



Darwin Harbour Clean-Up

An assessment of the data focussing on the container
deposit scheme and plastic shopping bag ban

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AUSTRALIAN
MARINE DEBRIS INITIATIVE



Introduction

The Darwin Harbour Cleanup (DHCU) is an annual event organised by the Northern Territory Seafood Council and OceanWatch Australia's SeaNet Program through funding from the Australian Government's Caring for our Country and Territory Natural Resource Management's Coastcare Program. The clean-up is a combined effort involving volunteers, and a variety of community, business and government organisations lending expertise, facilities and equipment to what amounts to a major logistical task on the day. The cleanup is coordinated by the Northern Territory SeaNet Officer Lyn Lambeth.

This year's Darwin Harbour Clean-Up provided an opportunity to assess changes in levels of packaging items in and around the harbour following the introduction of two initiatives by the Northern Territory Government aimed at reducing the flow of packaging items into the environment. A container deposit scheme (CDS) began operating in the Northern Territory on 3rd January 2012. The scheme offers a 10c refund on eligible containers. These include;

- plastic drink bottles used for juice, water, soft drink, sports drinks, iced tea and vitamin drinks
- Cardboard drink cartons used for flavoured milk and juice
- Aluminium cans used for beer and soft drink
- Glass stubbies used for beer and pre mixed alcoholic drinks.

The NT Government also introduced a territory-wide ban on plastic shopping bags which came into effect in September 2011.

Data Collection and Limitations

Due to the large volume and weight of retrieved debris and time and resource constraints a full count of items collected on DHCU cleanup days is not achievable. At each site approximately 5% of randomly selected bags of debris are therefore counted and the results are extrapolated. Tangaroa Blue Foundation (TBF) Data Collection Sheets are used to record and categorise data.

The priority of the DHCU is to remove debris from the harbour surrounds combined with public education. There is some variation in the number of sites cleaned each year and also in the amount of resource available to be deployed into each site. This together with the necessary extrapolation of total amounts for sites places some limitations on interpreting the data but does not prevent the extraction of useful information.

As the clean-up has grown in popularity over the three years it has been held, so has the number of people and sites involved, and the amount of resources dedicated to removing rubbish. Therefore an increase in the amount of rubbish collected is not necessarily related to an increase in the amount of rubbish entering the marine environment.

Method

DHCU sites fall into two broad areas, sites on the city side of the Darwin Harbour and sites on the Cox Peninsula where there are small communities with limited infrastructure and facilities. Data from each area was examined separately for comparison purposes. To find an indication of the effects of the CDS and plastic shopping bag ban, data was examined in three ways. Trends in the proportion of debris attributable to littering or originating from other local sources were determined using an index developed by TBF. Trends in the proportions of plastic, glass and metal in the cleanup data were charted as were trends in the numbers of selected containers and plastic bags recovered from cleanup sites. Trends in container and shopping bag numbers were established by finding the average number of these items across sites where they occurred. Glass beer stubbies and cardboard drink packaging were not examined due to their numbers being very low in the data.

Results

General Source of Debris

Figure 1 below shows the DHCU achieving the recovery of an increasing amount of debris from the harbour surrounds over the past 3 years. Much of the increase in the amount of rubbish collected can be attributed to an increase in effort (number of people collecting rubbish and an increase in the number of sites).

Figure 1 - Totals and weights for the Darwin Harbour cleanups.

