Fishing intensity in Mediterranean Natura 2000: How monitoring can support management & conservation

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The increasing availability of detailed fisheries data, including logbooks and monitoring systems, enables the analysis of the relationships between fishing activities, their intensity and their potential environmental impacts at an unprecedented level of detail. In particular, from tracking data of fishing vessels, it is possible to derive information about the behavior of coastal fisheries and to know, for example, which are the areas where they fish more frequently. This information, combined with a geographic information system (GIS), offers cost-effective and practical tools to Natura 2000 managers for fisheries monitoring and enforcement of fishing regulations, identifying areas where potential impacts are high in relation to particular ecological features (e.g., sensitive and vulnerable marine habitats), and estimating socioeconomic impacts on fisheries.

In 2016, the Joint Research Centre (JRC) released a map of EU fishery intensity[1] based on open source data from the Automatic Identification System (AIS) for EU fishing vessels above 15 m length, from the period between September 2014 and September 2015. The activities of the vessels were classified through an algorithm which proved to be particularly robust in the case of trawlers (representing the majority of EU fishing vessels) over 15 m in length.

We have used the JRC map as a basis for exploring where bottom trawling in EU Mediterranean waters overlaps with:
o Natura 2000 marine sites (i.e., Sites of Community Importance (SCI) and Special Areas of Conservation (SAC); **Figs. 1** and **2**);
o Essential fish habitats (EFH) – i.e., habitats that are essential to the lifecycles of fished species (**Fig. 3**; **Table 1**).
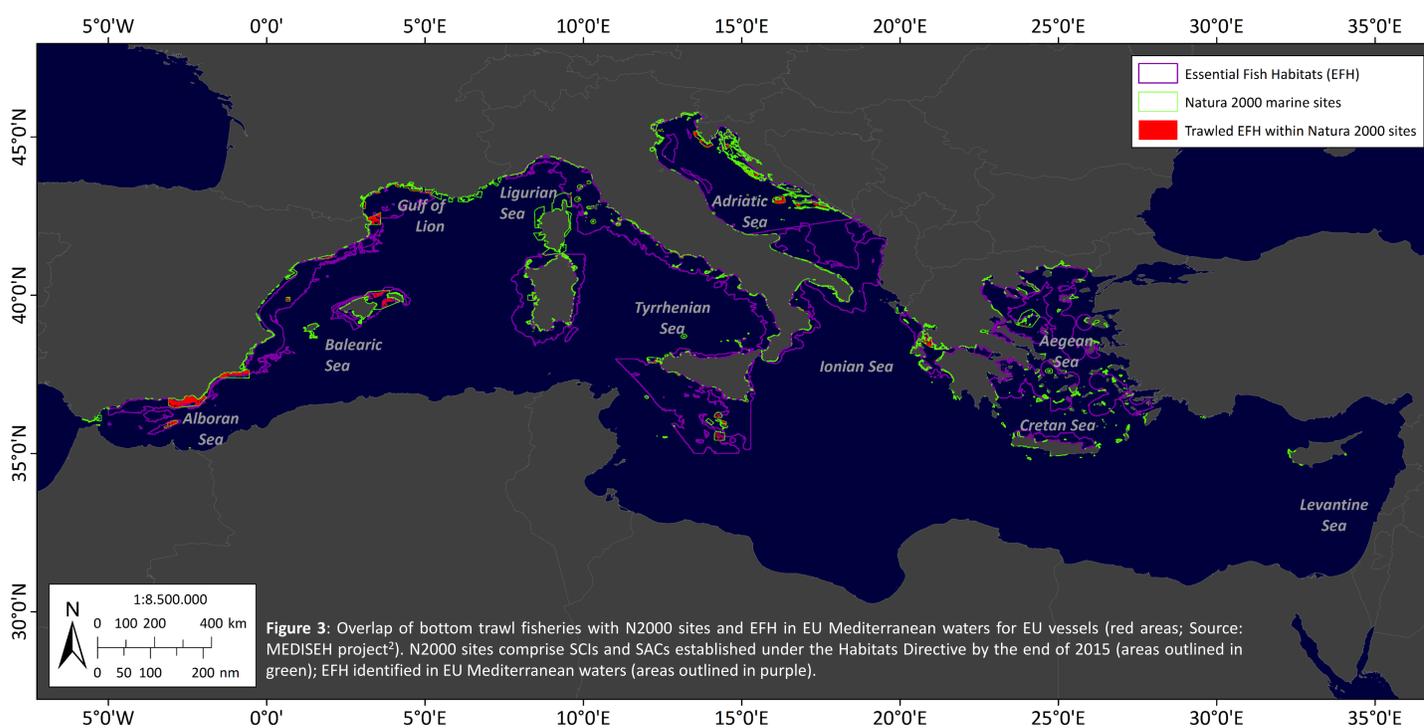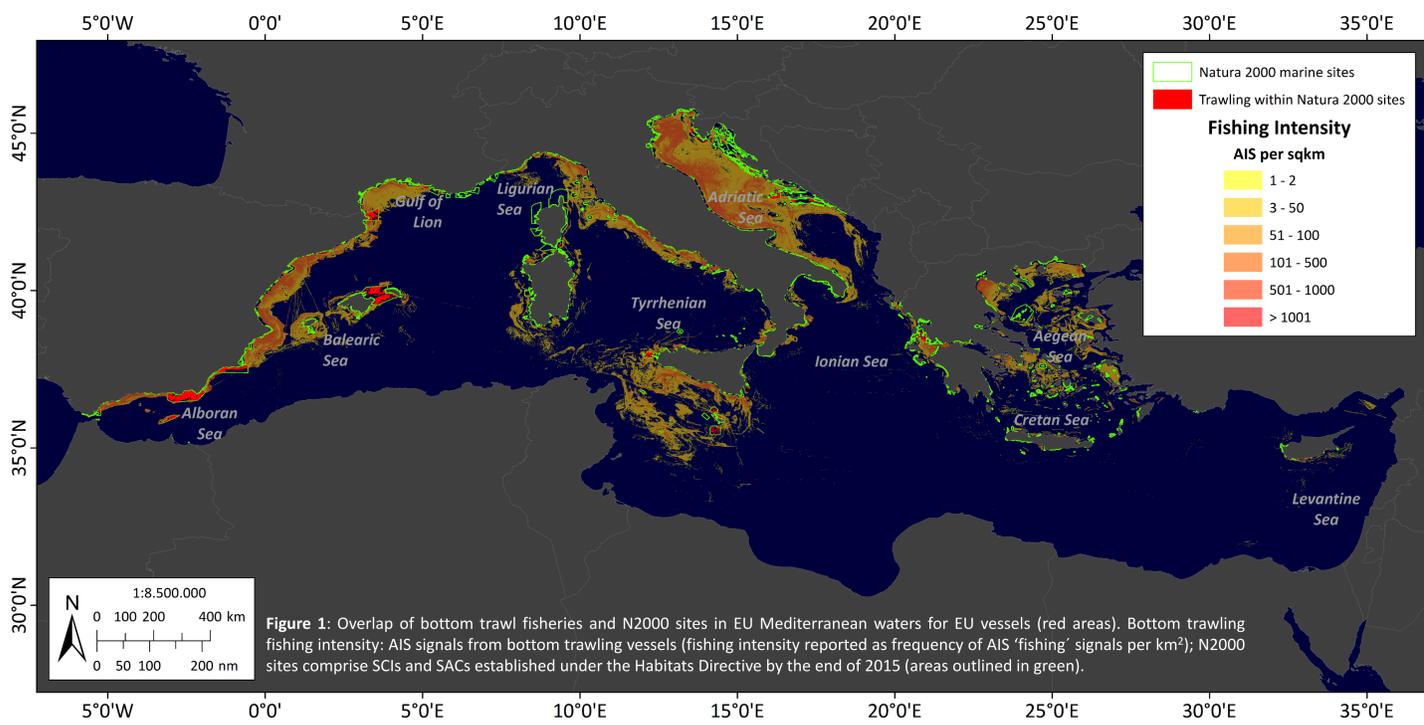

Figure 2: Marine Natura 2000 area (SACs, SCIs) (km^2; gray bar) and area in which bottom trawling occurred (orange bar) by Mediterranean EU MS over the period 2014-2015, as per JRC analysis[1]. Labels indicate percentage of marine Natura 2000 area trawled.

Figure 1: Overlap of bottom trawl fisheries and N2000 sites in EU Mediterranean waters for EU vessels (red areas). Bottom trawling fishing intensity: AIS signals from bottom trawling vessels (fishing intensity reported as frequency of AIS 'fishing' signals per km^2); N2000 sites comprise SCIs and SACs established under the Habitats Directive by the end of 2015 (areas outlined in green).

