

**Buried Litter on the Beaches of
the Northwest Pacific Region:
Small but Significant Plastic
Fragments in the Sand**



Takashi Kusui

Toyama Prefectural University, Japan

Background

- **Plastic products are the major marine litter or debris all over the world**
 - susceptible to degradation and fragmentation under the natural conditions
- **The smaller fragments of plastic products have been reported to injure the health of wild life**
- **The fate of small plastics is not clear due to the lack of survey method.**
- **Few reports regarding marine litter in the Northwest Pacific region.**

Objective

- **To monitor the distribution and abundance of marine litter, especially buried litter in the sand, in the Northwest Pacific region**
- **as a part of "Research on Buried Objects and Washed-up Driftage on the Coasts along the Northwest Pacific Region" conducted by NPEC**

Outline of survey

● **Period: 2002~2004**

● **Survey location**

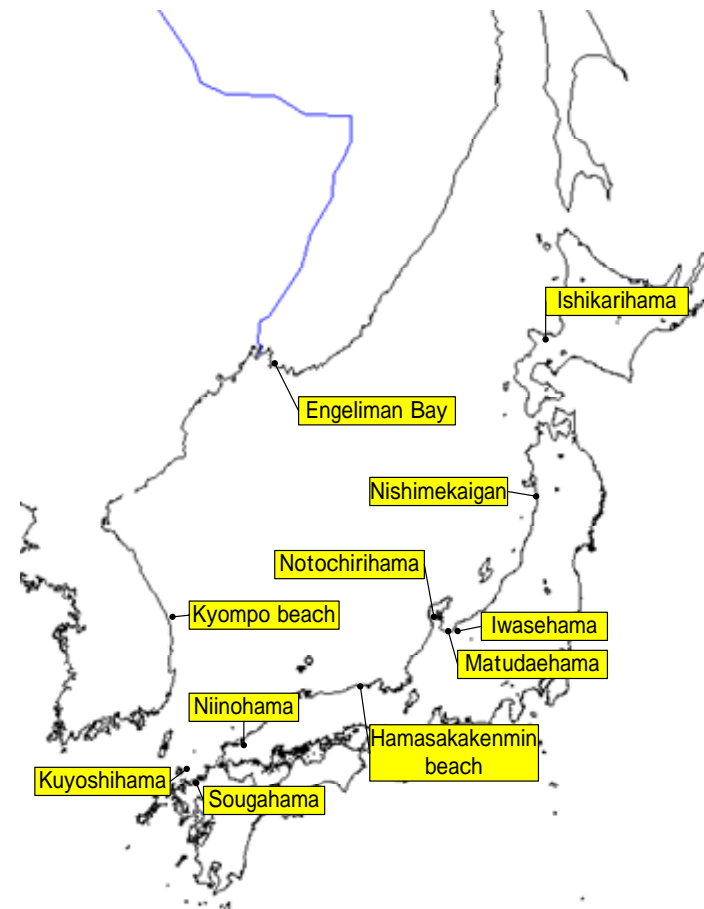
⇒ 11 beaches

⇒ Japan(9), Russia(1), Korea(1)

● **3points/beach**

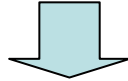
● **Collection and sorting (Ogi et al,2000)**

⇒ Toyama Prefectural University,
Japan except Korean sample

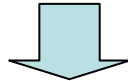


Sampling

Selection of sampling points
(3 points/beach)



Removal of visible stranded litters
on the sand



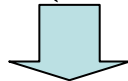
The sand of 8L (W. 40cm x L. 40cm x H.5cm)
was raked by using
box-shape stainless steel frame



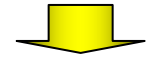
Mixed with water



Supernatant was filtered
with a net (0.3mm mesh)

