



## Nurdles, Nurdles Everywhere... Marine Plastic Pollution

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### Overview



Container losses



Marine Plastics



Case Study



## IMO: Marine Plastic Litter from Ships – Action Plan (October 2018)

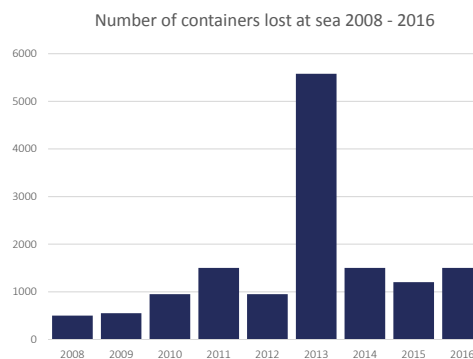
# NEWS... NEWS... NEWS...

### Selected Considered Measures:

1. Reduction of marine plastic litter generated from, and retrieved by, fishing vessels
2. Reduction of shipping's contribution to marine plastic litter  
by considering establishing a compulsory mechanism to declare losses of containers
3. Improvement of the effectiveness of port reception and facilities
4. Enhanced public awareness, education and seafarer training
5. Improved understanding of the contribution of ships to marine plastic litter



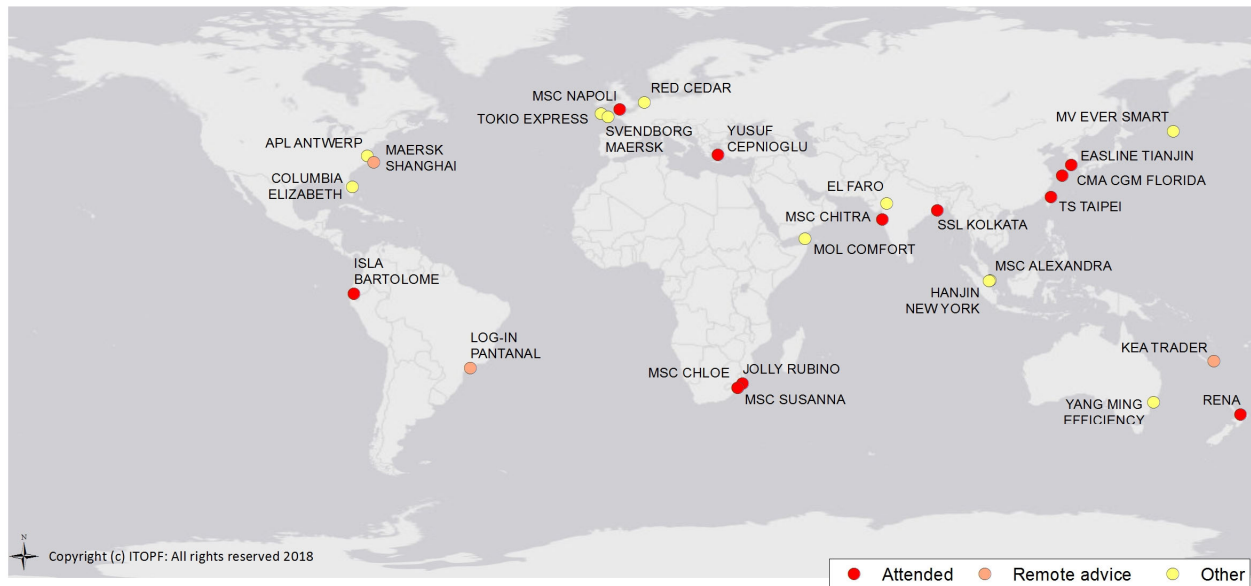
## Container Ships, Container Losses



- 80 % of global trade (by volume) is transported on board ships [UNCTAD, 2017]
- Global TEU capacity of container ships in 2017: 21 million TEU
- In 2016 140 million TEU were transported [UNCTAD, 2017]
- On average 1,852 containers were lost every year between 2008 – 2016 [World Shipping Council, 2017]



## Vessels Loosing Containers Overboard (1997 -2018)



## Definitions: Marine Debris

Marine debris, or marine litter, is human-created waste that has deliberately or accidentally been released in a lake, sea, ocean, or waterway.



