Marine Debris Monitoring in South Australia: A Report on the 2005 Annual Robe Litter Survey

Prepared for the
Australian Government Envirofund and the
South East Natural Resource Consultative Committee

by
Y. M. Eglinton, R. J. Wear, M. J. Theil & E. J. O'Loughlin

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EXECUTIVE SUMMARY

The 2005 annual litter survey held at Long Beach, Robe was undertaken on the 15th September. The survey revealed that the total amount of litter has decreased by 44% since 2004, from 1689 kg to 945 kg, which equates to 78.8 kg/km of beach. The most prominent decrease in litter was that of processed wood, which decreased by 521 kg from 1326 kg in 2004 to 805 kg in 2005. Although wood represented approximately 85% of the total litter collected, the combined decrease in hard and soft plastics were positive given the impact that plastic can have on local fauna. In 2005, a total of 82.8 kg of plastic-related litter was collected, representing a 69.6% drop from 2004. It is possible that this decline is attributed to the initiation of the Australian Government's "Clean Green" program, which promotes industry sustainability and responsible disposal of all rubbish in the rock lobster industry. Since the Robe Litter Survey began in 1997 the amount of glass and metal has varied considerably. In 2005, 30 kg of glass were collected, which was the lowest amount ever recorded, whilst 16.5 kg of metal were collected. Despite the considerable drop in litter from the previous year, there has been an overall increase in litter collected since the survey began in 1997. Furthermore, comparisons of studies that have adopted similar methodologies in remote locations suggest that the amount of litter along Long Beach is relatively high.

1. INTRODUCTION

The ever-increasing growth of the human population and the increasing trend to live along the world's coastal margins (Australian State of the Environment Committee, 2001) is resulting in significant and continuing changes to coastal and marine environments worldwide (Vitousek et al., 1997). Impact to such environments include coastal development, overexploitation of natural resources, and pollution. Pollution in the marine environment is derived from both ocean- and land-based sources and reduces the quality of the water through increases in nutrients, toxins and suspended solids. Land-based sources of pollution include wastewater and stormwater discharges as well as urban and industrial run-off, while ocean-based pollution predominantly includes oil spills, anti-fouling agents and the addition of nutrients and sediments from aquaculture operations. Ocean litter, enters the ocean from a number of sources, including 'at-sea' dumping by fishing, merchant, cruise and recreational ships (Otley and Ingham, 2003). While this form of litter has been considered to be minor in comparison to problems associated with the other forms of ocean pollution, evidence exists that indicates that ocean litter poses a significant threat to numerous organisms.

Direct threats associated with litter in the oceans primarily relate to physical entanglement of animals and ingestion of small fragments of synthetic materials (Laist, 1987). Animals that are physically entangled in loops or openings of drifting debris may be killed, or suffer an impaired ability to catch food or avoid predators. Animals may also incur wounds and infections from the abrasive or cutting action of attached debris, or exhibit altered behavioural patterns that place them at a survival disadvantage. In some circumstances, animals that are physically entangled in debris may drown (summarised in Laist, 1987). The ingestion of foreign material (eg. plastic debris) by a variety of marine organisms that may be unable to distinguish between normal prey and certain types of litter, also has negative impacts. Ingested debris may block the digestive tract or remain in the stomach for extended periods, and thereby lessen the feeding drive, cause ulcerations and injury to the stomach lining (Fry et al., 1987), or perhaps even provide a source of toxic chemicals (Fry et al., 1987). Weakened animals may then be more susceptible to predators and disease and less fit to breed successfully or rear their young. Animals that are affected by marine debris include marine mammals (eg. seals; Fowler, 1987; Page et al., 2004; whales; Volgenau et al., 1995), reptiles (eg. turtles; Carr, 1987; Tomas et al., 2002; Mascarenhas et al., 2004), fish (Jones, 1995; Cliff et al., 2002), and seabirds (eg. albatrosses and wedge-tailed shearwaters; Fry et al., 1987; Piatt and Nettleship, 1987; Copello and Quintana, 2003). Of course the impact that ocean litter has on marine biota is not the only negative aspect of this form of pollution; ocean litter also poses a danger to divers and swimmers, and is unsightly and unhygienic. Ocean litter, when washed onto beaches, can reduce the recreational and aesthetic value of the beach (Jones, 1995). It can have a serious effect on many user groups who visit and enjoy these areas (Whiting,

1998) as well as being hazardous (Jones, 1995). Thus ocean litter can negatively impact tourism, which in turn could impact negatively on local economics.

