CINEA/EMFAF/2021/3.1.2/03/SC04/SI2.881222
Specific Contract 2021/3.1.2/03/SC04
Hosting, maintenance and further development of the Regional Database for the Mediterranean and Black Seas

Med&BS RDBFIS

Mapping spatial distribution of SSF in data limited cases: A space-time tool to estimate spatial effort, weight and value of landings

Presenting: Irida Maina

Overview and scope of this training

1. Overview on the MCDA approach for estimating fishing effort, landings and value of small scale fishery

2. Live demonstration

3. Practical session (Running examples)

Introduction

- **Small-Scale Fishing (SSF)** is highly **important for the Mediterranean fisheries**
- **The spatial distribution of SSF** (LOA <12 m) **is unknown** since data on fishing vessels locations, e.g. **VMS/AIS data, are not available**
- Certain, **SSF techniques** (e.g. bottom longlines) might have **impacts** on maerl beds, coralligenous formations etc.

➢ An approach that combines geospatial data and experts' knowledge (**GIS-MCDA**) has been employed to estimate spatial fishing pressure.

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
The journal is available on line at http://www.medit-mar-sc.net
DOI: http://dx.doi.org/10.12681/mms.1087

Research Article

Multi-Criteria Decision Analysis as a tool to extract fishing footprints: application to small scale fisheries and implications for management in the context of the Maritime Spatial Planning Directive

S. KAVADAS[1], I. MAINA[1], D. DAMALAS[1,2], I. DOKOS[1], M. PANTAZI[1] and V. VASSILOPOULOU[1]

[1] Hellenic Centre for Marine Research, P.O. Box 712, 19013, Anavyssos, Hellas
[2] European Commission - Joint Research Center, Institute for the Protection and Security of the Citizen (IPSC) - Maritime Affairs Unit - FISHREG - Scientific Support to Fisheries, TP 051, I-21027 Ispra (VA), Italy

Corresponding author: stefanos@hcmr.gr

Handling Editor: Argyro Zenetos

Received: 3 October 2014; Accepted: 8 January 2015; Published on line: 22 April 2015

Abstract

In the context of the Maritime Spatial Planning Directive and with the intention of contributing to the implementation of a future maritime spatial plan, it was decided to analyze data from the small scale coastal fisheries sector of Greece and estimate the actual extent of its activities, which is largely unknown to date. To this end, we identified the most influential components affecting coastal fishing in terms of its distribution and intensity: fishing capacity, bathymetry, distance from coast, Sea Surface Chlorophyll (Chl-a) concentration, legislation, maritime traffic activity, trawlers and purse seiners fishing effort and no-take zones. By means of Multi-Criteria Decision Analysis (MCDA) conducted through a stepwise procedure, the potential fishing footprint with the corresponding fishing intensity was derived. The method provides an innovative and cost-effective way to assess the impact of the, notoriously hard to assess, coastal fleet. It was further considered how the inclusion of all relevant anthropogenic activities (besides fishing) could provide the background needed to plan future marine activities in the framework of Marine Spatial Planning (MSP) and form the basis for a more realistic management approach.

Keywords: Small-scale fisheries, MCDA, AHP, Fuzzy logic, GIS, Mediterranean Sea, MSP.