"What Goes Around, Comes Around". Guildford College Art Gallery, 2013

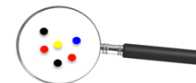
### Macroplastic



### Microplastic



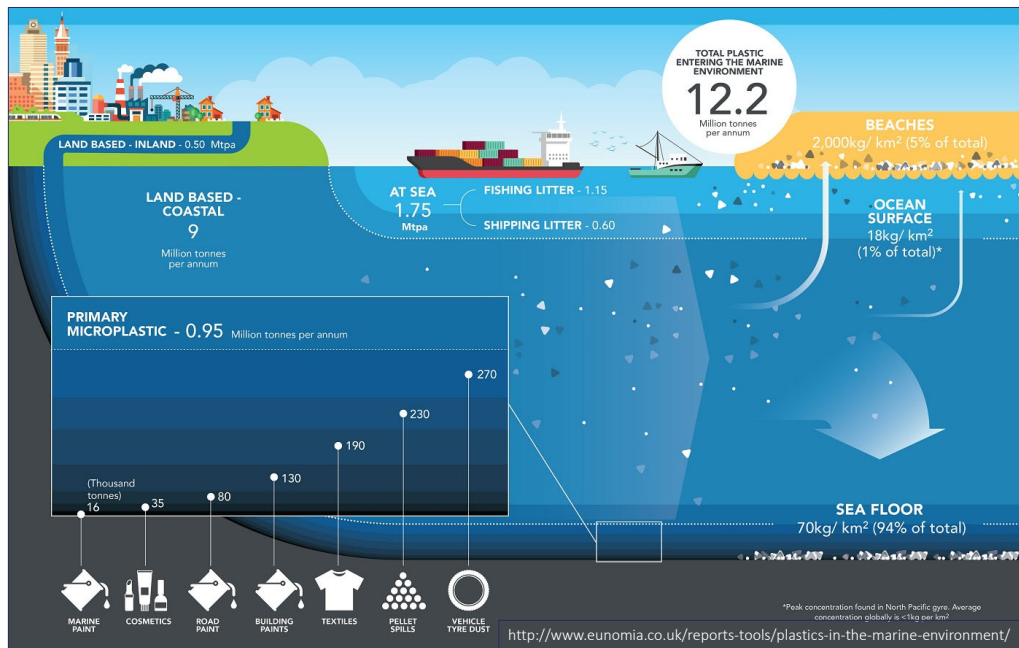
### Nanoplastic



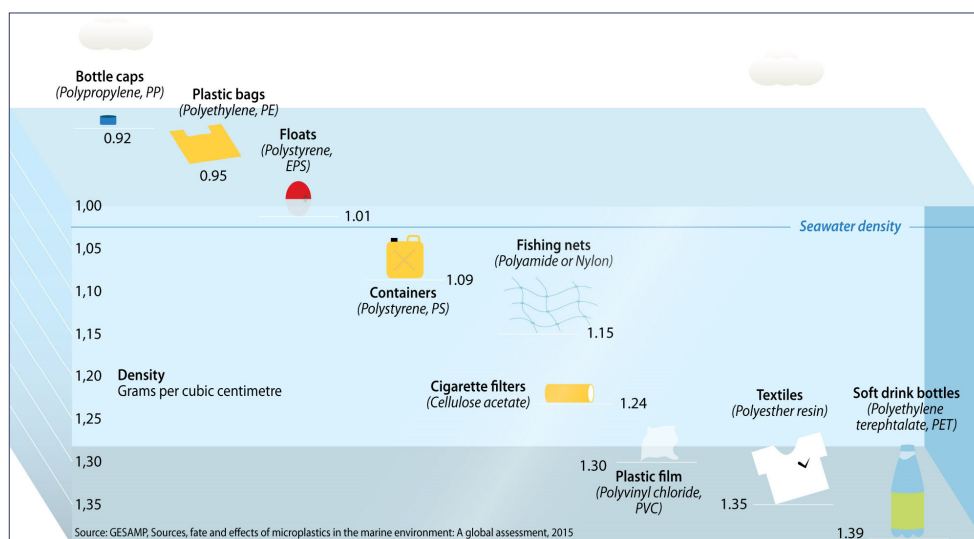




## Sources of Marine Plastic Pollution [Eunomia, 2016]



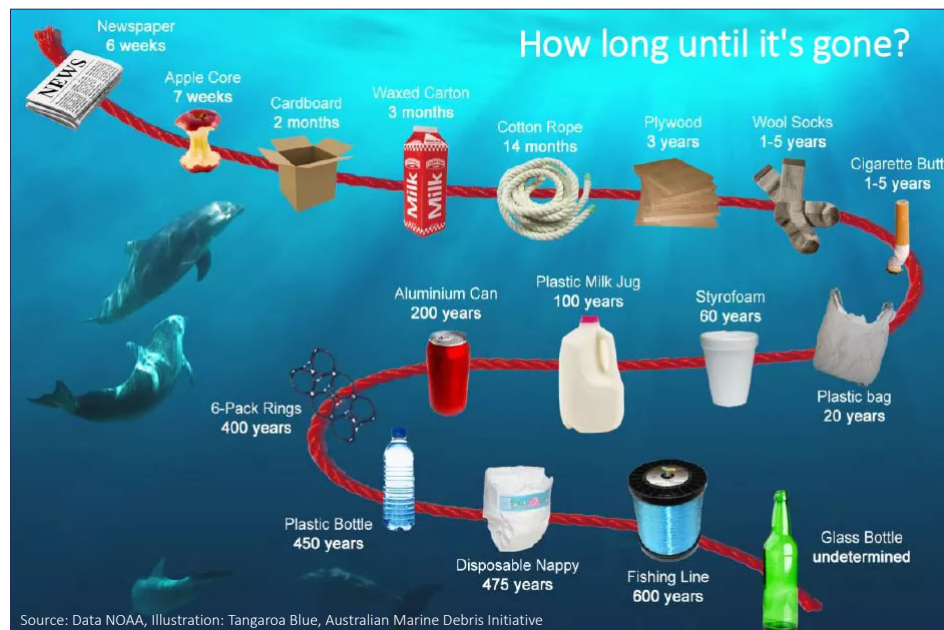
## Behaviour of Different Kinds of Plastics in Seawater







## Fate of Plastics and Other Items in Seawater



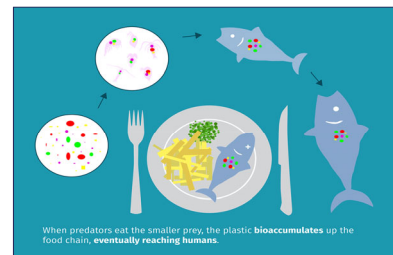
## Environmental Impacts [Kuehn, *et al.* 2015]



Algalita Marine



Francis Pérez



