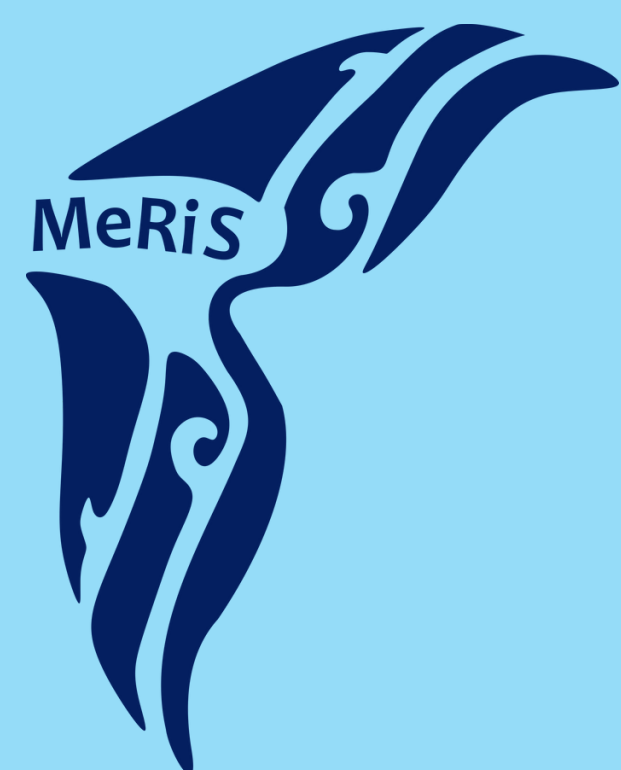




Jessica Alessi



Floating macro-litter composition, distribution, and overlap with bottlenose dolphins (*Tursiops truncatus*) along the Western Sicilian coast (Italy)

