

Field Investigation and Information Collection On Site

II-1 Field investigations Objectives

In the field investigation project, to sample the debris derived from the disaster or other origins, the following four types were conducted;

- Disaster Origin Marine Debris Investigation
- Japanese Origin Marine Debris Investigation
- Coastal Driftage Investigation
- Marine Debris Treatment Investigation

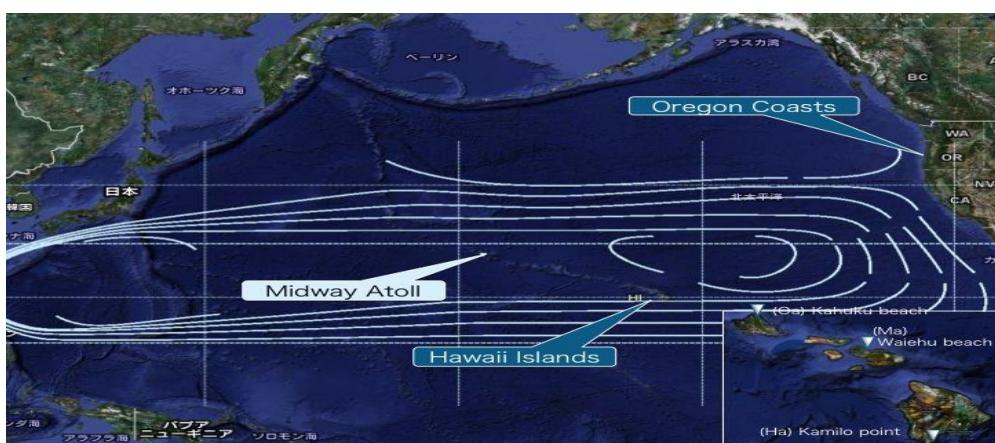
In "Disaster Origin Marine Debris Investigation", mainly the drifted items thought from the disaster for checking their amount and condition.

Besides the above, there have been ocean litters from Eastern Asian countries including Japan. In "Japanese Origin Marine Debris Investigation", the focus was on those objects potentially from Japan but non TSUNAMI origin, by classifying them same as above. Plus, in "Coastal Driftage Investigation", the focus was mainly on the shore circumstances. Recording the items of their numbers and conditions in the sample spot may promise the quick response in accordance with the changing coastal environment once the major debris driftage occurs. In "Marine Debris Treatment Investigation", to set forth the preparation against future major stranding, the target regions were examined of their work force, regional accessibility, and the treatments of the collected debris. In addition, future supports from Japan was discussed.

II-2. Field Investigation Procedures

The 7 subject coasts were Kafuku beach, Oahu Islands, Hawaii, Kamilo Point, Hawaii Island, Hawaii, Waiehu Beach, Maui Islands, Hawaii, Chinook Winds Beach, Lincoln City, Oregon, Gleneden Beach, Lincoln City, Oregon and Nye Beach, New Port, Oregon

Map1 Location of the Investigation Beaches



(with ocean currents indicated as white lines)

Map 1 indicates location of the beaches. For the investigation trip details of Hawaii delegation are in Appendix 2, as well as in the 3 for the Oregon delegation.

The investigation details are indicated in Figure 1 followed by the procedures.

Figure 1 Subject Beaches and Types of Investigations

State	Island/ City	Beach	Date	Disaster	Origin	Japanese	Coastal	Marine
				Marine Debris	Origin Marine	Debris	Driftage	Debris
				Investigation	Debris	Investigation	Investigation	Treatment
Hawaii	Oahu	Kahuku beach	Jan.10 2013	○	○	○	◎	○
				○	○	○	◎	○
				○	○	○	○	○
Oregon	Lincoln City	Chinook winds beach	Feb.15 2013	○	○	○	◎	○
				○	○	○	○	○
	New Port	Gleneden beach	Feb.15 2013	○	○	○		○
		Nye beach	Feb.15 2013	○	○	○		○

◎ Including the plastic fragments

II-2-1. Disaster Origin Marine Debris Investigation

In "Disaster Origin Marine Debris Investigation", mainly the drifted items thought from the disaster were collected for checking their amount and condition.

II-2-2. Japanese Origin Debris Investigation

In "Japanese Origin Marine Debris Investigation", the focus was on those objects potentially from Japan but non TSUNAMI origin, by classifying them same as above. The subjects were;

- Disposable lighters, identifiable of their sources
- Oyster farm instruments or part of instruments ;oyster pipes, baby tubes, and the washers
- Pet bottles identifiable of their countries
- Other debris with some Japanese written on

Also, the followings were collected for the comparison;

- Chinese orange buoys
- Chinese blue buoys
- Korean conger traps
- Korean Sea squirt farm wires

If the driftage were too much, debris were collected in "Coastal Driftage Investigation".

II-2-3. Coastal Driftage Investigation

To understand the density of driftage and proportional ratio of the items, 5 cm × 5cm quadrats were set on the beach vertically across from the shoreline to the closest greens. The oyster farm baby tubes, as large as 1.5 square meters, and objects larger were collected from the quadrats. The features of the debris were recorded on the International Costal Cleanup Data Card, Japanese version, for the breakdown and calculation.

For the plastic fragments smaller than the "Baby Pipes", 40 cm × 40 cm × 5cm quadrats, were placed inside the above coastal driftage investigation quadrats. Every 8Ls of sand were collected and put in the watered bucket for the floating objects to be collected.

The collected objects were screened by the laboratory sieves after dried. The sieve sizes of the mesh were 0.5mm, 1.0mm, 1.4mm, 2.0mm, 2.8mm, 4.0mm, and 8.0mm, with which 2 minutes of screenings were conducted. The objects were then classified into 8 types according to their sizes as 0.5-1.0mm, 1.0-1.4mm, 1.4-2.0mm, 2.0-2.8mm, 2.8-4.0mm, 4.0-8.0mm, 8.0-16mm, and 16mm or greater.

