DOI: https://doi.org/10.3897/arphapreprints.e197291

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ARPHA Preprints Author-formatted, not peer-reviewed document posted on 27/04/2026. DOI: https://doi.org/10.3897/arphapreprints.e197291

Fishery rent: a spatial and species level analysis for marine policy

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Abstract

Fisheries rely on important renewable marine resources. Understanding the status of fish stocks and their role in food provisioning ecosystem services can help improve the management of the marine environment. While fish stock assessment is well established, research on the monetary valuation of fisheries provisioning ecosystem services remains limited, particularly at the level of individual species. To further contribute to the preservation of the marine environment for future generations, there is a strong need to develop and implement appropriate techniques for the valuation of fisheries resources. This study develops and demonstrates a method to estimate the economic value of (commercial) fisheries provisioning services at the level of individual species and fishing areas. The proposed technique fills this gap and is tested by using an Italian case study. Results provide the economic value of several commercial fisheries and move beyond data limitations to produce results for fisheries management and policy makers. We conclude by calling attention for further expansion to other countries and improvements to link economic valuation, habitat mapping and ecological research in policy analysis discussion.

Keywords

ecosystem services, food provisioning, fisheries provisioning, fishery rent, fisheries management, sustainable fisheries, exchange value

Introduction

Marine ecosystems provide a wide array of benefits essential to human well-being, among which fisheries resources represent one of the most economically significant. In 2022, the estimated total first-sale value of global commercial fisheries production, defined as the transaction price at which goods are initially sold by the producer to the first independent buyer, amounted to USD 159 billion, highlighting the substantial economic importance of fish provisioning at the global scale (FAO 2024). As pressures on marine environments intensify due to overexploitation, habitat degradation, and climate change, the need for reliable and policy-relevant valuation of marine ecosystem services has become increasingly urgent (OECD 2025). In this context, quantifying the economic value of fish provisioning ecosystem services is central to supporting evidence-based fisheries management, improving policy coherence, and promoting the sustainable use of marine resources in line with blue economy objectives, fisheries strategies, and broader ocean governance frameworks (European Parliament and Council of the European Union 2008,European Parliament and Union 2024, European Commission 2025,World Trade Organization 2025).

Despite the recognised importance of fisheries provisioning, the benefits ecosystems provide by supplying fish and other aquatic organisms for human use, estimating its economic value remains inherently complex. Valuation efforts are affected by illegal, unreported, and unregulated fishing, biological uncertainty related to stock dynamics and management regimes, and persistent gaps in economic data (Agnew et al. 2009Temple et al. 2022, OECD 2025). Moreover, many existing assessments rely on highly aggregated indicators that do not differentiate among fishing areas or species. This aggregation obscures ecological and economic heterogeneity, limits the relevance of valuation outcomes for spatially explicit management decisions, and weakens their usefulness for species-specific conservation strategies and regional policy planning. As a result, current valuation practices may fail to capture the true variability in economic value across locations and biological groups, potentially leading to suboptimal or insufficiently targeted policy interventions.

Reflecting these challenges, valuation of fisheries provisioning services has attracted growing interest among national statistical offices, academics, and marine policymakers, resulting in a proliferation of methodological approaches. These range from net-profit and access-price calculations to residual value and resource-rent estimates (ONS 2025a, ONS 2025b, Addamo et al. 2025, Australian Bureau of Statistics (ABS) 2025aAustralian Bureau of Statistics (ABS) 2025b, Greaker et al. 2017,Pascoe and Scheufele 2025). While such efforts have advanced understanding of fisheries economics, they often remain difficult to compare and translate into policy, particularly because of differences in spatial resolution, species coverage, and methodological consistency. Across both statistical and academic work, three cross-cutting limitations recur. First, reliance on aggregate or sector-level data obscures species- and area-specific contributions, reducing ecological relevance (Mangos et al. 2010, Bogaart et al. 2023). Second, financial performance metrics, while informative for profitability analysis (Sabatella et al. 2017, Flaaten et al. 2017, Gunnlaugsson and Agnarsson 2019, Gunnlaugsson et al. 2020), do not directly measure the economic contribution of marine ecosystems themselves). Third, transparency and comparability are frequently hindered by data gaps, methodological shortcuts, or reliance on regulatory proxies—such as licence or quota values—that are not consistently defined or available across fisheries. A summary of the reviewed studies by country, valuation approach, and degree of spatial and species disaggregation is provided in Suppl. material 1 (Table S1).

