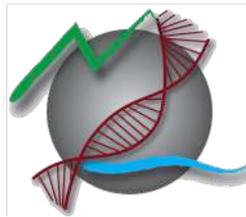


Towed gear restrictions in Aegean and Ionian Seas

Athanassios C. Tsikliras, Maria Makri, Donna Dimarchopoulou

Laboratory of Ichthyology, School of Biology, Aristotle University of Thessaloniki,
Thessaloniki, Greece
Email: atsik@bio.auth.gr



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Introduction

In the Mediterranean Sea, international (mainly EU Regulations) and national legislation act in a complementary way with international legislation mainly focusing on technical gear specifications (e.g. minimum mesh size) and minimum landing size for the main target species and national legislation complementing for other species, temporal closures, spatial closures and additional technical specifications or even a complete ban of certain gears such as pelagic trawling in Greece (Stergiou et al. 2016 and references therein). Specific management measures exist within Greek National Management Plans in terms of fishing capacity, fishing effort, catch management, temporal, seasonal and spatial closures and minimum landing size. Spatially restricted fishing areas involving depth zones, protected habitats, spawning and nursery habitats also exist in Greece (Stergiou et al. 2016).

The legal system regarding fisheries is very complex in Mediterranean countries and extremely complex in Greece (for an example see Tsikliras 2014), where, besides the Ministry of Rural Development and Food (former Ministry of Agriculture), several other authorities are involved in issuing fisheries restrictions including the Coast Guard (also referred to as Port Police in some papers which acts locally, mainly near or around ports), the Ministry of Shipping and Island Policy (former ministry of Maritime Affairs) and the Ministry of Culture and Sports (acts in marine areas of archaeological interest). The multitude of legislative instruments with diverse objectives and the lack of a central system where all the restrictions, regulations and laws are clearly defined complicate their implementation and enforcement (Petza et al. 2017) and may affect fisheries management.

Another important issue that should be mentioned is that there is no Exclusive Economic Zone (EEZ) in Greece and that the national territorial waters of the country in the Aegean Sea extend up to six (6) nautical miles from shore (Tsikliras 2014). This means that the legislation and enforcement authorities may differ between national and international waters. In fact, this is a loophole that has been used by the fleet claiming that national legislation is valid only in territorial waters. Since 2014 the fishing season of bottom-trawling and purse-seining exist only in national waters, while the areas beyond the six mile “border” are being exploited throughout the year thereby increasing fishing effort and pressure to the stocks (Tsikliras 2014).

The existing fisheries restricted areas of the Mediterranean Sea have been identified and reviewed within the framework of the MEDISEH project (Giannoulaki et al. 2013) and all the fishing restrictions of the entire fleet/gears in the Greek part of the Aegean Sea were collected through the PROTOMEDEA project (Petza et al. 2017). Some of the restrictions in Greek waters have been very recently available in a map by the Fisheries Department of the Hellenic Coast Guard and it is planned that the majority of them (if not all) will be mapped for all gears in the following years (see an example of trawling map here <http://www.hcg.gr/alieia/prohibitions/GREECE/GREECE.php?appid=c7c5c0c529654d6386468badc4f0ce2a>).

The objective of this work was to collect and gather information on both temporary and permanent spatial closures/restrictions of towed fishing gears in the Aegean and Ionian Seas, in place to protect essential fish habitats or sensitive habitats and to provide scientific assessment on the level of implementation, enforcement and compliance.

Datasets and methods

The entire legislation regarding fisheries the spatial restrictions and regulations of towed gears (bottom-trawl or otter-trawl, beach-seine and all types of dredges) in the Aegean and Ionian Seas was extracted from the website (<http://www.hcg.gr/alieia/>) of the Hellenic Coast Guard, which is responsible for enforcing the legislation and issuing some of the restrictions. All the original documents of the national (in Greek) and EU legislation were downloaded in PDF format covering documents back to 1953. After this exhaustive search, the chances of having missed a document are minimum unless the document was not publically available. Besides the EU Common Fisheries Policy legislation and regulations, the main



fisheries legislation in Greece is based on Mediterranean regulations, Royal (before 1975) and Presidential (after 1975) Decrees that generally apply to the entire Greek Seas for specific gears and local restrictions or regulations (often issued by the Port Police) that apply locally.

The following information was extracted: name of area, administrative region, other regional/local name, longitude and latitude, surface area (in km²). Each restriction was noted in terms of designation for EFH/SH protection, permanent or temporary enforcement, level of enforcement, compliance and described (depth, gear restrictions, target species, monitoring provisions, etc.). The year the restriction was issued and the hyperlink to the original document were also provided. Although the coordinates may not always be exact (in case of non rectangular surface areas), the estimation of the area covered by each restriction is always correct as it was estimated as a polygon in Google Earth (local ones) and GIS software (those that apply to the entire Greek Seas). Coordinates are missing in a few cases where the area was really small (e.g. radially around fish farming cages) or really large (e.g. the restriction to bottom-trawls operating nearshore).