II-2-4. Marine Debris Treatment Investigation

To calculate the whole amount of objects, "Ashore Litter Calculations Standardized Method" was applied. At the same time, the accessibility to the beach (time and distance) was checked to see the potentiality of sample collection. Also, the interviews were conducted to grasp the sorting out /disposal procedure.

II-3. Field Investigation Analysis

II-3-1. Disaster Origin Marine Debris Investigation

In the Hawaii coastlines, some refrigerators or lighters with Japanese words written on were found. Although some fish luring lights with Japanese words on were found in Oregon. However, the keys to determine their origins were not found. Thus, it was hardly possible to judge if they were the disaster origins. For many of the US citizens, it was too difficult to distinguish languages other than English (Korean, Chinese, Taiwanese, Russian, and Japanese). Many inquiry calls about drifted objects with foreign languages were over generalizing that every item was of Tsunami origin regardless of the language written. In Oregon beaches, despite their unknown origins, broken roofing applications made of rigid polyurethane or fishery buoys of Styrofoam were found.

II-3-2. Japanese Origin Marine Debris Investigation

At Hawaii coastal areas, 237 disposable lighters have been collected, including those found for the past one year period. Among them, 84 were US origin to form the largest

group as 35.4 %, then 54 Japanese, 22.8%, and then 15 Taiwanese lighters were found to be 6.3%.(figure 2). Further among these, the followings are found their origin; ; 12 from Maui Island ,1 from Hualien County, Taiwan, 1 from Xinzhuang City, Taiwan, and 1 from Yamagata, Japan. From 3 beaches in Oregon, only 1 lighter were found and its home is yet identified.

The popular oyster farm utensils in Japan, baby tubes, and the oyster pipes and washers, particularly used in Hiroshima oyster farms, were found at all the sampling beaches (see Coastal Driftage Figure2 for details). As Figure 3 indicates, these pipes exceeded 70/m density at Kamilo Point, Hawaii. Among them, over 17 % were the pipes used in Hiroshima that indicates the driftage source can be the Seto Inland Sea to the outer ocean.

On the other hand, to be described in Coastal Driftage Investigation, very few pet bottles were found with clear origins; only 10 throughout the 4 beaches.

Thus, the origin trace was omitted. Also, Korean EEL sieves, sea squirt farm wires, large ball buoys, Japanese seaweed farm rings, Chinese orange buoys, and blue buoys were not found in Hawaii whereas not in Oregon beaches.

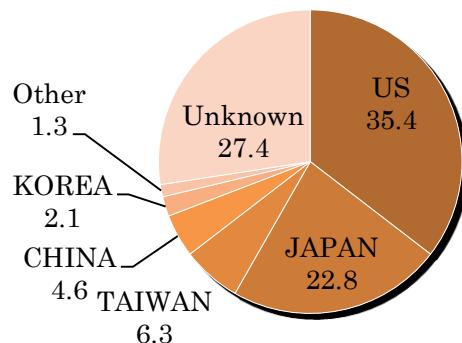


Figure 2. The origins of the disposable lighters found on Hawaii Beaches

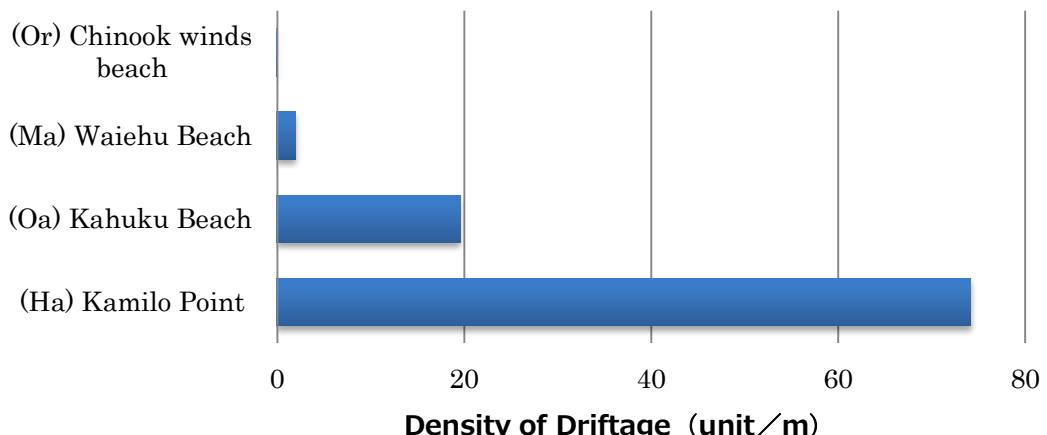


Figure 3. Driftage Density of oyster pipes found on Hawaii Beaches

II-3-3. Coastal Driftage Investigation

The drifted debris breakdown is as in Figure 2. The debris such as Styrofoam pieces and resin pellets smaller than the standard subject size were omitted from recording on the ICC Japanese Data Card. Details are in the micro plastic analysis section.

For the reference and comparison, the attached are the coastal debris breakdown on the Japan Pacific side by ICC, Sept. - Oct, 2012 as well as the 2011 ICC debris breakdown conducted by JEAN at Midway Atoll.

Figure 4 indicates the proportion of the coastal drifted objects. Regarding the results, the findings were similar to those at Pacific side of Japan done by ICC, there scattered some beverage related items, tobacco filters, fire works and so forth. Those were mainly disposed by the beach goers.

However, at Midway Atoll or Hawaii Islands, the largest debris was hard plastics posing over 90%, especially on Hawaii or Oahu Islands, showing a strong deviation to one from the others.

The oyster pipes were ranked as "Worst 10" items both in Midway and in U.S. coastal areas, also counted as worst 2 especially on Hawaii Islands and Oahu Islands. Bottle caps, ropes, and strings were ranked within the worst 10. As described, a lot of Styrofoam and urethane foam debris were found at Chinook Winds Beach, Oregon.

