G7 Workshop on Marine Litter
(Rome, Italy – 20-21 April 2017)

PLASTIC BUSTERS

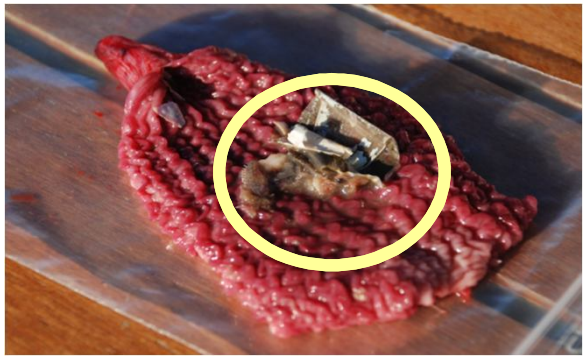
Marine litter in the Mediterranean Sea

UNIVERSITÀ DI SIENA 1240

Maria Cristina Fossi
Biomarker Laboratory, University of Siena, Italy
Fossi@unisi.it

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS
Mediterranean

Marine litter: what happens in the Med ?



7 plastic items in the stomach

145 plastic items in the stomach

5 Kg *of plastic in the stomach*

More than 80 studies have showed the interactions of marine fauna with plastic in the Mediterranean basin

MARINE LITTER IN THE MEDITERRANEAN SEA

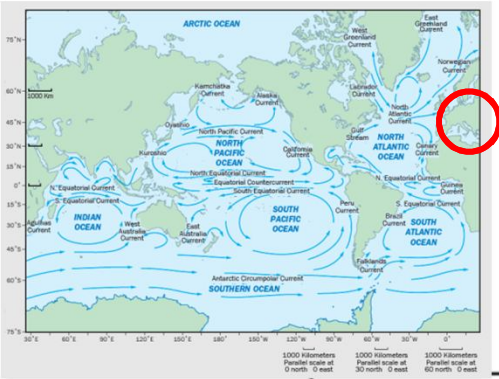
- An highly urbanized and developped coastline
- A closed basin
- 30% of the maritime traffic
- A touristic destination
- Large rivers (Rhône, Nile, Po)

THE MOST AFFECTED AREA WORLWIDE FOR MARINE LITTER

- Some of the largest amounts of Municipal Solid Waste (MSW) are generated annually per person in the Mediterranean Sea (208 – 760 kg/Year)
- An estimated 731 tons of plastic is littered every day, with important differences depending on country
- Cigarette butts may reach 40% of stranded litter
- the highest densities of marine litter stranded on the sea floor, up to 100,000 items / km² (French Coast) are found in the Mediterranean Sea
- the highest densities of floating microplastics , up to 4680,000 items / km² (Southern Adriatic) are found in the Mediterranean Sea