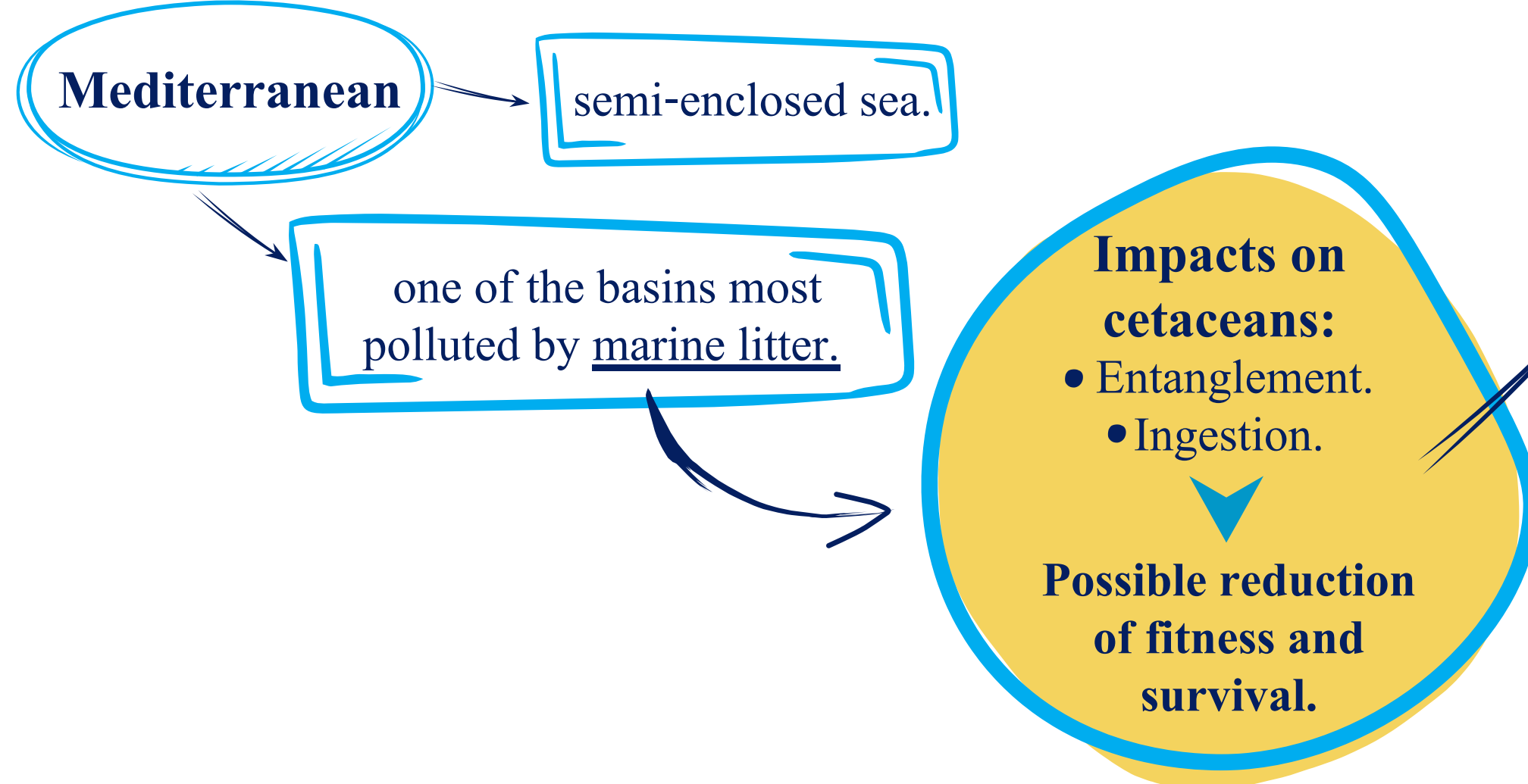


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INTRODUCTION



- AIMS**
- 1 To investigate the composition, and the distribution of floating marine macro-litter (FML) along the waters of the Agrigento province (Strait of Sicily, Mediterranean Sea).
 - 2 To identify the higher risk zones for dolphins by overlapping the density maps of the FML and of bottlenose dolphins.



Figure 1. Study area.

MATERIALS AND METHODS

Sampling platform: 6.4 m long and semi-cabin boat equipped with a 130 hp outboard engine.

Data were collected from 2019 to 2021 following a random sampling design, only with good weather conditions (Beaufort Scale ≤ 3 for species monitoring; Beaufort Scale ≤ 1 for FML monitoring).

Indices calculated:

$$\text{Encounter Rate (E.R.)} = \frac{\text{total number of sightings}}{\text{km on effort}}$$

$$\text{Mean abundance of FML (1)} = \frac{\text{number of items of each sub-category}}{\text{km monitored}}$$

The non-parametric Kernel Density Estimation method was used to isolate areas that correspond to a given percentage of the total cumulative distribution (2). 95 and 50 Percent Volume Contours (PVC) were produced, which can be interpreted as the areas where the population spends x% of its time (3). 50PVC was used to define the boundaries of the core area of the species and of the FML. These core areas were superimposed to perform a geographical risk analysis.

RESULTS

SURVEYS:

No. of surveys: 90

- Effort: 5201.23 km, 76 sightings (ER = 0.015).
- Effort: 2309.68 km, 629 sightings (ER = 0.272).

FLOATING MARINE LITTER COMPOSITION AND MEAN ABUNDANCE

- Plastic No. 429, 0.19 No. items/km.
- Styrofoam No. 137, 0.06 No. items/km.
- Other materials No. 63, 0.03 No. items/km.