Figur 2 Marine Debris Drifted Brakdown from Hawaii and Oregon Beach Investigation (Compared with Pacific Ocean Debris, ICC, Fall 2012 and Midway Atoll 2011)

State	Hawaii						Oregon						Data for Comparison						
	Maui Island Waiehu Beach			Hawaii Island Kamilo Point			Oahu Island Kahuku Beach			Lincoln City Chinook winds beach			Midway Atoll Sand Island North beach			Japan ICC (Pacific) 2012			
Types	Item	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage	Rank	Number	Percentage	Rank
Pieces/ Broken items	Hard plastics pieces	309	47.9%	1	4872	87.1%	1	3182	89.0%	1	529	34.3%	1	1192	73.0%	1	18,819	29.8%	1
	Plastic sheets / Pieces of bags	93	14.4%	2	14	0.3%	9	5	0.1%	12	48	3.1%	6	3	0.2%	7	12,508	19.8%	2
	Styrofoam Pieces: Small: (below 1")	41	6.4%	4	7	0.1%	10	64	1.8%	5	467	30.3%	2	0	0.0%	24	4,239	6.7%	4
	Styro Foam Pieces: Large (over 1")	1	0.2%	22	19	0.3%	6	76	2.1%	4	9	0.6%	11	0	0.0%	24	980	1.5%	13
	Glasses or Ceramics	0	0.0%	27	0	0.0%	26	0	0.0%	24	5	0.3%	16	0	0.0%	24	1,373	2.2%	8
	Paper	13	2.0%	8	0	0.0%	26	0	0.0%	24	2	0.1%	23	0	0.0%	24	384	0.6%	20
	Metals	0	0.0%	27	3	0.1%	16	10	0.3%	10	85	5.5%	4	1	0.1%	12	0	0.0%	62
Life Items/La nd Source(D aily, Medical, and other)	※ Ulethane Foams	2	0.3%	17	0	0.0%	26	1	0.0%	19	177	11.5%	3	0	0.0%	24	2,667	4.2%	6
	Cigarettes / Filters	0	0.0%	27	0	0.0%	26	0	0.0%	24	1	0.1%	27	0	0.0%	24	150	0.2%	28
	Cigarette packages /Wrappings	0	0.0%	27	1	0.0%	20	0	0.0%	24	6	0.4%	15	0	0.0%	24	137	0.2%	31
	Cigar tips	1	0.2%	22	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	455	0.7%	18
	Disposable Liaghters	1	0.2%	22	4	0.1%	14	0	0.0%	24	5	0.3%	16	3	0.2%	7	1,149	1.8%	11
	Plastic Beverage Bottles	2	0.3%	17	0	0.0%	26	0	0.0%	24	7	0.5%	14	1	0.1%	12	409	0.6%	19
	Glass Beverage Bottles	18	2.8%	6	0	0.0%	26	0	0.0%	24	4	0.3%	21	0	0.0%	24	656	1.0%	15
	Beverage can	25	3.9%	5	268	4.8%	4	91	2.5%	3	82	5.3%	5	161	9.9%	2	4,987	7.9%	3
	Caps, Lids	0	0.0%	27	1	0.0%	20	0	0.0%	24	0	0.0%	32	0	0.0%	24	198	0.3%	26
	Pull tabs	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	12	0.0%	53
	6 Pack holders	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	24	0.4%	22
	Picnic items(Knives, Forks,Spoons or C	0	0.0%	27	0	0.0%	26	1	0.0%	19	2	0.1%	23	1	0.1%	12	241	0.4%	22
	Straws, Stirrers	1	0.2%	22	5	0.1%	13	2	0.1%	16	10	0.6%	10	0	0.0%	24	1,282	2.0%	10
	Food Package, wrappings, vessels	4	0.6%	13	1	0.0%	20	1	0.0%	19	9	0.6%	11	0	0.0%	24	3,332	5.3%	5
	Plastic bags (non agricultural purposes)	4	0.6%	13	0	0.0%	26	0	0.0%	24	5	0.3%	16	1	0.1%	12	1,369	2.2%	9
	Paper bags(non agricultural purposes)	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	77	0.1%	39
	Bags for farm chemicals or fertilizers	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	89	0.1%	36
	Sheetings (Leisue Sheets)	0	0.0%	27	0	0.0%	26	1	0.0%	19	0	0.0%	32	0	0.0%	24	27	0.0%	47
	Gardening pots	1	0.2%	22	0	0.0%	26	0	0.0%	24	1	0.1%	27	0	0.0%	24	210	0.3%	24
	Shotgun shells (for hunting rifles)	0	0.0%	27	1	0.0%	20	0	0.0%	24	8	0.5%	13	0	0.0%	24	32	0.1%	46
	Resin pellets	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	0	0.0%	57
	Syringes	0	0.0%	27	2	0.0%	18	1	0.0%	19	1	0.1%	27	1	0.1%	12	37	0.1%	44
	Medical wastes other than syringes	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	1	0.1%	12	134	0.2%	32
	Detergent / Bleach bottles	0	0.0%	27	1	0.0%	20	0	0.0%	24	0	0.0%	32	1	0.1%	12	81	0.1%	38
	Spray Cans	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	37	0.1%	44
	Common life items	5	0.8%	10	27	0.5%	5	13	0.4%	9	5	0.3%	16	7	0.4%	6	1,088	1.7%	12
	Toys	2	0.3%	17	3	0.1%	16	5	0.1%	12	1	0.1%	27	1	0.1%	12	317	0.5%	21
	Balloons	0	0.0%	27	2	0.0%	18	3	0.1%	14	0	0.0%	32	0	0.0%	24	40	0.1%	42
	Fireworks	0	0.0%	27	1	0.0%	20	0	0.0%	24	18	1.2%	8	1	0.1%	12	631	1.0%	16
	Clothes	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	216	0.3%	23
	Shoes, sandals	4	0.6%	13	0	0.0%	26	0	0.0%	24	0	0.0%	32	2	0.1%	10	204	0.3%	25
	Electri appliances, Furniture	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	17	0.0%	49
	Batteries(including car batteries)	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	13	0.0%	51
	Bikes, Motorcycles	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	2	0.0%	60
	Tires	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	16	0.0%	50
	Car Parts (excluding car batteries)	2	0.3%	17	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	13	0.0%	51
	Car oil cans, bottles	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	8	0.0%	56
	Wooden packagings	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	24	0.0%	48
	Shipping pallets	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	2	0.0%	60
	Shipping straps, bonages	0	0.0%	27	7	0.1%	10	3	0.1%	14	1	0.1%	27	1	0.1%	12	156	0.2%	27
	Oil drums	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	0	0.0%	62
	Nails, wires	0	0.0%	27	0	0.0%	26	0	0.0%	24	2	0.1%	23	0	0.0%	24	139	0.2%	30
	Construction materials (excluding nails	5	0.8%	10	0	0.0%	26	0	0.0%	24	5	0.3%	16	0	0.0%	24	576	0.9%	17
	Condoms	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	4	0.0%	59
	Tampon applicators	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	9	0.0%	55
	Diapers	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	5	0.0%	57
River or Ocean, Wateraw ay Source Debris	Fishing lines	17	2.6%	7	0	0.0%	26	0	0.0%	24	3	0.2%	22	0	0.0%	24	118	0.2%	33
	Ropes , strings	74	11.5%	3	309	5.5%	3	56	1.6%	6	42	2.7%	7	129	7.9%	3	2,063	3.3%	7
	Fishing Nets	3	0.5%	16	0	0.0%	26	32	0.9%	7	2	0.1%	23	3	0.2%	7	108	0.2%	35
	Styrofoam floats	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	1	0.1%	12	88	0.1%	37
	Floats, buoys	0	0.0%	27	4	0.1%	14	0	0.0%	24	0	0.0%	32	10	0.6%	5	149	0.2%	29
	Fishing traps	2	0.3%	17	18	0.3%	7	2	0.1%	16	0	0.0%	32	2	0.1%	10	57	0.1%	41
	Fishing boxes	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	5	0.0%	57
	Bait vessels	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	0	0.0%	24	71	0.1%	40
	Bulbs, Fluoroscent Lights (including ho	0	0.0%	27	0	0.0%	26	0	0.0%	24	0	0.0%	32	1	0.1%	12	39	0.1%	43
	Lures, Fluoro-light-sticks	0	0.0%	27	6	0.1%	12	8	0.2%	11	0	0.0%	32	0	0.0%	24	115	0.2%	34
Total	Oysterfarm pipes			63			33			1									
	Baby farm pipes			297			165			11									
	Washers			11			8			1									
	Weight (kg)	7.1	10.7		8.3		11.1							-					
	Capacity(l)	40	60		60		120							90					
	Area	25	25		50</														