UNEP
UNITED NATIONS
ENVIRONMENT PROGRAMME
MEDITERRANEAN ACTION PLAN

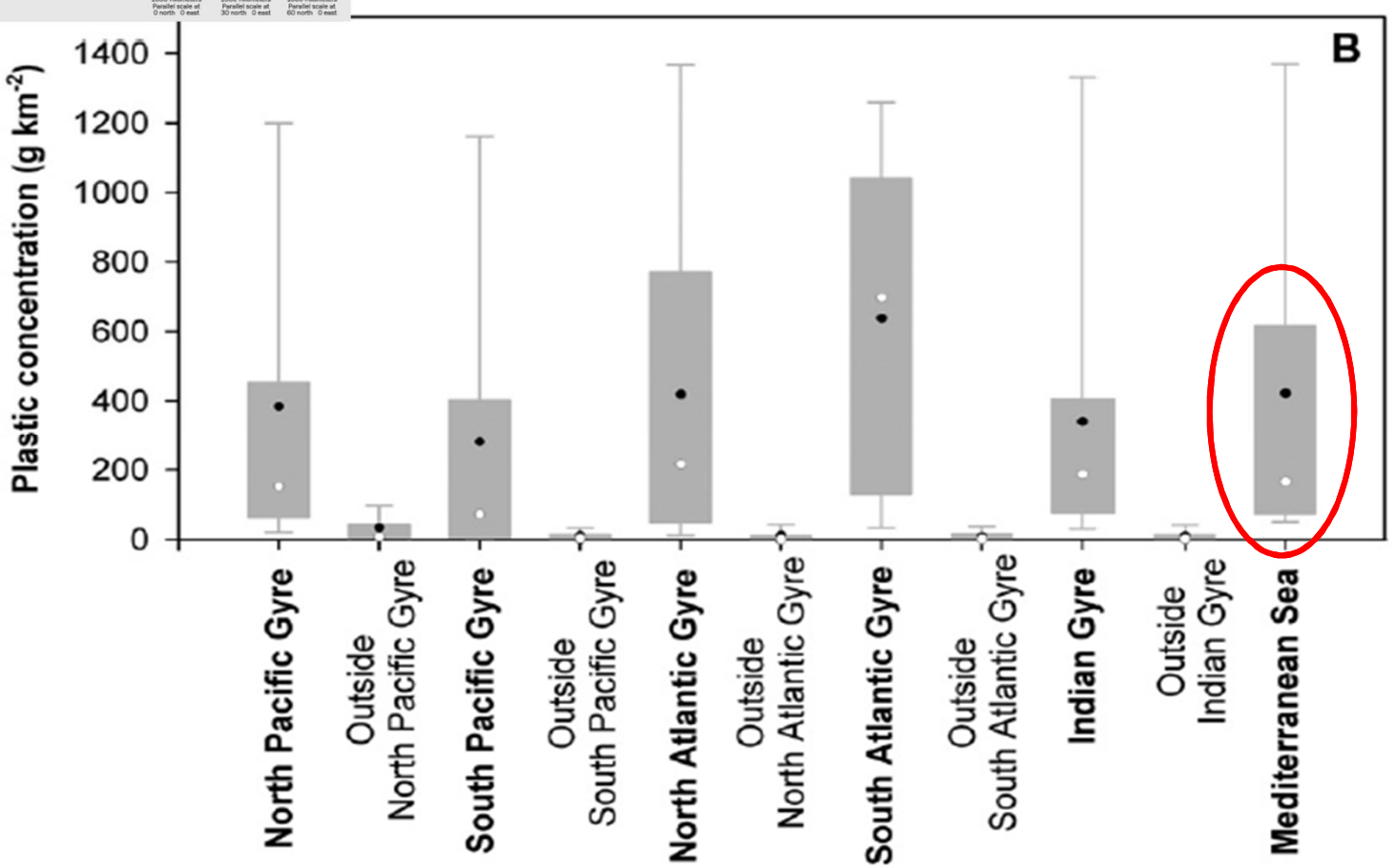
PLOS ONE



RESEARCH ARTICLE

Plastic Accumulation in the Mediterranean Sea

Andrés Cózar[1]*, Marina Sanz-Martín[2,3], Elisa Martí[1], J. Ignacio González-Gordillo[1], Bárbara Ubeda[1], José Á. Gálvez[1], Xabier Irigoien[4], Carlos M. Duarte[2,4]



Plastic Busters project

How can we better assess the marine litter problem and impacts in the whole Mediterranean?

A crucial aspect of the marine litter issue, underlined by the **Barcelona Convention within the Regional Plan for Marine Litter** (Istanbul 2013) is that: "Marine pollution knows no border, pollution in one country affects all other 21 countries, hence there is a need for a regional approach".

Plastic Busters is the first project at basin scale that binds the Southern and Northern Mediterranean countries on the issue of Marine Litter under the umbrella of UNEP/MAP and UfM, with 10 countries already involved in the project and 12 countries endorsing the project.

Diagnosis of the problem to identified specific solutions

Impact on Biodiversity?
Impact on Fisheries?
Identification of Hot spot areas?
Impact on Human?

blueMed

MALTA EU2017

WP2

INFORMATION GAPS AND DATA COLLECTION

WP3

DESIGN AND IMPLEMENTATION OF DEMONSTRATION PROJECTS

WP4

IMPLEMENTATION OF THE REGIONAL PLAN

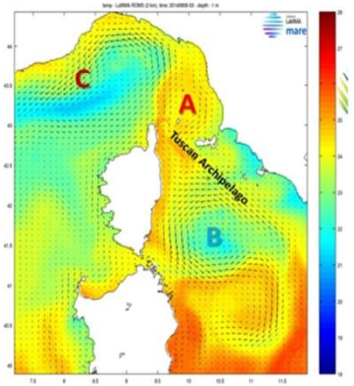
WP5

AWARENESS RAISING AND EDUCATION FOR SUSTAINABLE DEVELOPMENT

WP1

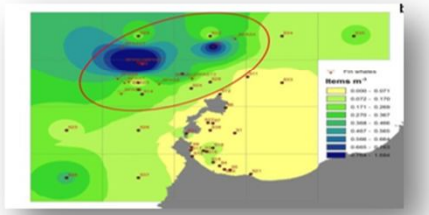
COORDINATES AND MANAGES THE ACTIVITIES IN THE PROJECT

