

DIVING FOR ASSESSING SEAFLOOR MARINE LITTER IN SHALLOW COASTAL MPAS; IS THERE A RELATION WITH THE BEACHED LITTER?



The Mediterranean Sea is one of the most affected seas by marine litter, and Marine Protected Areas (MPAs) are not free from this type of pollution (Alomar et al., 2016). Considering its widespread presence in the marine environment, there is evidence and concern on its availability for different species with different trophic guilds (Alomar and Deudero, 2015) and coastal species have been seen to be more susceptible to this type of contamination (Compa et al., 2019). The Plastic Busters MPAs: preserving biodiversity from plastics in Mediterranean Marine Protected Areas is an Interreg Med funded project aiming to maintain biodiversity and preserve natural ecosystems in pelagic and coastal marine protected areas. Within its objective, beaches were visually surveyed and the seafloor was monitored through scuba diving surveys to characterize and study the marine litter in an effort to identify potential sources.



Fig 1. Sampling macrolitter on beach and seafloor of Cabrera National Park.

The study area (Figure 2) consists of the beaches and shallow coastal areas of Cabrera National Park (Balearic Islands).

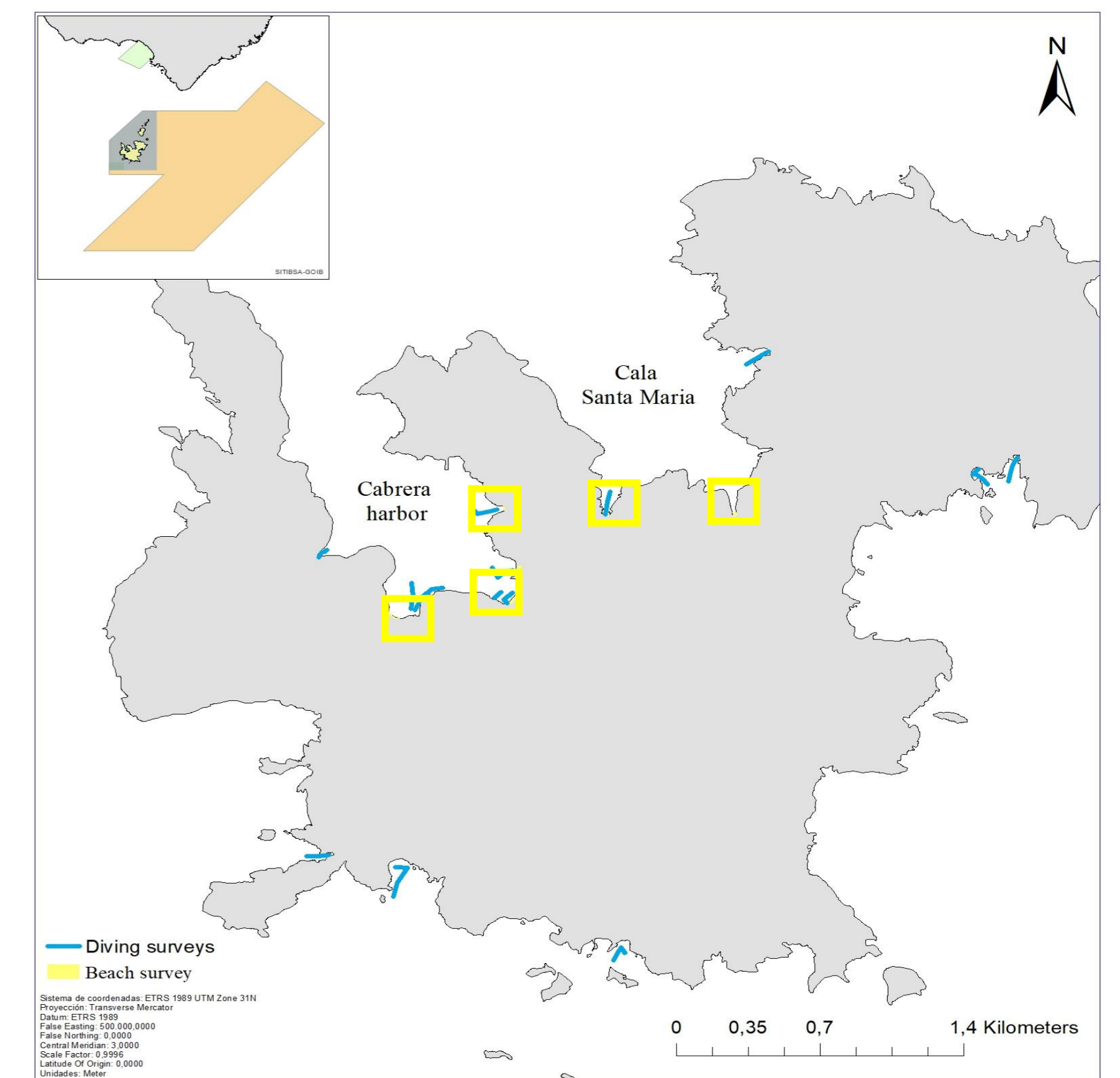
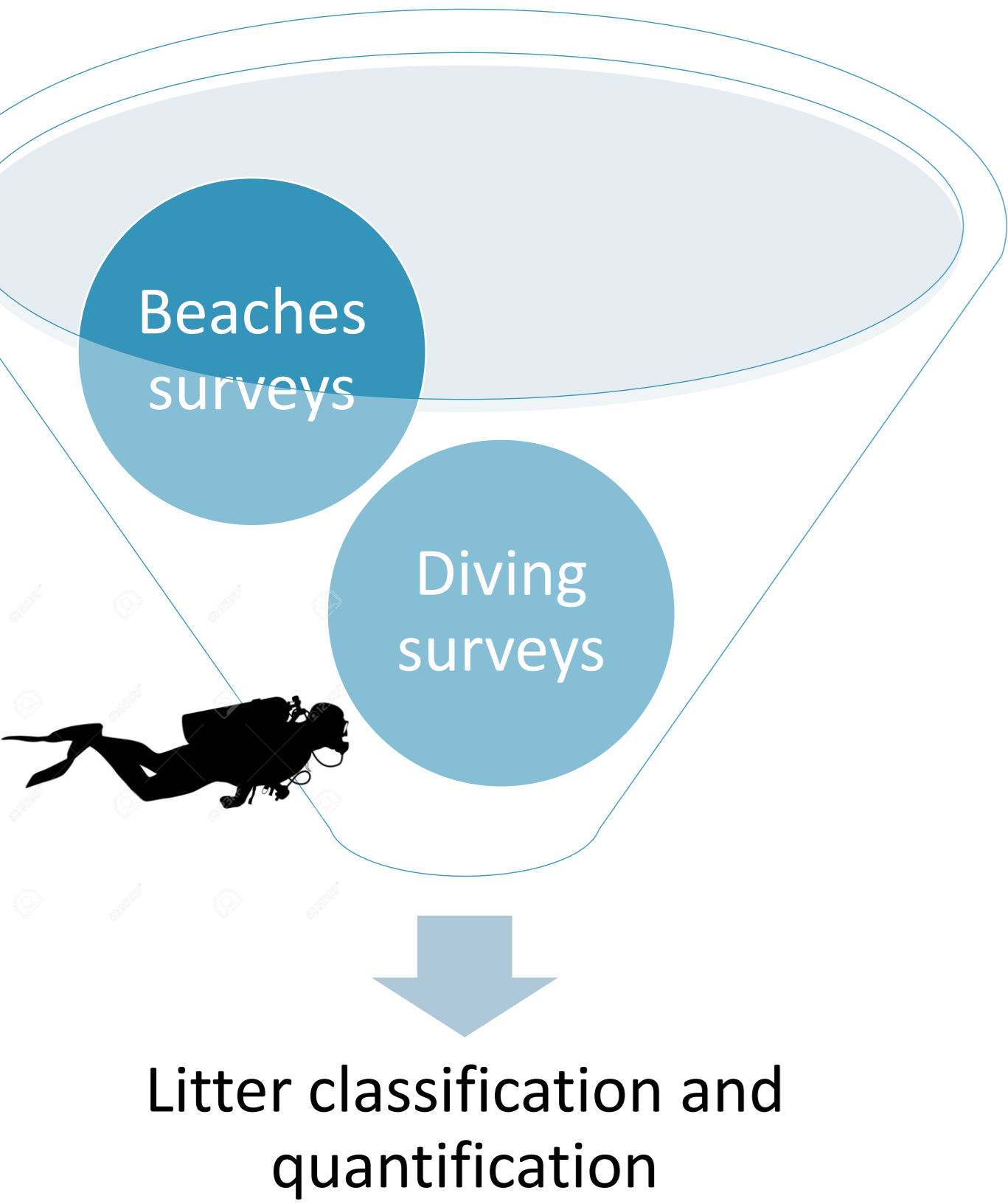


Fig 2. Study area in Cabrera National Park.