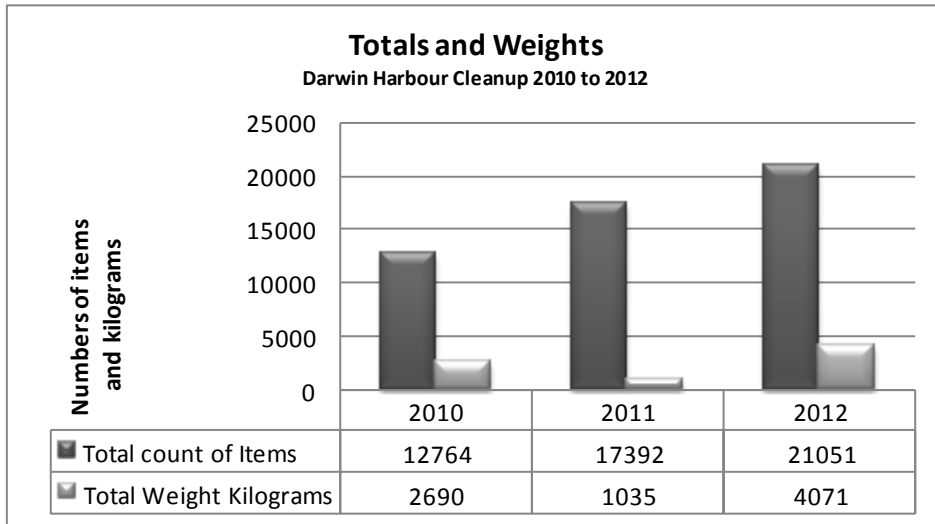


Figure 2 below shows a reduction in the number of items collected around the harbour over the last two years, despite an increase in effort.

Figure 2 – Total items per volunteer hour (“volunteer hour” being a unit of effort representing the number of volunteers multiplied by the number of hours spent collecting rubbish).

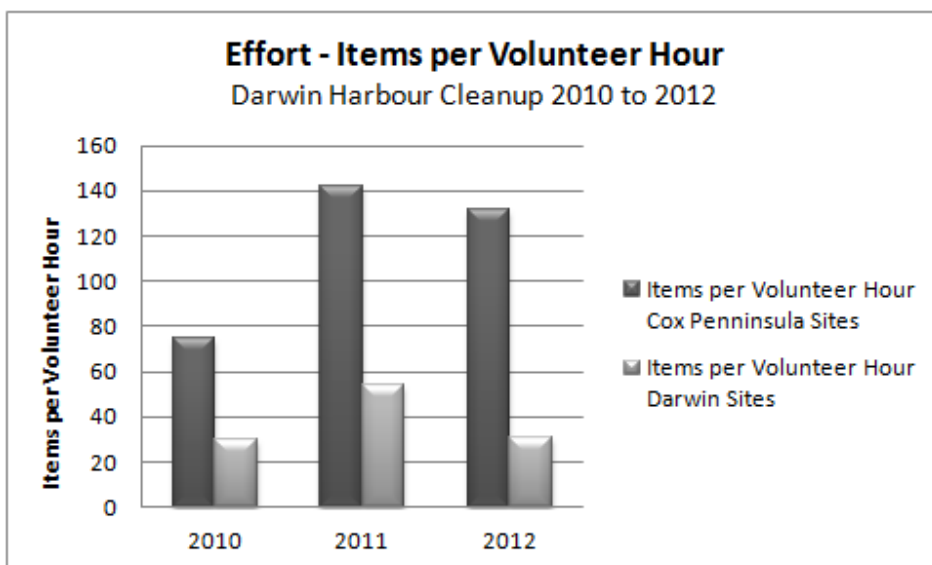
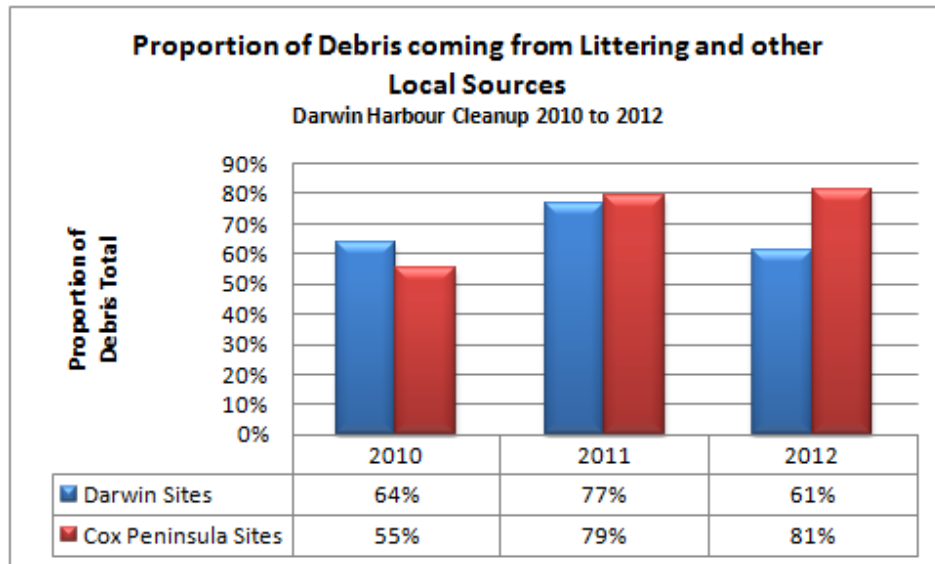