To address these challenges, the present study proposes a systematic application of the residual value method, an economic valuation approach used to estimate the contribution of natural resources to production by calculating what remains of total revenues after covering all production costs, such as labour, capital, and other operating expenses. In fisheries, this remaining value, often referred to as resource rent, represents the economic contribution of fish stocks to fishing activities. The method is applied in a disaggregated manner by fish species and fishing area. This approach explicitly links observed revenues and costs to ecological units, mitigating the spatial mismatch inherent in aggregate estimates, avoiding dependence on regulatory proxies, and improving transparency and replicability through the use of publicly available data. As an illustrative application, the method is applied to selected species across Italian fishing areas, demonstrating its capacity to capture variation in economic value across species and spatial units and to provide insights directly relevant for marine management and policy processes.

By producing species- and area-specific economic value, reporting uncertainty bounds, and presenting results at the fishing-area level, this study extends prior applications in terms of spatial resolution and statistical transparency. In doing so, it contributes to the development of policy-relevant valuation tools that better reflect ecological realities and support sustainable fisheries management.

The remainder of the paper is structured as follows: Section 2 describes data and methodology; Section 3 presents the empirical results; Section 4 discusses policy implications and concludes with directions for future research.

Data and methodology

The residual value method is employed to estimate resource rent, which serves as a proxy for the economic value of provisioning ecosystem services derived from natural resources. This approach calculates resource rent by deducting the user costs of produced and human capital (e.g., energy and labour costs), along with applicable taxes and subsidies, from an enterprise's gross operating surplus (GOS). By doing so, it provides a conceptually coherent and empirically grounded measure of economic rent which refers to any payment to the owner of a resource or input of production that exceeds the minimum costs required to bring that factor into production.

Alternative approaches, such as the appropriation method, which estimates rent based on payments to environmental asset owners (e.g., fees and royalties), and the access price method, which infers rent from the market value of tradable rights (e.g., quotas or licences), often yield less reliable estimates due to policy distortions, market imperfections, or data limitations. In contrast, the residual value method provides a systematic and comparable means of integrating resource rent estimation into national accounts. For this reason, the residual value method remains the preferred and most practicable approach for natural resources in both empirical and policy contexts such as the System of Environmental-Economic Accounting Central Framework (SEEA-CF) and Ecosystem Accounting (United Nations et al. 2014, United Nations et al. 2024).

In the context of fisheries, the concept of resource rent - hereafter referred to as *fishery rent* - can be illustrated using a single fish species *(s)* as an example. The total resource rent (RR) generated during an accounting period *(t)* can be expressed as:

$$RR_{s,t} = Q_{s,t} \times P_{s,t} \qquad (1)$$

where $Q_{s,t}$ is the quantity of fish extracted during the period, $P_{s,t}$ is the unit fishery rent, i.e., the surplus value per unit of fish extracted.

The unit fishery rent reflects the residual value attributable to the environmental asset (i.e., the fish stock) after accounting for all operational and capital costs. However, in practice, data limitations often complicate this estimation. For instance, available data are typically aggregated at the fleet-segment level, encompassing multiple species. This aggregation creates a mismatch that complicates the application of the method and introduces challenges in isolating the economic performance and rent generation associated with individual species across fishing areas, thereby necessitating the use of various estimation approaches.

This paper focuses on estimating fishery rent at the species level across fishing areas and over time, based on the management and harmonization of existing landings and economic fleet segment data.