Methods



Six macrolitter surveys on beaches were completed during summer (July) and autumn (October) of 2019. Additionally, twelve macrolitter diving surveys for seafloor marine litter quantification in shallow coastal areas were conducted during summer (July) of 2019, at the same sites.

The sampling unit for macrolitter on beaches is defined as a fixed section of a beach covering the whole area from the strandline to the back of the beach, and the survey area for macrolitter on the seafloor is defined by time scuba diving visual transects.

For litter classification and quantification (number of items) the “Joint List of Marine Litter Items Categories” was used for comparison amongst sites (table 1).

Table 1. Top 10 of total items on beaches and marine seafloor of Cabrera National Park. Red the most abundant items, green the least abundant items.

Top 10 Items Beaches

TOP 10	Material type	Code	Items name	Number of items (Σ total)
1	ARTIFICIAL POLYMER MATERIALS	G79	Plastic pieces 2.5 cm > < 50cm	1005
2	ARTIFICIAL POLYMER MATERIALS	G21	Plastic caps/lids from drinks	373
3	SANITARY WASTE	G95	Cotton bud sticks	292
4	ARTIFICIAL POLYMER MATERIALS	G10	Food containers incl. fast food containers	273
5	GLASS/CERAMICS	G208	Glass or ceramic fragments >2.5cm	267
6	ARTIFICIAL POLYMER MATERIALS	G53	Nets and pieces of net < 50 cm	220
7	ARTIFICIAL POLYMER MATERIALS	G64	Shells, plastic bags, e.g. freezer bags, including pieces	101
8	ARTIFICIAL POLYMER MATERIALS	G67	Sheets, industrial packaging, plastic sheeting	89
9	ARTIFICIAL POLYMER MATERIALS	G73	Foam sponge	89
10	ARTIFICIAL POLYMER MATERIALS	G124	Other plastic/polystyrene items (identifiable)	85

Top 10 Items Seafloor

TOP 10	Material type	Code	Items name	Number of items (Σ total)
1	GLASS/CERAMICS	G200	Bottles, including pieces	202
2	GLASS/CERAMICS	G208	Glass or ceramic fragments >2.5cm	47
3	ARTIFICIAL POLYMER MATERIALS	G10	Food containers incl. fast food containers	57
4	ARTIFICIAL POLYMER MATERIALS	G79	Plastic pieces 2.5 cm > < 50cm	46
5	ARTIFICIAL POLYMER MATERIALS	G53	Bags	31
6	ARTIFICIAL POLYMER MATERIALS	G21	Nets and pieces of net < 50 cm	31
7	ARTIFICIAL POLYMER MATERIALS	G67	Sheets, industrial packaging, plastic sheeting	19
8	ARTIFICIAL POLYMER MATERIALS	G13	Drink bottles <=0.5l	15
9	ARTIFICIAL POLYMER MATERIALS	G13	Other bottles <= containers (drums)	12
10	ARTIFICIAL POLYMER MATERIALS	G124	Other plastic/polystyrene items (identifiable)	10

Results & Discussion

According to beaches, artificial polymer materials made up 94% of the items identified, in contrast, in the seafloor samples, the artificial polymer materials were the main fraction (96%) in a seafloor located within the port follow by glass and ceramics (up to 83%) in an integral reserve area. Preliminary results highlight that there is variation in the amount of macrolitter arriving to the beaches and the seafloor of Cabrera National Park. Overall, more than 5000 (4395 items of macrolitter on beaches, and 668 of macrolitter on seafloor) marine macro litter items were identified on the beaches and in the surrounding seafloor shallow areas indicating not only local sources from within the port area but also high transference to areas where human activities are either limited or with high restrictions.

A Spearman's correlation indicated there is a significant relationship ($R = 0.42$, $p < 0.001$) between the total number of items on the seafloor and the number of items on the beaches (Figure 4).