Figure 3 shows the proportion of debris coming from littering and other local sources for each side of the harbour. The litter and local source index is the fraction of debris generated locally and is a guide to where the debris is coming from. Whilst the index stays steady on the Cox Peninsula side of the harbour, it shows a decline on the Darwin side for the current year.

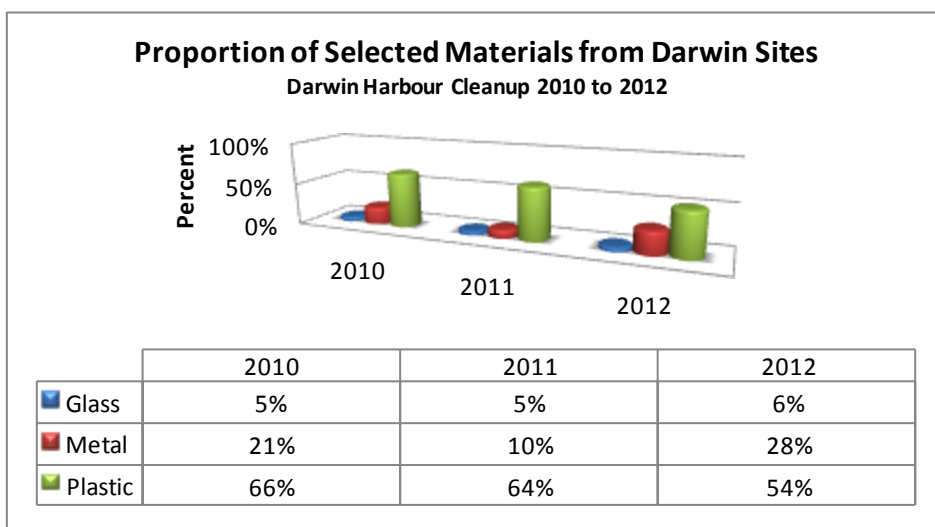
Figure 3 – Trend in the proportion of debris attributable to littering or other local sources.



Materials

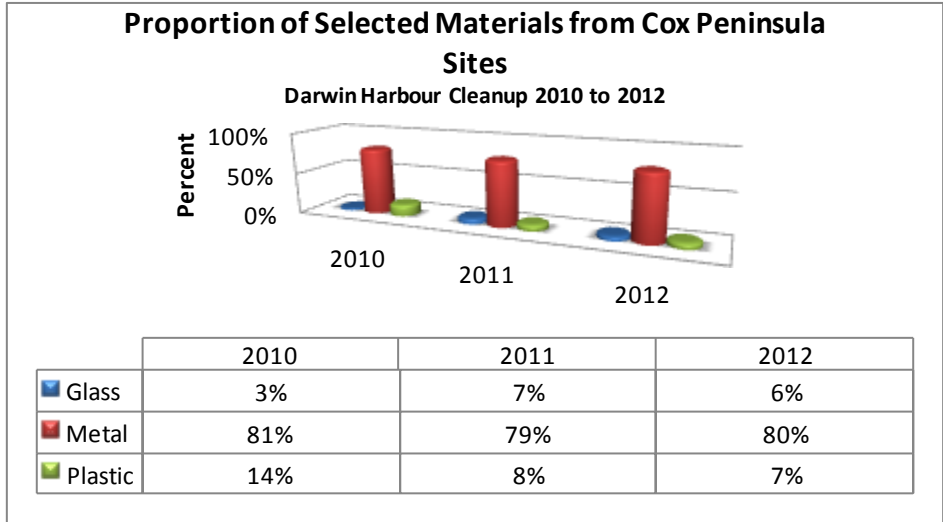
Glass, metal, plastic and cardboard are the materials involved in the manufacture of containers eligible under the CDS. On the Darwin side as shown in Figure 4 below, glass remains at a low and steady proportion while metal rises and plastic falls.