Plastic Busters project: from diagnosis to solutions

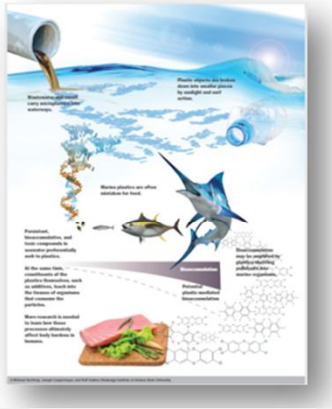


STEP1 - Model-based prediction of **plastic debris accumulation areas** to design sampling activities, using information mapping

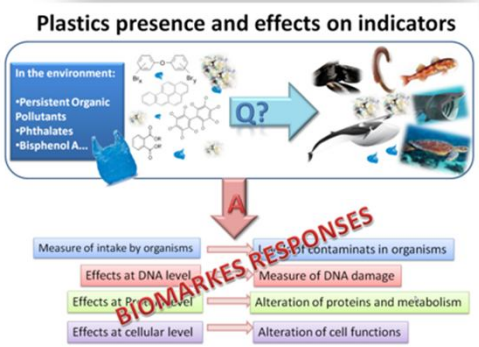
STEP 2 - Monitoring the **presence and effects of plastic debris** in marine ecosystems using **bioindicators** - GIS Mapping (Hot Spots)



STEP 3 - Detecting the effects of marine litter on marine **trophic webs** and **fishery resources**

