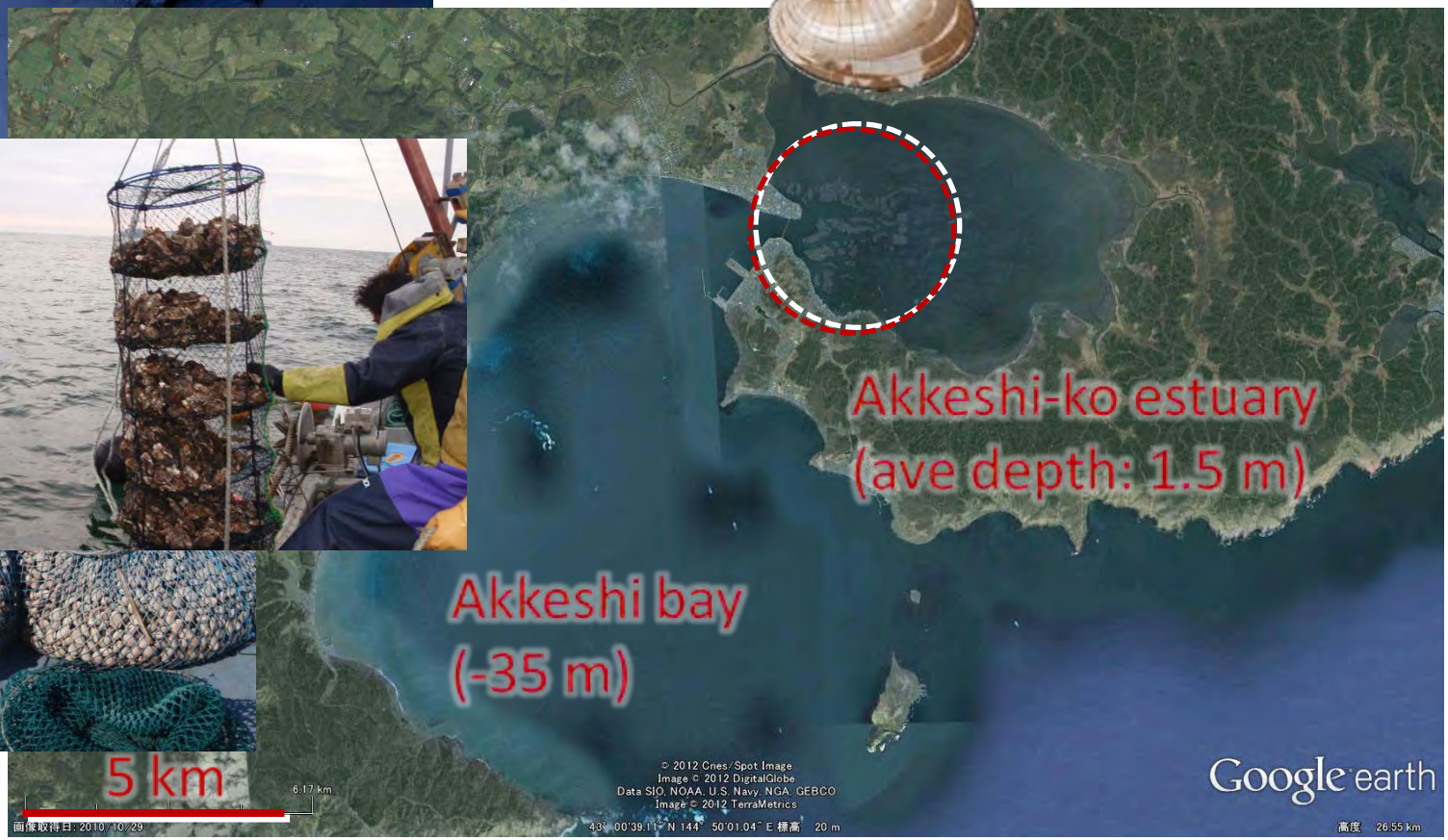


Fisheries Agency

Akkeshi area in East Hokkaido

- Pacific oyster culturing (200 ton yr^{-1})
- Asari clam fishery (900 ton yr^{-1})
  (*Ruditapes philippinarum*)



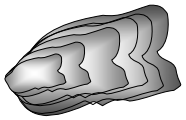



Clam fishing grounds
by K. Watanabe (Hokkaido Univ.)