Two separate EXCEL files are provided, one for the Ionian Sea and one for the Aegean Sea. The yellow highlight denotes all temporary restrictions and the light green highlights the spatial overlap among restrictions. Restrictions that apply to the entire Greek Seas (such as the 1.5 nautical mile distance from shore for bottom-trawling) may include some other local restrictions that are confined to specific areas and cover a smaller surface. Therefore, a sum of all spatial closures in terms of surface area will result in an overestimation of the total fisheries restricted areas in Greek Seas.

Results and discussion

Overall, 219 towed gear restrictions were identified for the Aegean Sea and 90 for the Ionian Sea, which covers a smaller area. Most of these restrictions are permanent and have been issued by the Ministry of Rural Development and Food aiming towards protecting fish species/stocks and their sensitive habitats. However, with only few exceptions such as the protection of *Posidonia* beds, the name of the stock/species to be protected and the scientific basis of the legislation/regulation is not clearly mentioned in any document. The only exceptions are the Management plans for the bottom-trawlers and purse-seiners, which clearly mention the reference points and the species whose populations should recover and their fishing mortality monitored, i.e. those that should be less fished by each fleet. In these cases however, the restrictions mostly had to do with fishing effort and temporal closures.

In general, the coastal zone and the *Posidonia* beds are protected against towed gears across the Greek coastline, including the islands, aiming to secure spawning and nursery grounds of demersal stock/species. Again, no particular fish species is mentioned in any of the documents. The deep-sea seabed and fauna are also protected as bottom-trawling is prohibited in depths exceeding 1000 m. However, the vast majority of regulations for towed gears and closures do not refer to specific stocks/species partly because of the multi-species nature of these gears.

Several fisheries restrictions are partially or fully overlapping, especially the temporary ones with the ones enforced across the Greek Seas creating a very complex pattern, which is difficult to map in a single layer (see examples for the Ionian Sea in Figure 1; the entire Ionian Sea map with the fisheries restrictions is included in the deliverables as a file) and complicates fisheries management. For another example of multi-gear spatial restrictions for Thermaikos Gulf, one of the main fishing grounds of the Aegean Sea, see Supplementary material in Dimarchopoulou et al. (2018).