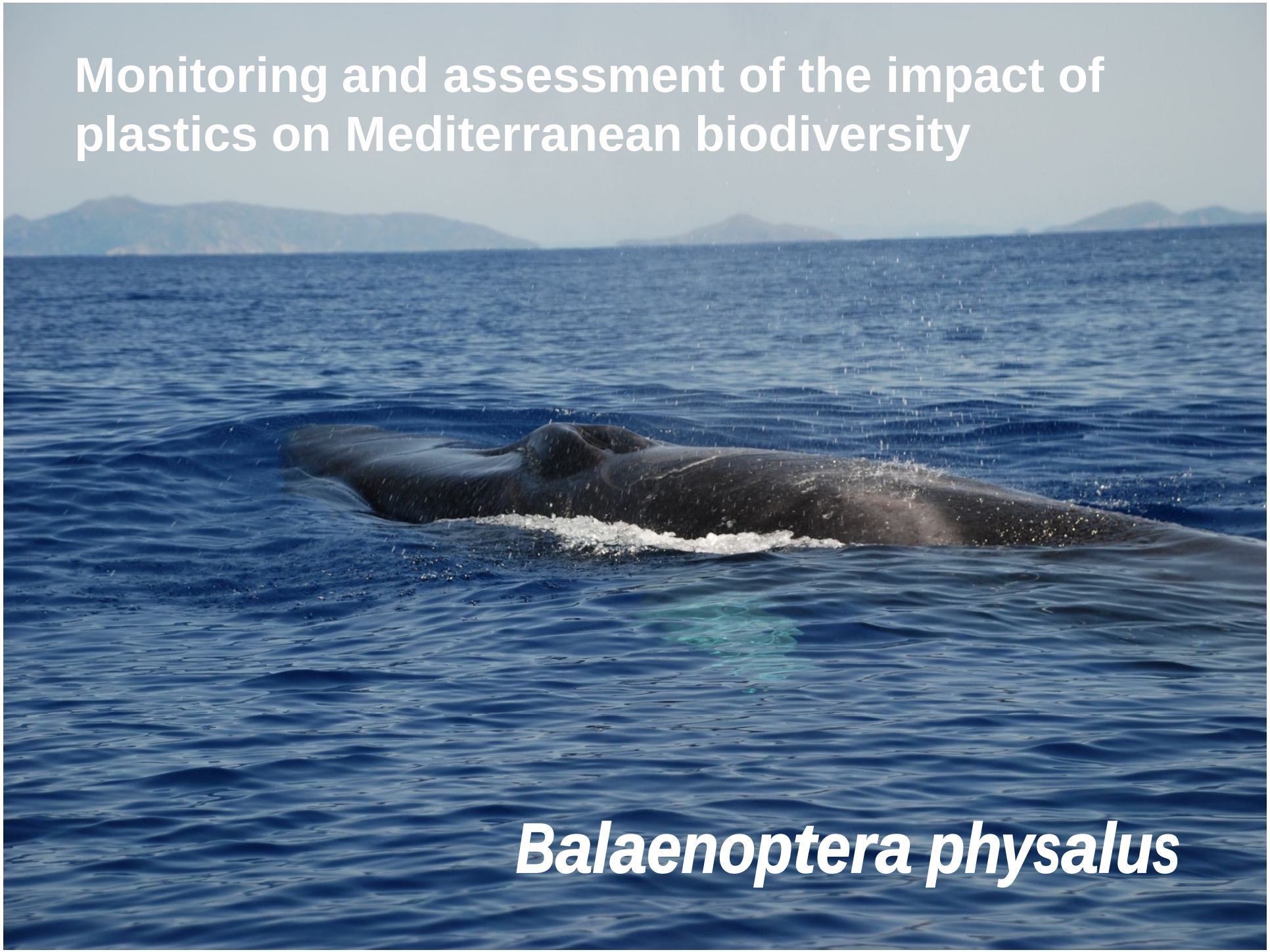


STEP 4 - Investigating the impacts of plastics on **human health**



MALTAEU2017

Monitoring and assessment of the impact of plastics on Mediterranean biodiversity



