



Tangaroa Blue Ocean Care Society

New Zealand Marine Debris Project

Technical Report

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Introduction

A total of 12302.5 items were collected from ten sites on the east and south west coasts of the North Island New Zealand between March 2008 and November 2009. Eight cleanups to the end of August 2008 constituted a Tangaroa Blue Ocean Care Society pilot cleanup project with the remaining seventeen cleanups being carried out under the Tangaroa Blue Ocean Care Society New Zealand Marine Debris Project between October 2008 and November 2009. This technical report uses both sets of data.

Summary

Much of the debris cleaned from the beaches in this project was from land sources. Very little commercial fishing and other ocean sourced debris showed up in the data whereas high numbers of packaging items, farming items and dead animals, broken glass and dumped items pointed strongly to land based sources. This also shows in the material composition of items in the data where 58% of items were composed of plastic and 30% were glass. The classic signature shown by ocean sourced debris is one of strongly buoyant plastic items and plastic item remnants making up a percentage in the high 90s of the total debris. River runoff looks to be the primary vector for land sourced debris followed by human activity on or near the beaches. At East Beach Waitara between late June and early September 2009 the carcasses of six cows, 6 sheep and 1 goat were found on the beach having been washed down the Waitara River along with a variety of farming items.

Broken Glass, pieces of hard plastic, fishing line, polystyrene foam and plastic drink bottles made up the top 5 items ranked by total.

A comparison between 2008 and 2009 is provided showing the annual average density, range of items collected and totals. All figures show an increase from 2008 to 2009 except for the density figure for East Beach Waitara where the decrease may be a sign of the impact the regular cleanups are having on the debris load.

East Waitara was cleaned periodically over the life of the project with 4 cleanups in 2008 and 6 in 2009. Packaging items were most numerous with remnant items second most numerous followed by occasional spikes in linear items – mainly fishing line. Seasonal variation is less distinct with average rainfall remaining high and fairly even throughout the year. Debris levels on the beaches are therefore likely to remain high and fluctuating depending on both rainfall variations and the amount of human activity at the sites.

With constant and high rainfall and periodic extreme weather events, the river systems of New Zealand provide a potent source for marine debris input onto its coasts and into the surrounding seas. Litter prevention, waste disposal practices and screening of stormwater outlets are some of the areas where this input can be curbed. Marine debris monitoring programmes would also help to build up a picture of the processes involved and highlight heavily polluted areas and their sources.



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Preface

The Tangaroa Blue Ocean Care Society New Zealand project mainly centred on the area in the South West of North Island and covered the stretch of coast from Cape Egmont to Albatross Point. A number of sites were cleaned once only and one site was cleaned periodically during 2008 and 2009. Three Sites were cleaned on the East coast, however, the bags of debris from two of these were stolen when the volunteers vehicle was broken into (these two sites were Melon Bay and Howick Beach).

Terminology

The term “Item” refers to either an individual item e.g. “Plastic Bag” or to a group of similar items e.g. “Cups, Plates and Cutlery”. The term signature refers to the pattern shown by a graph for a given site or group of sites and where data is sorted into categories.

Report Method

The basic quantitative unit for this report is the count of items. With the aim of the report being to shed light on the source/s of debris and the processes moving the debris around, the comparison of size and weight between different items is set aside apart from “Linear Items” where our convention is to make 1 linear metre of the item equal to a count of 1 item. This convention covers Rope, Fishing Line, Fishing Net and Strapping Bands. (This is small comfort to the volunteers who struggle to drag tyres and other large heavy objects out of the mud on a regular basis)!

Cleanup Site Summary

Cleanup sites in date order and grouped under their respective areas.

Site	Cleanup Date	Total	Site Length	Bags	Weight Kg
South West Coast Sites					
East Beach Waitara	1/03/2008	229	1500	3	15
Waiongana	1/03/2008	229	1000	2	25
Mokau	1/04/2008	102	600	3	25
East Beach Waitara	1/04/2008	354	900	2	15
East Beach Waitara	1/07/2008	141	800	2	25
East Beach Waitara	20/07/2008	385	2000	10	200
East Beach Waitara	1/08/2008	171	600	2	8
Rocky Point	30/08/2008	163	400	2.5	10
East Beach Waitara	12/11/2008	161	1000	2	10
East Beach Waitara	3/12/2008	340	2000	8	100
East Beach Waitara	10/12/2008	438.5	1000	3	20
Waikawau	6/01/2009	82	600	1	5
Komene Beach Okato	10/02/2009	3579	4000	7.5	70
Oakura Beach	19/02/2009	2468	3000	80	250
East Beach Waitara	21/03/2009	287	1000	2	25
East Beach Waitara	26/03/2009	488	3000	20	120