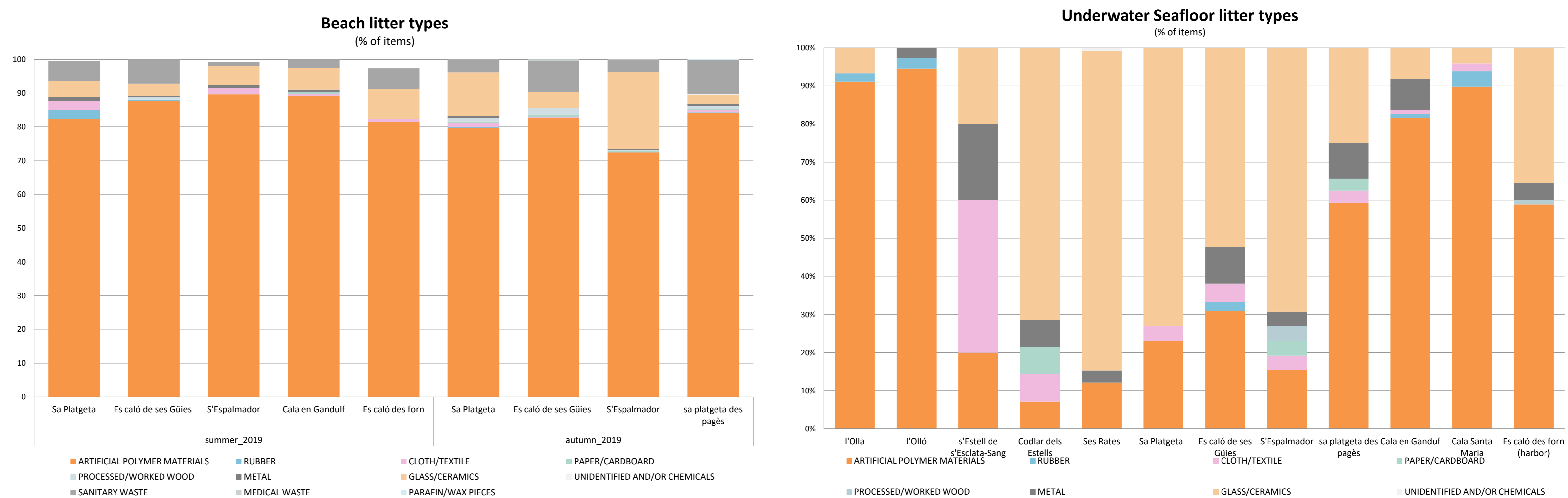


Fig 3. Percentage of number of items by type of material (Beach and underwater seafloor macrolitter) according to “Joint List of Marine Litter Items Categories” in Cabrera National Park

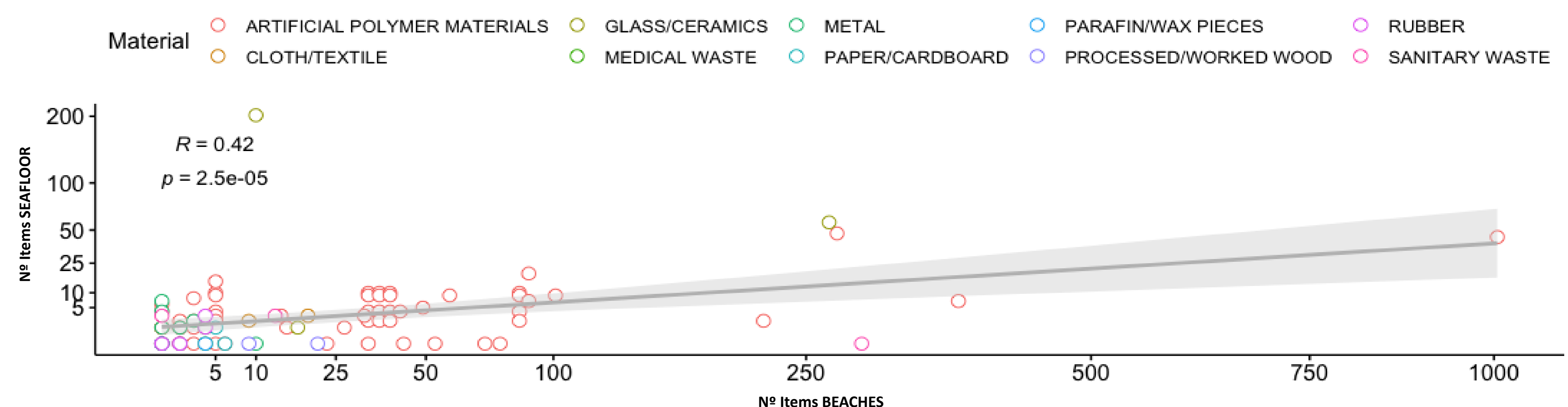


Fig 4. Spearman's correlation of total number of items on the seafloor and beaches of Cabrera National Park.

References

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