66 % of all marine **mammal** species (81 of 123 species)  
 100 % of all marine **turtle** species (7 of 7 species)  
 50 % of all **seabird** species (203 of 406 species)

**Entanglement** → leading to injury, strangulation, reduced feeding efficiency, increased energy expenditure and / or drowning

**Ingestion** → causing physical injury, obstruction of the gut, accumulation of indigestible material, starvation

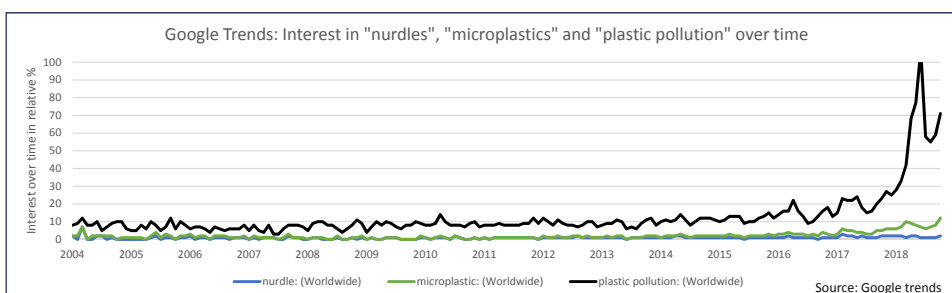
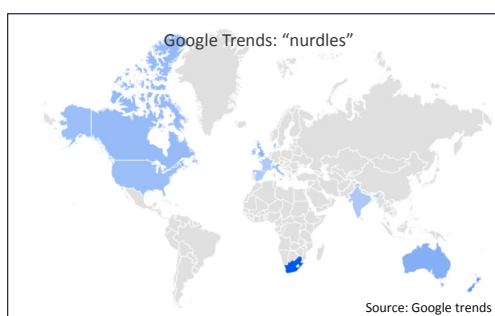
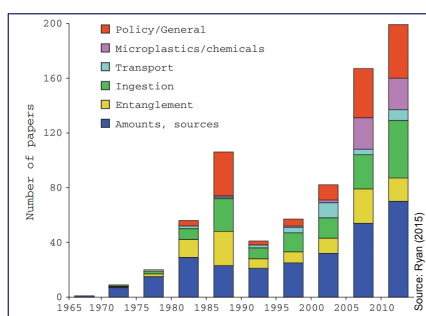
Microplastics harbour **Persistent Organic Pollutants** found in the marine environment