FML composition & abundance

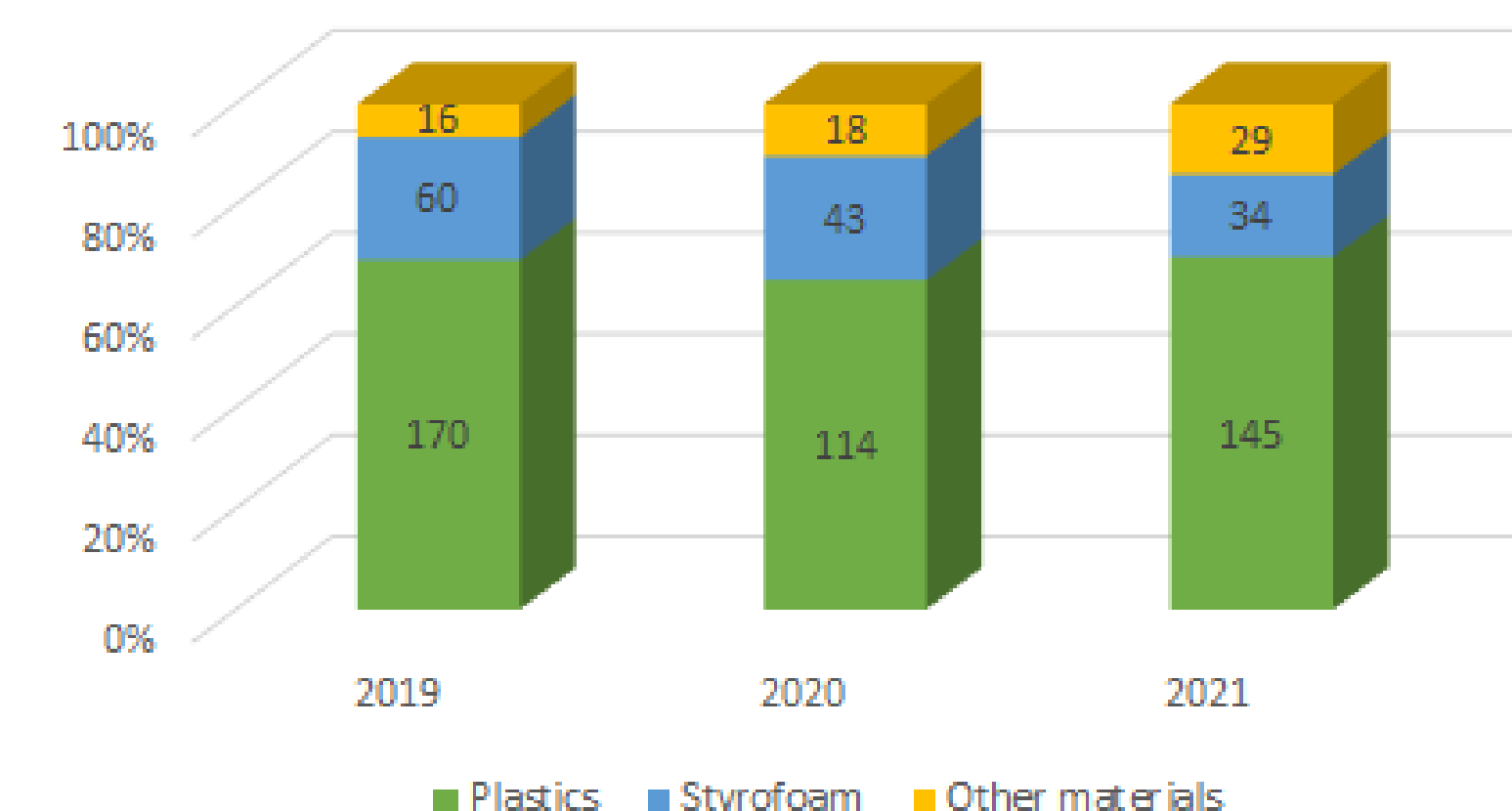


Figure 3. Composition of Floating Marine Litter over the years of study.