Microplastics impact in fin whale

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

300 liters of water daily

70,000 liters of water

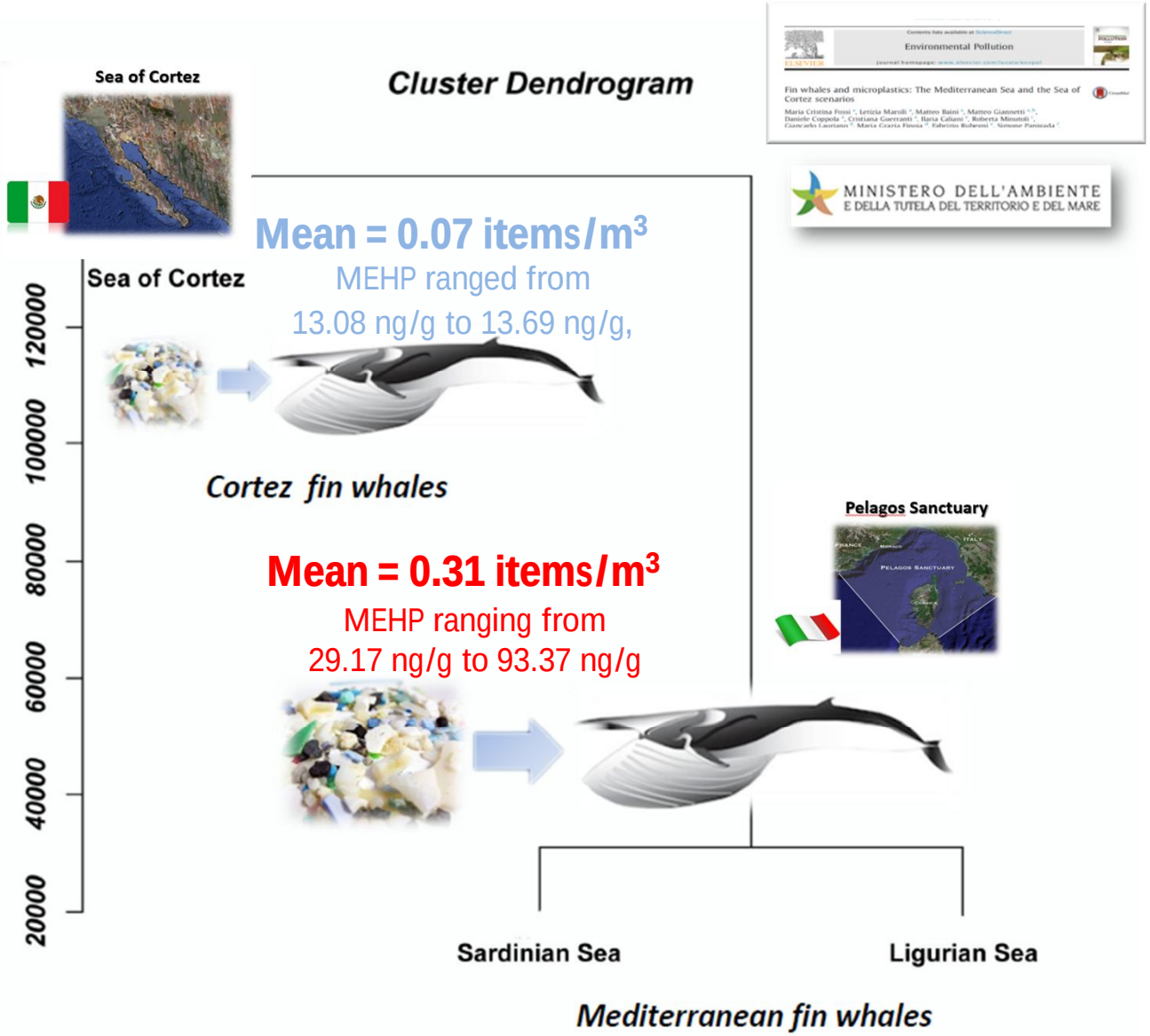
with each mouthful

Baleen whales, during their filtrating activity for feeding, potentially undergo the ingestion of micro-litter. Fin whale with each mouthful it can trap each time about 70,000 litres of water and could undergo the risk of the ingestion of microplastics and related contaminants such as plastic additives and PBTs.

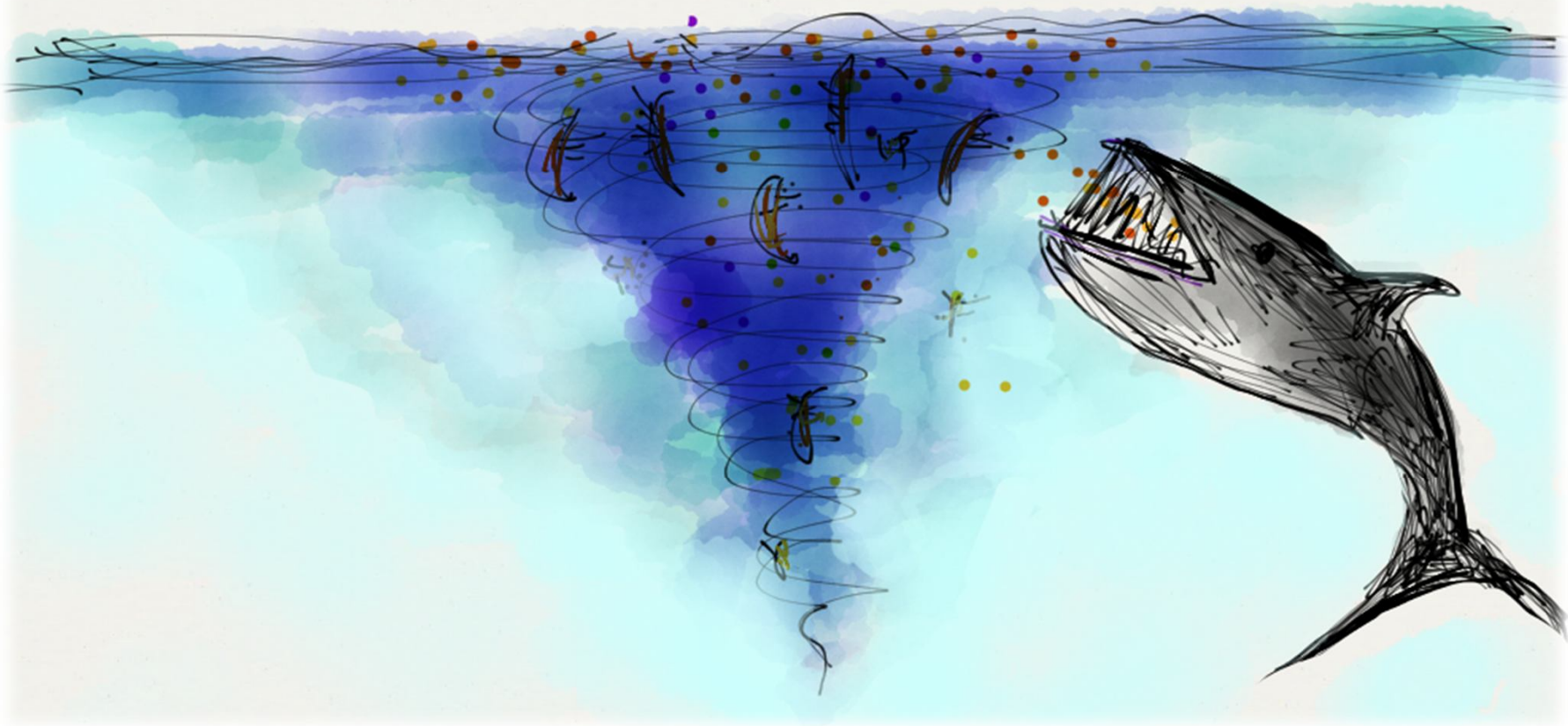
Fin whale as indicator of the health status of sea basin