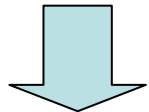


Floating plastic particles

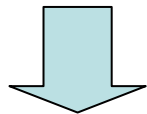


Sorting

Washing with pure water
to remove salinity



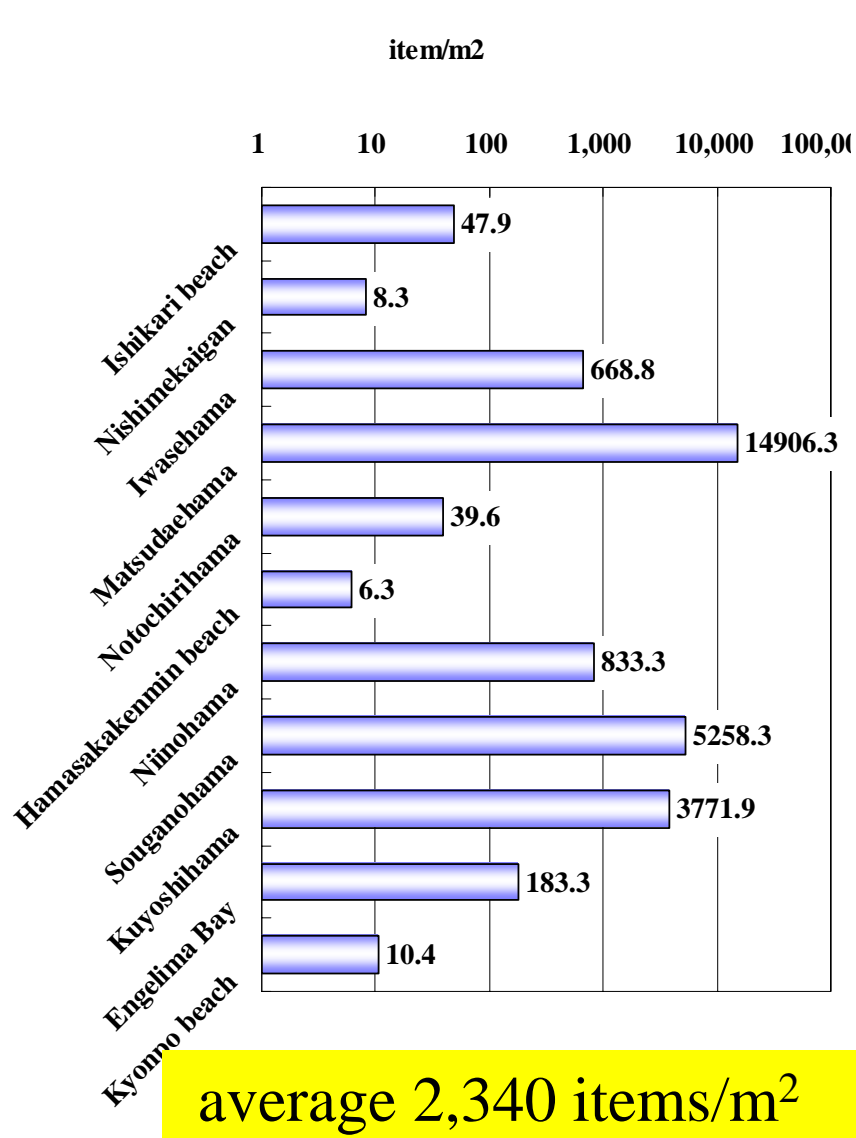
Sorting according to size
and category(11)



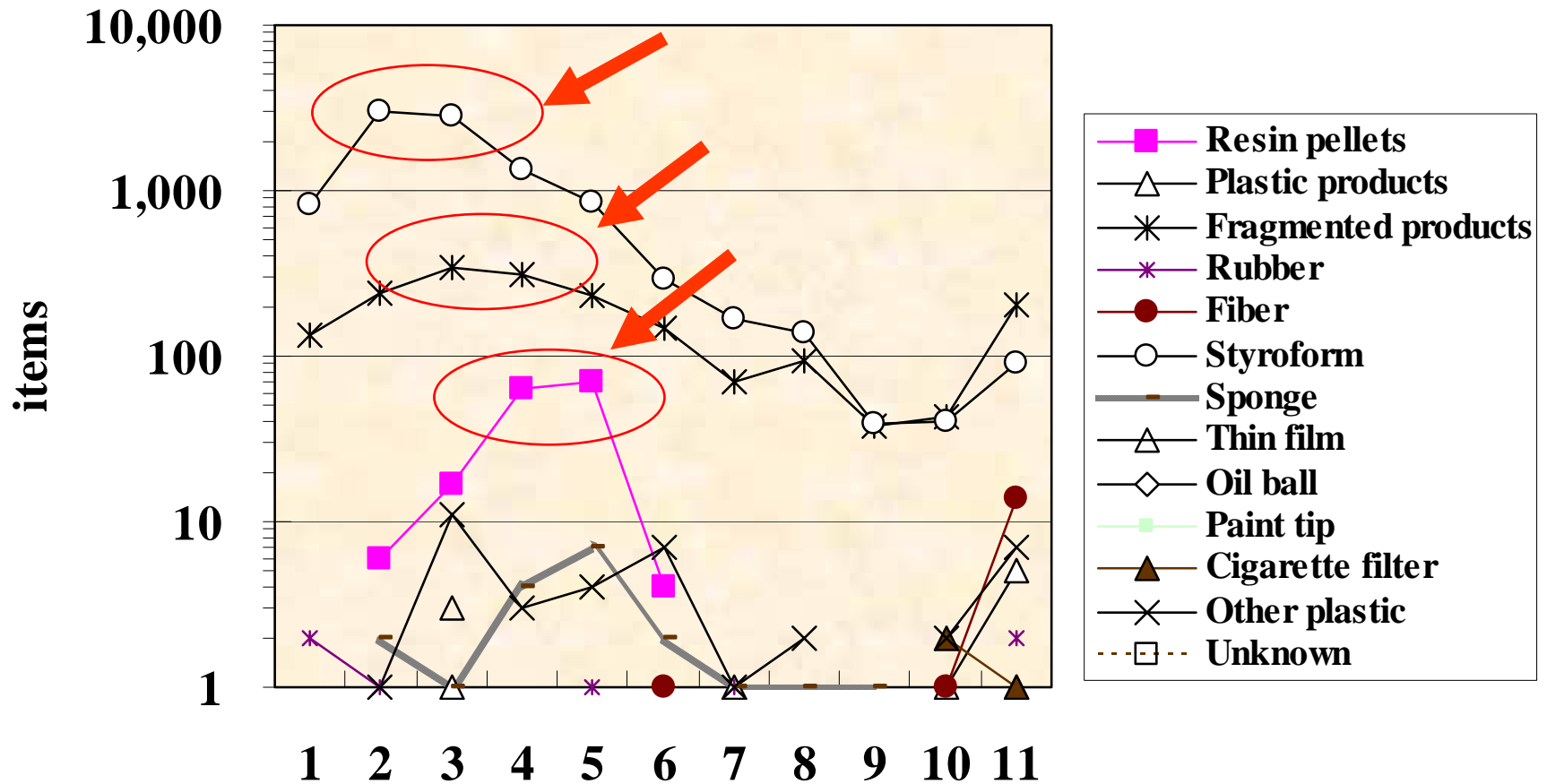
Counting and weighing
after drying



Buried litter (2004): number

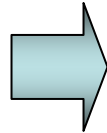
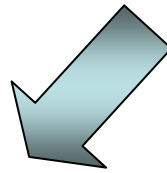
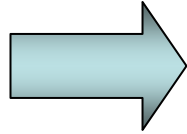