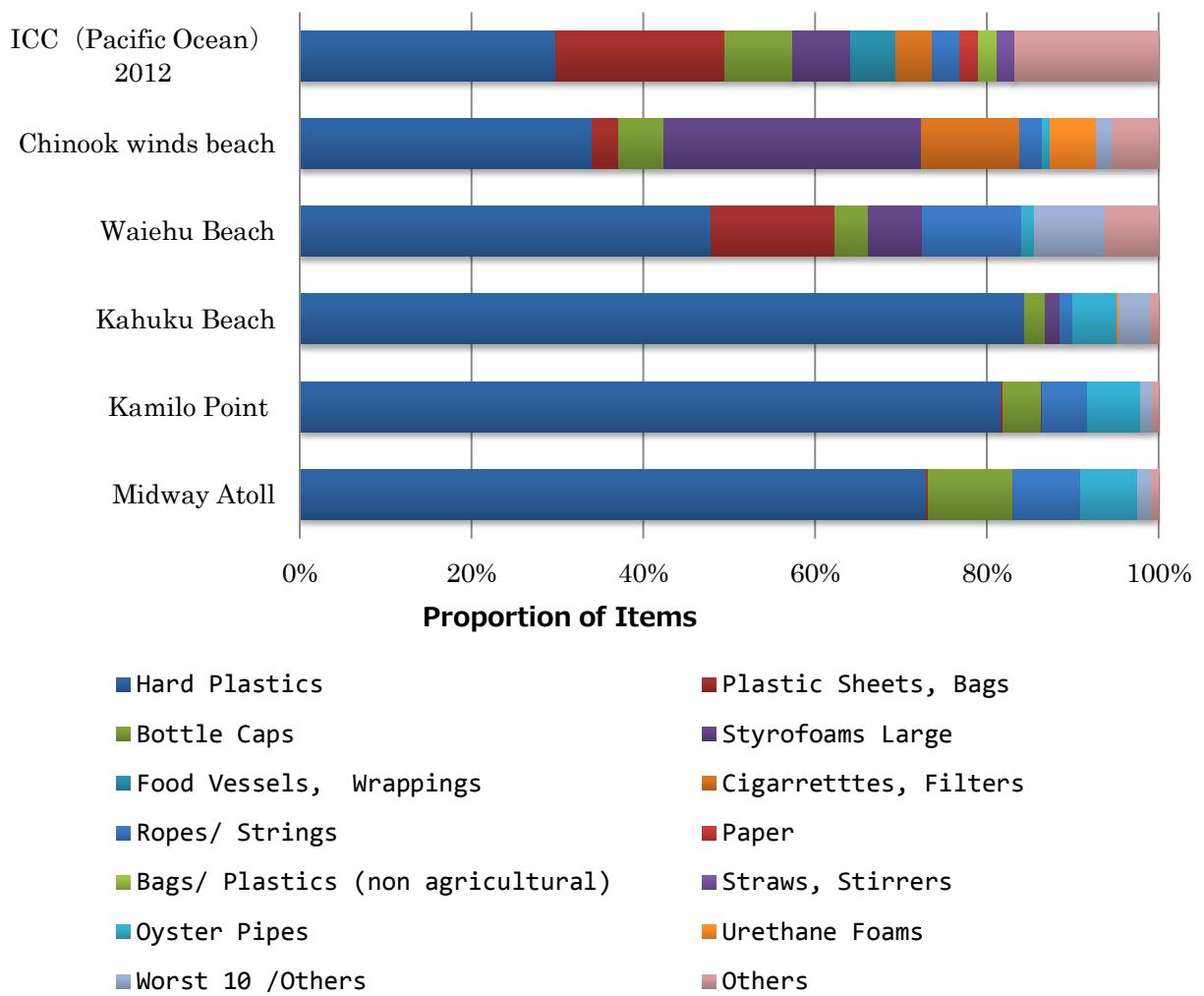


Figure 4. Breakdown of Drifted Items

The density of drifted objects are shown in Figure 5. The highest density was found in Kamilo point, Hawaii Island at 1119 unit/m. On the other hand, the density at Chinook Beach Oregon was as little as 1/m, and its weight was smaller than 0.1kg/m, 100 times less than that of Hawaii Islands; 1.4-2.1kg/m.