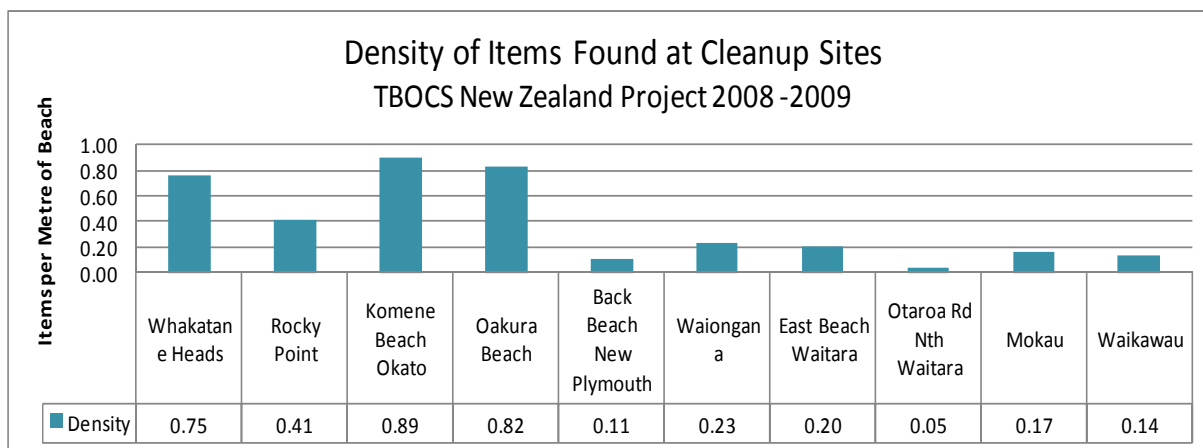
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East Beach Waitara	28/03/2009	195	2000	4	30
Otaroa Rd Nth Waitara	2/04/2009	68	1500	4	30
East Beach Waitara	20/06/2009	137	2000	1.5	10
East Beach Waitara	1/07/2009	415	2000	2	30
East Beach Waitara	3/07/2009	139	1000	3	30
Back Beach New Plymouth	27/08/2009	164	1500	3	25
East Beach Waitara	8/09/2009	738	2000	8	250
East Coast Site					
Whakatane Heads	21/11/2008	398	100	3	20
Whakatane Heads	14/01/2009	431	1000	2	10
Count/Totals	25	12302.5	36500	180.5	1358

(Pilot Project Cleanups)

Cleanup Data Summary

Density (Items per Metre of Beach) Found at each Site



The East coast site is on the left hand side followed by the South West coast sites in South to North order. All sites were single cleanups apart from Whakatane heads (2 cleanups) and East Beach Waitara (10 cleanups). Density for these 2 latter sites was averaged. The data from Whakatane Heads, a large population centre, indicates a heavy debris load on its beaches. Adjoining a farming district, the Komene Beach, Okata figure is likely to be skewed as a result of the high total of broken glass collected whereas the Oakura beach figure is likely to reflect a heavy debris load, with the beach being in the town area.



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Top ranking Debris Items for the Project

Top Ranking 20 Items			
Item	Total	Range of Totals for Item in Cleanups	Number of Cleanups Occurring In (out of 25)
Glass Broken	3382	1 to 2564	16/25
Plastic Hard Pieces	1192	4 to 235	24/25
Fishing Line - Metres	1117	7 to 400	20/25
Polystyrene Foam	872	2 to 154	25/25
Plastic Drink Bottles	766	5 to 97	24/25
Lids/Bottle Tops/Corks	392	3 to 111	23/25
Plastic Film Remnants	389	2 to 180	17/25
Plastic Wrap - Food	367	1 to 10	19/25
Aluminium Cans	339	1 to 116	25/25
Glass Drink Bottles	314	1 to 150	22/25
Cigarettes/Filters	289	1 to 200	14/25
Rope - Metres	268	1 to 200	16/25
Paper/Cardboard	195	1 to 107	16/25
Plastic Bags	163	1 to 60	18/25
Plastic Wrap - Non Food	142	1 to 45	13/25
Straws	137	1 to 35	20/25
Shoes	125	1 to 17	24/25
Shotgun Shells	122	1 to 56	18/25
Plastic Containers	114	1 to 16	20/25
Metal	112	1 to 36	17/25
<u>20</u>	<u>10797</u>		