Figure 4 - Trend in the proportion of glass, metal and plastic for Darwin sites



On the Cox Peninsula side the percentage of metal items recovered in the cleanup increases and remains at a high proportion of the debris compared to glass and plastic which remain relatively low across the 3 years (Figure 5).

Figure 5 - Trend in the proportion of glass, metal and plastic for Cox Peninsula sites



Containers

A rise in the average number of aluminium cans per site on the Darwin side of the harbour slowed in the current year’s cleanup while there was a noticeable fall in the average number of plastic drink bottles (Figure 6). On the Cox Peninsula side plastic drink bottle numbers were low while aluminium cans numbers rose considerably (Figure 7).

These trends are also reflected in the gross numbers for each side of the harbour shown in Table 1 below.

Figure 6 - Trend in selected containers for Darwin sites

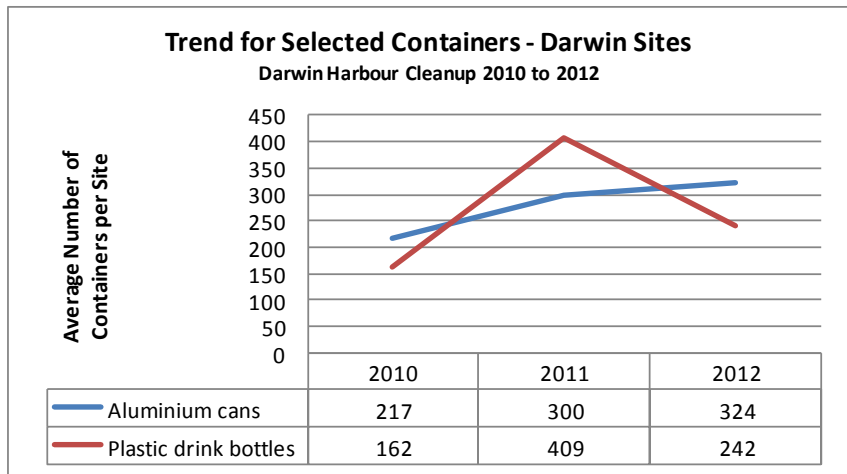


Figure 7 - Trend in selected containers for Cox Peninsula sites

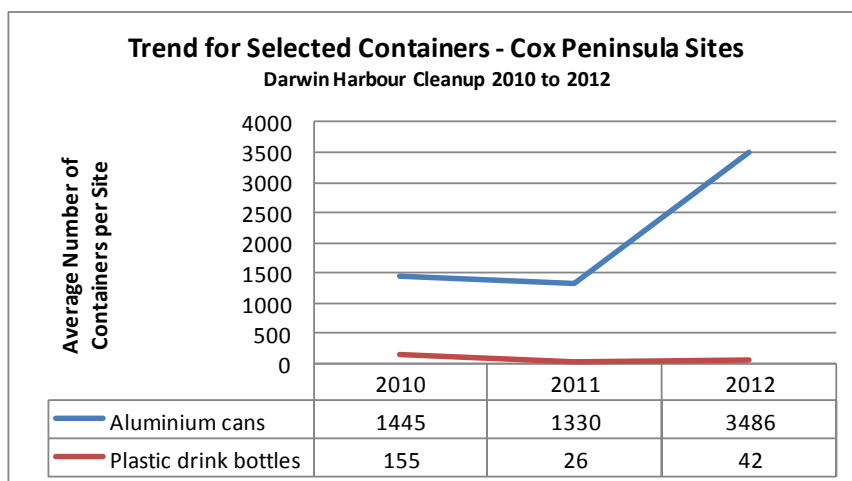


Table 1 - Total numbers of containers

Plastic Drink Bottles			
	2010	2011	2012
Darwin Sites	486	1636	1453
Cox Peninsula Sites	774	51	127
Aluminium Cans			
	2010	2011	2012
Darwin Sites	650	1199	1621
Cox Peninsula Sites	7226	3989	10458

Plastic Bags

A substantial decrease is shown by the data in the average numbers of bags recovered from Darwin cleanup sites. Plastic bags on the Cox Peninsula side were in low numbers but increased in the current year's cleanup (Figure 8).

Figure 8 - Trend in plastic bag numbers

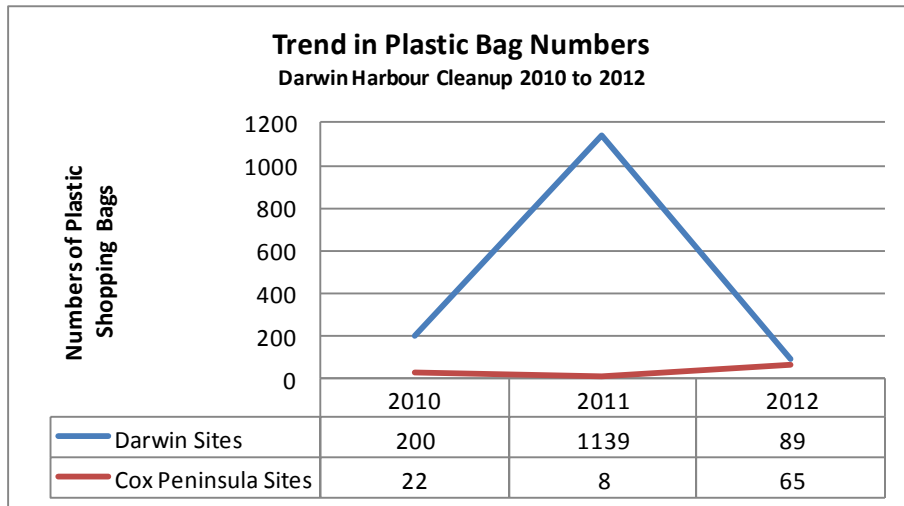