For the quantification of the fishery rent and economic value of fisheries provisioning ecosystem services, the EU Fleet Economic Performance data provided by the Scientific, Technical and Economic Committee for Fisheries (STECF) are used (AER - STECF - Scientific, Technical and Economic Committee for Fisheries) . Specifically, the dataset *“STECF 23-07 – EU Fleet Economic and Transversal Data Fleet Segment”* is employed, which contains:

- **Fleet segment–level data** on expenditure, revenues, and capital, without geographical indication
- **Fleet segment, species, subregion, landing weight and value data**, including geographic location

It is worth noting that no reference about the geographical location or fishing area are included into the dataset in which the economic variables are, while the fleet segment landings data refer to Food and Agriculture Organization (FAO) fishing area *[1]. For this reason, the resource rent cannot be calculated directly, as there is no disaggregated information linking each fish species landed to the specific fleet, fishing area, and associated economic data. A proposed four step methodology is adopted to fill this gap

The economic variables analysed focus on the dataset variable category classified as *Income*, *Expenditure* and *Capital* *[2]. The *gross value of landing*, *income from leasing out quota*, *operating subsidies* and *other not specified income* are included in the income category. The expenditure variables encompass the *consumption of fixed capital*, *energy costs*, *lease/rental payments for quota*, *personal costs*, *repairing and maintenance costs*, *owner ship costs*, *other variable* and *non-variable costs*. The capital category focuses on the *total asset* variable. Table 1 summaries the main economic variables used and their description *[3].

This study applies a four-step methodological process which is illustrated graphically in Fig. 1. First, the economic variables of the fleet and the corresponding landing weights for the targeted area (e.g. coastal fishing zones off the Italian coast) and species are isolated. Second, the economic variables (which lack geographical identifiers) are merged with the landing's dataset. Third, the economic variables are apportioned to each species according to the share of the landing weight of a given species relative to the total fleet landings in a specific area. Finally, the economic value is estimated at both the fishing area and species levels.

The apportioning of economic variables at species level assumes that costs and revenues are driven by the live weight of fish landing by each fleet in different fishing area. The main aim of Step 3 consists in the computation of the shares which allow to allocate costs and revenues based on the fishing effort by species in each fishing area. Formally, given:

- Fleet segment =1, … , N
- Fishing sub-area =1, …, M
- Fish species =1, … , L

The shares are computed as follow:

$$Share_{i,a,s} = \frac{\text{weight of landings}_{i,a,s}}{\sum_{a=1}^{M} \text{weight of landings}_i} \times 100 \qquad (2)$$

Subsequently, the fleet segment economic variables are disaggregated by multiplying the total of each variable by the share computed. This gives us the economic variables at species level, by fishing areas and by year. The Figure 2 presents an example illustrating the computation of shares for a single fleet operating across two fishing areas—GSA 10 and GSA 17—and targeting two species, A and B, in each area for a specific year. The total landings amount to 100 tonnes, with 30 tonnes originating from GSA 10 and 70 tonnes from GSA 17. Within GSA 10, the fleet lands 10 tonnes of species A and 20 tonnes of species B. In GSA 17, the fleet lands 30 tonnes of species A and 40 tonnes of species B (Fig. 2).

Different fishery rent formulas are used to test how the inclusion of different economic component (e.g. short against long term variable) affects the final figures. The fishery rent is derived using the following formulas in equation (3), (4) and (5):

Fishery rent = *Gross operating surplus - Value of unpaid labour*

(3)

Fishery rent = *Gross operating surplus - Value of unpaid labour - Consumption of fixed capital* *(4)*

Fishery rent = *Gross operating surplus - Value of unpaid labour - Consumption of fixed capital - Return on produced assets* *(5)*

where

Gross operating surplus (GOS) = Operating Income - *Operating cost*

Operating cost = Energy costs + Lease/rental payments for quota + Other non-variable costs + Other variable costs + Personnel costs + Repair & maintenance costs

Operating Income = Gross value of landings + Income from leasing out quota + Operating subsidies + Other income

*Return on produced = total asset*ROA*

ROA = GOS/ Total asset

Equations (3), (4), and (5) are respectively used to derive the maximum, average, and minimum values of fishery rent. This methodological choice reflects the need to account for heterogeneity across estimates. Subsequently, to account for price fluctuations, as recommended by the SEEA-CF (United Nations et al. 2014, unit fishery rents are calculated by dividing the total fishery rent for an individual fish species by the corresponding quantities extracted.