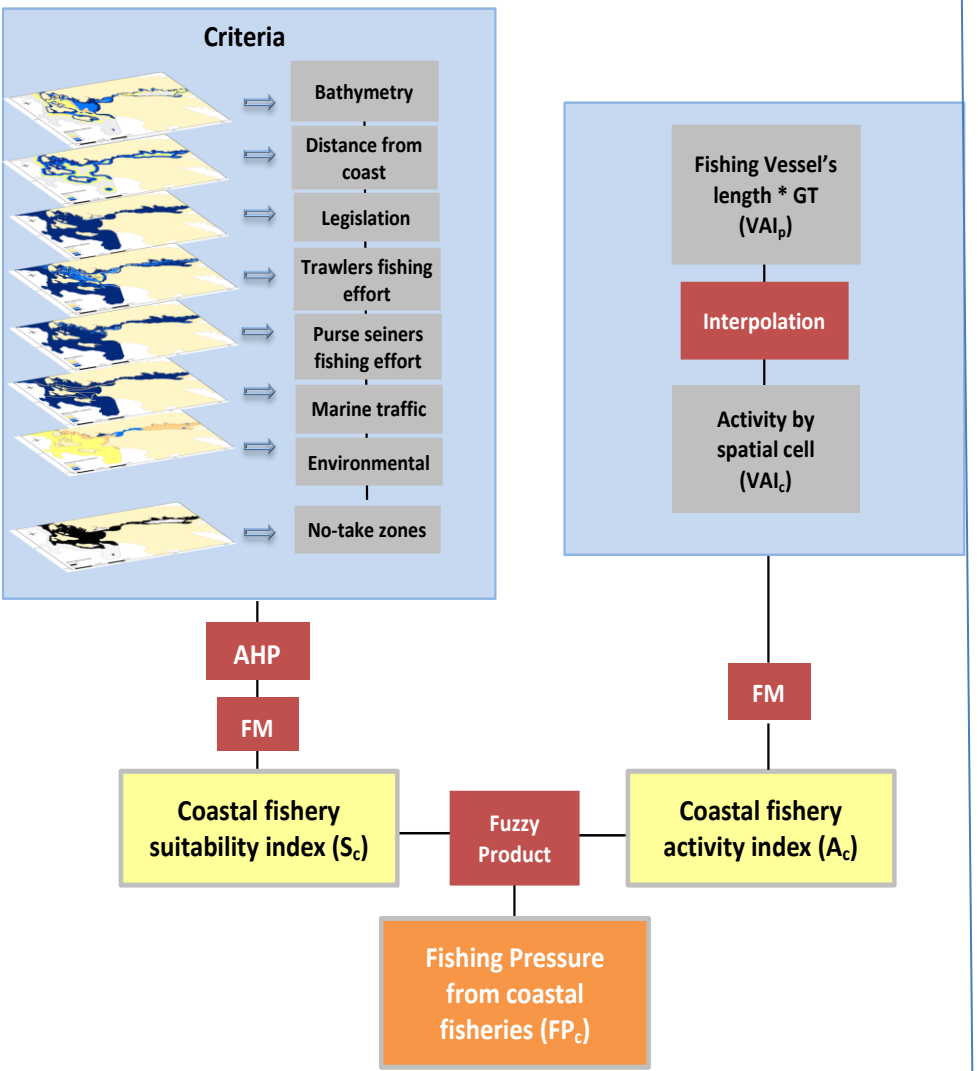
Introduction

specific coastal ecosystems, with their great diversity and

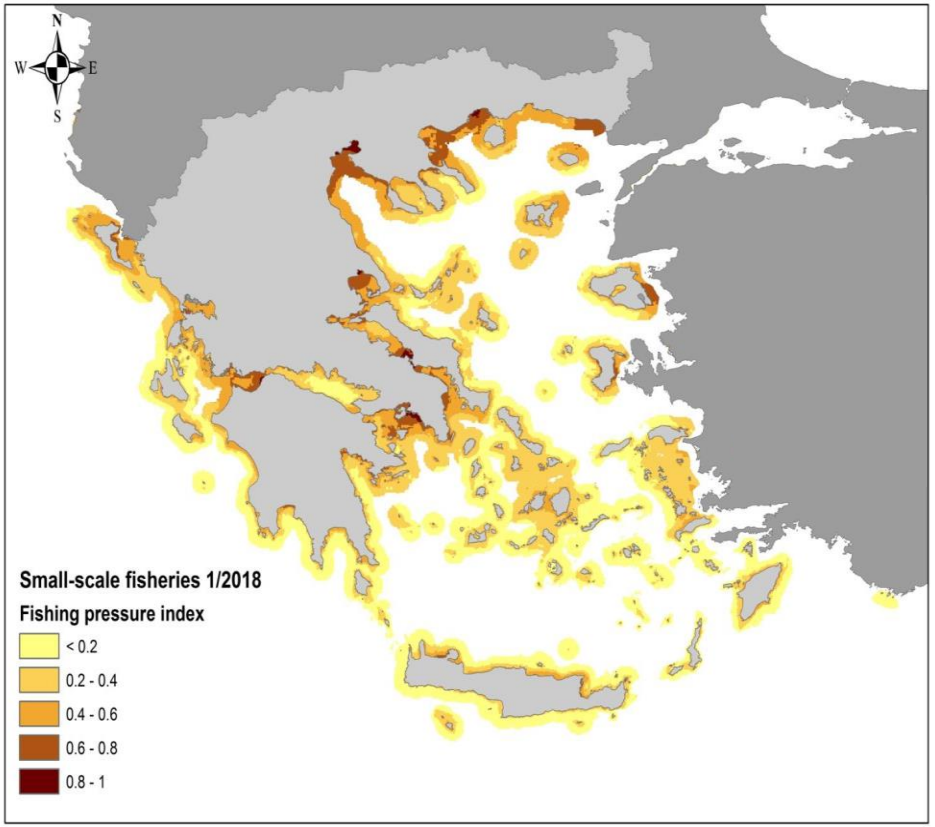
DOI: https://doi.org/10.12681/mms.1087

Introduction: MCDA – Multi-Criteria Decision Analysis

Method workflow