From the above, on Hawaii Islands, the hard plastic fragments occupies largely while on the Oregon coastlines, usually only little drifted litters are expected. Micro plastics' proportion is in Graph 6, Figure 3.

On those islands as Hawaii and Oahu, further, on their beaches as Kamilo Point and Kahuku Beach, the hard micro plastic fragments occupied over 80 % of the whole micro plastics. Also, in Oregon, where Styrofoam debris took 30 % of the whole drifted objects through Ocean Driftage Investigation, even in the micro plastic category, Styrofoam debris took more than 20 %. Resin pellets found in these beaches accounted over 5 %.

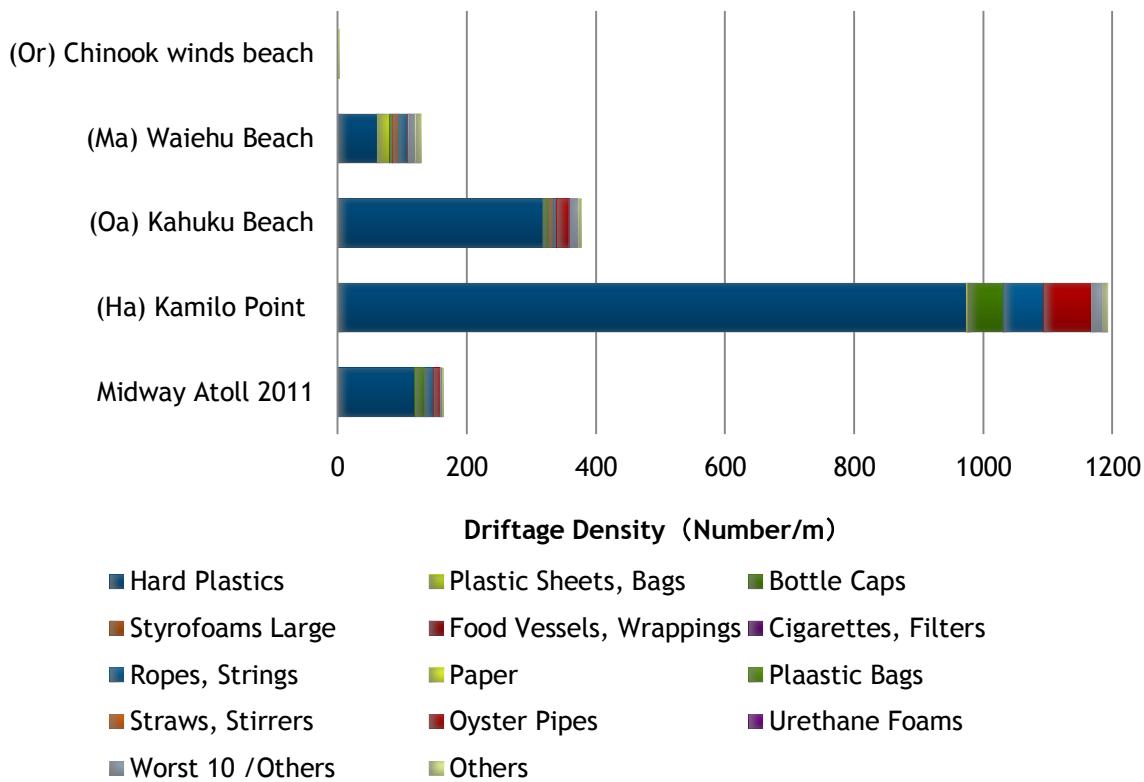


Figure 5 The density of the drifted objects

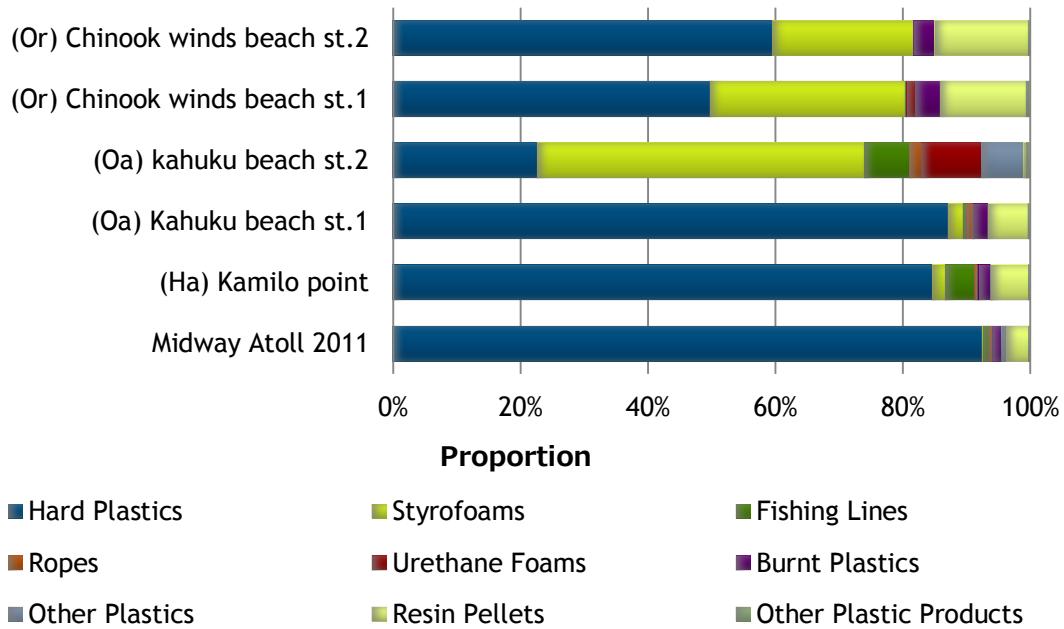
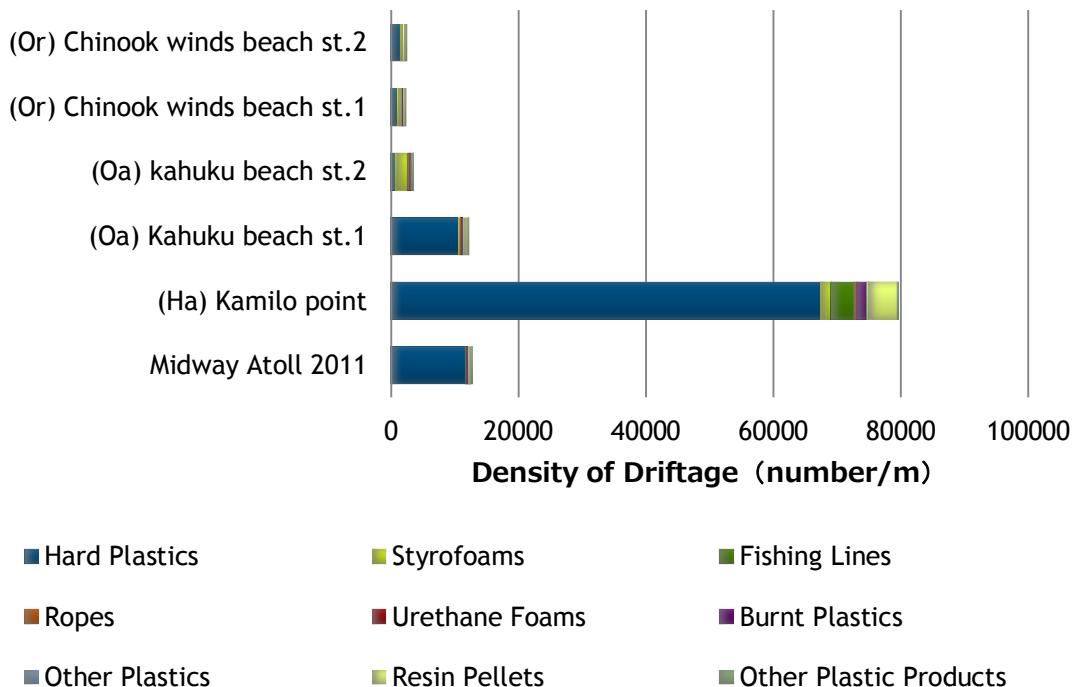


Figure 6 Proportion of Micro Plastics (over 0.5m)

Figure 3 Microplastic Drifted Objects Collected size 0.5mm> Density (1m^2) and Proportional Ratio

Category	Type	Objects	Sampling points										
			Oahu Island, kahuku beach st.1	Oahu Island, kahuku beach st.2	Hawaii Island, Kamilo point	Chinook winds St.1	Chinook winds St.2	Midway Atoll, Sand Island, Old seaplane Beach					
Plastics	Pieces	Styrofoam Pieces	281	2.3%	1,788	51.3%	1,606	2.0%	694	30.4%	538	22.1%	
		Hard Plastics	10,638	87.2%	794	22.8%	67,494	84.7%	1,131	49.6%	1,450	59.6%	
