Methods

Study Sites:

Our study area consisted of 5 beaches around the city of Cape Town. These include Strandfontein (18° 33' 28.819" E, 34° 5' 11.626" S), Muizenberg (18°28'13.8"E, 34°06'30.5"S), Fish Hoek (18° 26' 5.71" E, 34° 8' 9.124" S), Hout Bay East (18°21'34.0"E, 34°02'50.0"S) and Hout Bay West (18°20'59.4"E, 34°02'46.4"S). These sites are divided up into 'cleared' and 'non-cleared' sections, where the ‘cleared’ sections are recognised by the City of Cape Town as kelp removal zones. Kelp is removed from Strandfontein beach on a seasonal basis, and a regular basis from the four remaining sites.

Sampling methods:

Both cleared and non-cleared areas of each beach were sampled for POM content in the soil. Transects of various lengths were run perpendicular to the shore, and divided into 5 sections according to the length of the transect on that particular sampling occasion. Soil samples were collected at a depth of 20cm at each of the sections ~~along the transect~~. Samples were taken back to the UWC laboratory, where they were weighed (wet weight), dried, weighed again (dry weight) and placed in a muffle furnace and finally reweighed (burned weight). The difference between the dry weight and burned weight is an estimate of the POM content.

Visual observations (metadata) were made regarding the amount of kelp present on the beaches at the time of sampling. These observations were recorded as zero, very low, low, average and above average. A ranking system was then applied to these observations from 1 to 5, where 1 = zero kelp and 5 representing an above average abundance of kelp.

Statistical methods:

All data was recorded and entered into an Excel spread sheet, which was then converted to a CSV, in order to be read into the R Project for statistical analysis.

The Shapiro test for normality was conducted on the data along with homoscedastic tests to determine the distribution and variance of the data. For non-normally distributed data, non-parametric tests such as the Kruskal- Wallis (non-parametric equivalent of an ANOVA) and the Wilcox (non-parametric equivalent of a one-sample t-test) tests were performed. Significant differences at p≤0.05 were analysed using Kruskalmc post hoc analysis in R.

A one way analysis of variance (ANOVA) was conducted on normally distributed data, followed by a tukey post hoc analysis in order to determine the where significant differences lie.

In order to determine whether pom changes with time, the site strandfontein was removed due to it only being sampled once, whereas the other sites were sampled multiple times.

Results:

* Area

Total POM content was significantly higher in cleared sites than in non-cleared sites (p = 0.0389) (Fig 1).

* Site

POM content was significantly different (df = 4, p = 5.561e-07), between Fish Hoek and Hout Bay West, Hout Bay East and Muizenberg, Hout Bay West and Muizenberg & Hout Bay West and Strandfontein as depicted by the kruskalmc post hoc test.

* Time

POM differs significantly over time ( p = 0.0001278), with the significant difference occurring between March and April.

* Transect lengths

(AREA): Due to an unexplained error in determining the distribution of transect length as a factor of site, the metadata was converted into long form. The Shapiro test produced a p-value of 0.03587, suggesting that the data is not normally distributed and therefore a Wilcox test was performed resulting in there being no significant difference between means of cleared transects and non-cleared transects.

(SITE): the cleared and non-cleared areas were addressed separately. The only sites with significantly different cleared transect means were Muizenberg- Fish Hoek ( p =0.0299052), concluded from the kruskalmc post hoc test.

The non-cleared transects showed a normal distribution, therefore an analysis of variance could be conducted, but concluding that there is no significant difference (p = 0.0537) between the transect lengths in non-cleared areas of the sites.