Example outcome



In the framework of RDBFis a development of an **r-package** is ongoing aiming to support and automate the following processes:

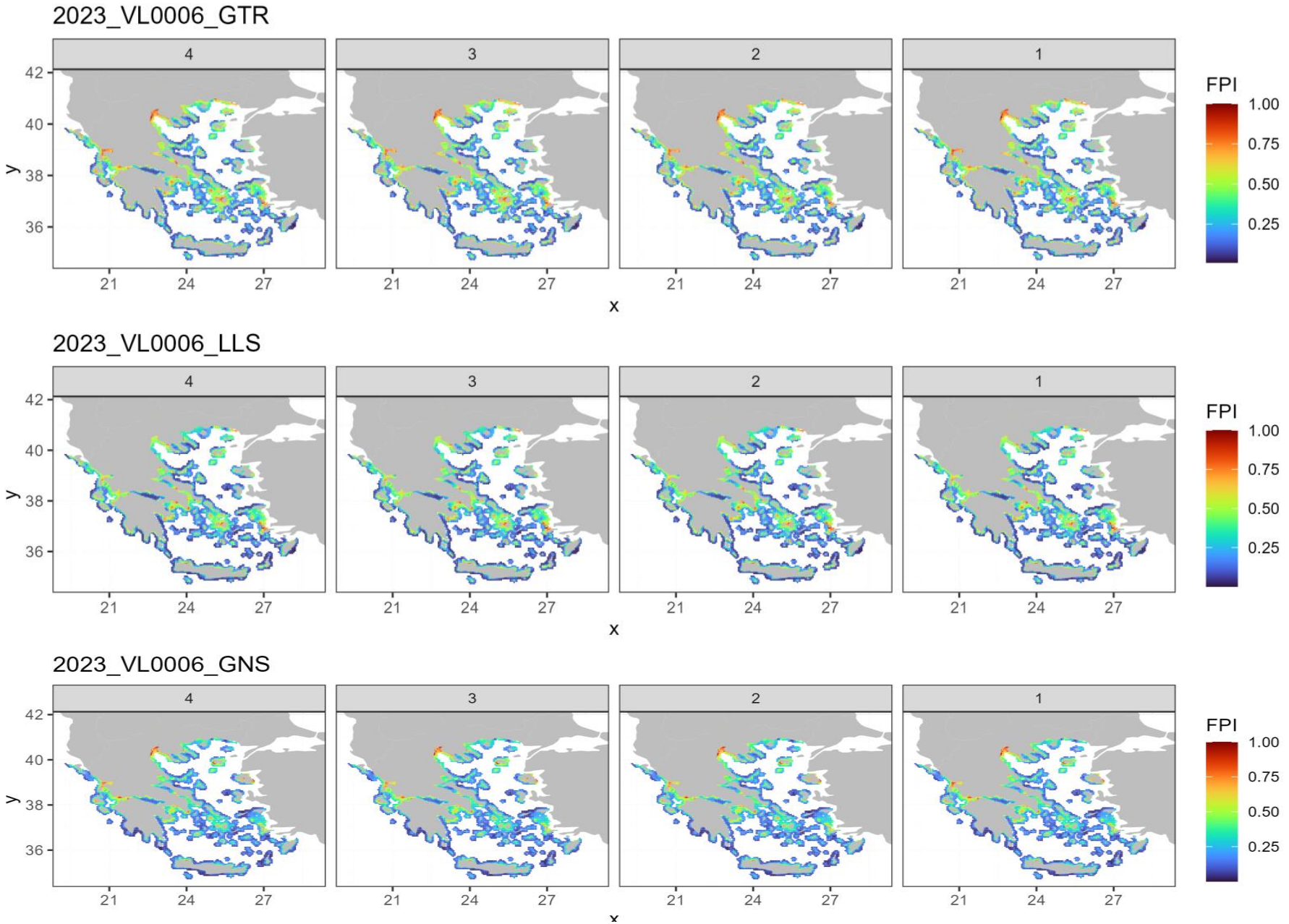
- 1) Estimate a proxy of spatial fishing pressure based on MCDA

