



Understanding plastic on a local scale.

Queensland, Australia, (neighboring state to the Great Barrier Reef) is known as the 'rubbish state' with 4x the national average of litter¹.

Queensland is located in the monsoonal tropics. Much of the plastic on local beaches is speculated to originate from storm drains^{2,3}.

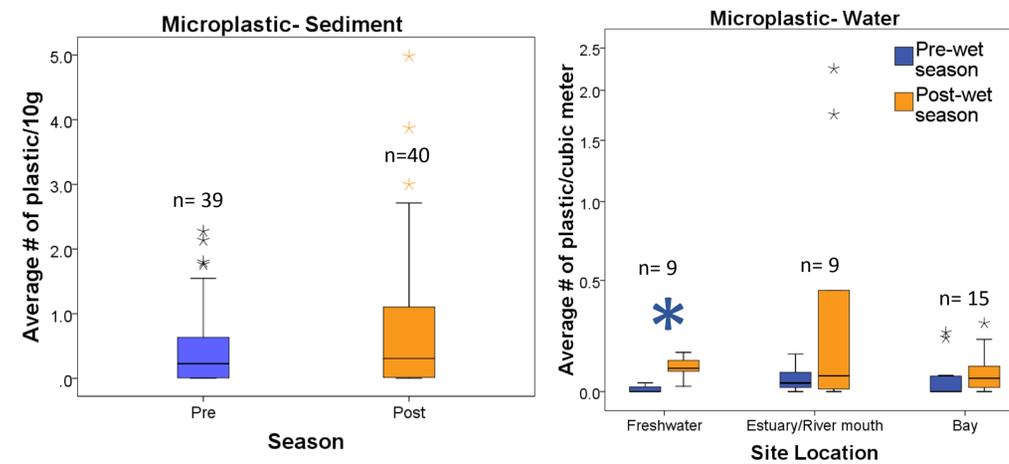
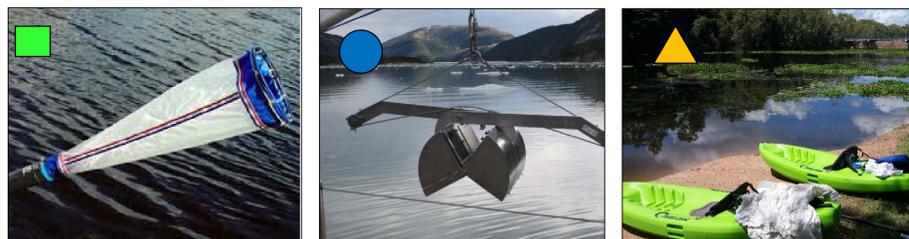
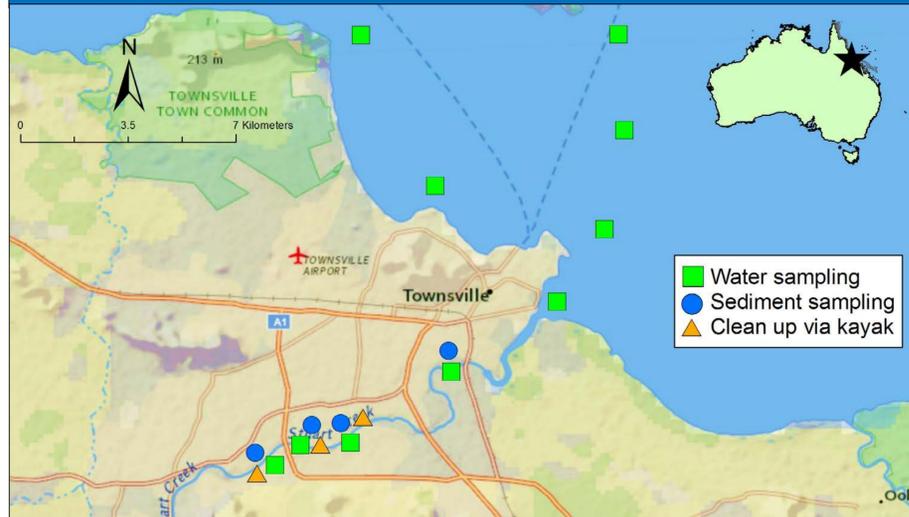
AFTER RAINFALL, litter from streets, sidewalks, and car parks wash into storm drain catchments that can lead directly into the river systems.

How much plastic originates from storm drains?

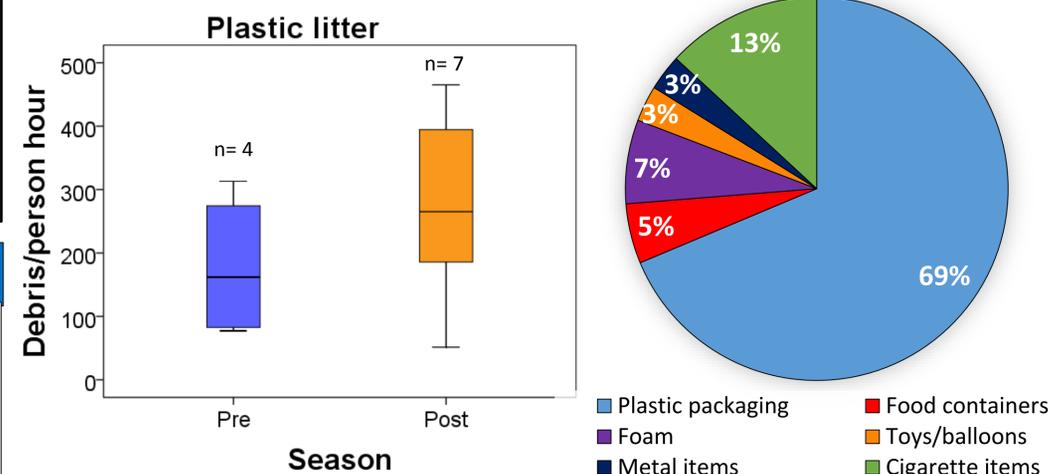
We use the Queensland wet season to determine how much plastic enters the river system after rain events. To do this we quantify:

1. Microplastic loads within **sediments** near storm water drains.
2. Microplastic on **water** surface outside storm drains, and compare abundance of plastics exiting the river system into the bay
3. **Plastic litter** within the freshwater sections of the river.

Sampling Design



Microplastic abundance before and after the wet season within sediments and water samples. Small * indicate outliers, and the large blue * indicates significant difference between season.



Plastic litter abundance before and after the wet season (left), and the overall composition of litter within the river (right).



Plastic litter occurring outside storm water effluents. This is a typical plastic load during post wet season collections.

Key results: There is plastic in the river ALL the time.

Sediment samples averaged 0.5 plastic particles per 10g of sediment in the pre-wet season, and 0.75 of particles in the post-wet season.

Water samples averaged 0.036 particles/m³ in the pre-wet season, and 0.20 particles/m³ in the post-wet season. The only significant difference between seasons occurred in freshwater locations (p=0.008).

Plastic abundance was the highest within the estuary/river mouth, post-wet season.

There was no significant difference of plastic litter abundance between the pre- and post-wet season (p=0.245).



Microplastics in sediments (left), and water samples (middle two photos). Other debris items, such as glass, is also commonly found in sediments (right photo)

Management Implications:

Direct littering on or near the river is likely to contribute as much or more plastic than what flows from the storm drains.

These data provide an insight to the plastic debris problem on a realistic local management scale.

It suggests a need for educational material to reduce littering, particularly around the river and nearby parklands.