Results

The marine domain analysed corresponds to Italian fishing grounds as classified by the Food and Agriculture Organization (FAO) and the geographical subareas (GSAs) of the General Fisheries Commission for the Mediterranean (GFCM)*[4]. Italy lies within FAO Area 37 (Mediterranean and Black Sea) and comprises seven GSAs: Ligurian and North Tyrrhenian Sea (GSA 9), Southern and Central Tyrrhenian Sea (GSA 10), Sardinia (GSA 11), Southern Sicily (GSA 16), Northern Adriatic (GSA 17), Southern Adriatic Sea (GSA 18), and Western Ionian Sea (GSA 19). Fig. 3 depicts the Italian GSAs to which the methodology is applied.

Using this methodology, unit fishery rents and corresponding confidence intervals were estimated for 303 species; together with the extracted quantity (e.g. landings), these estimates allow the economic value of fisheries provisioning ecosystem services to be derived. For illustration, we highlight 15 targeted species (Table 2), selected according to: (i) commercial importance (accounting on average for 27% of total landings) and availability of fleet-segment economic variables (landings, costs, expenditures); (ii) ecological relevance, including habitat considerations and coverage by biological monitoring (European Commission 2021); (iii) the need to align ecological and economic datasets across years for temporal consistency; and (iv) continuity with species previously examined in the literature (Addamo et al. 2025). Table 3 summarises the exchange value of fish provisioning ecosystem services for total landings and for the targeted species in Italy from 2017 to 2020. This time period was chosen because of the availability of fleet total asset data which permits a complete analysis when incorporating the asset variable into fishery rent calculations.

Table 3 indicates a marked decline in the total exchange value from €259 million in 2017 to €103 million in 2020 (current prices). Aggregating the targeted species for clarity shows that contributions vary by fishing area, with GSA 17 the largest contributor, followed by GSA 10, GSA 18, and GSA 9. This aggregation facilitates comparison of targeted species over time and across areas, and provides a benchmark against national totals. On average over 2017–2020, targeted species accounted for 27% of the total value (approximately €51 million).

The value of the fish provision ecosystem service estimates rest on two key inputs: landings and unit fishery rent. Landings (kg) and unit fishery rent (€/kg) by species and by Italian subregion over 2013–2021 are shown in Fig. 4 and Fig. 5, Fig. 6 and Fig. 7, respectively.

Figure 4 shows time series of landings (kg) by species and GSA, which were also used to compute the aggregate figures. The figure shows marked heterogeneity in landings across GSAs and over time, with GSA17 clearly dominating total catches throughout the period. Overall landings display temporal fluctuations, including peaks in the mid-2010s followed by a general decline after 2018 in most areas. Species composition also varies across GSAs, indicating spatial differences in fishing activity and stock exploitation.

Figs 5, 6, 7 report unit fishery rent values (computed via Equation 4) as bars and, where available, confidence intervals (derived using Equations 4 and 5). The results reveal pronounced heterogeneity across species and regions, consistent with differences in biological productivity, market demand, and fishing practices. Interannual variation, particularly over 2017–2020, further underscores the dynamic nature of fisheries, plausibly reflecting shifts in stock abundance, environmental conditions, and regulatory settings.

Additionally, the computed shares provide valuable insights into the spatial and species-specific patterns of fishing activity. They enable an understanding of where the fleet operated, and which species were primarily targeted in different areas. For example, in 2017, the ITA MBS DRB1218 NGI * fleet predominantly operated in subregion GSA17, accounting for 98.3% of its activity, followed by smaller shares in GSA18 (1.53%), GSA9, and GSA10. By 2020, the fishing areas were streamlined to just three regions: GSA17, GSA18, and GSA9, with GSA17 maintaining its dominant role. Notably, in 2017, species targeted in GSA18 were not listed, whereas in 2020 they were included, suggesting a shift or expansion in fishing focus. This indicates that between 2017 and 2020, the fleet segment not only consolidated its fishing zones but also increased its efforts toward the species outlined in the list, highlighting a change in both spatial and species-specific fishing strategies. Additional examples for fleet segments characterised by high, medium, and low gross operating surplus are reported in Suppl. material 2 (Tables S1–S3).