Microplastic and phthalates concentration **are 4 times higher** in the Mediterranean Sea than Sea of Cortez

Phthalates, OCs and biomarkers responses in **skin biopsies of fin whales** underline a **higher risk** of exposure in the whale from the Pelagos Sanctuary



Do fin whales feed in areas affected by microplastics?



Identification of Hot Spot Areas and risk prediction

frontiers

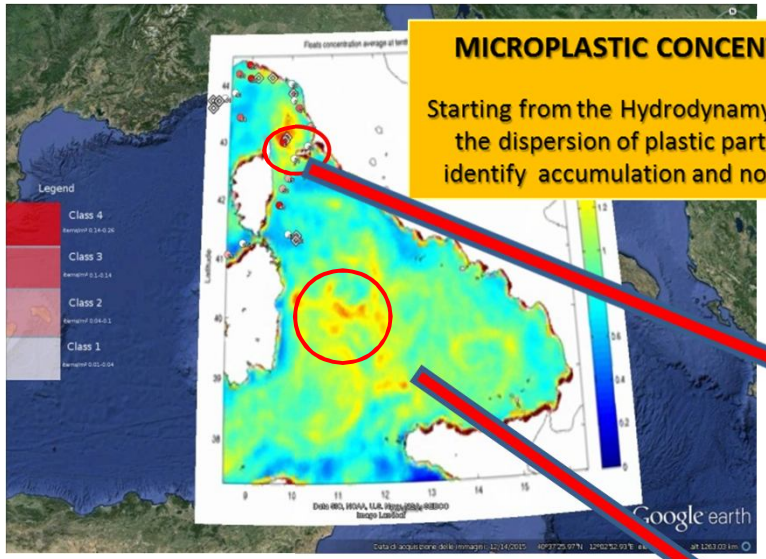
Plastic debris occurrence, convergence areas and fin whales feeding ground in the Mediterranean Marine Protected Area Pelagos Sanctuary: a modelling approach

Maria Cristina Fossi, Teresa Romeo, Cristina Panti', Matteo Baini, Letizia Marsili, Tommaso Campani, Simonepietro Canese, Francois Galgani, Jean-noel Druon, Sabina Airoldi, Stefano Taddei, Maria Pattorini, Carlo Brandini and Chiara Lapucci

Original Research, Front. Mar. Sci. - Marine Pollution

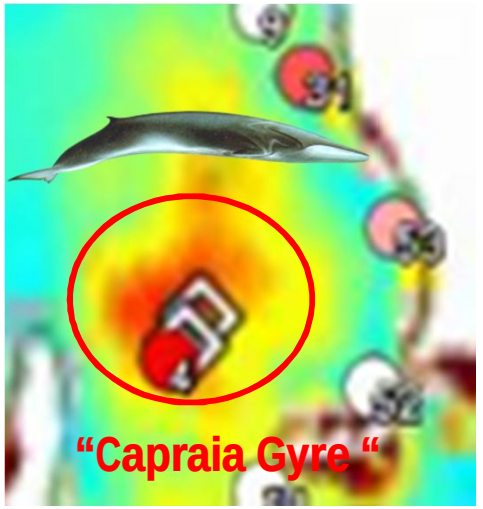
Submitted on: 13 Jan 2017, Edited by: Mario Barletta