Tsunami damage

Clam fishing ground

Sediments with clams were either washed out or locally re-arranged.



Oyster culture

Rearing facilities were destroyed & lost.

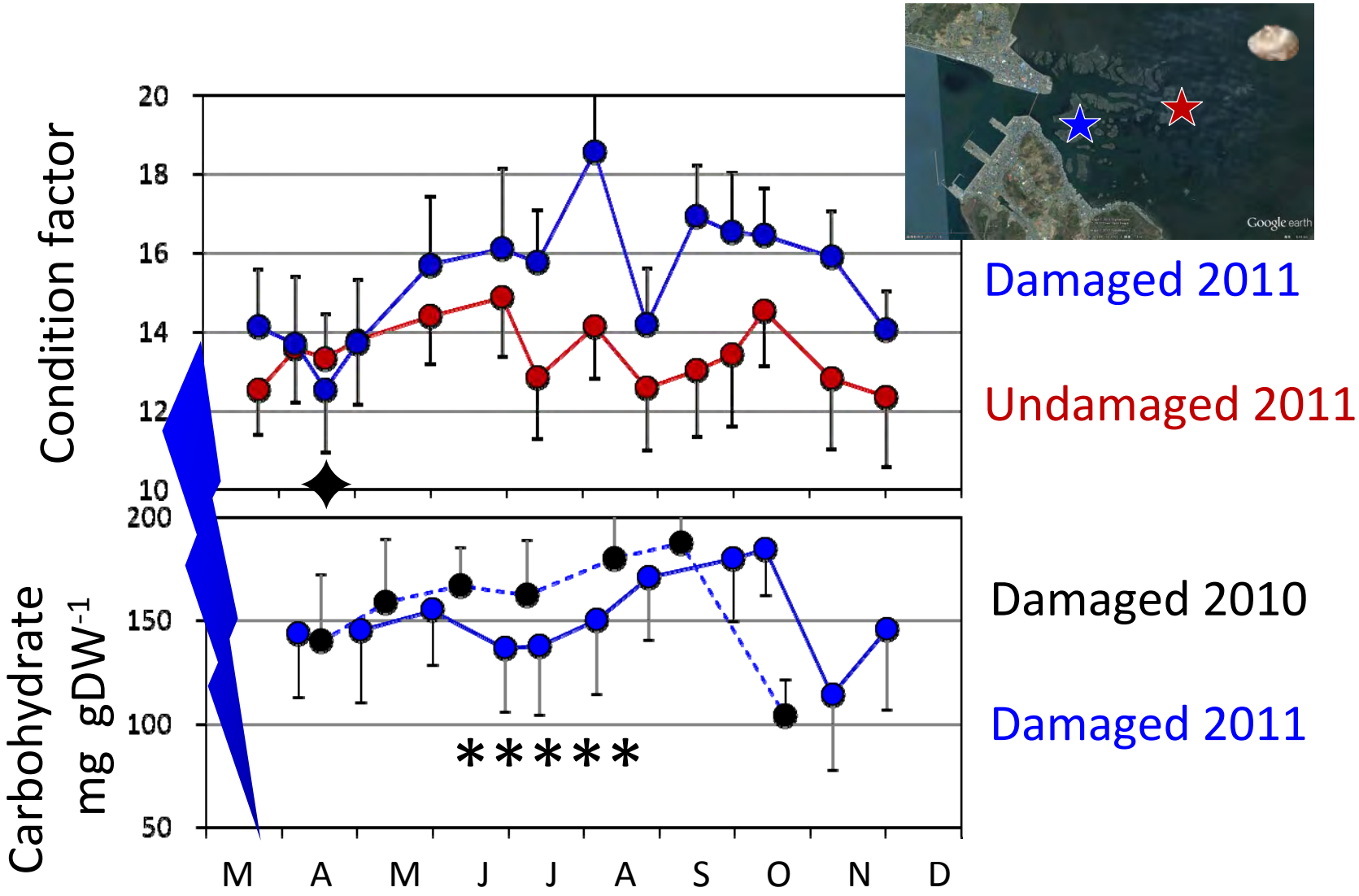
In Akkeshi-ko estuary,
monitoring the clams & the environmental conditions before the tsunami in the projects.