		Artificial Grass	0	0.0%	0	0.0%	38	0.0%	0	0.0%	0	0.0%	
		Films	6	0.1%	0	0.0%	125	0.2%	0	0.0%	0	0.0%	
		Sponge	0	0.0%	6	0.2%	0	0.0%	0	0.0%	0	0.0%	
		Fibers	0	0.0%	225	6.5%	0	0.0%	0	0.0%	0	0.0%	
		Fishing Lines	56	0.5%	250	7.2%	3,644	4.6%	6	0.3%	0	0.0%	
		Ropes	138	1.1%	63	1.8%	313	0.4%	0	0.0%	0	0.4%	
		Urethane	6	0.1%	331	9.5%	219	0.3%	31	1.4%	0	0.0%	
		Burnt Plastics	275	2.3%	0	0.0%	1,431	1.8%	88	3.8%	81	3.3%	
		Sub Total	11,400	93.5%	3,456	99.1%	74,869	94.0%	1,950	85.5%	2,069	85.1%	
Items		Resin Pellets	769	6.3%	13	0.4%	4,644	5.8%	306	13.4%	356	14.7%	
		Farm Chemical Capsules	0	0.0%	0	0.0%	0	0.0%	6	0.3%	0	0.0%	
		Oyster Farm Pipes	0	0.0%	0	0.0%	44	0.1%	0	0.0%	0	0.0%	
		Oyster Pipe Washers	6	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
		Plastic Caps	0	0.0%	6	0.2%	38	0.0%	0	0.0%	0	0.0%	
		Fishing Nets	19	0.2%	6	0.2%	44	0.1%	0	0.0%	0	0.0%	
		Others	0	0.0%	6	0.2%	0	0.0%	6	0.3%	6	0.3%	
		Subtotal	794	6.5%	31	0.9%	4,769	6.0%	319	14.0%	363	14.9%	
		Subtotal	12,194	100.0%	3,488	100.0%	79,638	100.0%	2,269	99.5%	2,431	100.0%	
Non Plastics			0	0.0%	0	0.0%	6	0.0%	13	0.5%	0	0.0%	
Total			12,194		3,488		79,644		2,281		2,431		12,688

The Driftage Density of Micro Plastic Fragments (over 5.0 mm)



The driftage density is shown in Figure 7 of the micro plastic fragments larger than 0.5 mm. The highest density was shown in Kamilo Point, Hawaii where the density showed as high as 800000 /m².