**Trophic transfer** of microplastics?

Ingestion of microplastics may provide a vector for POPs and other toxins to enter the food web



## Scientific and Public Interest, Google Trends

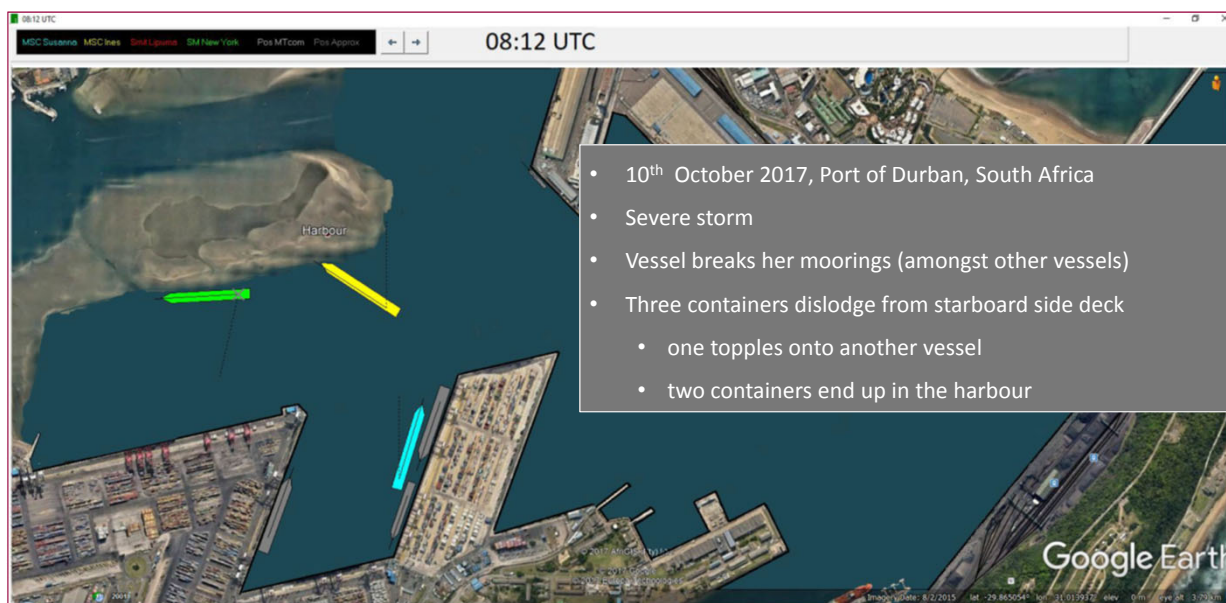


## Case Study – Nurdles in South Africa





## Case Study – The Incident



## Nurdles



### HDPE & LDPE aka "nurdles"

- Diameter: 5 mm, Weight: 0.25 g
- Density: 0.91-0.97 g/cm<sup>3</sup>
- LDPE are convex on both sides
- HDPE are domed on one side
- Are not considered hazardous and therefore do not need to be labelled
- Transported in 25 kg bags, shrink wrapped onto timber pallet bases