Fisheries Agency

Clam

Environments

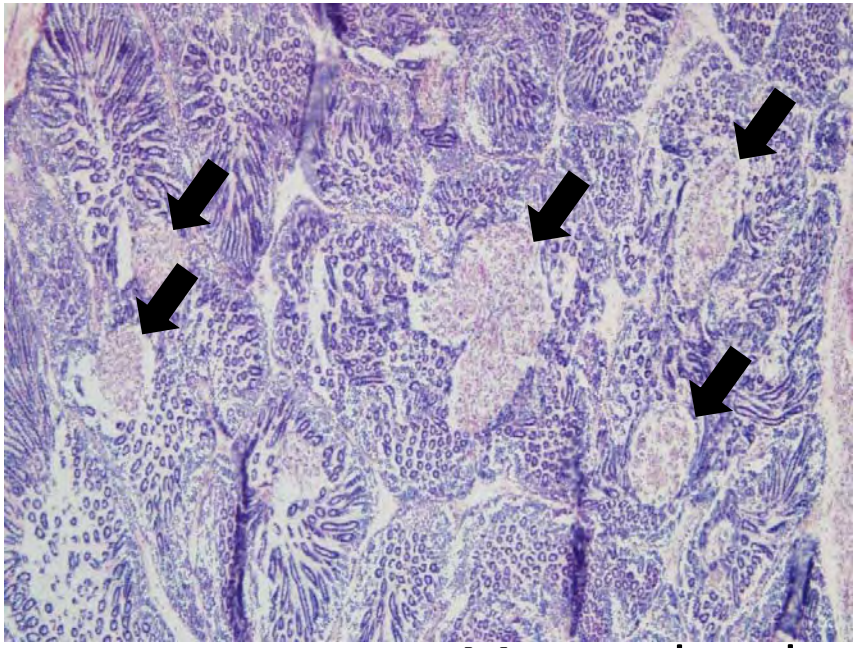
Through continuous monitoring after the tsunami ,
finding out the type and degree of the damage to Asari clam fishery and the problems encountered in the recovery process.



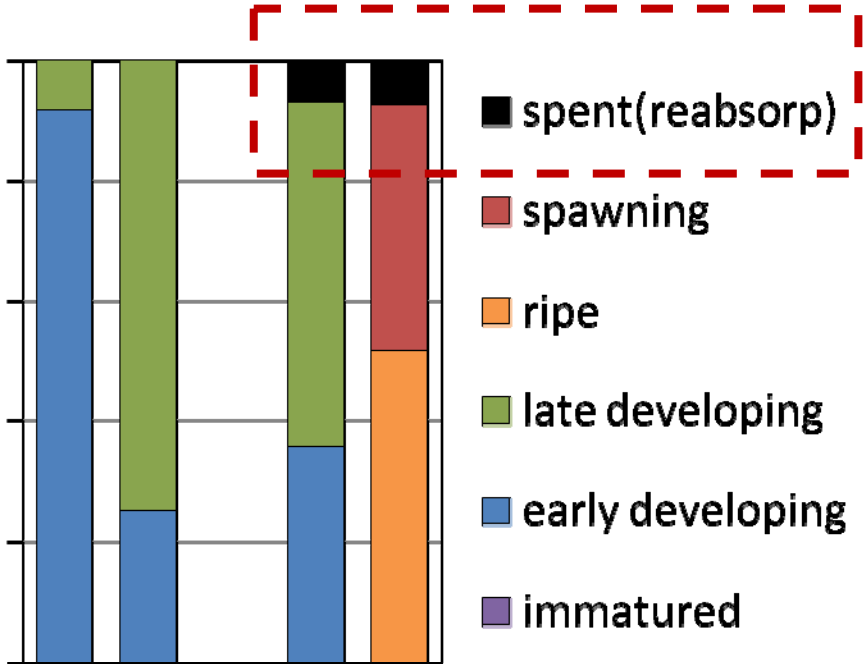
✦ Decline of condition factor at one month after tsunami