According to Fujieda (2011) the average density of the micro plastic fragments in the Seto Inland Sea, Japan, indicated 45, 833/m² for Styrofoam litters, 892/m² for hard plastic debris, and 211/m² for resin pellets.

When compared with these at Kamilo Beach, Hawaii Island, Styrofoam debris indicated very low density as 1,094 / m², 1/40 of the average, whereas the hard plastics were more than 50 times (52, 019/ m²) and 20 times for resin pellets (4,644/ m²). This indicates even at remote areas from the plastic litter source, at Kamilo Beach, Hawaii Islands, micro plastic fragments and resin pellets are found. Thus, these beaches have different problems from those of the inner beaches close to the region with dense population.

Figure 8 also indicates the size breakdown of the hard plastics collected at Kamilo Point, Hawaii Island. The hard plastics occupies 23% of the whole, which indicates there might as well exist those under 0.5 mm.

Because of the above, in the North Pacific, the decayed-then-fragmentized plastics are found after a considerable floating on the current to Hawaii Islands and West coast of the United States. So will the plastics washed away due to the Tsunami along with the long term floating be smaller particles.

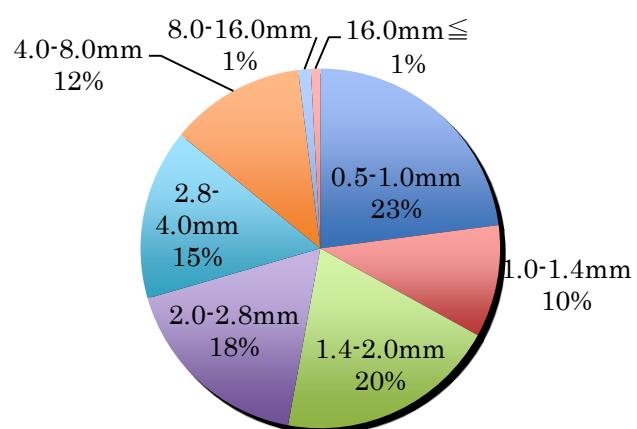


Figure 8 Size Differences of Hard Plastics at Kamilo Point

II-3-4. Marine Debris Treatment Investigation

II-3-4-1. Hawaii Beaches

At Hawaii Beaches, three beaches of the three different islands were investigated of their driftage at the shore, looked into their site details so that the practical and smooth collection of debris and would be possible.

Kahuku Beach (Oahu Island)

Kahuku Beachh is conveniently located as it is only 15 min. drive from Turtle Bay Condos, our base, and is 90 min. from the Honolulu City. There is a grass filed for parking, just along from the gate of the James Campbell National Wild Reservation to the beach, which surely enables the team of volunteers to work on debris collection . However, the bathroom is in distance as 3km away, in the office of the Reservation, which is the only one around. Plus, the investigators may have to prepare their own waters for drinking. Since the beach itself is relatively large, the collected debris may need some people to get it transported. Some shallow shores had a lot of micro plastics captured. A small cottage is next to the reservation office and an open space, initial briefing for the collection can be done here, then drive to the gate, and start exploring the beach.

Kamiro point (Hawaii Island)

Kamiro Point is about 4 hours and 20 minutes away by driving from Hiro Hawaiian Hotel, the team base. Because of the time for commuting, the team may be limited to work only for a few hours though keeping an early start. The bathroom is only located at the nearest park by the highway which is still one hour distance, coupled with a bumpy drive if the volunteers go to beach for collection. The investigators have to have a 4WD vehicle and a truck to the collection site. Plus, temporary restrooms should be installed.

Also, drinking water should be secured. Considering this beach circumstances, only less than 100 people can work for collection. Moreover, some large sized fishing nets were drifted along with a lot of plastic debris. Worse enough, the car rental company did not allow its cars to pass these bad roads. The collected litter is taken to the dump store, where the local citizens bring in their house garbage since the garbage collection system has not yet been established. Then the litter is sort out, stored, and transported to Oahu Island in the containers for disposals.

Waiehu Beach (Maui Island)

Waiehu Beach is 10 minutes away from the base, The Maui Beach Hotel, but only 6-7 cars are available to park. Hence, to secure the parking space is necessary in a large team activity. Also, temporary bathrooms should be installed for a long time practice of

collection. The beach is relatively narrow and long where a lot of wood and fishing nets are adrift. Plus, probably because of the golf yard nearby, many golf balls were found.

Findings of Hawaii Coasts

Foreign volunteer staff can work on the pre-ground contacts with the local community leaders and the ICC coordinators and other interest groups are very active and well tied throughout the islands.

However, regarding Kamilo Point, Hawaii Island, where the largest driftage was found, the beach accessibility is a little problematic. For the visiting staff, it will be a little difficult to fully work.

In order for sending Japanese volunteer staff in response to the Japan origin debris , before the need arises, securing the manpower who coordinates those with a high command of Japanese language and understanding of the culture is necessary. Also a certain amount of funds may require for the payment of the salaries, the travels costs, and for the transportation. At the same time, money for the pre-ground operational work done by ICC coordinators and related groups should be secured.

From the investigation, though a lot of drifted objects were found, not yet to judge them as the disaster debris. Also, it is important the general marine litter issues are the basis of this disaster marine debris problem. Considering this, Japan - US NGOs should work collaboratively on 1) the debris collections conducted when the semi annual ICC is held in September, and 2) keeping the local volunteer workers registered in case for the large driftage to occur.

II-3-4-2. Oregon Beaches

In Oregon state, "OREGON BEACH CLEANUP" by SOLVE is conducted semi annually, in spring and fall, dividing the whole state beaches into 14 zones.

The Oregon beaches expand to the south and north along with Oregon Coast Highway on the coastlines. There are nearby residential areas and it is very easy to commute the beach. The river oriented drifted debris, such as large trees, can be found on these sandy beaches. Particularly at this investigation, not much driftage was found other than some micro plastic particles. At the bordering backside areas of the beaches, still not much driftage, debris, was identified which indicates very few objects are drifted on the daily basis.

