

- Can you provide the value of projects and activities funded related to marine debris by financial year from 2012?
- Can you provide details of projects and activities funded, showing amount of funding, source of funding (Federal/state/local government, private sector, community groups etc), length of funding, and purpose of funding?

We have been working in the marine debris research space with funded projects since 2009. The first two projects were co-funded by the department of the environment (DEWHA) and GhostNets Australia (also DEWHA through CfoC).

***See Table at end of document***

- Can you please list any projects related to marine debris which have ceased due to failure or not being re-funded?
  - Please outline the reason for their cessation.

We answered this at the time. All of the CSIRO supported projects in this space have run for their funded duration. **See table** for list of projects, duration, etc.

- How long has the SA container deposit scheme been operational?

The SA container deposit scheme was introduced in 1977, according to the SA EPA website ([http://www.epa.sa.gov.au/environmental\\_info/container\\_deposit](http://www.epa.sa.gov.au/environmental_info/container_deposit)).

The CSIRO report which addresses beverage container differences by states (and bottle cap discussion as well), can be downloaded from this page:

<http://www.csiro.au/en/Research/OandA/Areas/Marine-resources-and-industries/Marine-debris>

The specific link is:

<https://publications.csiro.au/rpr/download?pid=csiro:EP147352&dsid=DS1>

The section in the report is 8.2, beginning on page 56.

- Are there any clinical studies of humans which demonstrate the long-term effects of plastics ingestion?

There are no papers on this specific topic to my knowledge.

- Are there any studies which show the breakdown process for marine plastic which show type of intervention is the most effective? For example, breakdown by biological/bacterial agents, environmental agents such as the sun, wind, sand erosion or salt water etc...

As above, this is not something we at CSIRO have done, but there is some ongoing work in this space by some labs in other countries. Also note newly published paper (since inquiry) with link to publication below.

- Are there any bacteria or other organisms which can assist with the problem?

I answered this question during the inquiry. Subsequent to the inquiry, a paper has been published which identifies bacteria that can break down plastic under particular conditions:

A link to the article is here: <http://science.sciencemag.org/content/351/6278/1196>

A popular piece describing is here: <http://www.aaas.org/news/science-newly-identified-bacteria-break-down-tough-plastic>

Overall, I think this is promising and interesting research, but I would hope that people do not consider this as an appropriate approach to mitigating appropriate waste management for plastics and losses into the environment. Also note the environmental conditions required with respect to this being an effective approach for degrading PET.

- Can you please provide details of the proportion of marine plastics as a result of illegal dumping?  
Dr Hardesty answered saying we do not have this information (nor is it available to my knowledge)
- Can you please provide a cost/benefit analysis of all the mitigation schemes around reduction of coastal debris to identify which of them provide the greatest return on investment from the expenditure of public monies?

Dr Hardesty answered this saying we haven't carried out a cost-benefit analysis. It may be an important area for future work. It is worthwhile doing, but such a project would require an appropriate approach (and funding to do the work). It is something we would be very interested in carrying out.

- In relation to the comment from Senator Whish-Wilson, Dr Hardesty agreed to investigate the methodology/formula used to support the statement that in the future there will be more plastic in the ocean than fish.

Dr Hardesty answered this question and told him that I don't know the basis for this information and I haven't evaluated that analysis. To assist, Dr Hardesty said she could do a quick fact check on this and provide that information back to the inquiry committee.

The quote comes from a 2016 report produced by the Ellen MacArthur foundation. A link to the report is here: [http://www3.weforum.org/docs/WEF\\_The\\_New\\_Plastics\\_Economy.pdf](http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf). On p 14 of the report, they state "without significant action, there may be more plastic than fish in the ocean, by weight, by 2050<sup>25</sup>".

Reference 25 of the report: *By weight. 2015-2050 projection of plastics in the ocean as described in Endnote 22. 2015-2050 projections of fish stocks based on an estimated 812 million tonnes (S. Jennings et al., Global-scale predictions of community and ecosystem properties from simple ecological theory (Proceedings of the Royal Society, 2008) and in line with Stemming the Tide). The stock of fish is assumed to stay constant between 2015 and 2050 (a conservative assumption given that fish stocks could decline as a result of overfishing.)*

Marine Debris Projects	Actual		Actual		Actual		Actual		Actual		Actual		Totals	
	2009-10		2010-11		2011-12		2012-13		2013-14		2014-2015			
	External	Approp	External	Approp	External	External	Approp	Approp	External	Approp	External	Approp	External	Approp
Ghost nets (GhostNets AU/DEWHA)	42,359	66,848	56,723	89,517	42,580	67,197	67,421	106,400					209,083	329,962
Marine debris in Australian waters (DEWHA)	28,947	48,758	41,053	69,146									70,000	117,904
Earthwatch Marine Debris					357,720	390,092	429,812	468,708	413,683	451,118	19,371	191,107	1,201,215	1,501,025
<b>Totals</b>	<b>71,306</b>	<b>115,606</b>	<b>97,776</b>	<b>158,663</b>	<b>400,300</b>	<b>457,289</b>	<b>497,233</b>	<b>575,108</b>	<b>413,683</b>	<b>451,118</b>	<b>19,371</b>	<b>191,107</b>		

Projects	Budget (projected)		Budget (projected)		Budget (projected)		TOTALS			
	2014-15		2015-16		2016-17		2017-18			
	External	Approp	External	Approp	External	Approp	External	Approp	External	Approp
(OC) Ocean Conservancy	19,371			15,000					19,371	15,000
NPCIA Coastal Waste Policy Effectiveness			98,962	99,203	69,038	69,206			168,000	168,409
UNEP litter Modelling and monitoring			101,072	67,919	82,745	55,602			183,817	123,521
OC global litter analysis			91,293	78,065	91,909	78,591	14,499	12,398	197,701	169,054
<b>Totals</b>			<b>291,328</b>	<b>260,186</b>	<b>243,691</b>	<b>203,400</b>	<b>14,499</b>	<b>12,398</b>	<b>2,049,187</b>	<b>2,424,875</b>