Size distribution of buried litter : number

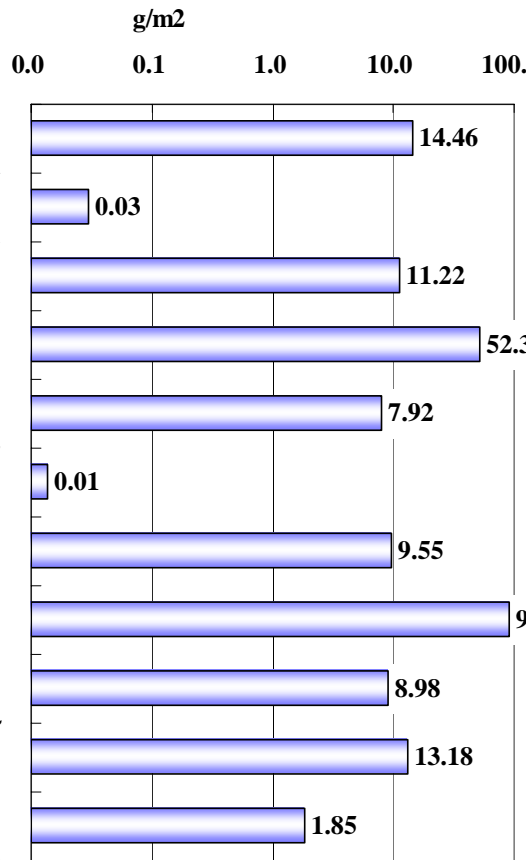


Horizontal axis(x) represents
 items with a diameter over (X-1) mm and less than X mm.