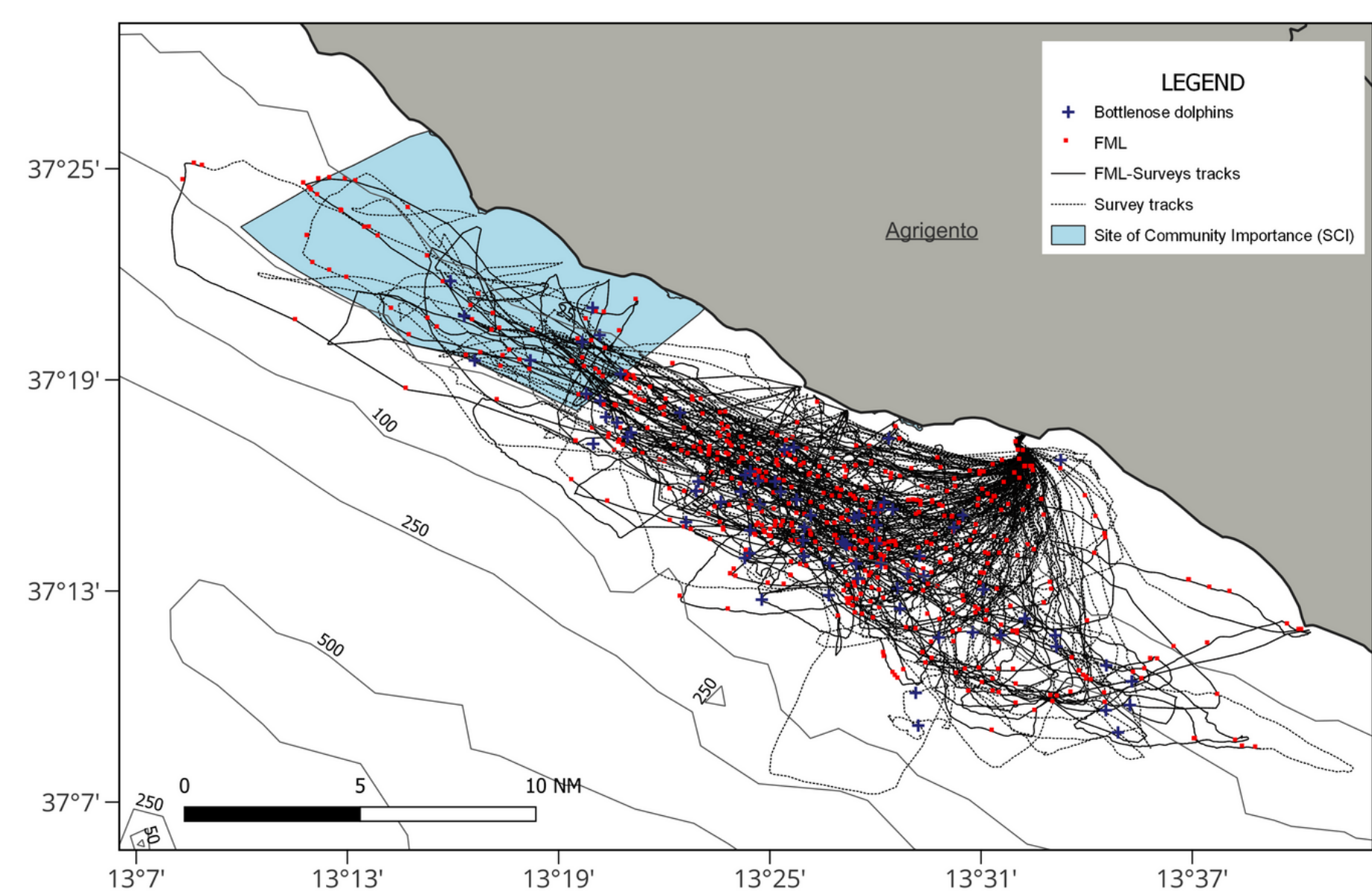


Figure 2. Survey tracks and distribution of sightings.