* Low carbohydrate contents during summer 2011

Effects of tsunami in clam reproduction?



Matured male



Reabsorption
(cancel of gamete production)

One month after tsunami, a massive clam die-off was happened(coinciding the decrease of condition factor)

Any remaining clams could not dig themselves into grounds without enough sediment ➡ various stresses

Expansion of damage by clam rescue work?

Active individuals may have been harmed unintentionally through the aggravation of the benthic environment when fishermen re-buried the dying clams.

Even in summer,

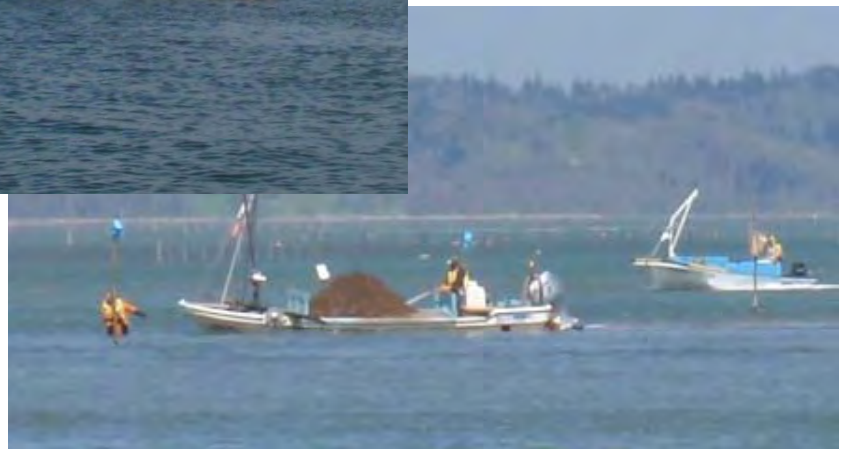
Damaged Undamaged

Anoxic condition

- High density of clam
- Unsuitable condition in sediments

Remaining clams were negatively affected even in summer.