International concerns regarding the impact of ocean litter led to the Marine Pollution Convention (MARPOL), regulating the disposal of rubbish at sea, which prohibits the disposal of garbage into marine waters (Annex V). This legislation was initiated on 31 December 1988, and has been included into Australian law as part of the Protection of the Sea: Prevention of Pollution from Ships Act, 1983. International concerns regarding the impact of litter have also led to an increasing number of studies and monitoring programs to investigate the quantity of litter present. Such programs have increased our understanding of how litter surveys should be undertaken and which sections of the coastline are most appropriate for such surveys. The preferred characteristics by which any beach should be chosen for an ocean litter survey are listed in Table 1 summarised by Wace (1995). According to these criteria, Long Beach in Robe is an ideal location to undertake a litter monitoring program. Not only is Long Beach oriented in a way that will aggregate rubbish ashore, but the beach is relatively long (~12 km), protected, backed by a dune system and relatively remote while still close to facilities to process and remove the litter collected. In 1997, an annual beach litter survey was instigated at Long Beach to monitor long-term trends in the amount and types of litter. This report outlines the results of the ninth annual Robe litter survey undertaken in September 2005.

Table 1. The preferred characteristics of any beach for ocean litter monitoring (summarised from Wace, 1995).

Ideal characteristics for beach litter monitoring	
Geographical	Facing the major wind systems and ocean currents which operate across the more-or-less defined area of sea whose litter is to be monitored.
Geomorphological	Sand, gravel or shingle beach, without reefs causing heavy surf to break offshore (which may smash glass before it reaches the beach).
	Nourished by offshore sands, rather than by nearby rivers contributing land-based sediments (which may be associated with terrestrial litter).
	Backed by a dune system with an understood relationship to the beach sands.
	Having a uniform sediment compartment, at least 5 km long, with minimal longshore drift of sand.
	Moderate beach gradients with a small tidal range, so that high and low water strandlines are close enough to be sampled simultaneously, and litter is not shunted across wide strandflats.
Ecological	No dense subtidal seagrass or algal growth offshore, whose storm debris can smother stranded ocean litter.
	No dense land vegetation, in dunes, mangroves or back-dune swamps behind the beach, in which windblown litter can be lost.
Social & Economic	Remote from human settlements, seldom visited by tourists, and without easy access to motor vehicles.
	Without human settlements or industry in catchments contributing litter directly or indirectly to the beach.
	Without nearby inshore fisheries, mariculture, or anchorages which are used by fishing boats or recreational craft.
	Within reach of a rubbish tip, to which beach litter can be removed from the beach/dune systems.

2. INFORMATION ABOUT THE STUDY AREA

Long Beach at Robe is the site of the longest running annual beach litter survey undertaken in South Australia. It is situated approximately 340 km south-east of Adelaide, within Guichen Bay and is 12 km long, westerly-facing and bounded by Cape Dombey to the south and Cape Thomas to the north (Figure 1). The coastal geomorphology within the area surrounding Guichen Bay varies from rocky sea-cliffs fronted by intertidal shore platforms to low energy sandy beaches such as Wright and Rivoli Bays. Guichen Bay is also relatively sheltered as a result of the protection offered by submerged reefs, and a fragmented group of islets known as Baudin Rocks (formally known as Godfrey Islands) (Edyvane, 1999).

significance of the area and provides some incentive to protect this biodiversity from a range of disturbances, including ocean litter.

2.2. Fishing and Tourism in the area

The main single-species fishery within the area is the southern rock lobster fishery. This fishery contributes greatly to the economy of the local area through the creation of jobs and income. This area also supports the commercial harvest of blacklip abalone, however Guichen Bay does not feature in the particularly productive area for this species in this region (Mayfield et al., 2004). Recreational fishing by tourists and locals is also a prominent activity and is undertaken off the Robe jetty, breakwater, boats and beach. The major species sought include King George whiting, black bream, sand flathead, yellow-eye mullet, Australian salmon, snapper, mulloway, sweep, southern rock lobster, and toothbrush leatherjacket (Edyvane, 1999). Other recreational activities in which the large number of visitors to the south-east partake include sailing, boating, surfing and SCUBA diving. Commonwealth fisheries operating in offshore waters include the South-East Trawl Fishery, Southern Shark Fishery, and South-East Non-Trawl Fishery (Larcombe et al*.,* 2002). Some of the species targeted by these fishing activities include the blue-eye trevalla, blue grenadier, flathead, silver trevally, redfish, ocean perch, orange roughy, eastern school whiting, gummy shark, school shark, elephant fish, whiskery shark and the saw shark (Larcombe et al., 2002). The waters adjacent to Guichen Bay are also utilised as a route by ships travelling to or from ports in Gulf St Vincent and those travelling to and from west coast ports (Larcombe et al., 2002).

