Fremantle Port and the Swan River as Sources of Plastic Resin Pellets

Tangaroa Blue Ocean Care Society
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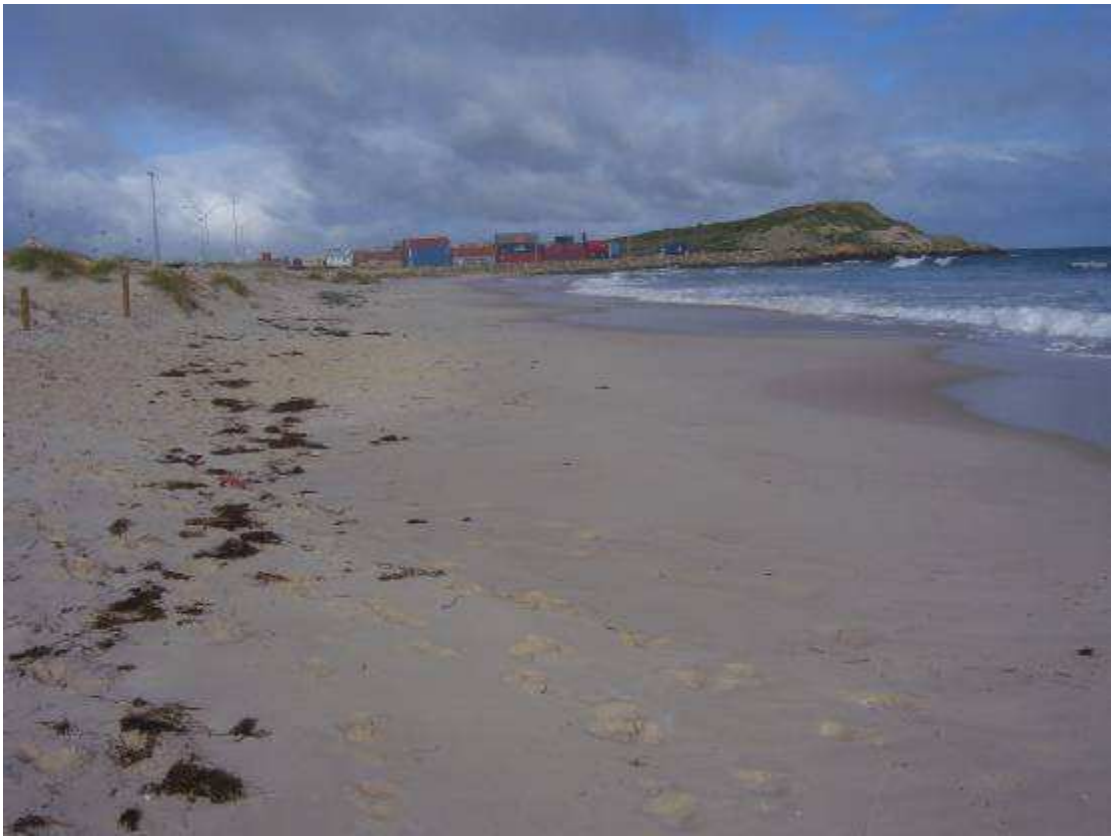
Distinctly different types of plastic resin pellets have been found during our surveys of beaches adjacent to the Port of Fremantle. The newness of these pellets and the numbers found indicate one or more local sources from the port precinct and or from drainage further up the Swan River.