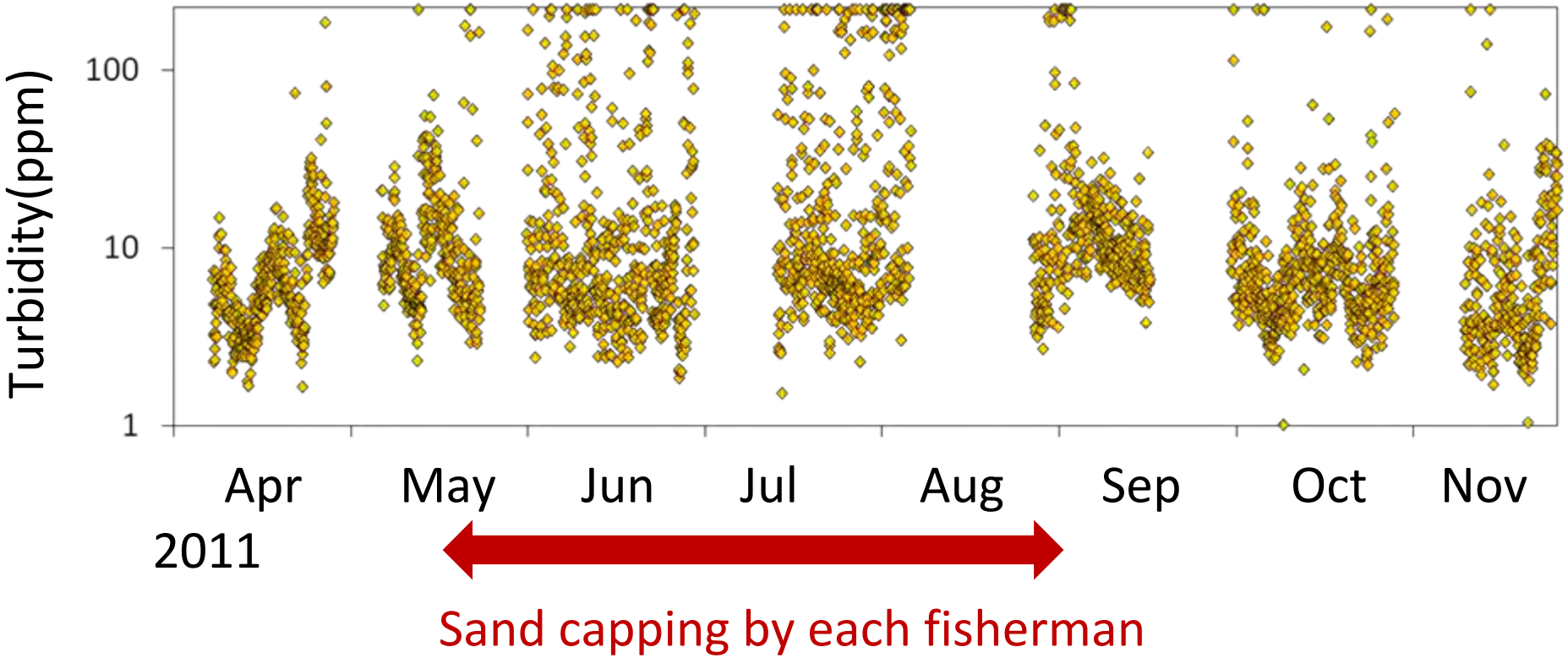
Recovery from the tsunami damage



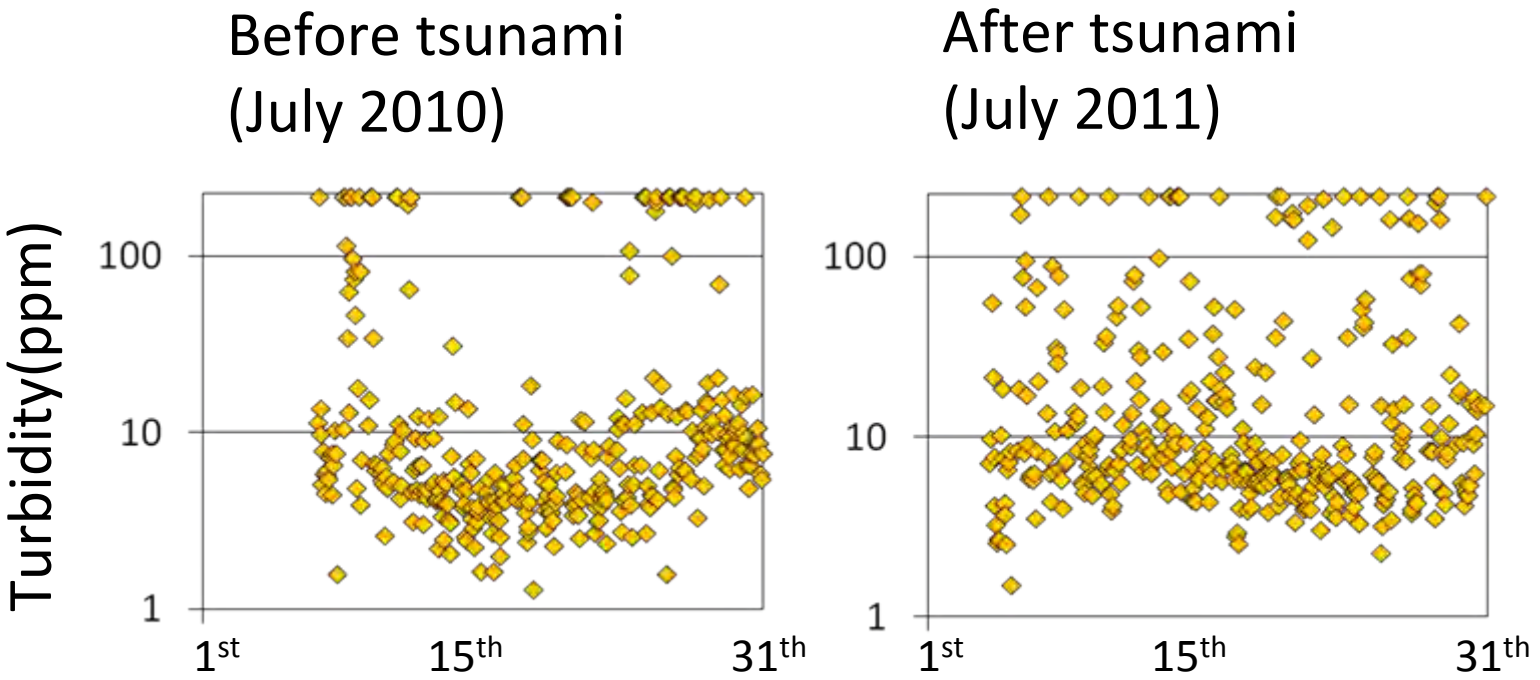
Sand capping for reconstruction of the fishing grounds

- Personal sand capping from May
- Large-scale sand capping in winter (supported enterprise)