Chinook Winds Beach (Lincoln City)

Chinook Winds Beach is at the north of Road's End State Park, with Chinook Winds Resort Hotel as its landmark in the center of the lengthy beach. In front of the hotel, the beach spans from the north, Road's End Beach Park to the south end, Siletz Bay FOR 11 km. The

hotel is neighboring the parking lot, restaurants, and the shopping center.

From the Portland Airport, the shuttle bus drives to the hotel, with the reservation needed, for about 120 miles taking two hours and a half. The access to the beach is secured though a bit far from the airport.

Plus, the beach is neighboring the hotel and Japanese volunteers may feel it easy to go for debris collection. The beach is of singing sand that is not so steep. Thus, when the tide is low, the 100m sand beach reveals, and the highest tide may cover whole the beach. Debris collection may be disturbed when the tide is highest, moreover, some re-driftage back to the ocean could take place. As its severe winter brings a lot of windy rain than sunshine, the debris treatment may require a lot of hard work.

There are some other hotels available and the rate becomes rather expensive in the summer as more guests are expected. This beach is in ZONE 6, "Road's End State Beach" as categorized on the OREGON BEACH CLEAN UP Web site. The debris taken from this zone is transported to North Lincoln Sanitary Service for disposals, located at the south Devils Lake. The debris from this investigation was, too, taken there for disposals.

Gleneden Beach (Lincoln Beach)

Gleneden Beach is located at the center of 9km sandy beach, lying from the south of Siletz Bay to Lincoln Beach and is 20 minutes drive from the Chinook Winds Resort Hotel. Parking space is available approximately for 10 cars. The beach is very close to the parking lot. There was a relatively more debris. The sandy beach is higher than the sea level, and even in high tide, the beach would not be fully covered, and re-driftage does not often take place.

This is ZONE 6 beach, registered as "Gleneden Beach" on the SOLVE OREGON CLEANUP website, whose litters are taken to North Lincoln Sanitary Service for disposals.

Nye Beach (Newport)

Nye Beach is a 6.5 km beach, lying the north of Newport Port. The beach is less steep as is Chinook Winds Beach, and reveals itself at the lowest tide. It is located at the south of the Chinook Winds Resort Hotel, about 45 minutes of driving on the Oregon Coast Highway as far as 45 km from the hotel. Parking space is available and surrounding are the residential areas or summer houses expecting a lot of beach goers. This beach is registered as "Nye Beach" in ZONE 7 whose litter disposal is conducted at Thompson's Sanitary Service.

Overview of Oregon Debris Management

To Oregon state, 5 direct flights per week are available from Narita International Airport. Also, flights are available via Seattle, Vancouver, Hawaii, and San Francisco. All of them, however, may require early reservation, which makes it not so suitable for the emergency trip for the Japanese debris team.

SOLVE, the main ICC coordinator in Oregon, hosting Oregon Beach Cleanup, is well connected with each of the municipal organizations. One of the major recreational activities of them is "beach calming", in which participants enjoy walking while searching for the debris drifted. This is an acknowledged activity from the whole states, and the state wide awareness to the debris is relatively high.

Other than "211" calling system, debris monitoring staff are deployed at each beach. Also, preparing for the huge future driftage, the training of emergency cleanup is tailored; by e-mail, phone, fax or SNS are used to gather as many volunteer staff in a limited time to respond to the debris. They are very well prepared and available for the prospective large driftage.

Once the large driftage hits, SOLVE has to focus on the first response to it, it is difficult to ask them for the arrangement to accommodate Japanese volunteers. Rather, it may be realistic for the Japanese volunteers to participate in the semi annual events, Oregon Beach Cleanup, may be the better solution.

II-4. Meeting with the NGOs and other representatives

II-4-1. NGO meeting at Hawaii Investigation

In Hawaii investigation, ICC coordinators from each island and the Japanese delegation had a meeting, also with the NGO/NPO related staffs, NOAA, and Hawaii State government officials. The content was as follows:

In Hawaii, the environmental hazard response is well formed among the related organizations, though the financial resource may need to secure.

From the Japanese participants, ideas were proposed for the under water debris monitoring. We would like to forward this idea so that it would make possible to work with the underwater conservancy run by divers.

Also, collecting and sharing the debris information and data should be advanced in order for more accurate calculation. NOAA has been conducting under water monitoring for 14 years at some areas.

In Hawaii, some cases are reported that people hurt themselves while snorkeling. Also the damage of the coral leafs, and invasive foreign species are the current

environmental issues to concern.

To prepare for the treatment of memorable items when adrift. Now that the collecting of information is getting ready for the prospective driftage.

As for now, the focus should be on how to manage the information flow to whoever concerned; Japan US NGOs, government organizations, local community, and general citizens, because this becomes the strongest and necessary counteract against the debris problems. The participants agreed that they proceed on strengthening the communication basis among all.

It is necessary to give primacy on the things on the working list; which beach should be the first to clean up or so. This will enable us the most efficient way of utilizing the limited resources, both human and financial.

Others

After the US- Japan NGO meeting, Hawaii ICC coordinators had a suggestion from the NOAA representative, as to implement the web cam beach debris monitoring system made by a team of Japanese researchers. Responding to it, OWS has started to seek for the sponsors for this project with JEAN.

II-4-2. Oregon meeting and workshops at the investigation

During the investigation at Oregon, the delegation had a meeting with the local Japanese related groups and community organizers as well as holding the special workshop with them.

In Oregon, there is a long history of beach maintenance with the local NGOs. Plus the close relation ship among the Japan related organizations has already been established.

In Oregon, 5 beach rangers periodically watch the beach at PARKS AND RESEARCH DEPARTMENT, and litter collection, and sorting out of the data are also conducted. The information is share with SOLVE.

Among the state of Washington, Oregon, and California, the governors already set up an alliance in order for them to actively involved in marine debris management cooperating with the environmental NGOs under state-wide collaborative plans.

" We now fully realized that Japan and US are tied by the ocean. Not only against the debris impacts, but also toward the rebuilding of Japanese disaster struck areas, we very much would like to start to cooperate." (workshop comments)