Discussion and Conclusions

In the context of economic valuation, a review of the literature reveals persistent inconsistencies and limited transparency in the application of the residual value method in fisheries economics. A substantial number of studies do not explicitly disclose the variables and parameters used in their estimations, thereby limiting replicability and cross-study comparability. Of particular concern is the widespread absence of information on unit fishery rent—defined as resource rent per unit of catch—which is rarely reported, especially at the level of individual fish species. This omission constrains the development of species-specific economic assessments and weakens the empirical basis for targeted, evidence-based fisheries policy aimed at improving economic efficiency and sustainability. In addition, the temporal scope of previous analyses varies considerably, reflecting differences in national data availability, sectoral relevance, and reliance on survey-based versus national accounts data.

Against this background, the present study contributes by introducing a method to estimate fishery resource rent that is consistent across European contexts and applicable more broadly where compatible fisheries data are available. The approach explicitly disaggregates estimates by species, fishing area, and time, addressing a key limitation of earlier applications. Central to this methodology is the computation of allocation shares, which capture both the spatial distribution of fleet activity across fishing areas and the species composition of catches relative to total output.

The resulting shares provide detailed insights into spatial and species-specific fishing patterns, enabling a clearer linkage between fishing effort, economic performance, and underlying marine ecosystems. For example, the analysis shows that in 2017 the ITA MBS DRB1218 NGI fleet segment operated almost exclusively in GSA17, with marginal activity in other areas, while by 2020 fishing activity had become more spatially concentrated and accompanied by a broader set of targeted species. These changes reflect shifts in both spatial strategy and species focus, underscoring the value of disaggregated data for understanding how fishing practices evolve over time. Such information is essential for assessing the spatial distribution of fish provisioning ecosystem services and for supporting ecosystem-based management and marine environmental–economic accounting.

The proposed methodology enables the systematic estimation of unit fishery rents by species and fishing area over time, while also providing information that is essential for the compilation of monetary accounts and consistent with the exchange value concept within the ecosystem accounting framework (e.g. the System of Environmental-Economic Accounting—Ecosystem Accounting). Variability in these estimates is influenced by the choice of formula and by the inclusion of different economic components, such as consumption of fixed capital or returns on produced assets. The results indicate that incorporating a more comprehensive set of cost components may yield negative rents in some cases, raising important concerns about the long-term economic sustainability of certain fisheries segments. While direct comparison with previous studies is limited by methodological and spatial differences, the findings complement existing work by providing more granular estimates and by offering a basis for temporal comparisons between fishery rent outcomes and implemented policy measures. Such comparisons may reveal that multi-objective management strategies, although socially or politically motivated, can obscure the economic value of natural resources and contribute to rent dissipation, a situation in which the potential economic value of a natural resource is eroded by excessive costs, inefficient use, or overexploitation, resulting in little or no net benefit for society despite the resource's underlying economic value.

Several considerations are relevant when interpreting and extending the results. First, although the analysis focuses on economic valuation, resource rent is inherently linked to ecological sustainability. Persistent positive rents can only be maintained if fish stocks remain healthy and fishing pressure is effectively managed. Conversely, sustained zero or negative rents may indicate overcapacity or overexploitation, where short-term economic gains reflect the depletion of natural capital rather than sustainable yield. The present framework implicitly assumes that catch levels are sustainable, given the existence of quota systems; however, if this assumption does not hold, observed rents may represent temporary resource mining. This highlights the importance of integrating economic valuation with ecological indicators such as stock status, biomass trends, and habitat condition in future research.

Second, disaggregation at the fleet-segment level reveals substantial heterogeneity in income and cost structures across Italian fleets. While a detailed analysis of the drivers of economic performance—such as productivity or operational efficiency—is beyond the scope of this study, this heterogeneity is likely to influence species- and area-specific rent estimates. An additional limitation arises from incomplete data on returns to produced assets, which are only available for a restricted set of years, thereby constraining the temporal scope of some rent calculations.