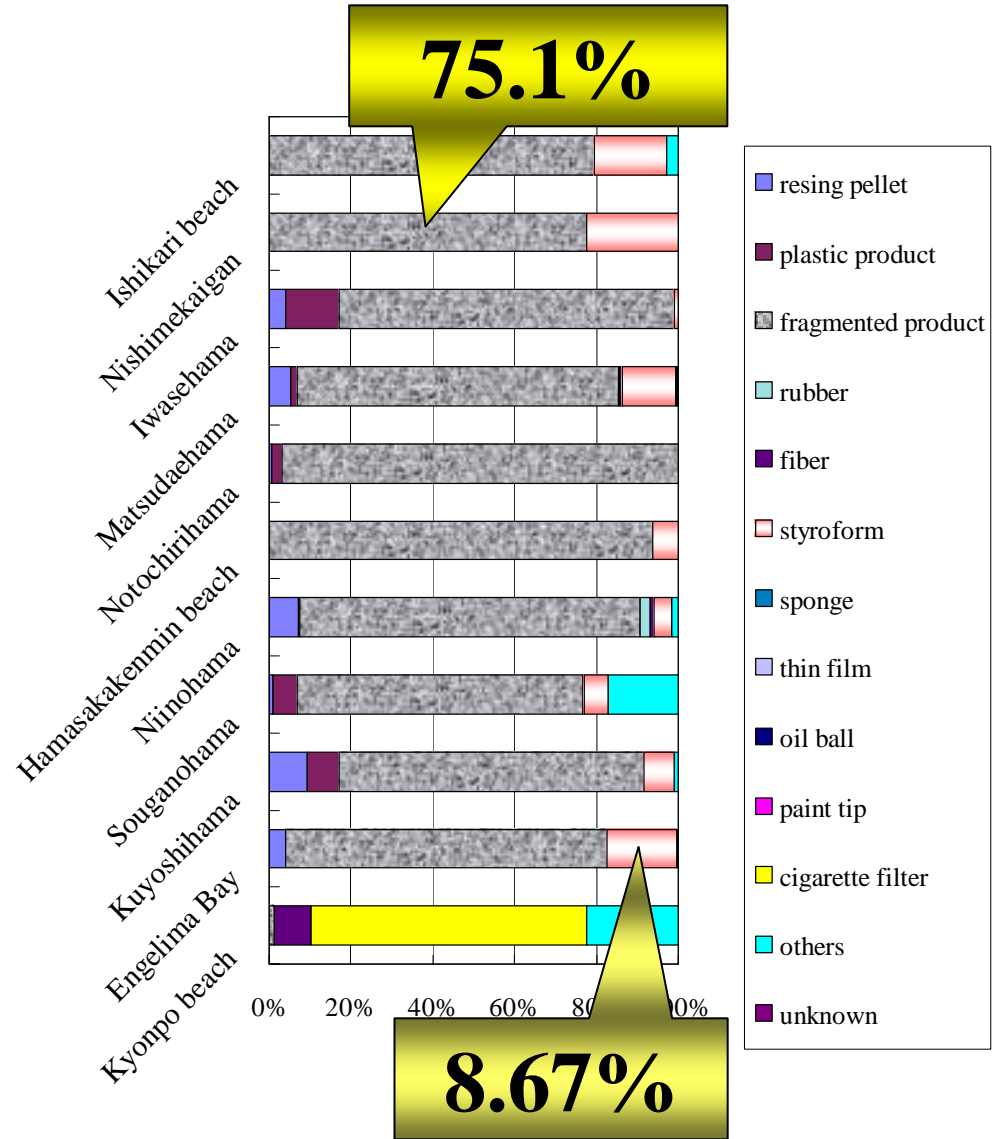
Styrofoam in buried litter



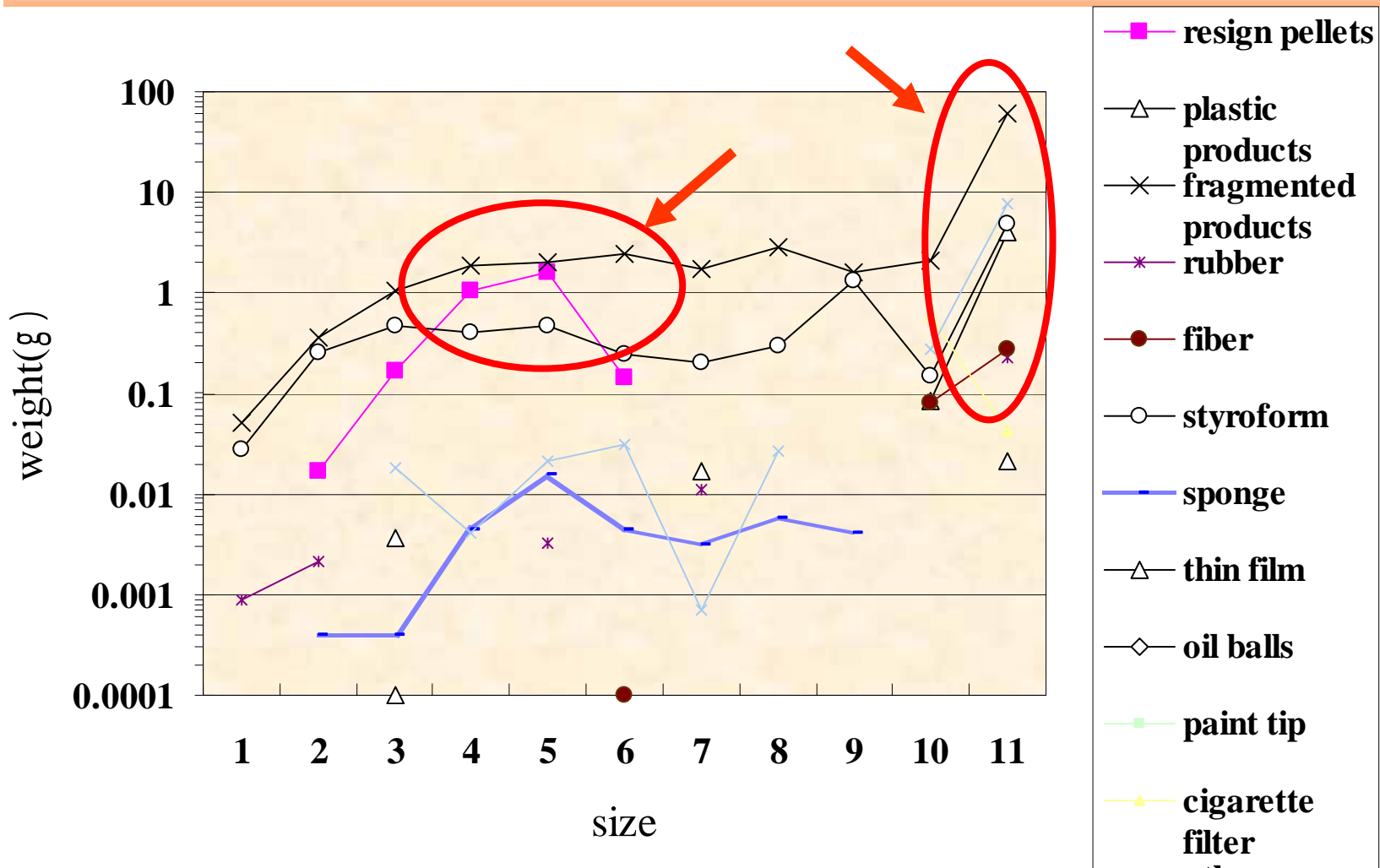
Buried litter (2004): weight



Average 19.2 g/m²



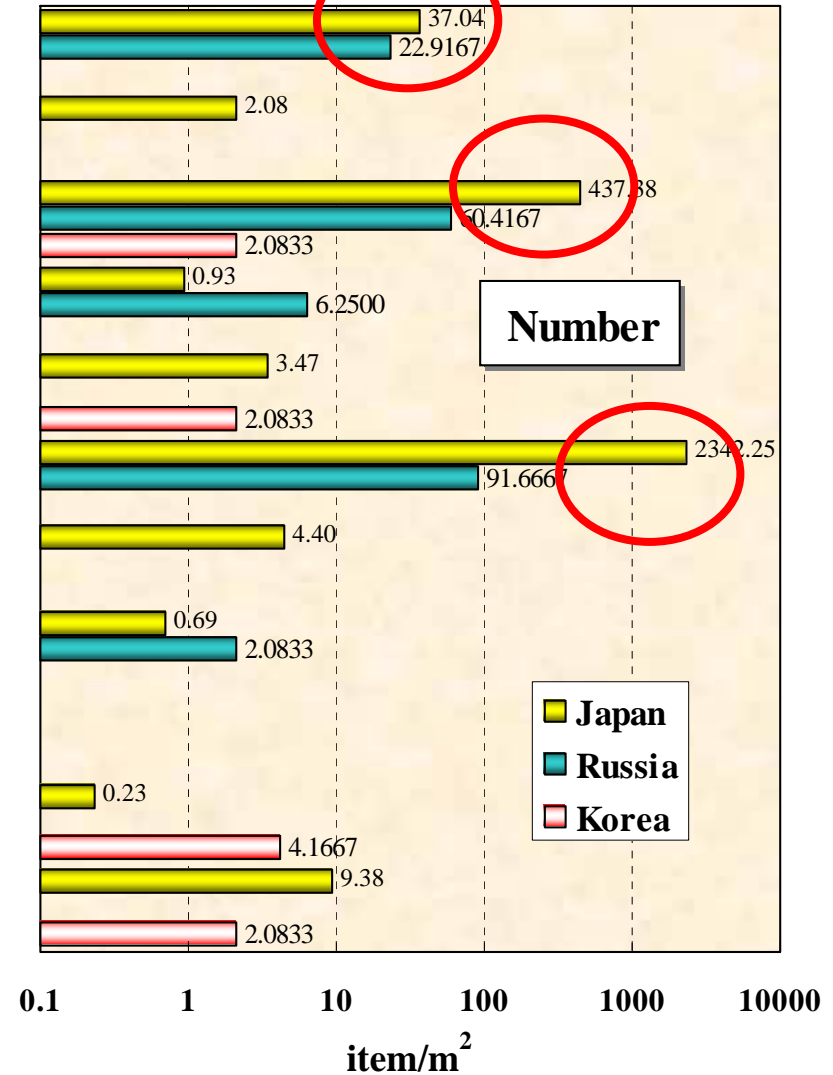
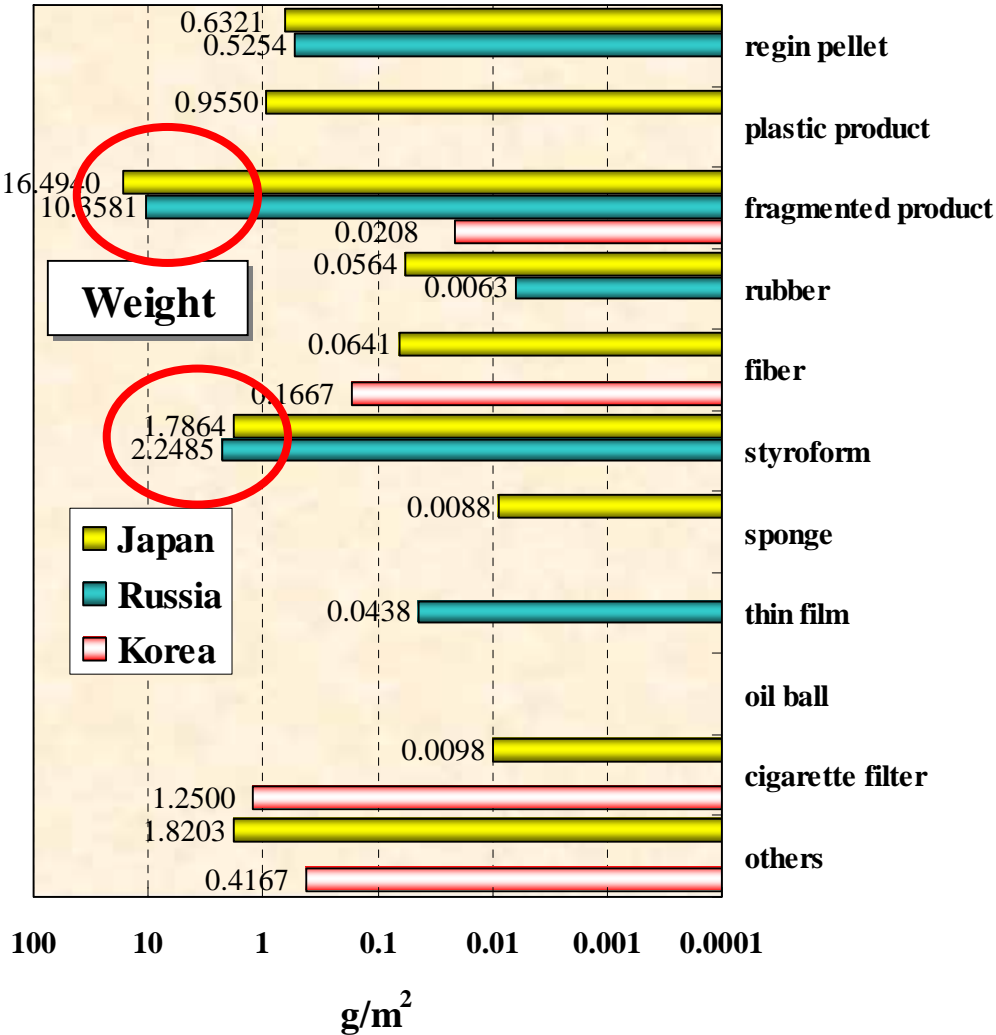
Size distribution of buried litter: weight



Average of burried litter(2004)

Country	g/m ²	items/m ²
Japan(9)	21.8	2840
Russia(1)	13.1	183
Korea(1)	1.9	10.4

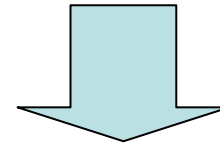
Comparison of buried litter(2004)