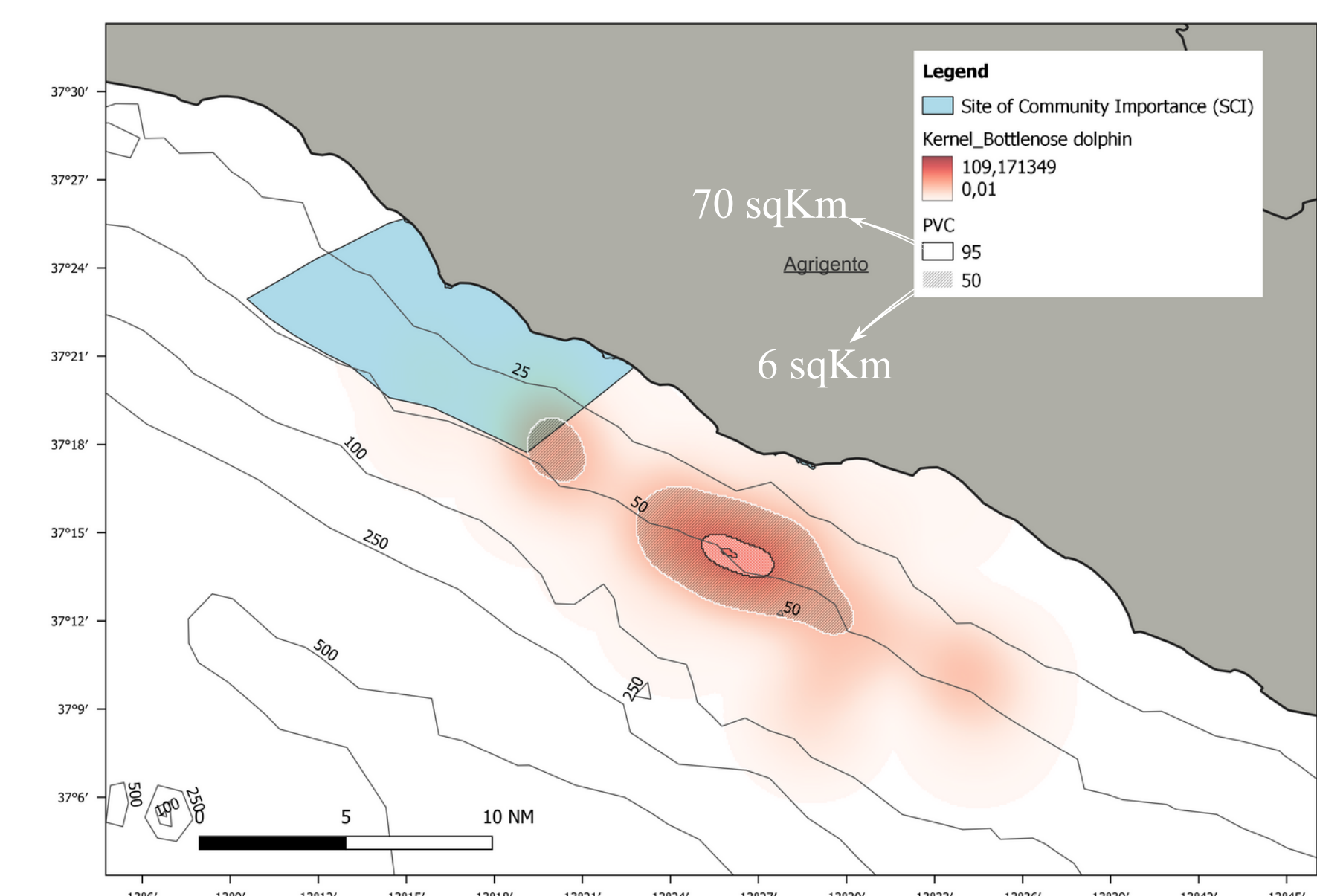


Figure 4. Kernel Density Estimation model of bottlenose dolphins.