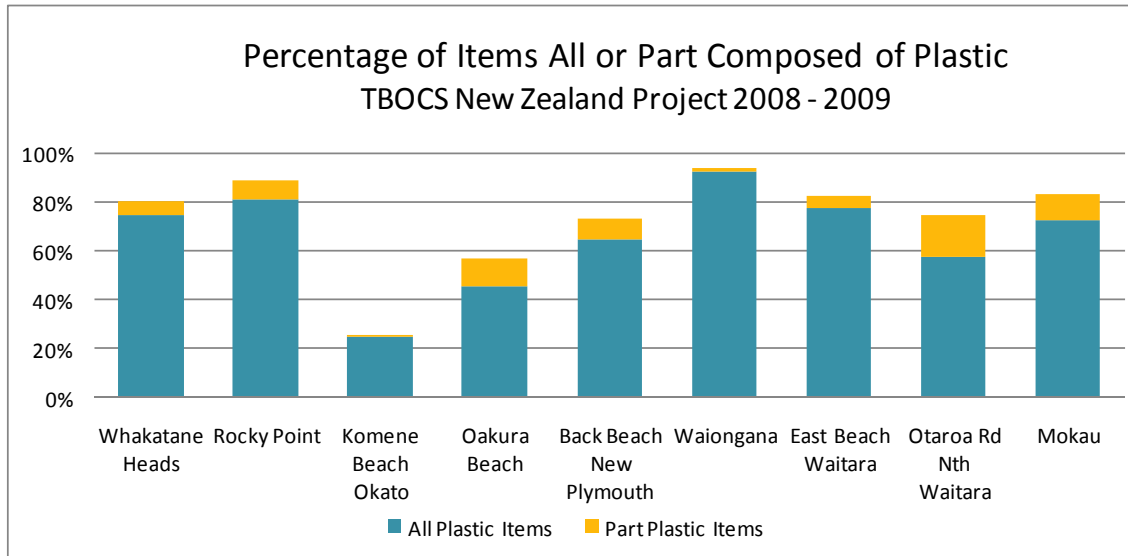
Material Composition of Debris Items

Material Category	Total	Percent	Material Category	Total	Percent
Plastic	7074.5	58%	Fibre Natural	100	1%
Glass	3726	30%	Rubber	77	1%
Metal	646	5%	Fabric	75	1%
Other	300	2%	Wood	57	0%
Pulp	244	2%	Wax	3	0%



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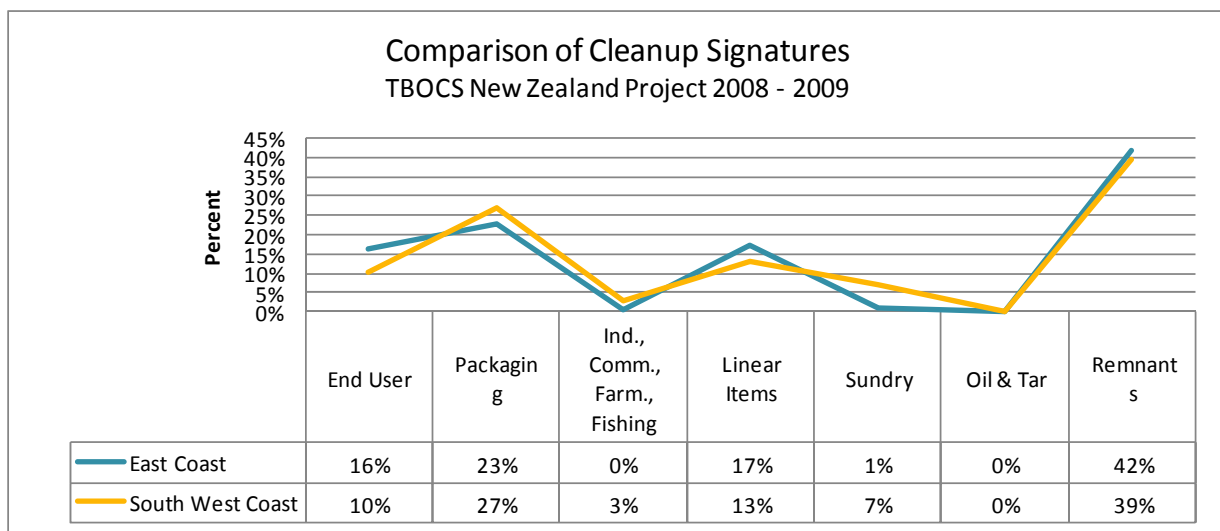
Plastic Composition of Debris Items



Part plastic items include those items which are partly made from plastic or are sometimes made from plastic. The high number of broken glass pieces collected at Komene Beach Otako has skewed these figures slightly.