Newcomer of buried litter



- **Egg shell or outer coat of something ?**



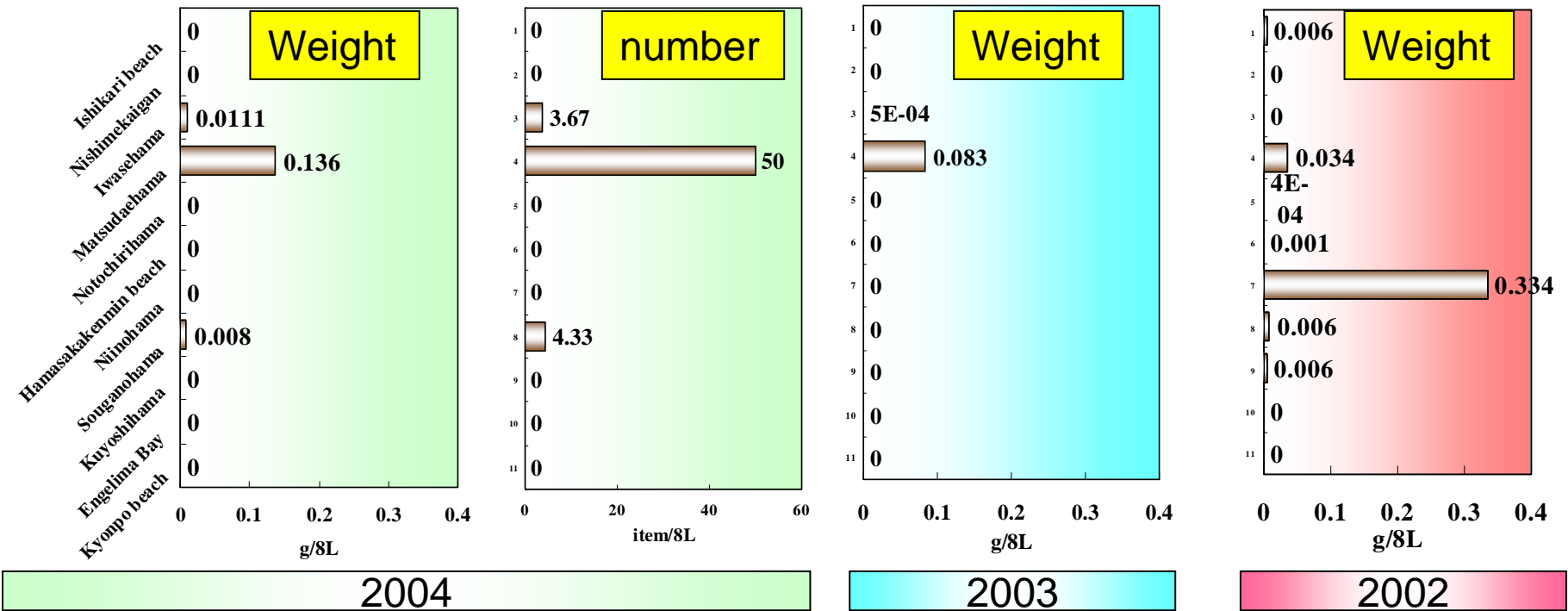
- **Polyethylene-coated fertilizer**
 - ca.50,000t/yr
 - ca.10% of total weight



fertilizer

outer coat

Outer coat of fertilizer



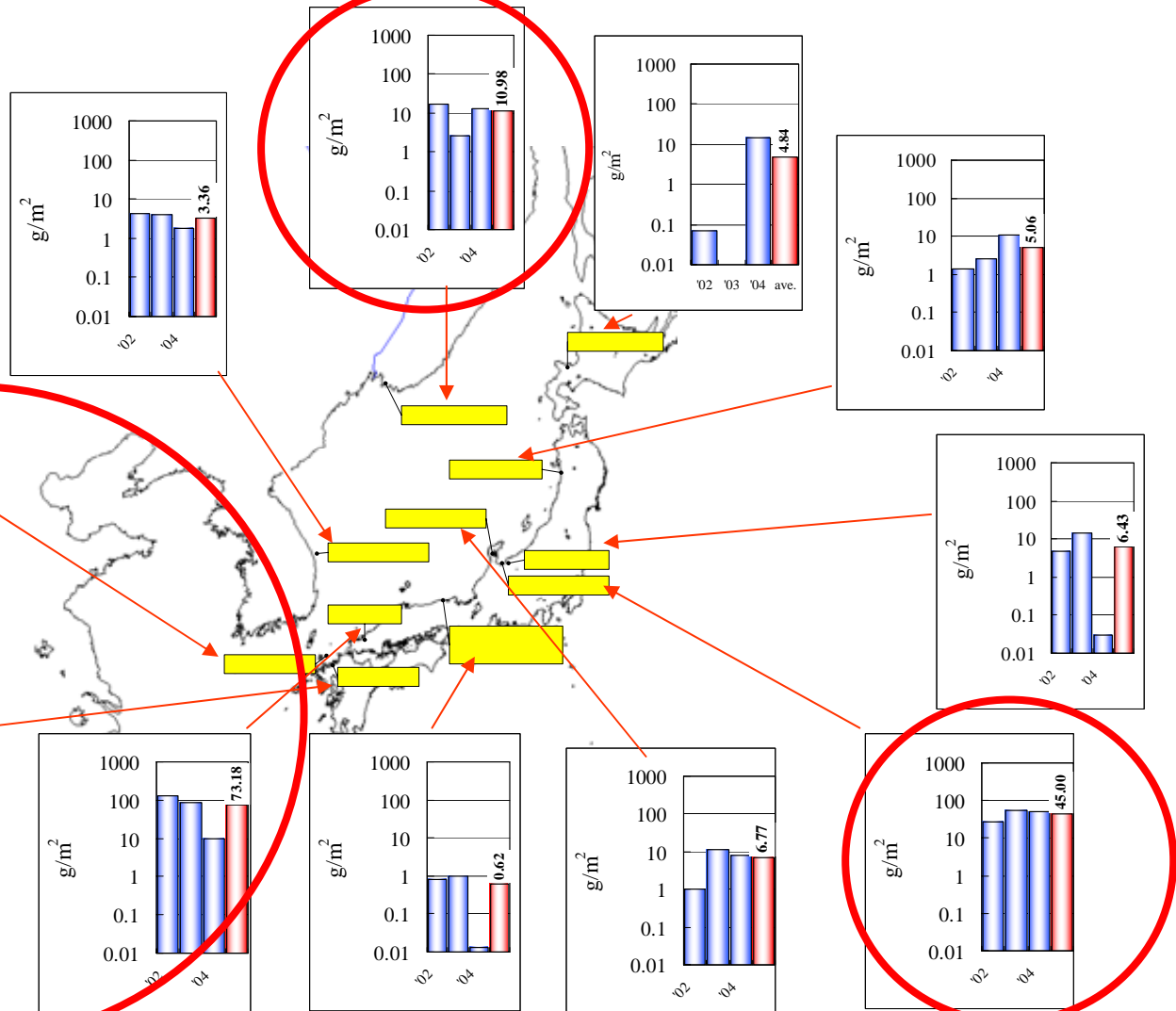
Found in 3 beaches in 2004. Of 9 Japanese beaches, found in 8 beaches in 2002-2004.