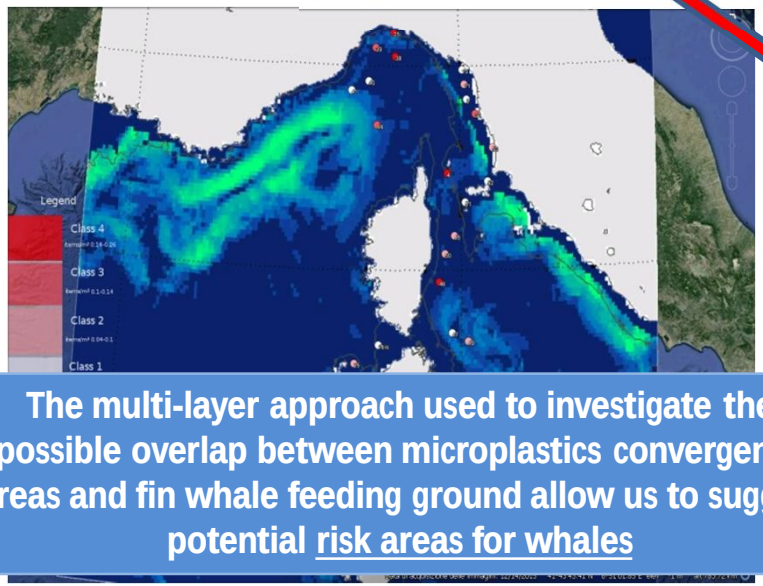
MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

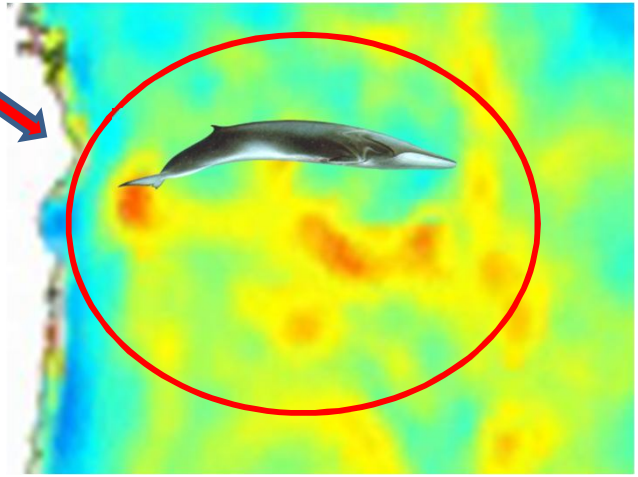


MICROPLASTIC CONCENTRATION MODEL

Starting from the Hydrodynamyc Model we simulated the dispersion of plastic particles that allowed to identify accumulation and not accumulation areas







The multi-layer approach used to investigate the possible overlap between microplastics convergence areas and fin whale feeding ground allow us to suggest potential risk areas for whales

Fin whale in Pelagos Sanctuary

Plastic Busters project:

Which are the most effective actions to put on place for removing/reducing marine litter from the Med and what about their impacts on jobs and economical growth in the Mediterranean sea basin?

It is essential to develop at **basin scale** specific **prevention and mitigation measures/actions** (outlined in the UNEP/MAP Regional Plan on Marine litter Management in the Mediterranean under article 9 and 10) aiming to reduce the input and impacts of marine litter in the Mediterranean coastal and marine environment (**Plastic Busters WP3**):

a) Single - use plastic bags reduction;

b) Deposit refund systems for beverage packaging;

c) Fishing for litter, targeted recovery of ghost nets and derelict fishing gear management;

d) Circular economy approach – turning plastic marine litter into products;

e) The no-special-fee system to reduce dumping at sea;

f) Bioremediation and biodegradation process on plastics;

g) Sustainable aquaculture.

blueMed

MALTA EU2017

BEST PRACTICE
Fishing for litter activity

FFL initiatives aim to reduce marine litter involving fishermen and local Authorities