3. MATERIALS AND METHODS

The Robe Litter Survey in 2005 was undertaken on September 15. The survey is an annual event that takes place on Long Beach, Guichen Bay and involves the systematic clearance of all litter from the 12 km beach, and separation into litter types and origin, where possible. Prior to the survey, the beach was separated into twelve, one kilometre sections, separated by labelled stakes. Within each one kilometre section, small groups of volunteers collected all visible, man-made litter from the beach (Figure 2a). Once collected the litter was transported to Second Ramp, where it was classified as either hard (i.e. moulded) plastic, soft (i.e. flexible) plastic, glass, metal, wood (processed wood only), cloth, rubber, paper or foam. Following classification, the litter was placed into appropriately labelled wheely bins (Figure 2b and c), and then transported to a near-by house where the contents were weighed (Figure 2d). Results were recorded onto a data sheet (Table 5 in the Appendix). The litter was then collected by the council for appropriate disposal or recycling. Examples of the type of litter collected within each classification are outlined in Table 2. In 2005, approximately 50 volunteers took part in the survey, including members of SARDI Aquatic Sciences, the Robe Professional Fisherman's Association, Robe Primary School and Friends of Little Dip Conservation Park.

Figure 2. Volunteer students collect litter along Long Beach (a) and sort the litter into various litter classifications (b and c), and members of the Robe Professional Fishermen's Association help to sort and weigh the wood (d).

Table 2. Examples of the type of litter collected within each litter classification.

Litter Classification	Examples of litter
Hard Plastic (moulded)	Liquid containers (eg bottles, tops, fragments), drums, buckets, crates, boxes, bait/burley baskets, crayfish pot necks, buoys, floats.
Soft Plastic (flexible)	Bags and polyethlene sheeting, rope, nets, cod-ends, fishing line, bait straps, buoys and floats, six-pack holders, polystyrene.
Glass	Bottles, jars, light globes, lights, fluorescent tubes.
Metal	Cans (food and drink), drums (oil containers), floats and buoys, aerosol cans.
Wood	Large permapine planks and posts and wooden crates. Does not include wood from natural processes eg. drift wood.
Paper and Foam	This category of litter included paper, cardboard and foam.
Cloth	Included cloth rags, and discarded clothing.
Other	This category included all other litter that could not be placed in the other classifications and included rubber products e.g. tyres, thongs.

4. RESULTS

Since the Robe Litter Survey began in 1997 more than 6,700 kg of litter has been removed from Long Beach. Over time there has been an overall increase in the amount of litter collected, and while just 333 kg of litter were collected in the first year, eight years later in 2004 the amount collected had increased five fold to almost 1,700 kg (Table 3; Figure 3). During the first five years of the survey the amount of litter collected varied little between 333 kg and 461 kg, however, since 2001 substantial increases have been apparent, and by 2004 the amount had increased to 1,690 kg. In 2005, approximately 946 kg of litter was collected, representing a 44% drop from the previous year, and the largest decrease since the inception of the Robe Litter Survey, nine years ago.

The substantial increase in total litter collected since the survey began, particularly since 2001, reflects a dramatic increase in the amount of processed wood collected along the beach. During the first five years of the survey the amount of wood varied between 25 kg and 199 kg, which represented between 7.7% and 50.6% of the total litter collected. In 2002, however, the amount of wood increased to almost 649 kg, and between 2003 and 2005 between 805 and 1,326 kg of wood were collected, representing between 77.3% and 85.2% of the total collected in these years (Figure 4a). During the early years of the survey the majority of wood collected consisted of small portions of broken wooden crates, while during recent surveys wood also consisted of large permapine planks and posts (Figure 5). The contribution that wood has made to the overall amount of litter collected is apparent when comparing litter volumes over time without wood. In such comparisons the amount of litter has varied from just 140 kg to 363 kg, with no apparent trend over time (Figure 3).

The amount of litter in the remaining classifications has varied little since the survey's initiation, and in most cases no clear tend is apparent. For example, the amount of metal collected since 1997 has varied between 6 and 31 kg, and the amount of paper and foam has varied from less than 1 kg to almost 10 kg, with no obvious increase or decrease over time (Figure 4). Such litter categories, as well as cloth and rubber, generally contributed very little to the total amount of litter collected each year (in most cases less than 3% of total litter), while others such as soft and hard plastics were more pronounced. While a record amount of hard and soft plastics were collected from Long Beach in 2004, during the 2005 survey the amount of plastic litter had decreased by almost 70%, and was the lowest amount of plastics collected since the survey began (Figure 4c and 4e). The amount of glass collected on Long Beach has also been reduced during recent years, incrementally decreasing from almost 72 kg in 2003 to 30 kg in 2005 (Figure 4g). As with the combined amount of plastics, the amount of glass collected in 2005 was the lowest since the survey began.