preparatory work on **local machine**

- 2) combine with tables A and G (FDI) to estimate spatial effort and landings in the format of table H and I

integrate with **RDBFIS**

1) Examples of fishing pressure index outcomes expressed by vessel length category and quarter for 2023



Available information for SSF (LOA <12 m)

Fisheries Dependent Information (FDI) & SSF effort and landings

- Table G: effort

country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier,metier_7, supra_region, sub_region, eez_indicator, geo_indicator, specon_tech, deep, totseadays, totkwdaysatsea, totgtdaysatsea, totfishdays, totkwfishdays, totgtfishdays, hrsea, kwhrsea, gthrsea, totves, confidential

- Table A: catch

country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier, metier_7, domain_discards, domain_landings, supra_region, sub_region, eez_indicator, geo_indicator, nep_sub_region, specon_tech, deep species, totwghtlandg, totvallandg, discards, confidential

Other available information:

- EU Fleet register (fleet characteristics by registration port)
- Questionnaires & expert judgment

Recent advances of the MCDA method

- The MCDA **method** has been **expanded** to include :

1) other **fishing effort, landing weight and value estimations** performed in **coarser** spatial scales (e.g. by Geographical Sub-Area - GSA and country level as reported in STECF-FDI tables A and G)
2) **criteria** that drive spatio**temporal** patterns of fishing pressure (e.g. **weather/climate conditions**)
3) **species distribution** (based on modeling e.g. GAMs, interpolation)

- The **merit** of including the above information to the MCDA is that:

❖ **Maps of fishing effort** can be:
  - ➢ expressed in commonly used indicators (e.g. **days at sea**)
  - ➢ assessed in several **temporal** scales (e.g. year-quarter) and.

❖ **Spatial landings and weight** can be now delineated **by species**.

In the framework of RDBFis a development of an **r-package** is ongoing aiming to support and automate the following processes:

- 1) Estimate a proxy of spatial fishing pressure based on MCDA

preparatory work on **local machine**

- 2) combine with tables A and G (FDI) to estimate spatial effort and landings in the format of table H and I

integrated within **RDBFIS**

Fisheries Dependent Information (FDI)