Comparisons - Coasts

Comparison of the South West Coast Cleanup Signature with the East Coast Cleanup Signature



This graph indicates that the type and proportion of debris is similar on both coasts. The higher percentage of "Sundry" items shows that dumping is a factor on the south west coast. Additional cleanup sites and data are needed from the east coast to determine dumping practices there.



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Comparisons – Averaged Density, Range of Items and Totals for all Cleanups 2008 and 2009 (25 Cleanups)

	Annual Average Density (Items per Metre of Beach)	Range of Items Found	Annual Average of Totals
2008	0.26	17 to 52	311.15
2009	0.37	14 to 64	707

In terms of all the sites the 2009 debris situation on the beaches has worsened. There were 12 cleanups in 2008 and 13 in 2009.

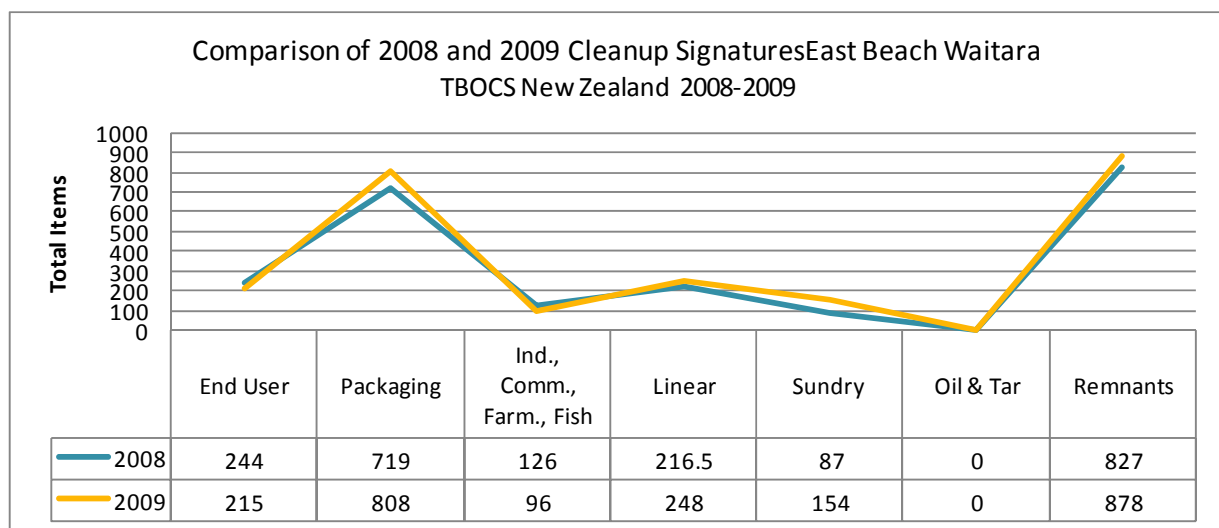
Comparisons – Periodic Cleanups at East Beach Waitara

Comparisons – Averaged Density, Range of Items and Totals East Beach Waitara 2008 and 2009 (10 Cleanups)

	Annual Average of Density (Items per Metre of Beach)	Range of Items Found in all Cleanups	Annual Average of Totals (Annual Total Divided by Number of Cleanups)
2008	0.25	15 to 52	277.44
2009	0.19	31 to 64	340.71

For the East Beach Waitara periodic cleanups the situation worsening impact is less pronounced than for the sites taken as a whole. This is likely to reflect the effectiveness of regular beach cleanups at the site.