Table 3. Major types of litter recorded from the annual litter survey held at Long Beach, Robe, between 1997 and 2005.

	Year of Survey								
Category of Litter	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Metal (kg)	12.4	7.45	31.25	9.61	6.5	7.83	22.31	30.66	16.5
Hard Plastic (kg)	94.6	70.7	63.6	93.61	104.6	48.46	66.79	108.42	22
Soft Plastic (kg)	111.6	70.75	42.81	96.5	105.51	98.59	129.43	163.83	60.84
Glass (kg)	79.05	49.75	38.95	67.3	83.4	38.41	71.86	45.468	30.06
Wood (kg)	25.6	155.8	199.1	174.02	70.5	649.28	1061.4	1326.3	805.46
Cloth (kg)	6	4.6	9.31	6.45	1.9	6.72	3.68	5.13	2.56
Paper/Foam (kg)	0.1	9.25	4.3	9.58	5	0.59	3.09	0.78	3
Rubber/Other (kg)	3.75	3.5	3.85	4.52	9.7	5.39	14.24	9.24	5.44
TOTAL (kg)	333.1	371.8	393.17	461.59	387.11	855.26	1372.8	1689.9	945.86
kg/km	30.28	33.8	35.74	41.96	35.19	71.27	114.4	140.8	78.82

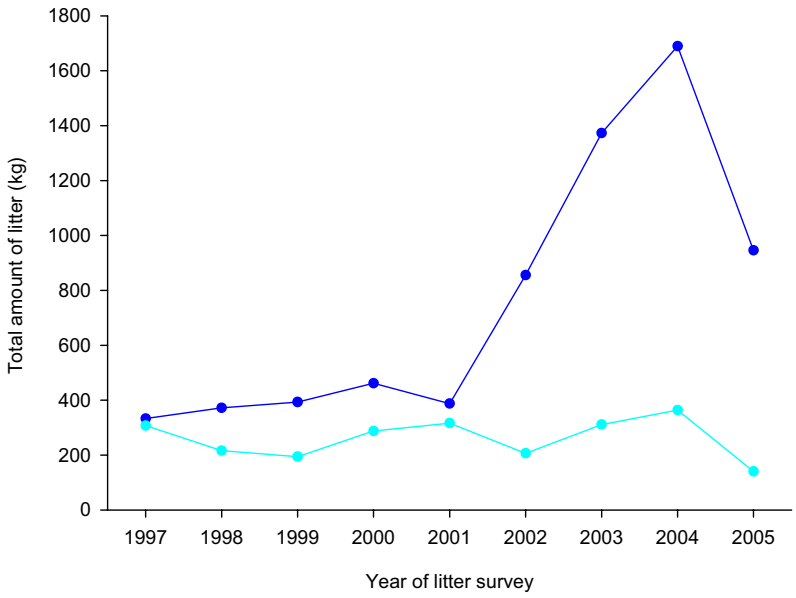

Figure 3. Total amount of litter, including wood (dark blue) and excluding wood (light blue), collected between 1997 and 2005 during the annual Robe Litter Survey.