Table 2 - Total numbers of plastic bags

Plastic Bags			
	2010	2011	2012
Darwin Sites	200	4557	531
Cox Peninsula Sites	44	15	129

Discussion

Container Deposit Scheme

On the Darwin side of the harbour where CDS infrastructure is in place the litter and local source index shows a reduced amount of littering sourced debris in general while the proportion of plastic is also reducing and the average number of plastic drink bottles recovered from sites has reduced substantially. Taken together these suggest the scheme is having an impact on this group of containers. Aluminium cans were collected in high numbers at the Coconut Grove and Ludmilla Creek cleanup site where a large amount of effort was directed over a larger area than previous years.. Some of this sites' volume of cans will have been from past years accumulation. It is therefore reasonable to conclude that the growth in the average number of aluminium cans recovered from Darwin cleanup sites has slowed and may be declining. In general, on the Darwin side of the harbour the average number of plastic drink bottles and aluminium cans is being reduced against a background of increasing effort producing larger debris recovery levels in the cleanups.

On the Cox Peninsula side where there is no CDS infrastructure the picture is dominated by the large numbers of aluminium cans. Here again additional manpower enabled a thorough cleanup amongst the mangroves and old camp sites resulting in the removal of many years accumulation of debris. It is unclear whether the CDS is having an impact in this area at this point in time.