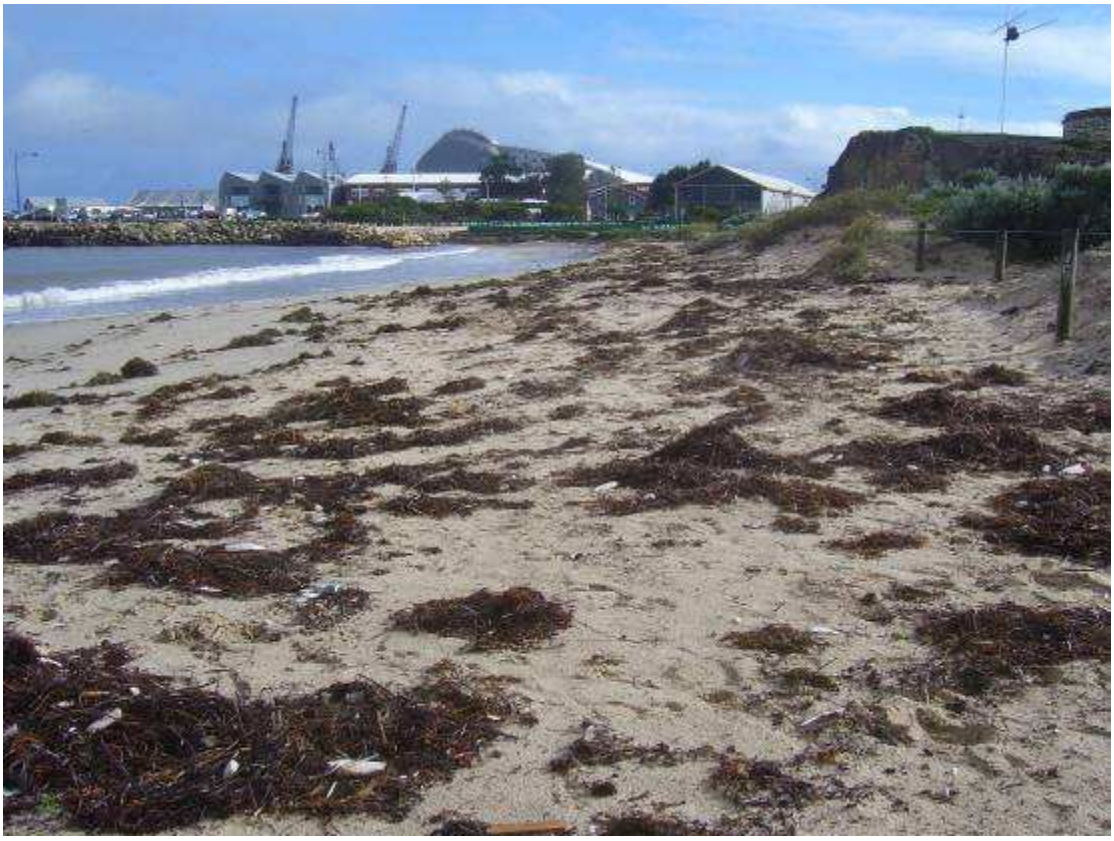
Survey Sites

Port Beach is north of the Harbour entrance and the section of beach surveyed – immediately north of Rous Head - is adjacent to the major shipping container depots and the main road into North Quay. Debris tends to accumulate in the southern corner of this section of beach as Rous Head interrupts the longshore flow especially in North West to Westerly wind regimes.



Port Beach with Rous Head in the background

Bathers Beach is adjacent to South Mole and lies between the Roundhouse and the Fremantle Fish markets. Its location can be likened to a pocket able in the right conditions to trap and hold debris. These conditions would include river flow, and frontal activity pushing debris to the south of the harbour entry in north westerlies and then westerlies and south westerlies driving debris into the beach.


Bathers Beach with the Roundhouse top right

Method
Analysis of Pellets collected during autumn had shown there to be high numbers of a translucent pellet in the Port Beach sample. (1) As this suggested a local input of pellets, Bathers Beach was added into the survey sites and samples collected. These were analysed for wear, staining and concentration.

The pellets from both sites were then further differentiated into types. Where a number of pellets of the same type turned up in a sample and were distinctly new looking and or distinctly different from the background range of pellet types they were given an identification number based on appearance, shape and whether they appeared to have been extruded or mechanically cut in the manufacturing process. (2)

Results
Figure 1 shows pellets being mainly unworn and unstained suggesting most were newer pellets.