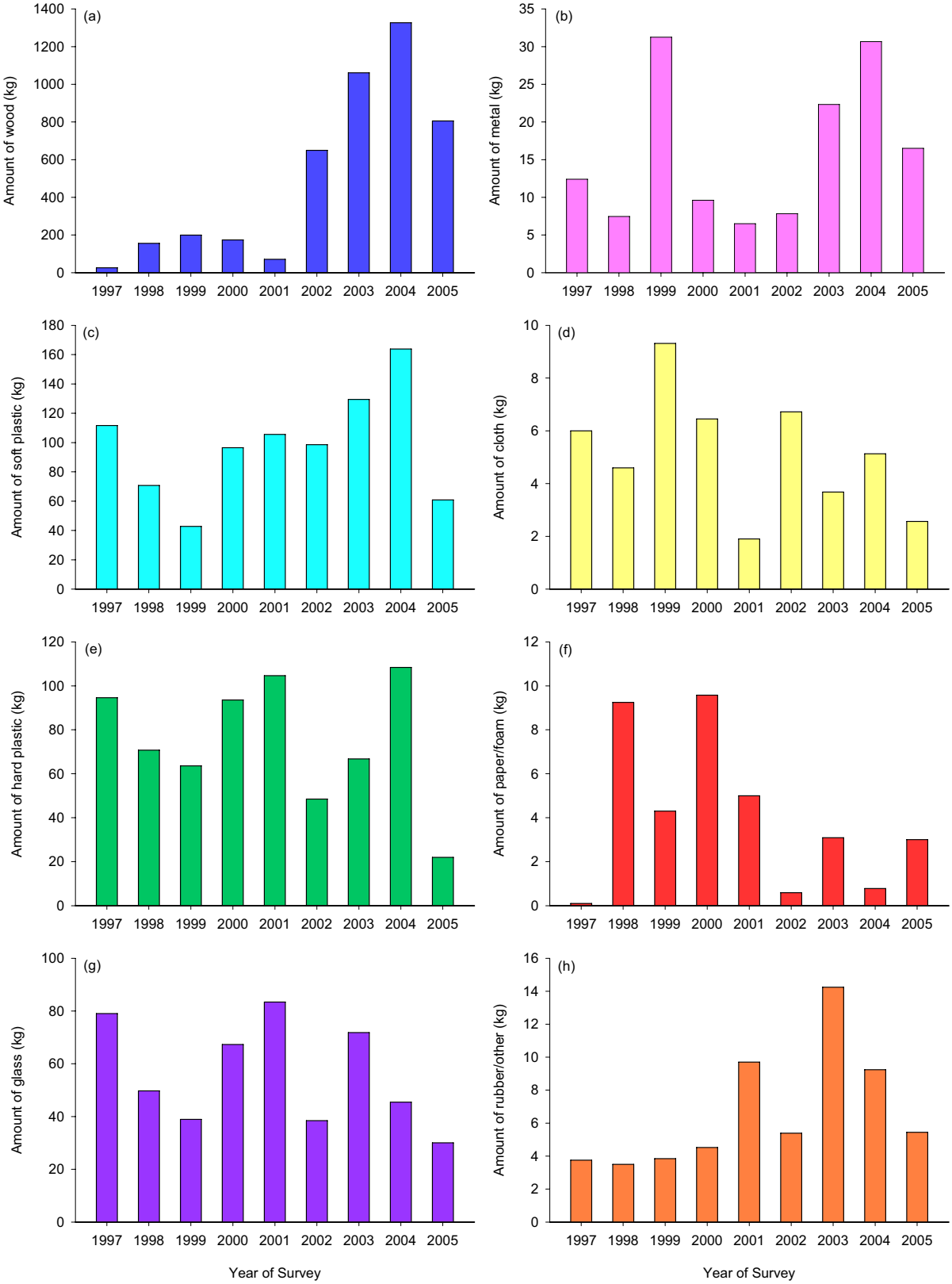

Figure 4. The total amount (kilograms) of wood (a), metal (b), soft plastic (c), cloth (d), hard plastic (e), paper/foam (f), glass (g), and rubber/other (h) collected at Long Beach in Robe between 1997 and 2005 from the annual Robe Litter Survey.