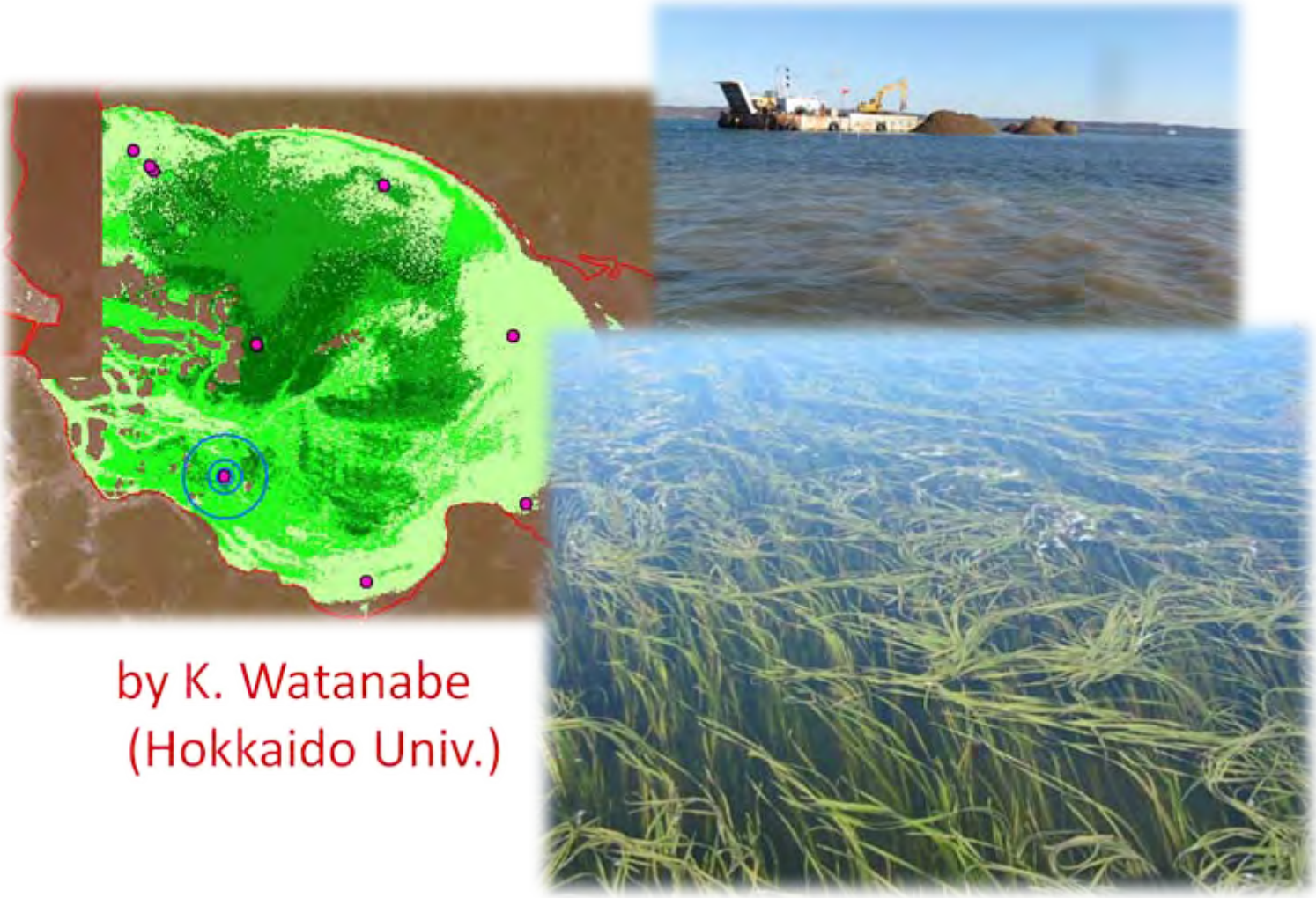

Fear of effect of water quality in recovery
Nov 2011



High turbidity with sand capping was observed.