Highest concentration : 50 items/8L of sand

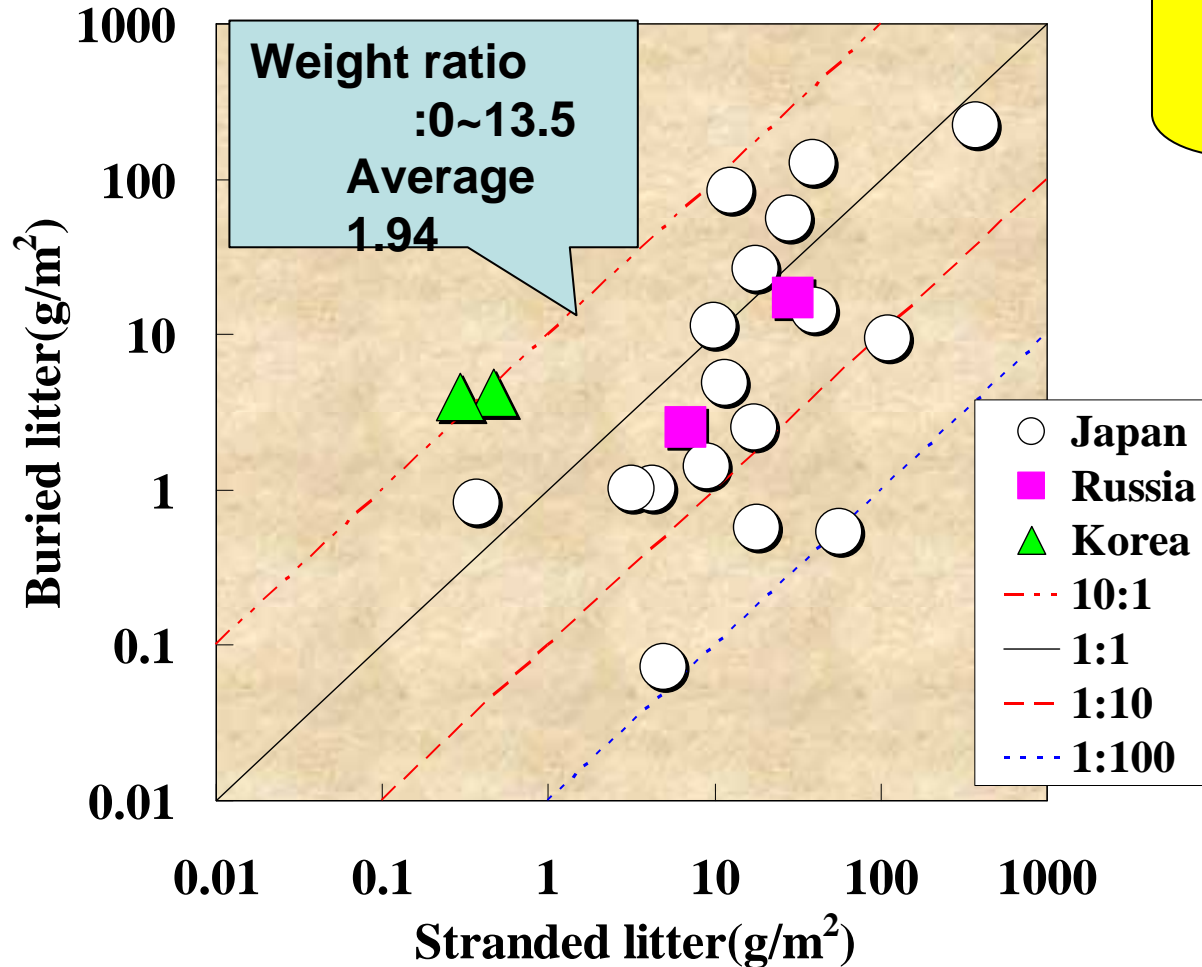
The weight is less than 1% of total weight.