Figure 3: Overlap of bottom trawl fisheries with N2000 sites and EFH in EU Mediterranean waters for EU vessels (red areas; Source: MEDISEH project[2]). N2000 sites comprise SCIs and SACs established under the Habitats Directive by the end of 2015 (areas outlined in green); EFH identified in EU Mediterranean waters (areas outlined in purple).
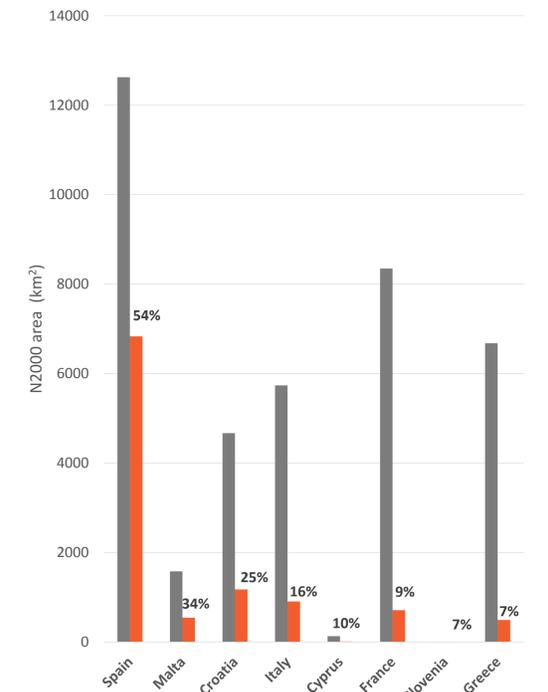
Table 1: Essential fish habitats (EFH; Source: MEDISEH project[2]), including nursery and spawning grounds, for commercial fish species falling within N2000 sites in EU Mediterranean waters.

EFH within N2K sites in EU Mediterranean waters		
Species	**EFH area within N2K (km^2)**	**Proportion of EFH area within N2K**
Red mullet (*Mullus barbatus*)	8925	6%
Broadtail shortfin squid (*Illex coindetii*)	7263	4%
Deep-water rose shrimp (*Parapenaeus longirostris*)	5987	4%
Common pandora (*Pagellus erythrinus*)	5236	8%
European hake (*Merluccius merluccius*)	4899	3%
Horned octopus (*Eledone cirrhosa*)	2997	2%
Thornback ray (*Raja clavata*)	2846	3%
Norway lobster (*Nephrops norvegicus*)	2514	2%
Blackmouth catshark (*Galeus melastomus*)	1856	2%
Red striped mullet (*Mullus surmuletus*)	1842	2%
Giant red shrimp (*Aristaeomorpha foliacea*)	849	2%
Blue and red shrimp (*Aristeus antennatus*)	432	1%
Common sole (*Solea solea*)	146	1%
Total	**45790**	**3%**

The need for proper control and enforcement of coastal fisheries in EU Mediterranean waters:

In the Mediterranean Sea, coastal habitats are under high pressure from destructive fisheries, mainly bottom trawling. Despite current regulations in EU waters, such as the Mediterranean Regulation,[3] and an established network of over 1466 marine N2000 sites (mainly coastal),[4] proper protection of Mediterranean sensitive habitats is still not fully implemented in EU waters.

Intense trawling can also be observed inside specific marine N2000 sites (**Fig. 1**). This is particularly alarming considering that the Mediterranean coastal shelf hosts important marine habitats, particularly sensitive to fishing gears, like maërl and coralligenous beds (Habitats 1110 and 1170[5]).

The AIS signals show that the combination of the Mediterranean Regulation and the conservation measures in place – including inside N2000 sites – seem ineffective and insufficient for guaranteeing the necessary protection of sensitive coastal ecosystems. Furthermore, our analysis shows that the N2000 network hosts an array of nursery and spawning grounds of important commercial fish stocks (**Fig. 3**; **Table 1**).

By effectively protecting marine Natura 2000 sites from bottom trawling, over 3% of EU Mediterranean EFH would be protected (Table 1), thereby contributing to restoring coastal fish stocks and supporting coastal fisheries and communities. Effective biodiversity protection and fish stock recovery can only occur when proper enforcement and control are implemented[6].

Recommendations:

➤ Prohibit destructive fishing gears, such as bottom trawls, in all waters down to 100 m depth, to ensure protection of both sensitive and vulnerable ecosystems, as well as coastal Essential Fish Habitat.

➤ Ensure proper fisheries control and enforcement, by adopting a compulsory vessel tracking system for all EU fishing boats, in order to cover the small vessels (<12 m LOA[7]) currently not required by law to carry such equipment, but which represents around 70% of the vessels in the EU Mediterranean fleet [8].

➤ Integrate the management of fisheries in Natura 2000 sites and the protection of Essential Fish Habitats into EU fisheries multi-annual plans being established under the Common Fisheries Policy[9].

References:
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