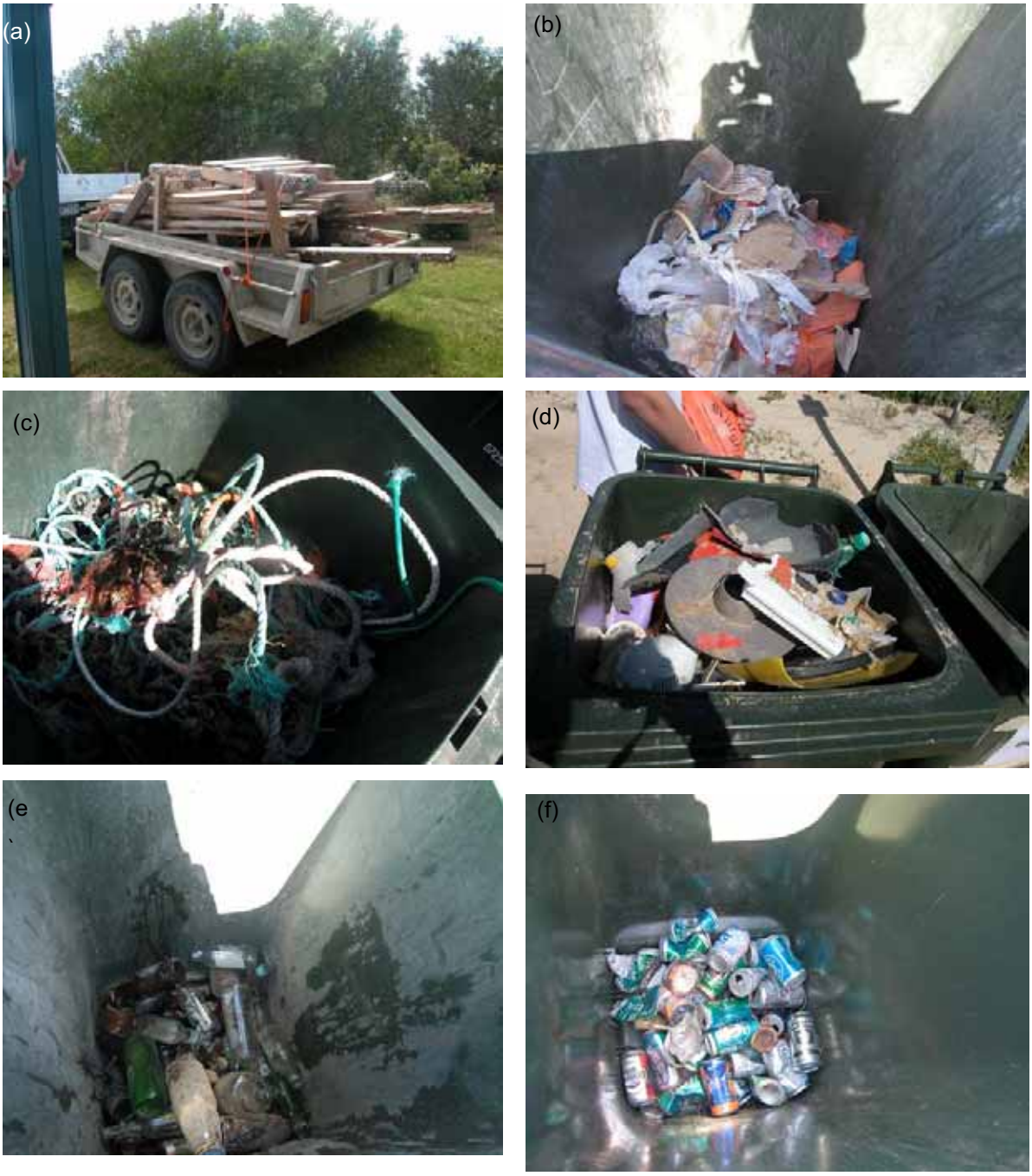

Figure 5. Types of litter collected during the 2005 Robe Litter Survey: (a) wood; (b) soft plastic; (c) soft plastic; (d) hard plastic; (e) glass; (f) metal.

5. DISCUSSION

While the impacts of beach litter have previously been thought to be relatively small, during recent decades as worldwide litter levels have increased, the ecological and economic impact of beach litter and threat posed to human health is becoming apparent. Beach litter surveys conducted regularly represent a means of collating quantitative and qualitative information on the levels and types of litter, and can provide valuable insights into the status of our oceans and the effectiveness of campaigns directed towards reducing inappropriate waste disposal.

The Robe Litter Survey has been conducted on an annual basis for the past nine years. During this time, a total of 6,700 kg of litter has been collected, with levels increasing in most years. In 2005, a total of 945 kg of litter was collected, which represented a 44% reduction from the previous year, and the largest decrease since the inception of the survey. This reduction was evident as a substantial decline in most categories, including wood, hard and soft plastics, glass and metal. The recent decline may have occurred as a result of a change in survey methodology. Between 1997 and 2004, litter was collected from the beach, fore dune and far dune (e.g. Wear et al., 2003; Eglinton et al., 2004), however in 2005 litter was collected from the beach and the face of the fore dune only. The reduction in area covered by volunteers is likely to have reduced the amount collected. Natural variability may also have contributed to the decline in litter collected in 2005. Given that the litter collected originates from both ocean and land-based sources and the survey has been occurring for nine years, it is possible that litter reductions have resulted from increased awareness of the impacts of litter and consequent improvements in litter disposal within the community.

Fishing-related litter, such as bait baskets, bait straps, nets and buoys, has previously been identified as a significant part of litter found in remote locations in other areas of South Australia (Edyvane et al., 2004), and represents a large proportion of the soft and hard plastics found in the present survey. In an effort to reduce fishing-related litter, the Australian Government initiated the “Clean Green” program. The program is directed towards the rock lobster industry and promotes industry sustainability and responsible disposal of all rubbish (eg. no straps on bait packaging). The program, which was initiated in 2004/05, may have contributed to the dramatic reduction in hard and soft plastics collected from Long Beach in 2005. The reduction in plastics found in 2005 is extremely encouraging especially considering that plastics constitute a large proportion of litter collected in marine debris surveys world wide (Whiting, 1998; Moore et al., 2001; Kusui and Noda, 2003; Otley and Ingham, 2003; Claereboudt, 2004; Abu-Hilal and Al-Najjar, 2004 and Santos et al., 2005), ancan d they have a devastating impact on coastal and marine animals.