Plastic Bags

There is a very substantial decrease shown by the data in the average numbers of bags recovered from Darwin cleanup sites. Plastic bags on the Cox Peninsula side were in low numbers but increased in the current year's cleanup again most likely as a result of increased effort. The success of the plastic bag ban in terms of reducing the input of plastic bags into the harbour environment is clearly evident from the Darwin cleanup sites.

Summary

It is evident from the DHCU cleanup data that the rising inputs of packaging litter polluting the harbour environment is being arrested and reversed. Plastic shopping bags are an example of a single (primary) use packaging item which has become a major global pollutant both on land and in the marine environment. The plastic shopping bag ban demonstrates that stopping the supply of these kinds of items at their source can have an immediate positive impact on the problem. The Container Deposit Scheme which relies on a change of attitude and practice within the community coupled with infrastructure provision requires time to develop. The signs are very positive that the scheme is working with regard to its impact on the levels of containers entering the harbour system as litter.

Acknowledgements

The Larrakia people - traditional owners of Larrakia Country

Territory Natural Resource Management's CoastCare Program

The Australian Government's Caring for our Country

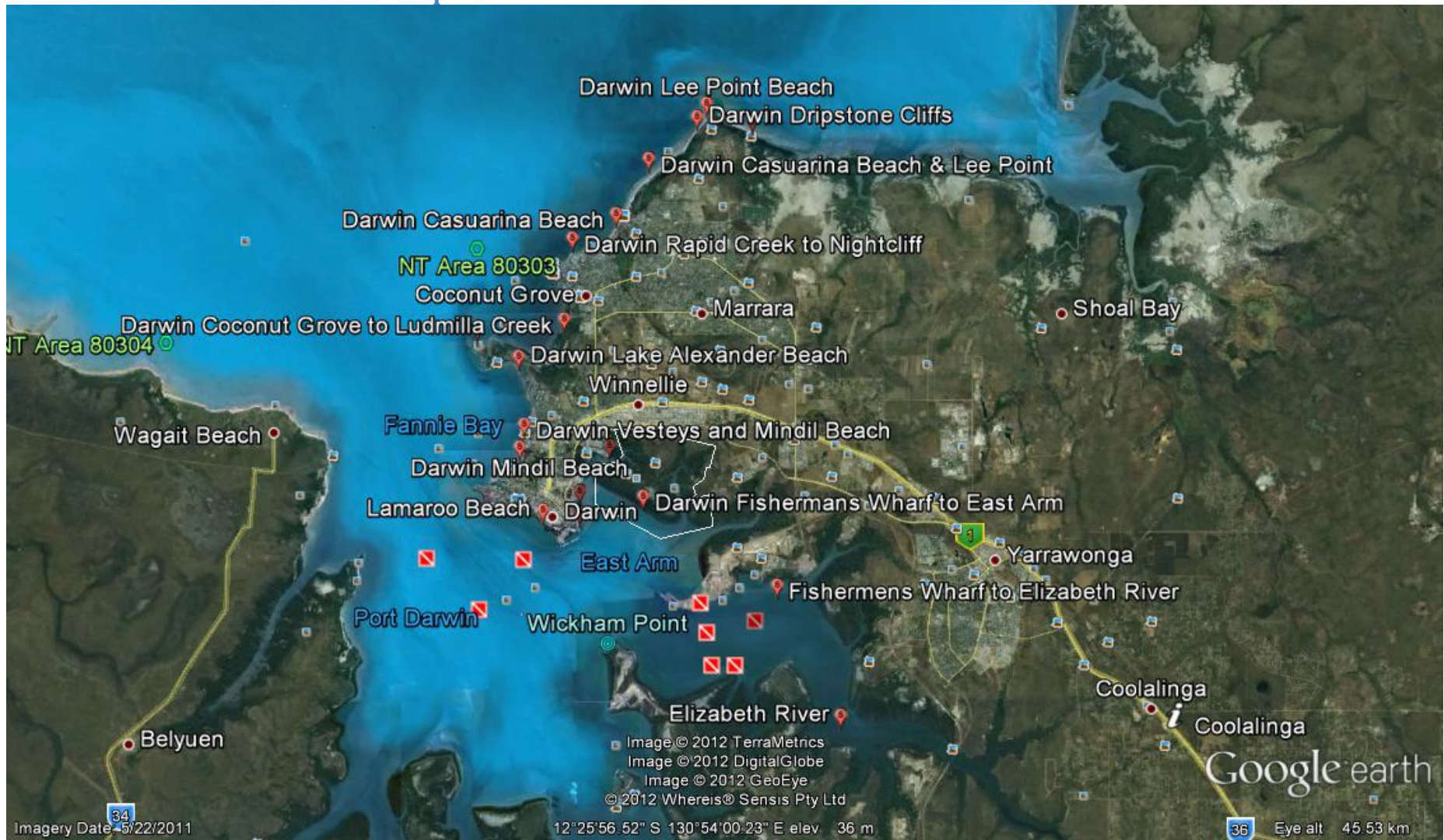
Northern Territory Seafood Council and OceanWatch Australia - event organisers