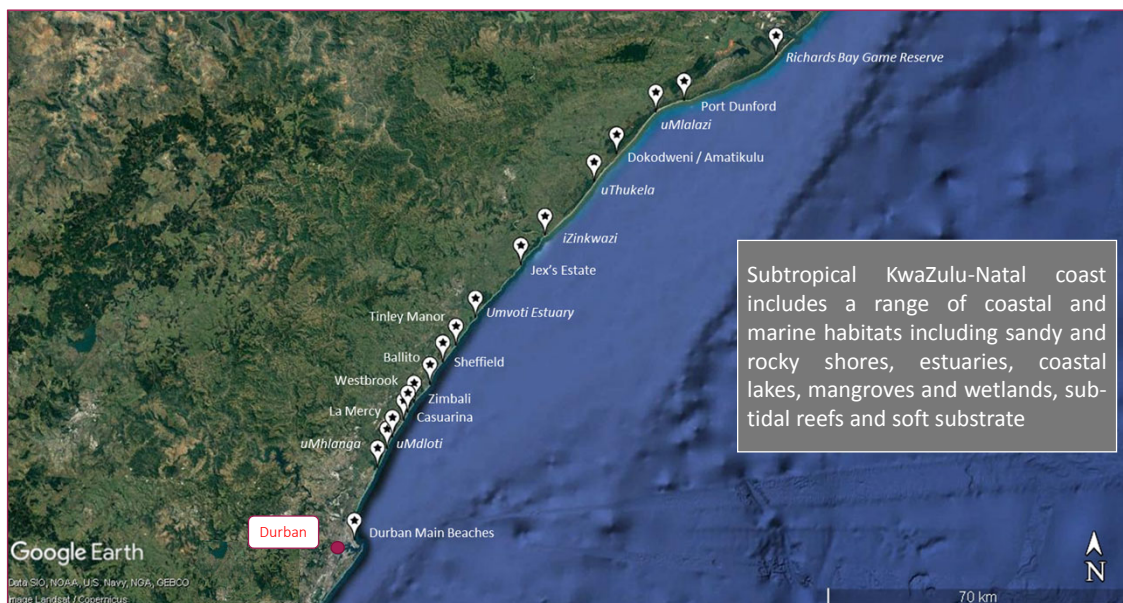




## Level of Contamination



## Extent of Contamination







## Affected Shoreline



- Environmentally sensitive area, very remote, difficult to access
- Buried nurdles re-mobilize with spring tides and storms
- Beaches are cleaned monthly – manual labour only
- Level of existing / background plastic pollution is high



## Shoreline Clean-up



- > 365 days into the response
- Using simple hand tools, such as nets, scoops, sieves, rakes and vacuum cleaners
- Workers have recovered 10 MT pure nurdles, 12 MT debris & nurdle mix
- Investigating recycling potential



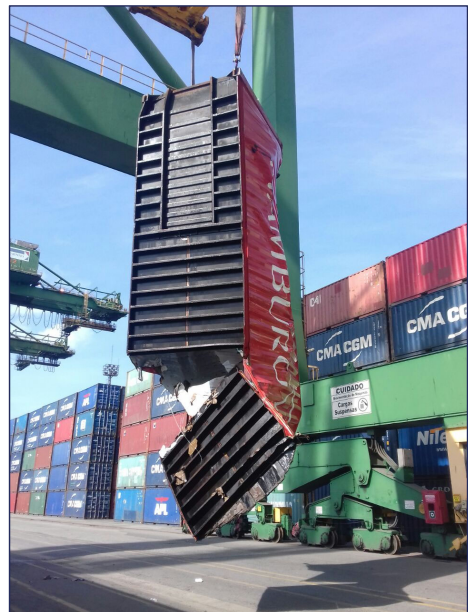
## Role of ITOPF on and off Site

- Contacted by the P&I Club in October 2017
- Provided initial **remote advice**
- **Attendance** on site in April 2018
  - **Shoreline Surveys**
  - **Liaise** with relevant stakeholders such as: South African Association for Marine Biological Research, South African Maritime Safety Agency, Department of Economic Development, Tourism and Environmental Affairs (regional as well national)
- **Technical report** summarizing extent and scale of known contamination, clean up operations thus far, potential environmental impacts, characterisation of affected shorelines, recommendations for remaining clean-up operations / strategy / techniques
- Providing remote advice on **buried nurdle extraction protocol** and recovery
- Future attendance on site



## Key Points for Accidental Plastic Pollution from Ships

- Predicting the **trajectory** and **fate** of contents released from containers can be very challenging (plastics may float or sink)
- **Locating** containers fallen overboard can be time consuming and difficult
- Plastic items will **fragment** over time, but remain in the environment for a very long time if not removed
- Shoreline response can be very **time and labour intensive**
- **High levels of pre-existing plastic pollution** may make it difficult to respond to the incident and agree on endpoints
- Light products might be affected by wind and potentially be carried inland
- Heightened public interest







Thank you for your attention

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