Include Fishing For Litter in marine litter reduction projects

Try to recycle and/or reuse collected materials

Increase awareness-raising and educational activities

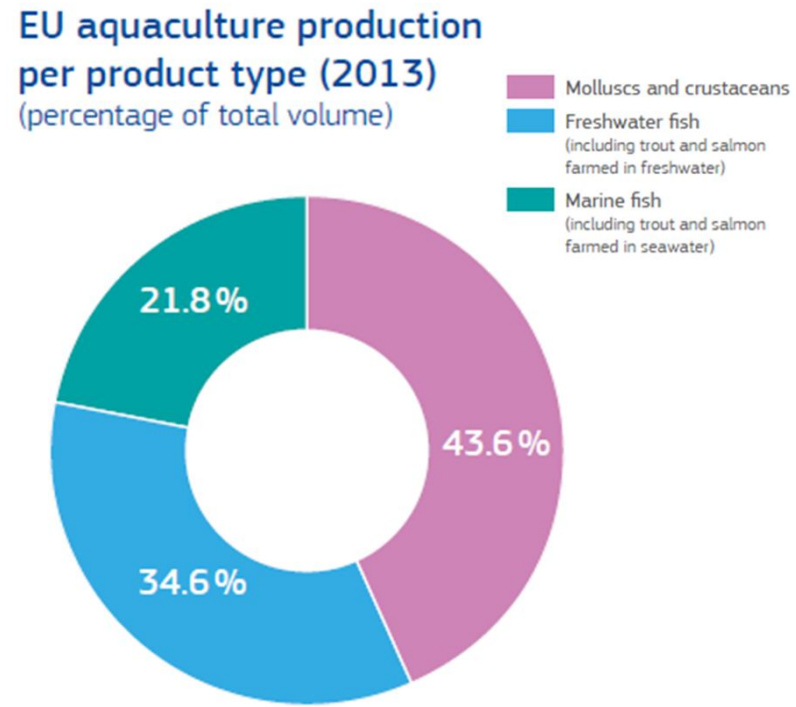
Storyboards by – louwheeler (2016)

FUTURE DEVELOPMENTS IN AQUACULTURE
Use of biodegradable and compostable plastics

Marine aquaculture is a significant activity in many European regions. It use huge amounts of plastics as nylon cage nets in fish culture and polypropylene socks in mollusk culture

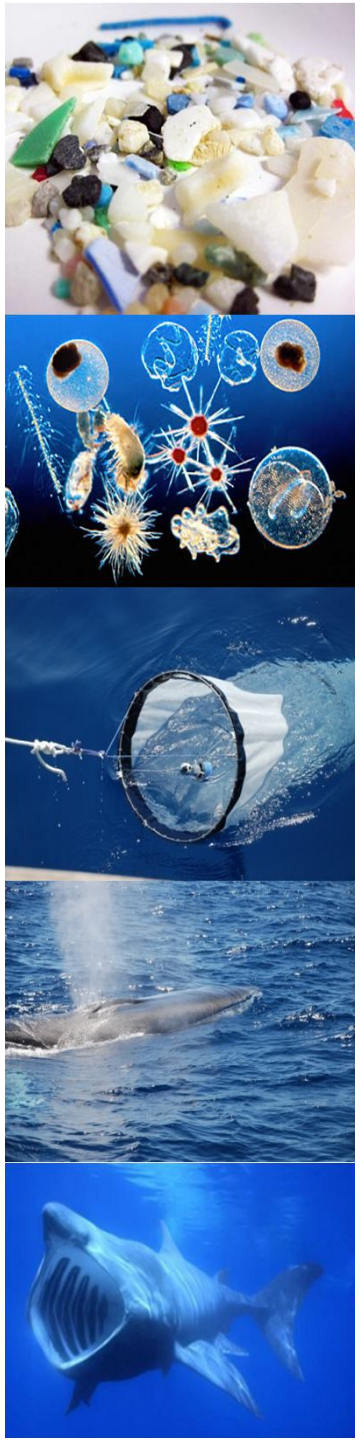
Develop and test the use of bioplastics in shellfish and fish farming as an alternative to conventional plastic polymers (polyethylene, polypropylene, nylon)

MATER-BI



Source: Eurostat and Eumofa

http://plasticbusters.unisi.it/



Acknowledgements

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS
Mediterranean

UNIVERSITÀ DI SIENA
1240

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

UNEP
MAP
40 Years TOGETHER FOR A SUSTAINABLE MEDITERRANEAN

Ifremer

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Union for the Mediterranean
Union pour la Méditerranée
الإتحاد من أجل المتوسط