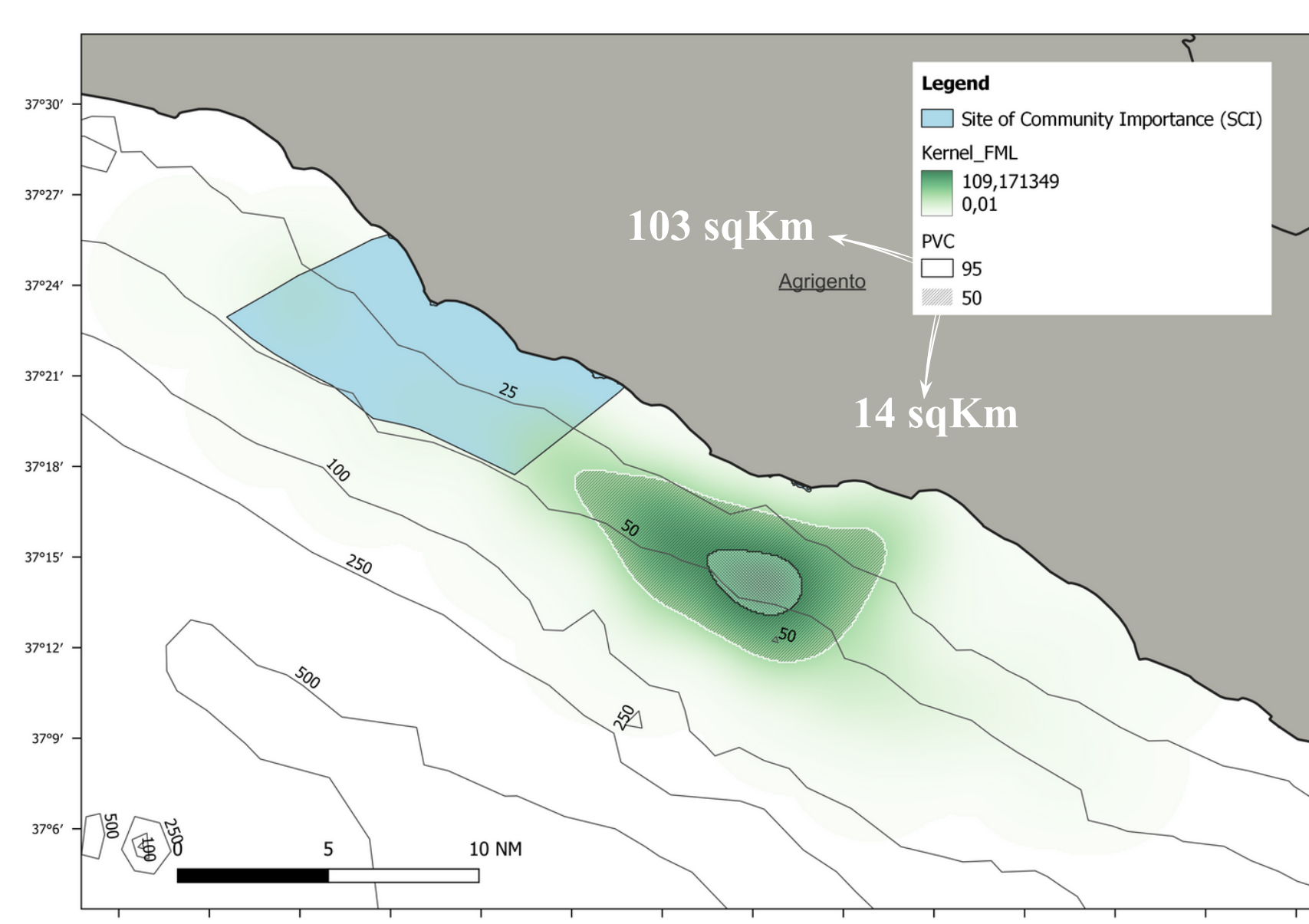


Figure 5. Kernel Density Estimation model of floating marine litter.