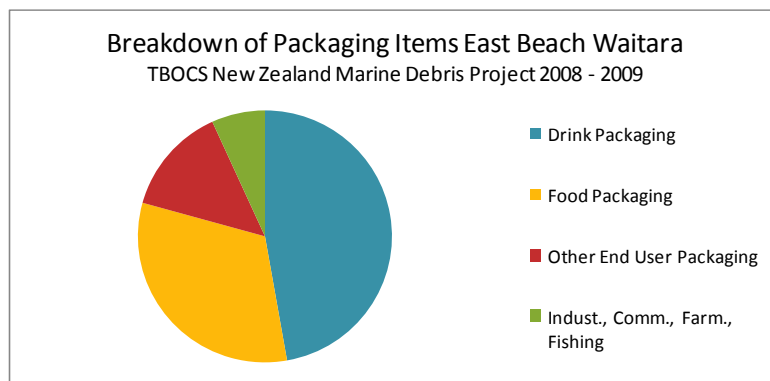
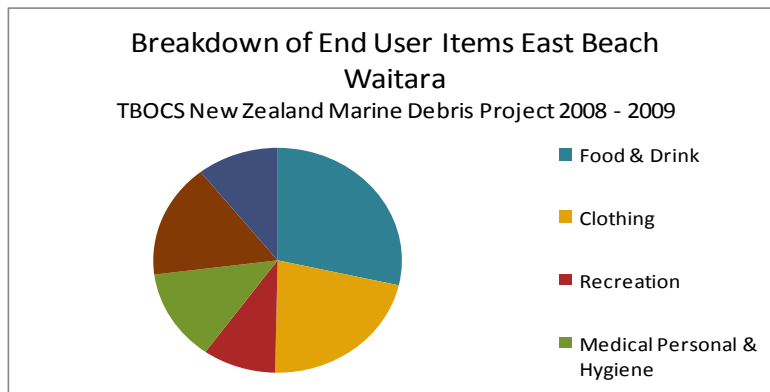
Annual Site Signature Comparison 2008 - 2009



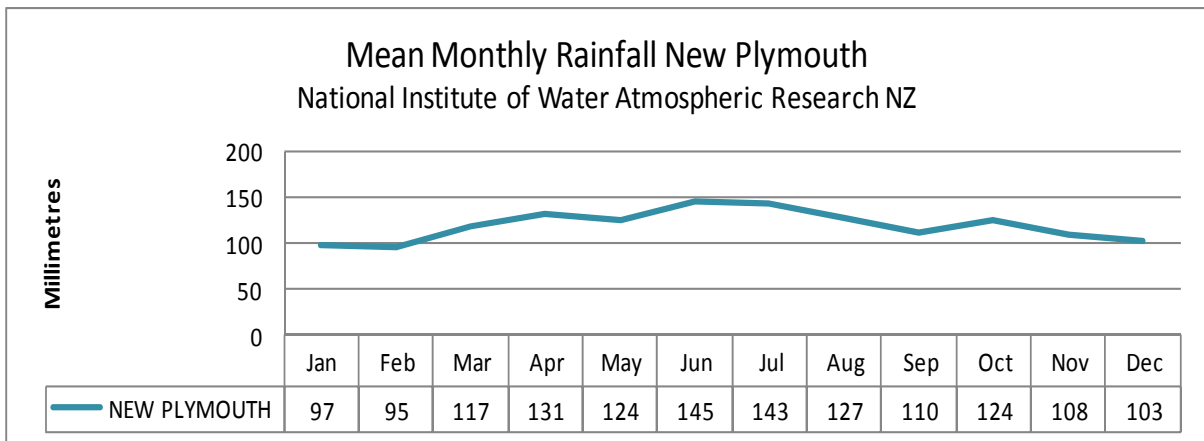
This graph shows how consumer items and consumer packaging items are now the most prevalent types of marine debris. It also shows how this mostly plastic debris continues to break down forever giving rise to the constant presence of remnants. Below are graphs showing the origins of these items in terms of what they are used for.



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Seasonal Factors Influencing Marine Debris presence



Rainfall is even and heavy throughout the year on average but extreme events and climate change are beginning to influence this average pattern. River borne rubbish will inevitably end up in the sea and in New Zealand's mountainous terrain the fast flowing rivers transmit this rubbish quickly. The generally prevailing wind direction is north westerly (NIWA) but the detail of the effects of wind regimes on the debris process is out of the scope of this report. Further data is needed to identify the wind driven input of marine debris from the various offshore sources.