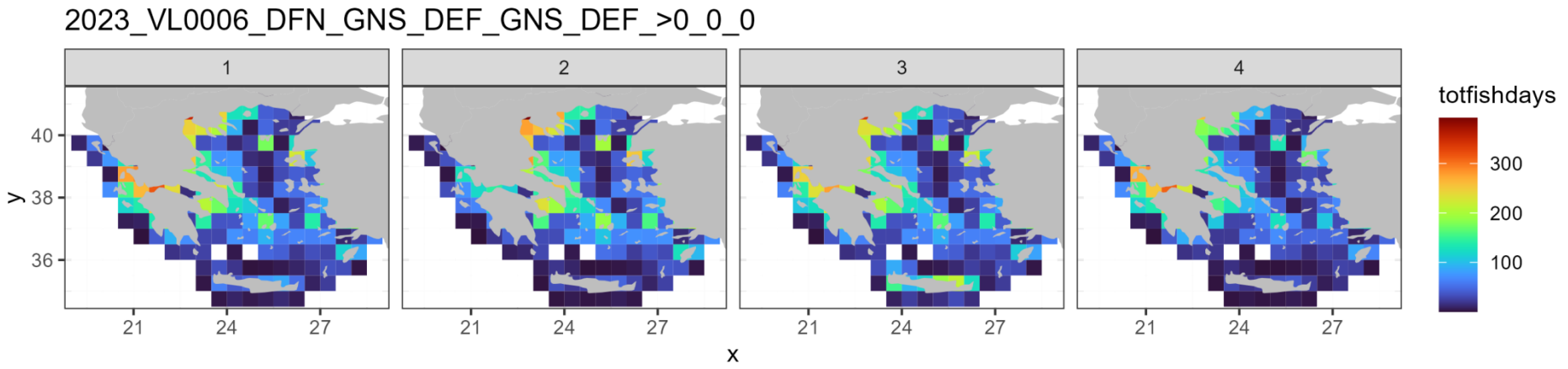
Table H: Landings by rectangle

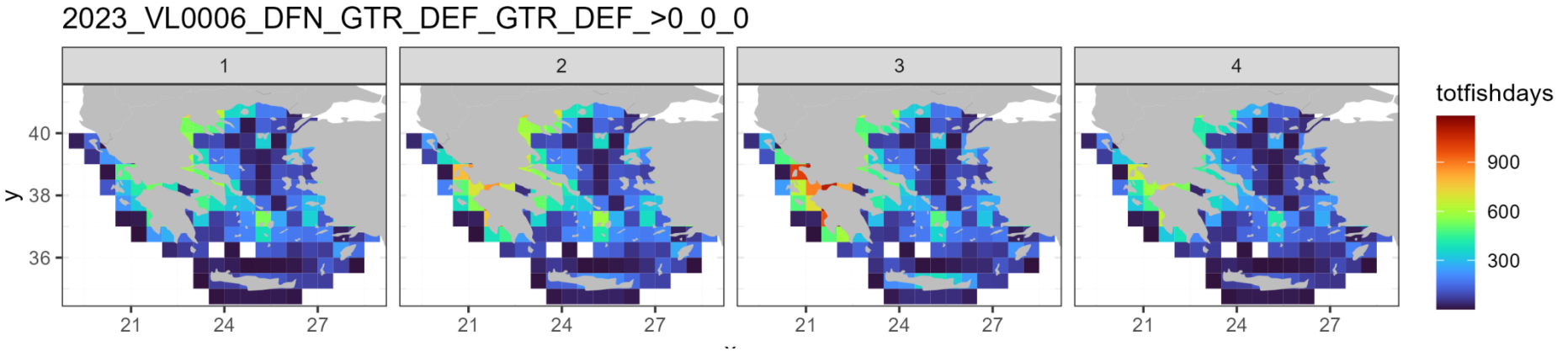
country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier, metier_7, supra_region, sub_region, eez_indicator ,geo_indicator, specon_tech, deep, rectangle_type, latitude, longitude, c_square, species, totwghtlandg, totvallandg, confidential

Table I: Effort by rectangle

country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier, metier_7, supra_region, sub_region, eez_indicator, geo_indicator, specon_tech, deep, rectangle_type, latitude, longitude, c_square, totfishdays, confidential

2) Examples of spatial fishing effort expressed in the format of Table I *





A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
country	year	quarter	vessel_length	fishing_tech	gear_type	target_assemblage	mesh_size	metier	metier_7	supra_regio	sub_region	eez_indicato	geo_indicator	specon_tech	deep	rectangle_	latitude	longitude	c_square	totfishdays	confidential
GRC	2023	1	VL0006	DFN	GNS	DEF	NK	GNS_DEF_	NK	MBS	GSA23	NA	NK	NK	NA	05*05	34.75	23.75	NA	3.163038422	N
GRC	2023	2	VL0006	DFN	GNS	DEF	NK	GNS_DEF_	NK	MBS	GSA23	NA	NK	NK	NA	05*05	34.75	23.75	NA	1.681401098	N

** based on MCDA and Fisheries Dependent Information - FDI (Effort by country.csv Table G in the data call https://stecf.jrc.ec.europa.eu/dd/fdi) and expert knowledge*