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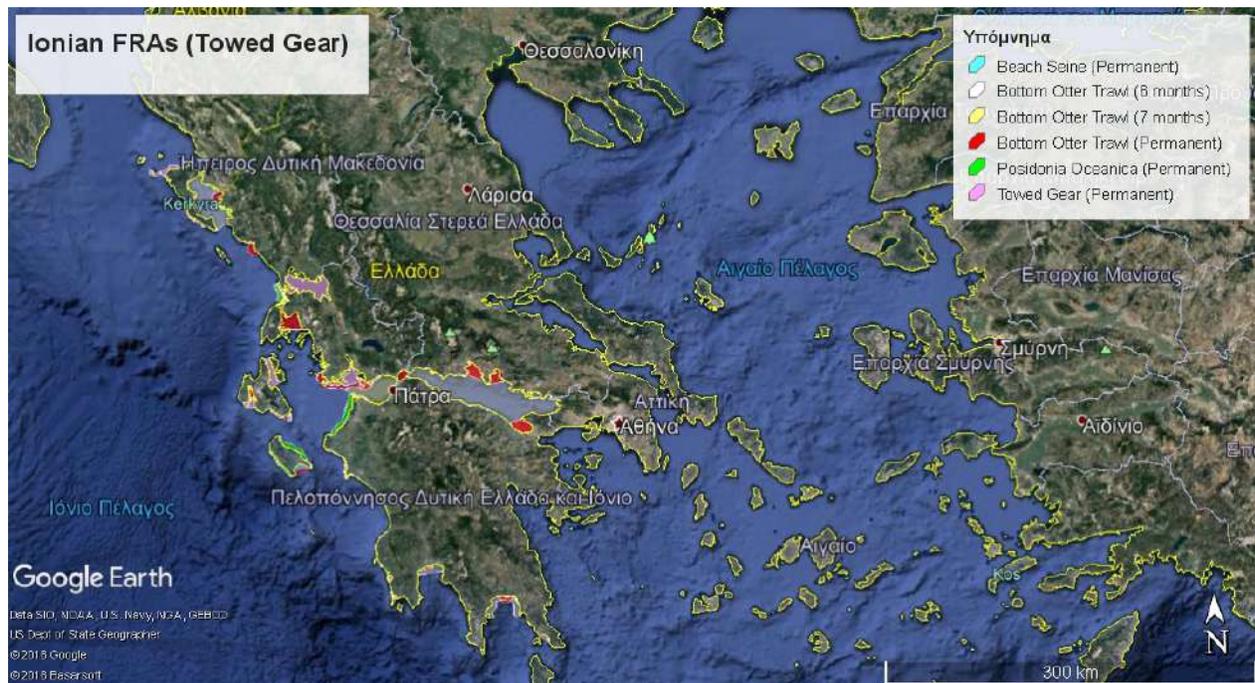
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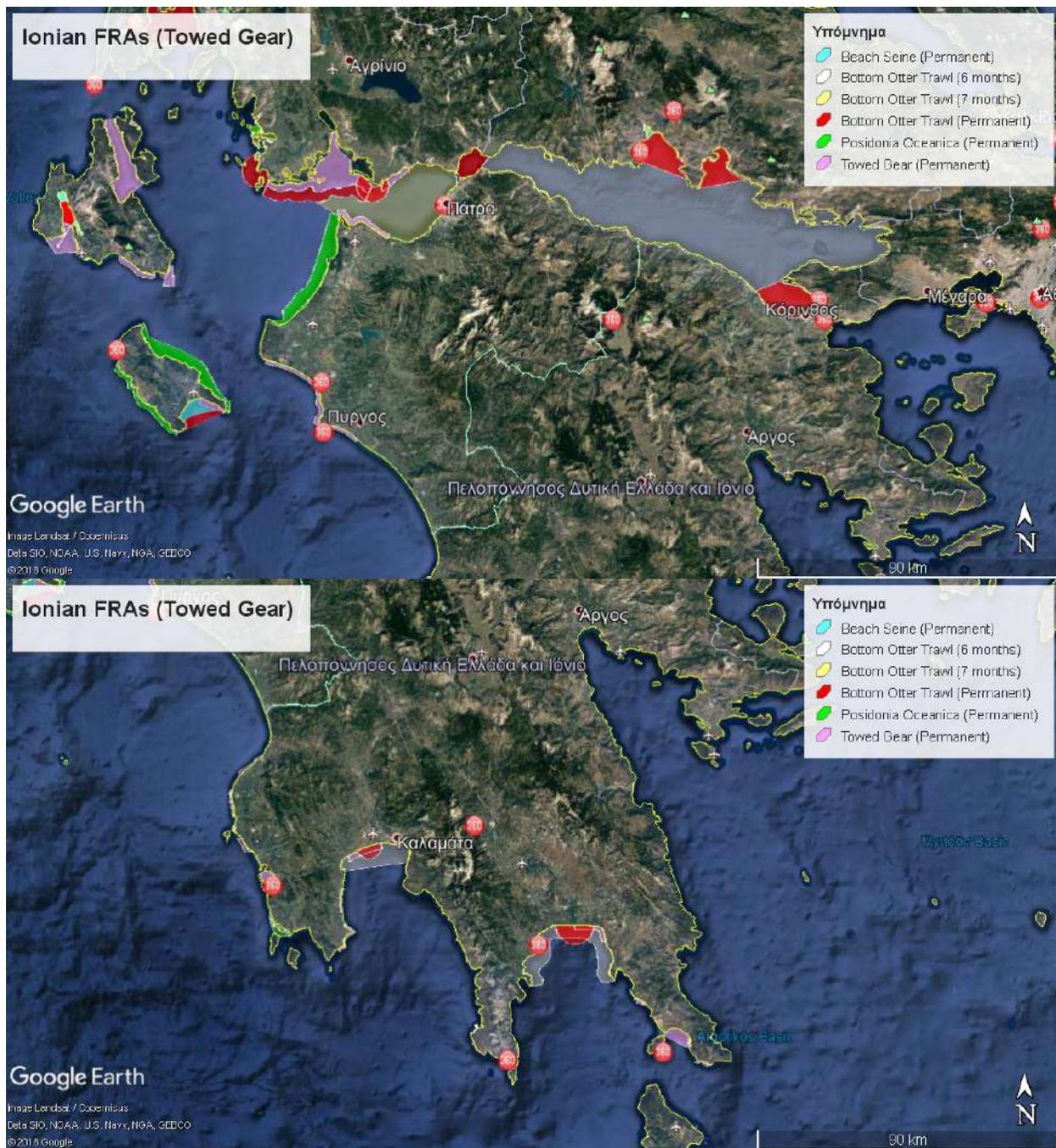


Figure 1. Maps (screenshots) of the Ionian Sea with the categories of the fisheries restricted areas.