Despite these limitations, the results have important implications for fishery management and marine policy. By providing replicable, species- and area-specific estimates of fishery rent based on open-access data, the proposed method supports the integration of fish provisioning ecosystem services into decision making framework such as the ecosystem accounting. Future research that integrates marine science more explicitly into this valuation approach could further strengthen the linkage between fish species, the ecosystems that sustain them, and the economic benefits they generate. Such integration would enhance the relevance of marine accounts for spatial planning and policy trade-offs, for example by supporting more informed decisions when balancing fisheries value against competing uses such as offshore renewable energy development.

In conclusion, while the residual value method remains the most widely used approach for valuing fish provisioning ecosystem services, its application has often been constrained by high levels of aggregation and limited transparency in data and procedures. This study advances the literature by introducing a transparent and replicable methodology to estimate unit fishery rent by species and fishing area, representing a step forward through a stronger and more explicit linkage between economic valuation and ecological context. By improving spatial and ecological resolution, the approach enhances the policy relevance of economic valuation and supports more informed and targeted fisheries management.

Future research should extend this methodology to other national contexts and refine species categorisation and allocation shares through productivity and efficiency analyses that account for vessel characteristics (e.g. gear and fishing technology) and governance and policy regimes (e.g. licences and permits, quota or effort allocations). Further work is also needed to more explicitly integrate ecological sustainability such as habitat types exploited and bycatch risk and ecosystem impact into economic valuation frameworks. Such efforts would help ensure that long-term economic benefits from fisheries are aligned with the conservation of marine ecosystems and the sustainable management of natural capital.

Acknowledgements

This study was conducted in the framework of the MARBEFES (MARine Biodiversity and Ecosystem Functioning leading to Ecosystem Services) project, funded by the European Union under the Horizon Europe Programme, “HORIZON-CL6-2021-BIODIV-01” Theme, Grant Agreement no. 101060937 [marbefes.eu] and UKRI Grant Number 10041354

Conflicts of interest

The authors have declared that no competing interests exist.

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Endnotes

*1 Fishing areas (europa.eu)

*2 Original variable names from "*STECF 23 07 - EU Fleet Economic and Transversal data_fleet segment*" are used

*3 For further details see AER - European Commission (europa.eu)

*4 Decision GFCM/33/2009/2 Status of the Compendium of GFCM decisions and revised Compendium (sharepoint.com)

*5 GFCM Geographical Sub-Areas — Tools4MSP Geoplatform

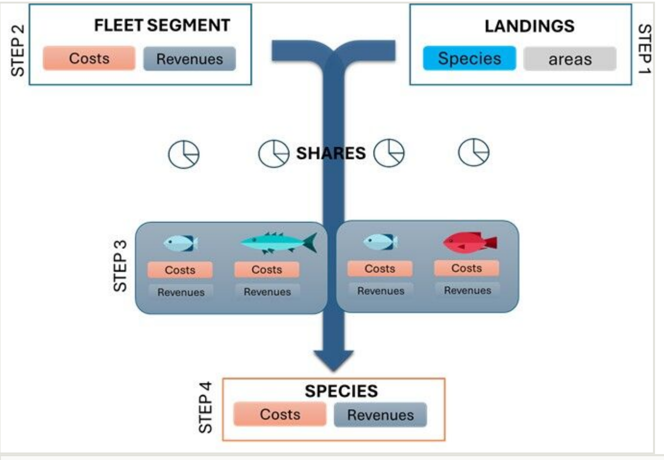

Figure 1.

Methodological steps of economics variables allocation process by species and fishing area and fishery rent calculation.