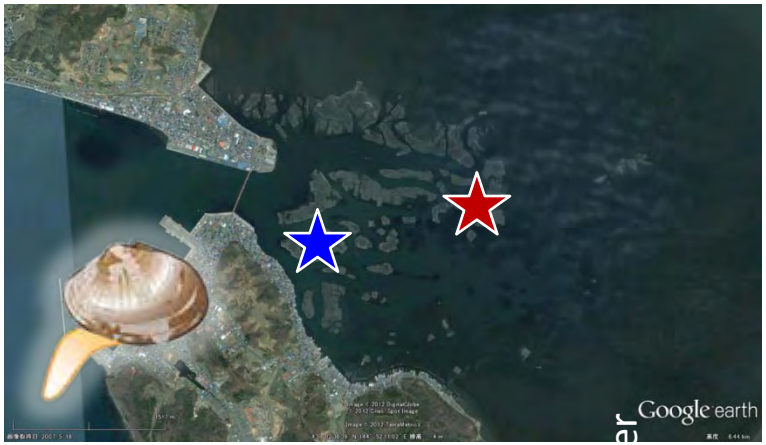


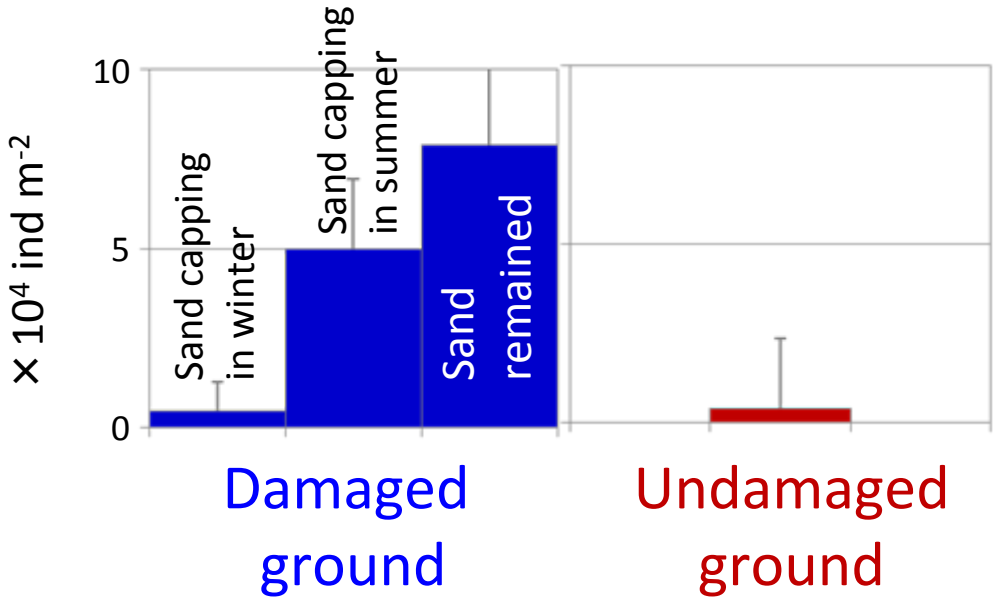
High turbidity with sand capping
was more frequent after the tsunami.



by K. Watanabe
(Hokkaido Univ.)

High turbidity might be affect the estuarine ecosystems, particular seagrass beds, which is the ecosystem engineer and modify the estuarine ecosystems





Dense population of juveniles in spring 2012 (spawned after tsunami).

Use of “Local” juveniles

for avoiding the need to transplant clams from other areas, with an invasion of alien organisms and diseases.

Predator

ex. *Euspira fortunei*

Disease

ex. Perkinsosis

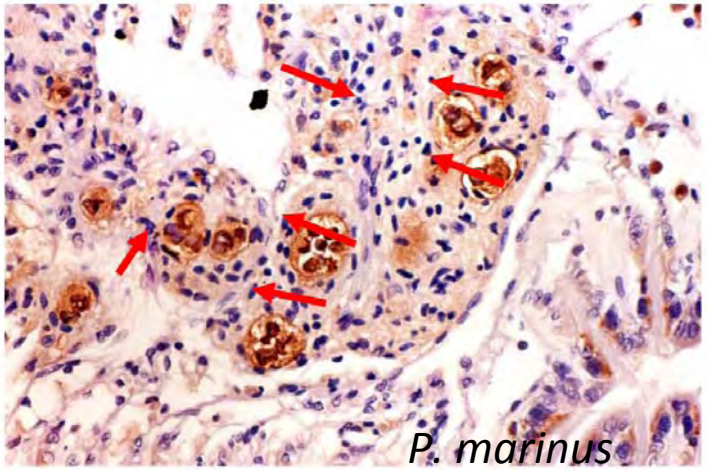


図 3-2-16 アサリ鰓にみられたパーキンサス属原虫の trophozoites（矢印）
抗－*Perkinsus marinus* 抗体による免疫組織化学染色、ヘマトキシリンによる対比染色

from Guideline for improvement of productivity in tidal flats by Fisheries Agency

Monitoring of the clams and the environmental conditions before and after tsunami revealed,

- Tsunami damaged the clam fishery, directly & indirectly.
  Indirect damage might be mitigate ?
- Sand capping was required, but turbidity were increased.
  Its effects to the estuarine ecosystem are not clear,
  although this estuary is heavily used in local fisheries.
- Beyond catastrophic damage of tsunami and the problems in recovery activities, juvenile clams was densely recruited.

Speed is required for recovery,
but care must be taken to sustain the fishery,
because fishery is supported by the ecosystems.

Acknowledgements

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•Mr. H. Abe, Mr. K. Watanabe (Hokkaido Univ.)