Interannual variation of buried litter(2002-2004)

Average
0.6~73.1
g/m²



Is buried litter significant compared to stranded litter?

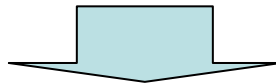


Yes, it is significant!!



Conclusion

- The average concentration of buried litter were 2,340 items/m², 19.2 g/m² in 2004.
- Of 11 beaches, resin pellets were found on 9 beaches, including Russian beach in 2004.
- Styrofoam and fragment plastic were the major litters in terms of number and weight respectively.
- The geographical distribution of buried litter is almost the same as that of stranded debris.
- The average weight ratio of buried litter to stranded litter is 1.94



Significance of buried litter in evaluating marine litter

Plastic Pellet Transport of Toxic in Ocean Environments

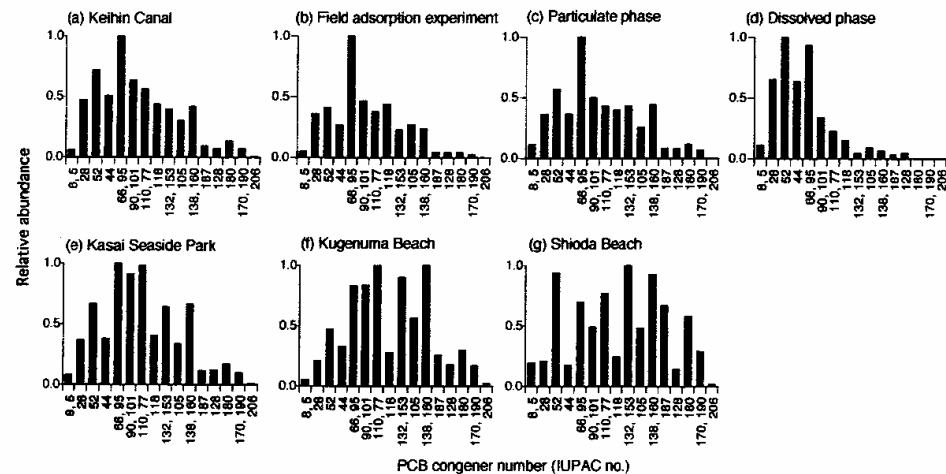
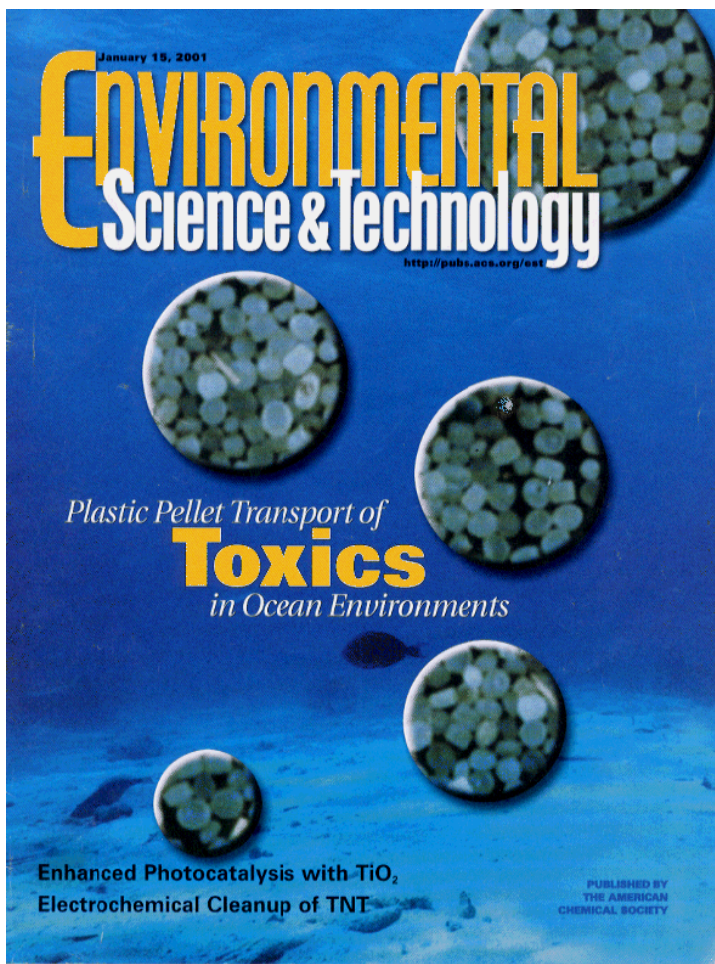


FIGURE 4. PCB congener profiles of (a) marine PP pellets collected from Keihin Canal, (b) deployed PP pellets in the Field Adsorption Experiment carried out at Keihin Canal, (c) seawater particulate phase from Keihin Canal, (d) seawater dissolved phase from Keihin Canal, (e) marine PP pellets collected from Kasai Seaside Park, (f) marine PP pellets from Kugenuma Beach, and (g) marine PP pellets from Shioda Beach. Y-axis is the relative abundance of individual congeners to the highest congeners.

PCB was absorbed on the surface of plastic pellets!



**Thank you for
your attention.**

2005 10 9