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Appendix 1 - List of All Items East Coast Site North island New Zealand

Item	Total	Item	Total
End User (Consumer) Items		Ind., Comm., Farm., Fishing	
Straws	26	Cable Tie/Tags	2
Cups/Plates/Cutlery	19	Animal Syringe	1
Cigarettes/Filters	18	Linear Items	
Shoes	13	Fishing Line - metres	130
Pens/Pencils	8	Rope - metres Natural	14
Wooden Ice Cream Sticks	7	Sundry Items (Materials, Dumping etc)	
Tissues	7	Wood	4
Tea Bag	5	Metal	3
Toys	5	Rubber	2
Band aid	5	Remnants	
Cigarette Lighters	5	Polystyrene Foam	161
Cloth/Clothing	3	Plastic Hard Pieces	89
Hooks/Sinkers	3	Glass Broken	49
Nappies	3	Lids/Bottle Tops/Corks	45
Binding/Thread/String	3	Plastic Film Remnants	4
Tampons/Applicators/Sanitary Napkins	2	47	829
Toothbrushes	2		
Fishing Rod/Hand Reel	1		
Brushes/Combs	1		
Packaging Items			
Plastic Drink Bottles	59		
Aluminium Cans	29		
Plastic Wrap - Food	27		
Glass Drink Bottles	23		
Plastic Containers	12		
Paper/Cardboard	7		
Plastic Bags	7		
Bait Bags/Packaging	7		
Foil	4		
Tins	3		
Skincare Bottles/Tubes	3		
Glass Jars	2		
Oil/Lube Bottles	2		
Bleach/Cleaner Bottles	2		
Tobacco Packaging	1		
Aerosol Cans	1		



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Appendix 2 - List of All Items South West Coast North Island New Zealand

Item	Total	Item	Total
End User (Consumer) Items		Plastic Wrap - Non Food	142
Cigarettes/Filters	271	Plastic Containers	102
Shoes	112	Foil	58
Straws	111	Aerosol Cans	49
Binding/Thread/String	70	Skincare Bottles/Tubes	46
Cloth/Clothing	63	Bait Bags/Packaging	44
Cups/Plates/Cutlery	53	Drench Containers 20lit	34
Cigarette Lighters	47	Tobacco Packaging	33
Tissues	42	Bleach/Cleaner Bottles	32
Toys	35	Tins	27
Confection Sticks	27	Glass Jars	22
Pens/Pencils	24	Oil/Lube Bottles	18
Wooden Ice Cream Sticks	20	20 Litre Drums	15
Hooks/Sinkers	19	Plastic Sheeting/Tarps	10
Band Aid	13	Pull Tabs	7
Cotton Bud Stems	12	Bubble Wrap	6
Toothbrushes	11	Hessian Bag	3
CO2 Gas Capsule	10	55-Gal. Drums	1
Nappies	8	Plastic Container 45lit	1
Fishing Floats	5	Ind., Comm., Farm., Fishing	
Brushes/Combs	5	Shotgun Shells	122
Syringes	5	Animal Syringe	38
Fireworks	3	Shotgun Wadding	28
Dummy	3	Cable Tie/Tags	17
Tampons/Applicators/Sanitary Napkins	3	Drip Canisters	11
Fishing Rod/Hand Reel	2	Fencing Wire - Metres	10
Surf Wax	2	Ear Tags	9
Torch	2	Suction Cup Cow Milking	9
Drug Paraphernalia	2	Light Bulbs/Tubes	6
Tea Bag	1	Buoys/Floats	5
Balloons	1	Crab/Lobster/Fish Traps	3
Bicycle	1	Cylume Chemical Glow Sticks	3
Chilly Bin	1	Brooms	3
Transistor Radio	1	Ballcock	2
Asthma Inhalers	1	Cow Inserts	2
Mouthguard	1	Plastic Drip Bottle	2
Candle	1	Bait Containers/Lids	1
Packaging Items		Feed Tub 5m x 1m	1
Plastic Drink Bottles	707	Traffic Cone	1
Plastic Wrap - Food	340	Linear	
Aluminium Cans	310	Fishing Line - Metres	987
Glass Drink Bottles	291	Rope - metres	268
Plastic Bags (continued top of next column)	156	Rope - metres Natural	13



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Sundry Items (Materials, Dumping etc)		Batteries	2
Metal	109	Marine Engine Parts	2
Poly Pipe	70	Fuel Pump	1
Rubber	59	Furniture	1
Plastic Piping	38	Lawn Mower	1
Wood	26	Plastic Mesh	1
Electrical Cable and Equipment	22	Remnants	
Cars/Car Parts	22	Glass Broken	3333
Tyres	16	Plastic Hard Pieces	1103
Building Materials	9	Polystyrene Foam	711
Ear Plug	8	Plastic Film Remnants	385
White Goods	5	Lids/Bottle Tops/Corks	347
Boat Pieces	3	<u>107</u>	<u>11473.5</u>