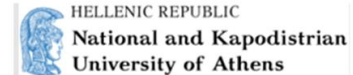




CINEA/EMFAF/2021/3.1.2/03/SC04/SI2.881222

Specific Contract 2021/3.1.2/03/SC04

Hosting, maintenance and further development of the Regional Database for the
Mediterranean and Black Seas



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 of the tool with examples
3. Discussion on possible additions/improvements

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 online 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

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Handling Editor: Argyro Zenetos

Received: 3 October 2014; Accepted: 8 January 2015; Published online: 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.

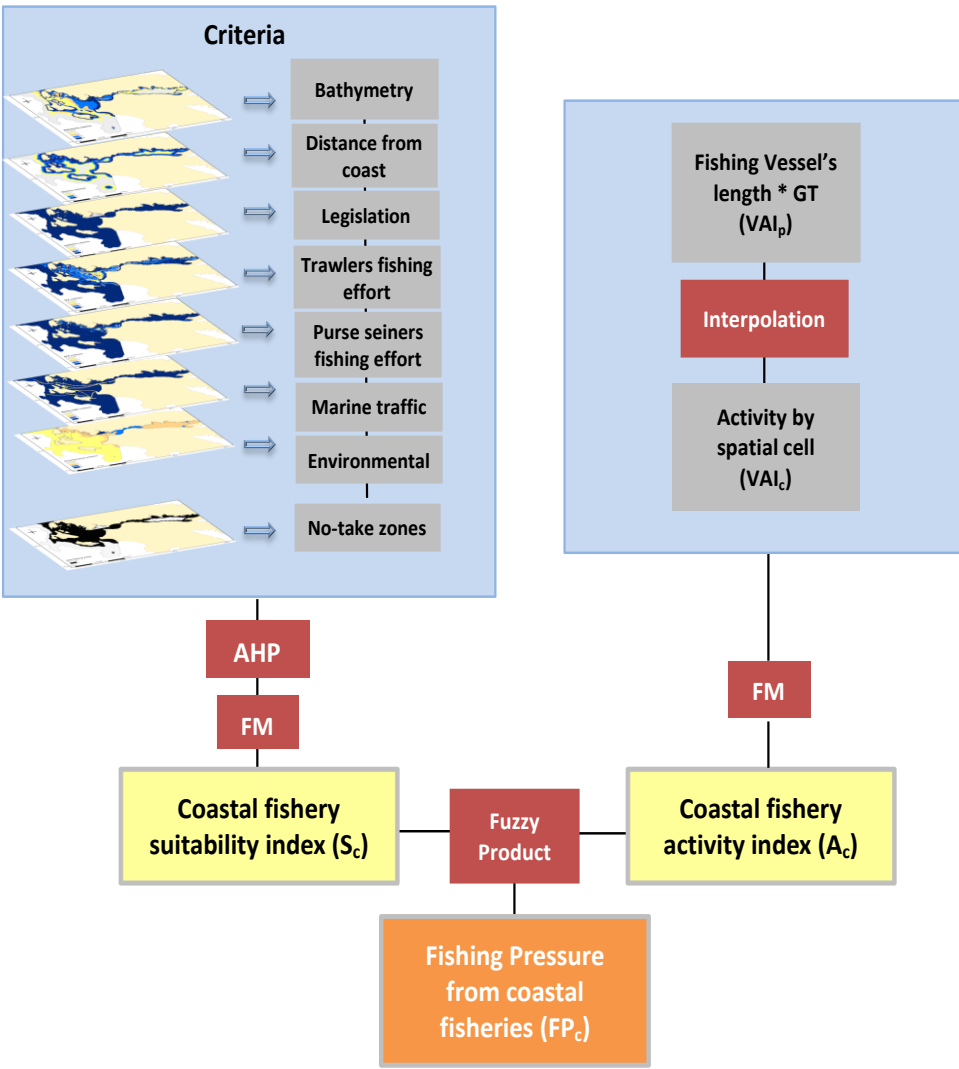
Introduction

specific coastal ecosystems, with their great diversity and

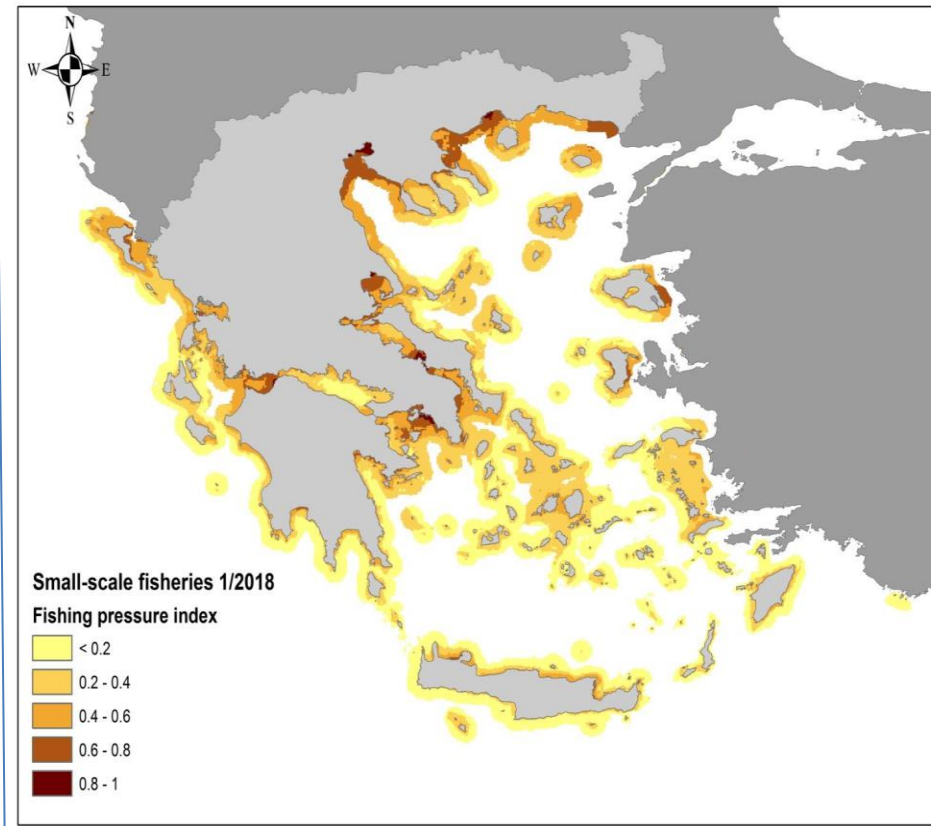
DOI: <https://doi.org/10.12681/mms.1087>