	Port Beach 17/6/08	Port Beach 1/8/08	Bathers Beach 1/8/08
Unworn	92%	95%	100%
Unstained	82%	76%	99%
Sample Size	198	115	168

Figure 1

Figure 2 shows pellets being the main small plastic item on each beach. The difference between sites indicates Bathers beach as trapping and holding debris more strongly than Port Beach

	Port Beach 17/6/08		Bathers Beach 1/8/08	
	# in sample	/M²	# in sample	/M²
Total PRP's	29	261	109	981
Plastic >5mm	3	27	29	261
Plastic <5mm	4	36	65*	585
Total Plastic	36	324	203	1827

Figure 2

*Plastic less than 5mm was mainly poly styrene fragments.

Figure 3 shows pellet types P1 and P3 as having a local source. The proportions of these two types in their respective samples found close to a major port rule out a chance accumulation from offshore. The remaining pellet types given IDs are highly likely to also have a local origin. Pellet types differ between the two sites adding weight to the possibility of a source near Port Beach and a source within the port or upstream in the river.

	Port Beach 17/6/08		Port Beach1/8/08 *		Bathers Beach 1/8/08	
Pellet ID	# pellets	%	# pellets	%	# pellets	%
P1	114	58%	6	5%	-	-
P2	11	6%	6	5%	-	-
P3	-	-	-	-	124	74%
P4	-	-	-	-	14	8%
P5	-	-	1	1%	8	5%
Sample size	198		115		168	

Figure 3

* Note that a series of strong cold fronts removed and redeposited debris at Port Beach in July and August and in that process the 1/8/08 sample resembled more closely the background pellet signature.

Pellets at Bathers Beach Fremantle

Discussion

Pellets are often packed in bales bags or drums. Damage to any of these will result in spillage. One or more of the following processes may account for the loss of pellets into the environment:

- Spillage on ships being swept overboard.
- Loss from trucks in transit.
- Unloading pellets from containers.
- Cleaning out emptied containers.
- Spillage at manufacturing sites or transport depots being swept or washed into the drainage system.

Pellets not transported in containers would be at higher risk of spillage.

No data is yet available on numbers of pellets in the background flow of pellets along the West coast and certainly no data on pellet spillage into the Swan River and Fremantle Harbour. It is therefore not possible to quantify this problem at this stage.

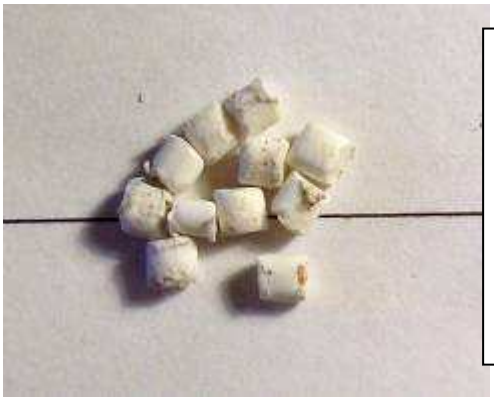
Notes

(1) See our report "Survey of Plastic Resin Pellets between Cape Leeuwin and Burns Beach Western Australia" (Tangaroa Blue Ocean Care Society)

(2) Pellet type is assessed on the following:

1. Pellet appearance – pellet is clearly Opaque, Translucent or Coloured. Codes O, T and C.
2. Pellet shape is largely Cylinder, Rounded, Platelet or Irregular. Codes C, R, P and I.
3. Pellet appears to have either been Extruded or cut by a Mechanical device. Codes E and M

Pellet P1
Size 4mm and 5mm
P1 is translucent in appearance, irregular in shape and extruded. (TIE1)
P1 was first noticed at Port Beach as making up 58% of a sample of pellets.



Pellet P2
Size 4mm
P2 is coloured (several colours so far observed), cylinder shaped and mechanically cut. (CCM1+colour)
P2 has been seen occasionally south of the metro area but showed up strongly at Port Beach as 6% of a sample.

Pellet P3
Size 4mm and 5mm
P3 is opaque, irregular and extruded. (OIE1)
P3 made up 74% of the sample from Bathers Beach.

Pellet P4
Size 4mm
P4 is opaque, largely rounded and extruded. (ORE1)
P4 made up 8% of the Bathers Beach sample.

Pellet P5
Size 4mm and 5mm
P5 is opaque, cylinder shaped and mechanically cut. (OCM1)
P5 made up 5% of the sample at Bathers Beach.