The amount of hard plastic, soft plastic, glass and wood show quantitative differences, but nevertheless follow similar trends, with relatively high levels of litter collected in 1997, 2000, 2001 and 2004. Previous studies have demonstrated that litter counts are strongly influenced

by local atmospheric and oceanographic conditions, with higher levels of litter often found during winter months or following strong onshore winds (e.g. Gabrielides et al., 1991; Golik and Gertner, 1992; Thornton and Jackson, 1998). To determine if the higher levels of litter in some years correlate with local conditions found in the current study, data from the Bureau of Meteorology were assessed. In most litter categories no correlations between litter levels with either onshore winds or sea level height were found, however, the amount of paper/foam collected correlated with changes in average wind speed. The number of volunteers taking part in the survey may also have influenced temporal difference in litter amounts. Notwithstanding this, in 2003 the lowest number of volunteers participated in the survey yet relatively large volumes of litter were collected, and in 2005 large numbers of volunteers participated, and reduced litter amounts were found. Increased usage of beaches by locals and tourists has previously been correlated with increased litter amounts in other areas (e.g. Madzena and Lasiak, 1997). Unfortunately there is no way of knowing if use of the beach is positively correlated with the litter amounts found in the current study, as use of the beach is not monitored.

Litter surveys vary substantially with methodology (beach, oceanic and aerial surveys) and sampling design (including number of collections with a given time period, the items collected and way in which litter is quantified – counted or weighed), and as a result comparisons between studies are difficult. Notwithstanding this, the few studies that have adopted similar methodologies in remote locations, suggest that the amounts of litter along Long Beach are relatively high. For example, Edyvane et al. (2004) published the results of a long-term annual beach litter survey undertaken in Anxious Bay on the Far West Coast of South Australia. From 1991 to 2000, between 1.9 and 15.0 kg/km of litter was collected. Otley and Ingham (2003) found higher amounts of litter (approximately 18.3 kg/km) on a remote beach in the Falkland Islands. In the current study between 11.7 and 30.3 kg/km were collected (values exclude wood so direct comparisons can be made).

The litter collected during the survey was divided into eight main categories. Although it would be useful to separate each of these into sub-categories to gain a better idea of the origin of the litter, this was not done due to logistic constraints. It is important to note that this project is reliant on help from volunteers within the community, so effort is put into making the work as accessible and easy as possible. The project's intrinsic value lies in creating broader community and industry awareness of beach litter and its impact, and the need for better environmental management. The trend seen at Robe reinforces the need for continued long-term litter monitoring to help local government manage the disposal of litter and for a meaningful assessment of MARPOL compliance and campaigns directed towards reducing litter, such as the "Clean Green" program.

6. ACKNOWLEDGMENTS

The annual Robe Litter Survey relies heavily on the support of local community groups. Thanks therefore go to the following groups for their efforts during the 2005 survey; the Robe Professional Fisherman's Association, Robe Primary School, Friends of Little Dip Conservation Park, and Robe District Council. Special thanks must go to Steve Kennett and Dean Woodward for help in organising and coordinating the survey. This report could never have been put together if it was not for the suggestions and recommendations of Dr David Turner, Dr Tony Fowler, Michael Guderian and Dr Dale McNeil. Funding for the Robe Litter Survey in 2005 was generously provided by the Commonwealth Department of Environment and Heritage's "*Envirofund*" program and the South East Natural Resource Consultative Committee. The Robe Litter Survey provides the local government with valuable information on the current status and health of South Australian waters, compliance of various groups to Annex V of the Marine Pollution Convention (MARPOL), and increases community awareness of the impacts of marine pollution.

The two SARDI volunteers Mandee Theil and Emma O'Loughlin who helped in making the 2005 survey a success.

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8. APPENDIX

Table 4. A list of marine protected species that may inhabit the Guichen Bay area, along with their status (vulnerable or protected), obtained from the Biodiversity Conservation Act, 1999, online database (www.ea.govau/epbc) on the 17th January 2005, using an area search with a 1 km buffer around the site.