Introduction: MCDA – Multi-Criteria Decision Analysis

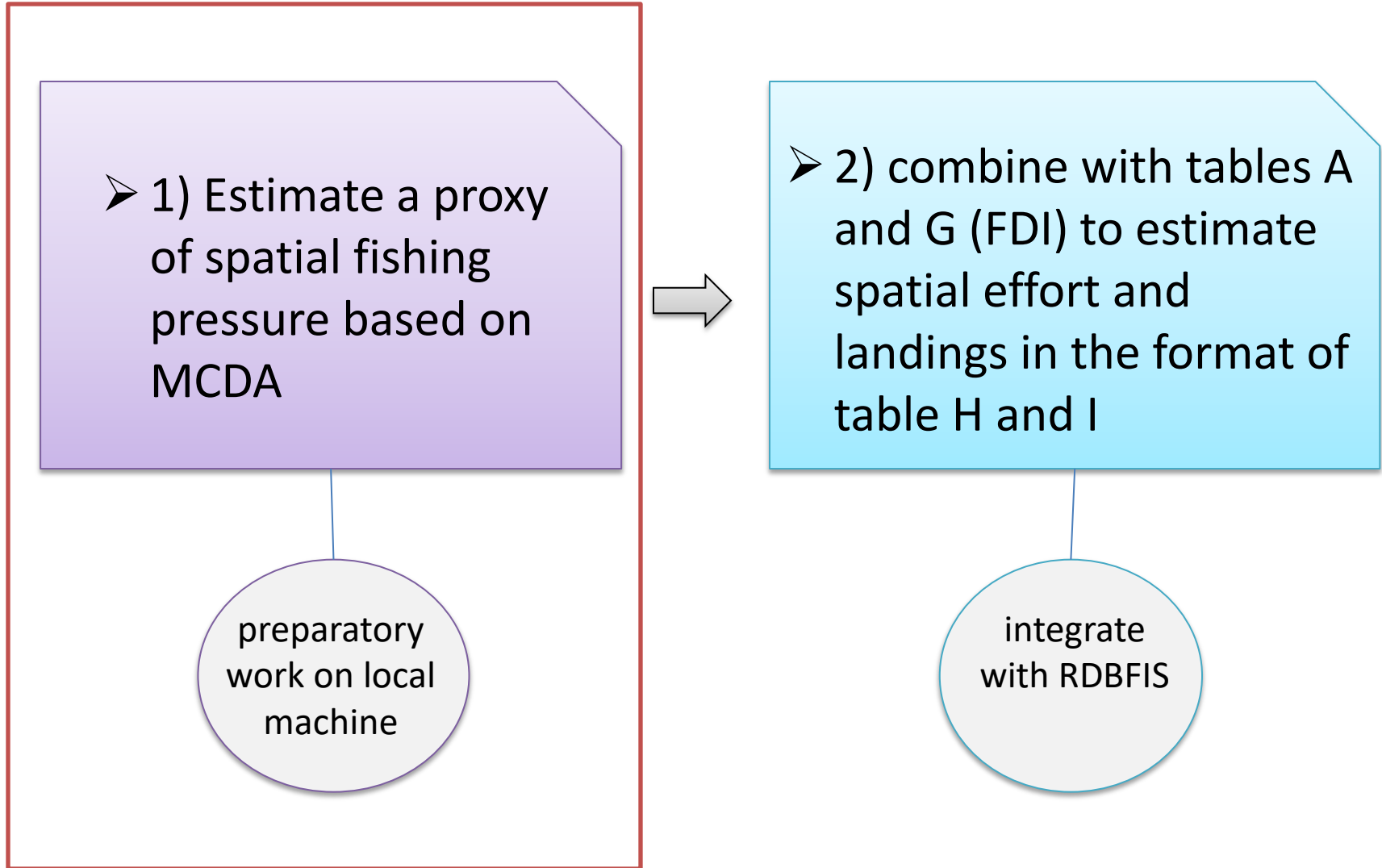
Method workflow



Example outcome

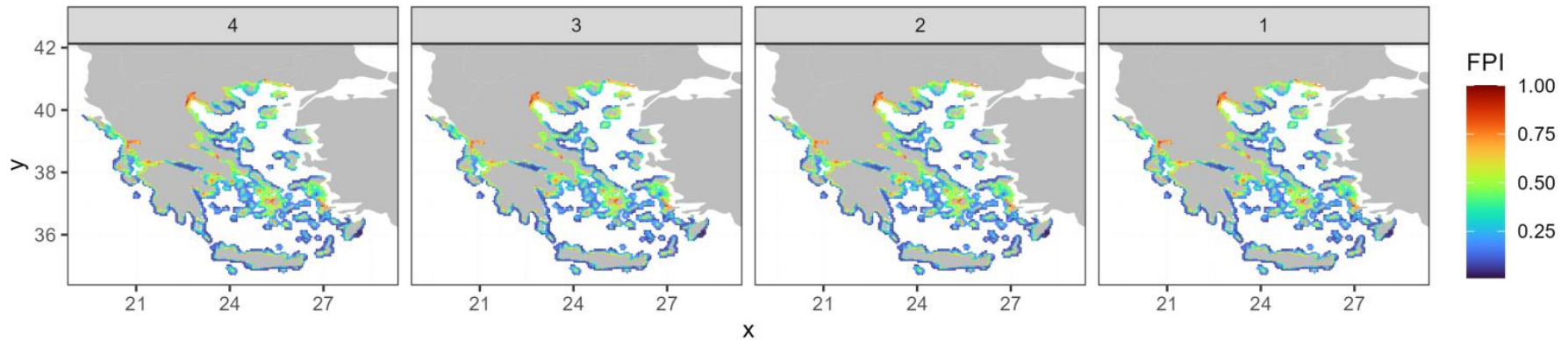


In the framework of RDBFis a development of an **r-package** is ongoing aiming to support and automate the following processes:

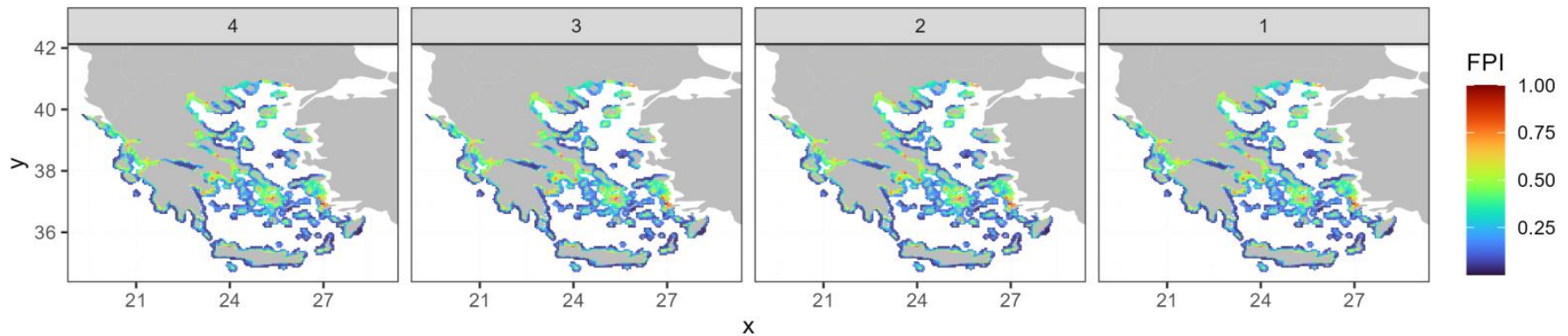


1) Examples of fishing pressure index outcomes expressed by vessel length category and quarter for 2023

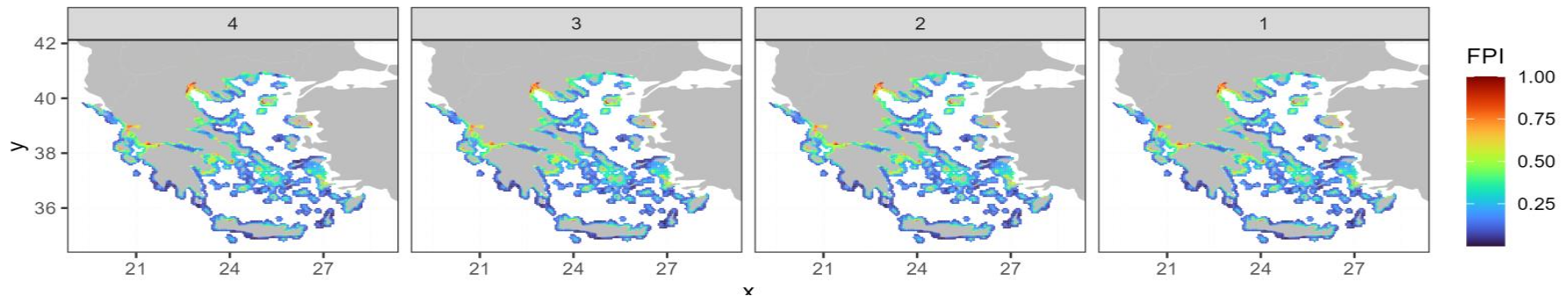
2023_VL0006_GTR



2023_VL0006_LLS



2023_VL0006_GNS



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 spatiotemporal 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:

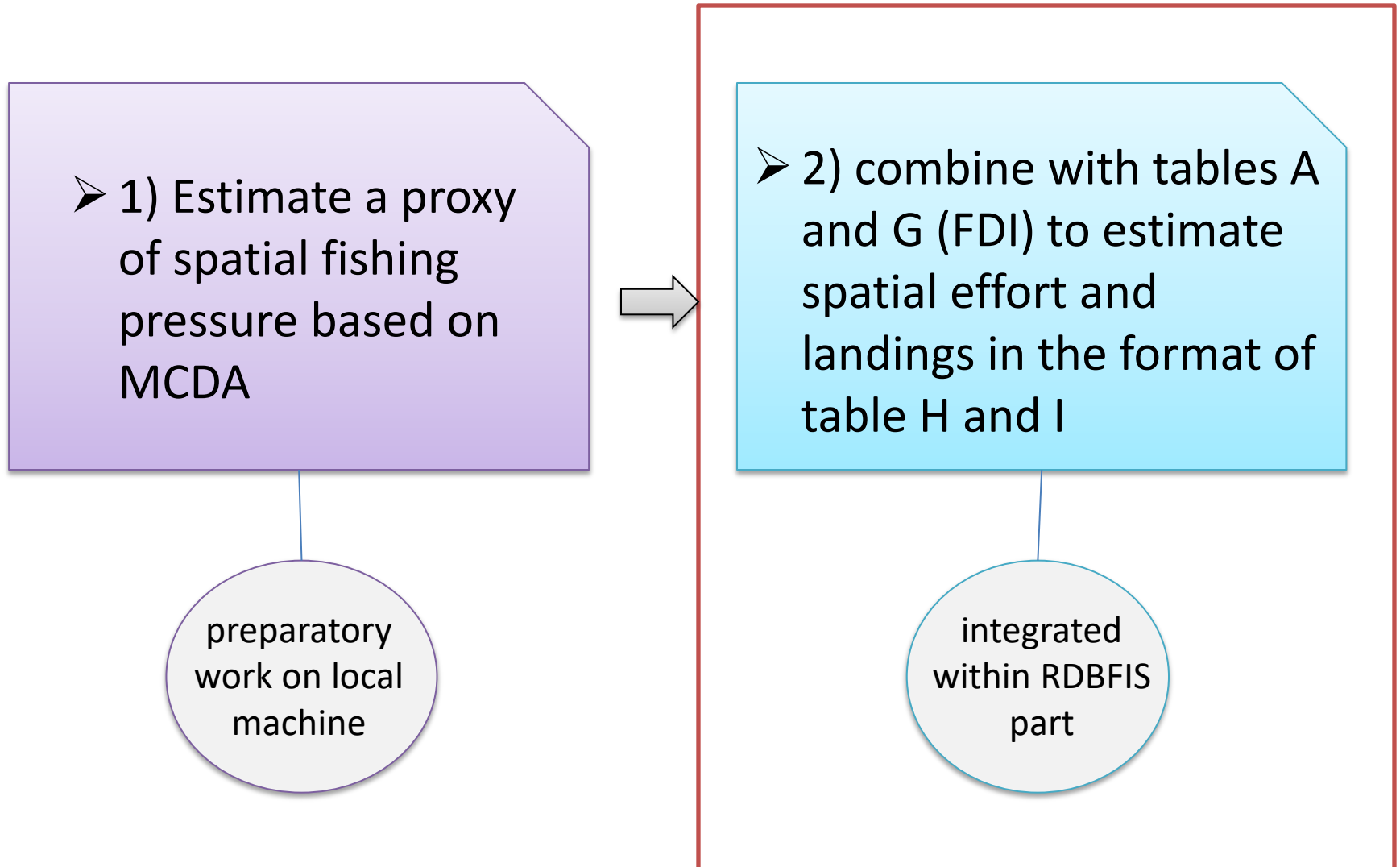


Table H: Landings by rectangle

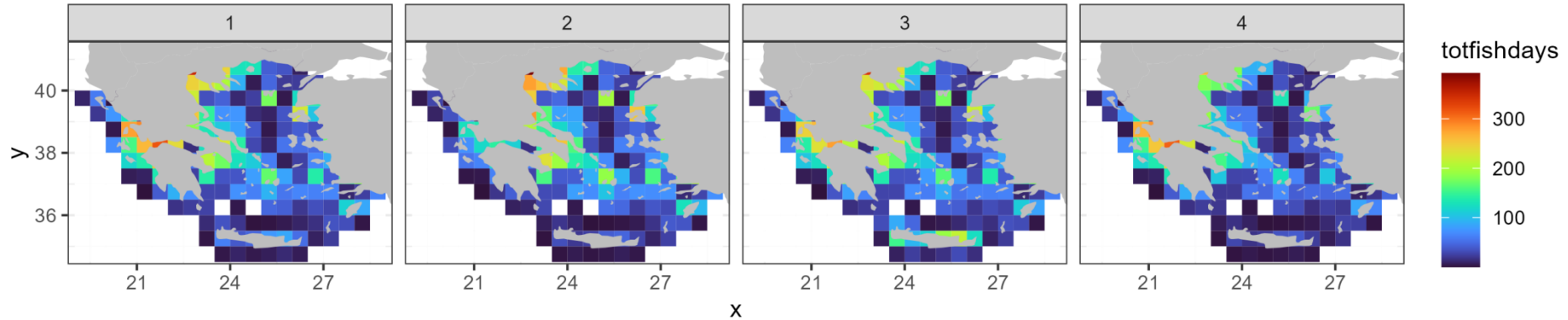
country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier, metier_7, supra_region, sub_region, eez_indicator, geo_indicator, specon_tech, deep, rectangle_type, latitude, longitude, c_square, species, totwghtlandg, totvallandg, confidential

Table I: Effort by rectangle

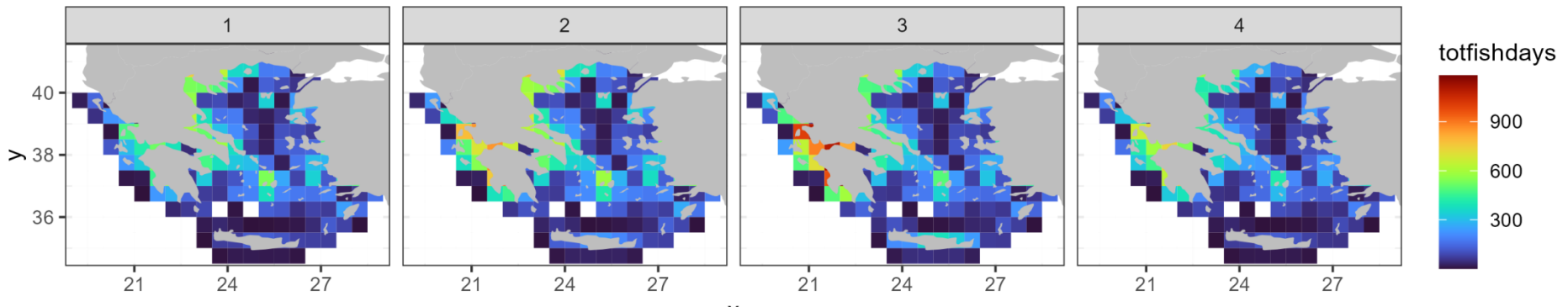
country, year, quarter, vessel_length, fishing_tech, gear_type, target_assemblage, mesh_size_range, metier, metier_7, supra_region, sub_region, eez_indicator, geo_indicator, specon_tech, deep, rectangle_type, latitude, longitude, c_square, totfishdays, confidential

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

2023_VL0006_DFN_GNS_DEF_GNS_DEF_>0_0_0



2023_VL0006_DFN_GTR_DEF_GTR_DEF_>0_0_0



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_region	sub_region	eez_indicator	geo_indicators	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