Volunteers and organisations participating in and supporting the Darwin Harbour Cleanup

Attachment 1 - Site Details

Area Code	Cleanup Site	Cleanup Date	Total of Items Recovered	Weight in Kg	Litter & Local Source Index
80303	Darwin Coconut Grove to Ludmilla Creek	13/07/2010	380	232	77%
80303	Darwin Fishermen's Wharf to East Arm	13/07/2010	2660	1999	52%
80303	Darwin Rapid Creek to Nightcliff	13/07/2010	736	102	63%
			3776	2333	64%
80304	Cox Peninsula Madpil/Bitbinbiyirrk	13/07/2010	212	17	8%
80304	Cox Peninsula Mandorah Pub mangroves	13/07/2010	6496	171	95%
80304	Cox Peninsula Two Fella Creek	13/07/2010	1277	116	69%
80304	Cox Peninsula Wagait Tower Rd to West Point	13/07/2010	267	27	20%
80304	Cox Peninsula West Point Beach to Wagait Beach	13/07/2010	736	26	81%
			8988	357	55%
80302	Buffalo Creek	5/07/2011	106	8	38%
			106	8	38%
80303	Darwin Coconut Grove to Ludmilla Creek	5/07/2011	3010	207	76%
80303	Darwin Fishermen's Wharf to East Arm	5/07/2011	5437	462	51%
80303	Darwin Lake Alexander Beach	5/07/2011	561	19	95%
80303	Darwin Rapid Creek to Nightcliff	5/07/2011	3165	83	87%
			12173	771	77%
80304	Cox Peninsula Mandorah Pub mangroves	5/07/2011	3140	82	98%
80304	Cox Peninsula Wagait Tower Rd to West Point	5/07/2011	296	99.5	53%
80304	Cox Peninsula West Point Beach	5/07/2011	1677	74.5	87%
			5113	256	79%
80303	Darwin Casuarina Beach	12/07/2012	199	19.5	73%
80303	Darwin Coconut Grove to Ludmilla Creek	12/07/2012	2909	2455	57%
80303	Fishermen's Wharf to Elizabeth River	12/07/2012	1482	273	60%
80303	Fishermen's Wharf to Lamaroo Beach	12/07/2012	836	166	72%
80303	Sadgroves Creek	12/07/2012	1122	257	43%
80303	Trower Road to Rapid Creek Mouth	12/07/2012	1069	91	59%
			7617	3261.5	61%
80304	Cox Peninsula Madpil/Bitbinbiyirrk	12/07/2012	5769	282	96%
80304	Cox Peninsula Mandorah Pub mangroves	12/07/2012	7422	510	97%
80304	Cox Peninsula Wagait Tower Rd to West Point	12/07/2012	243	17	51%
			13434	809	81%

Attachment 2 - Darwin Side Cleanup Sites



Attachment 3 - Cox Peninsula Side Cleanup Sites