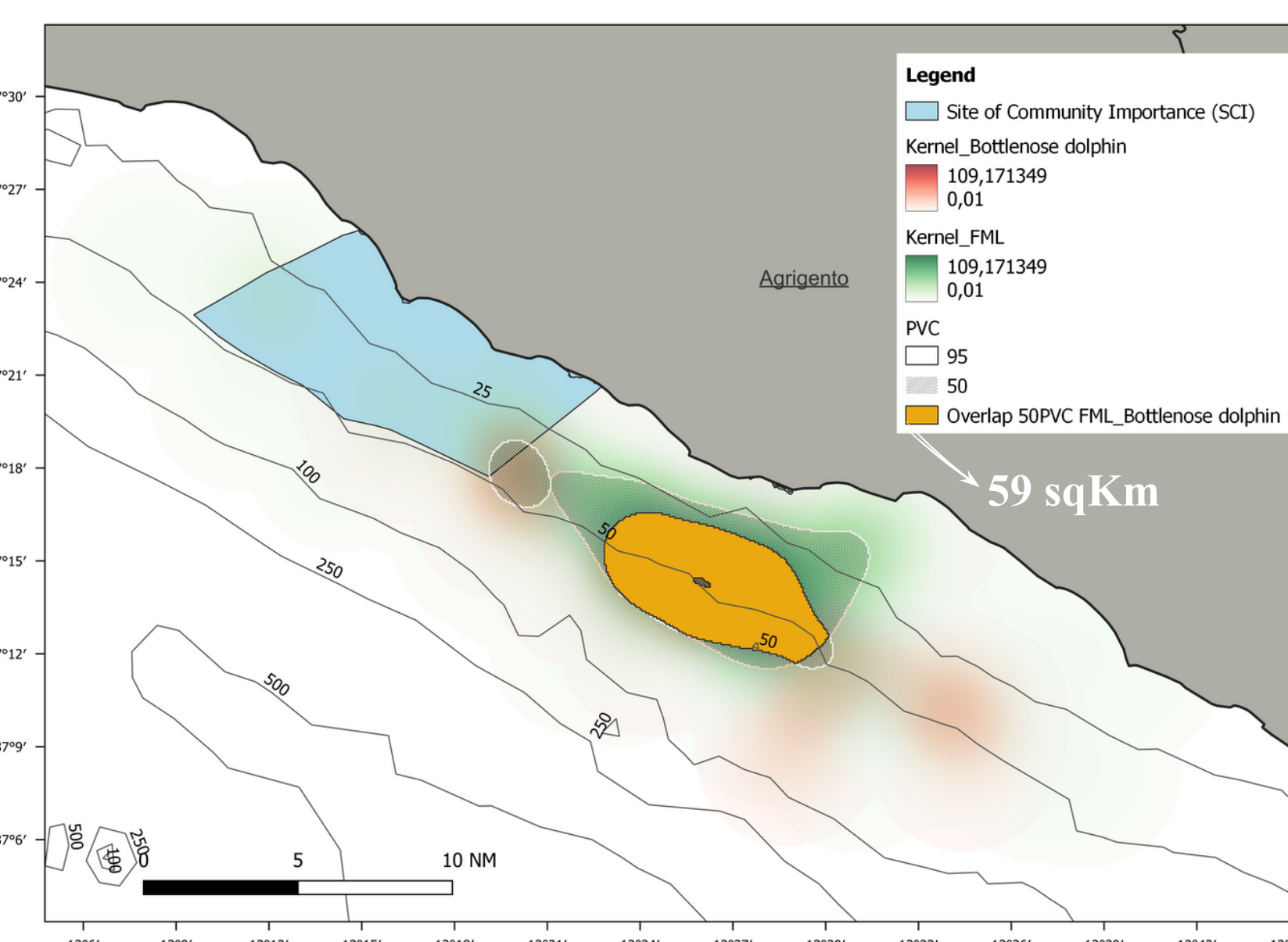


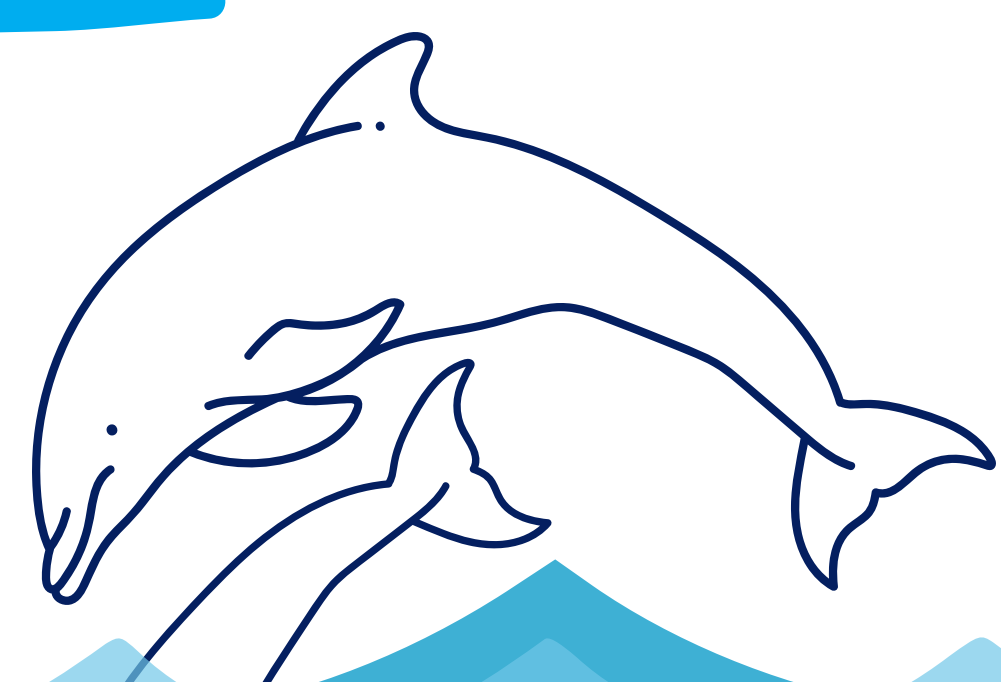
Figure 6. Overlap analysis of the 50PVCs of Floating Marine Litter (FML) and of bottlenose dolphins.

Considering the total surface covered by the core-areas, FML overlaps by 51% with bottlenose dolphins.

CONCLUSIONS

The waste composition reflects the one found worldwide, with plastic being the main component and reaching 90%.

The high degree of overlap between the core areas of the FML and of the dolphins underlines the need to enact specific management measures to reduce marine litter pollution and protect the species.



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