

**Report of August 2012 Meeting**  
**Royal Society**  
**Southern Highlands Branch**

**Speaker:** **Dr Chris Wilcox**  
**Senior Research Scientist**  
**CSIRO Marine and Atmospheric Research Division**

**Topic:** **Understanding the extent and impact of rubbish in the marine ecosystem.**

Marine debris is becoming a major issue, damaging the aesthetic value of natural places, impacting commercial activities, and potentially causing significant harm to wildlife. The scale of human pressure is daunting, with the rate of plastic production increasing globally in an exponential manner. Over 640 million tons of fishing gear alone are lost into the ocean each year. Results from coastal cleanup efforts suggest that this is just the tip of the iceberg, as fishing gear is not even in the top ten items found on beaches.

Dr Chris Wilcox emphasized the impact that human debris exerts on wildlife. He noted that although incidental records of the effects of debris on some species, such as birds caught in fishing line and turtles that have swallowed plastic bags are available, so far there has been no synoptic picture of the scale of the issue. Now with funding from the Commonwealth Government, coastal NRM groups and Shell Australia, Wilcox and his team have been able to initiate comprehensive research studies with a view to understanding the impact of the debris threat to marine life on a national scale.

A large part of Wilcox's presentation concerned his methods of risk analysis and associated mathematical modeling over selected areas of the ocean. He uses risk analysis as a way of breaking down a complex problem into parts, then combining the sets of data from those parts. For example, in predicting the impact of marine debris on turtles, he used overlapping studies in space and time for both the animals and the debris, mainly fishing nets in that case. He is finding strong correlation between actual surveys and the predicted outcomes from his modelling.

Plastic is everywhere all the time. Remote sites and densely populated sites have similar loads. Wilcox reported that experimentally cleaned beaches regained 50% of their load in three months. Unfortunately, these plastic items are extremely long-lasting: a life of up to 24 years has been documented for a gillnet and a 1994 UNESCO report stated that some plastics do not degrade for 500 years.

Plastics have two main modes of action on individual animals, entanglement and ingestion. Entanglement reduces the mobility of the animal and often causes physical

damage due to constriction. Ingestion has many complications. It reduces the gut volume (displacement of food, especially seabirds), damages the gut, introduces toxicity due to breakdown products (bisphenol, an estrogen mimic) and also causes toxicity due to adsorbed pollutants (PCBs, etc). While these are significant effects on the individual animals, there are also population level consequences. Reduced migratory ability due to fat losses, significantly increased mortality and significantly reduced fecundity have all been observed.

Chris Wilcox believes that ultimately there are solutions to the serious problems caused by plastic debris. Australia is currently considering a national bottle deposit system for beverage containers. Given that one third of the debris along the coastline globally is associated with the beverage industry, this seems a wise policy. However changing people's behavior is expensive financially and politically, so it is essential to have a solid basis, such as the Wilcox research, for targeting those resources that will have the greatest effect.

The 45 member audience asked numerous questions at the end of the lecture, prompting a prolonged informal discussion. They had all enjoyed a fascinating session.

Anne Wood