Group	Common Name	Scientific Name	Status	Threatened/ Migratory
Actinopterygii	Upside-down Pipefish	*Heraldia noctuma*	Protected	
Actinopterygii	Eastern Potbelly Seahorse, New Zealand Potbelly, Bigbelly Seahorse	*Hippocampus abdominalis*	Protected	
Actinopterygii	Short-head seahorse, Short-snouted Seahorse	*Hippocampus breviceps*	Protected	
Actinopterygii	Briggs' Crested pipefish, Briggs' Pipefish	*Histiogamphelus briggsii*	Protected	
Actinopterygii	Rhino Pipefish, Macleay's Crested Pipefish	*Histiogamphelus cristatus*	Protected	
Actinopterygii	Knife-snouted Pipefish	*Hypselognathus rostratus*	Protected	
Actinopterygii	Deep-bodied Pipefish	*Kaupus costatus*	Protected	
Actinopterygii	Brushtail Pipefish	*Leptoichthys fistularius*	Protected	
Actinopterygii	Australian Smooth Pipefish, Smooth Pipefish	*Lissocampus caudalis*	Protected	
Actinopterygii	Javelin pipefish	*Lissocampus runa*	Protected	
Actinopterygii	Sawtooth Pipefish	*Maroubra perserrata*	Protected	
Actinopterygii	Half-banded Pipefish	*Mitotichthys semistriatus*	Protected	
Actinopterygii	Tucker's Pipefish	*Mitotichthys tuckeri*	Protected	
Actinopterygii	Red Pipefish	*Notiocampus ruber*	Protected	
Actinopterygii	Leafy Seadragon	*Phycodurus eques*	Protected	
Actinopterygii	Weady Seadragon, Common Seadragon	*Phyllopteryx taeniolatus*	Protected	
Actinopterygii	Pug-nosed Pipefish	*Pugnaso curtirostris*	Protected	
Actinopterygii	Robust Spiny Pipehorse, Robust Pipehorse	*Solegnathus robustus*	Protected	
Actinopterygii	Spiny Pipehorse, Australian Spiny Pipehorse	*Solegnathus spinosissimus*	Protected	
Actinopterygii	Spotted Pipefish	*Stigmatopora argus*	Protected	
Actinopterygii	Wide-bodied Pipefish, Black Pipefish	*Stigmatopora nigra*	Protected	
Actinopterygii	Ring-backed Pipefish	*Stipecampus cristatus*	Protected	
Actinopterygii	Hairy pipefish	*Urocampus carinirostris*	Protected	
Actinopterygii	Mother-of-Pearl Pipefish	*Vanacampus margaritifer*	Protected	
Actinopterygii	Port Phillip Pipefish	*Vanacampus phillipi*	Protected	
Actinopterygii	Australian Long-snout Pipefish, Long-snouted Pipefish	*Vanacampus poecilolaemus*	Protected	
Aves	Great Skua	*Catharacta skua*	Protected	
Aves	Amsterdam Albatross	*Diomedea amsterdamensis*	Endangered	T/M
Aves	Tristan Albatross	*Diomedea dabbenena*	Endangered	T/M
Aves	Southern Royal Albatross	*Diomedea epomophora*	Vulnerable	T/M
Aves	Wandering Albatross	*Diomedia exulans*	Vulnerable	T/M
Aves	Gibson's Albatross	*Diomedea gibsoni*	Vulnerable	T/M
Aves	Northern Royal Albtross	*Diomedea sanfordi*	Endangered	T/M

Aves	Little Penguin	*Eudyptula minor* ***	Protected	
Aves	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Protected	M – terrestrial
Aves	Blue Petrel	*Halobaena caerulea*	Vulnerable	T

Table 5. Example of the data sheet in which the results were entered during the sorting of litter.

DATA SHEET – OCEAN LITTER SURVEY

Site Name _____ Beach Reference _____

Location / Map Reference / GPS Reading Distance (kms)

_____

_____

Survey Date _____

Collectors _____

Beach Profile:
- Beach
- Near Dune
- Far Dune
- Other

Litter Category	**No.**	**Weigh t (kg)**	**Other Info**	**Fishing/ nonfish/ unsure**	**Litter Category**	**No.**	**Weight (kg)**	**Other Info**	**Fishing/ nonfish/ unsure**
GLASS			Sealed / unsealed		**PAPER/ C-BOARD**				
Bottles					TOTAL				
Jars									
Others					**TIMBER / CORK**				
TOTAL					(processed)				
METAL			aerosol or drink		TOTAL				
Cans: steel									
Aluminium					CLOTH				
Other					TOTAL				
TOTAL									
HARD PLASTIC			un-bendable		ROPE				
Bottles					**Ropes**				
Containers					Nets				
Bait Pots					Fishing Line				
Floats/buoys					Bait Straps				
Other									
TOTAL					TOTAL				
SOFT PLASTIC			bendable						
Packaging					**Other**				
6 pack holder					TOTAL				
TOTAL									

SPECIAL MENTION – Recorded following

Fish Tags Flares Foreign Litter

Drift Cards Life-jackets Message in a bottle

COMMENTS