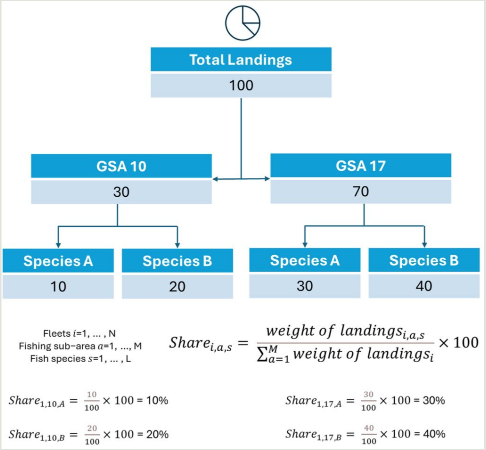

Figure 2.

Example of shares for a single fleet fishing two species in area GSA 10 and 17.

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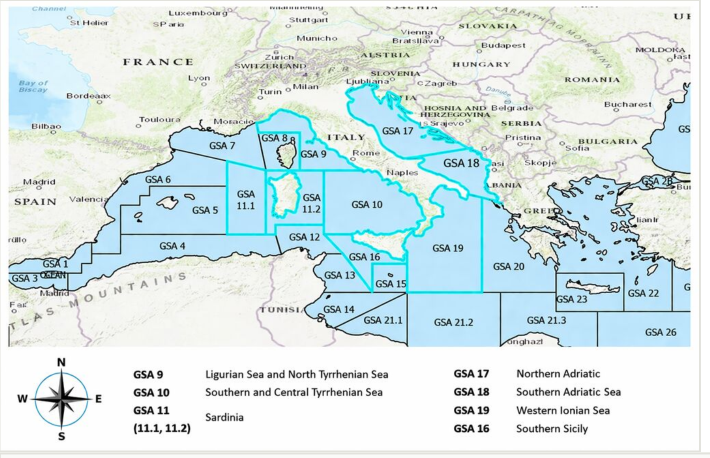

Figure 3.

Geographical representation of the Italian marine area under study (own elaboration based on the Tools4MSP Geoplatform *[5])

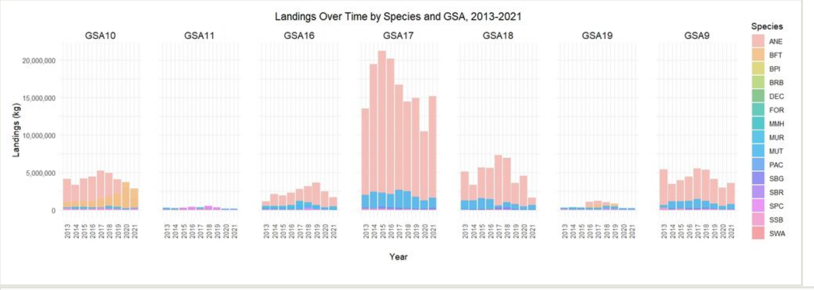

Figure 4.

Landings (kg) over time by species and GSA. Selected species: *Engraulis encrasicolus* (ANE), *Thunnus thynnus* (BFT), *Spicara maena* (BPI), *Spondyliosoma cantharus* (BRB) and *Dentex dentex* (DEC), *hycis phycis* (FOR), *Muraena helena* (MMH), *Mullus surmuletus* (MUR), *Mullus barbatus* (MUT) and *Pagellus erythrinus* (PAC), Sparus aurata (SBG), *Pagellus bogaraveo* (SBR), *Spicara smaris* (SPC), *Lithognathus mormyrus* (SSB) and *Diplodus sargus* (SWA).

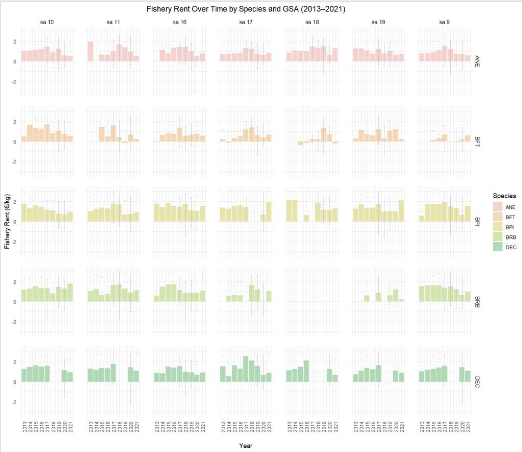

Figure 5.

Unit fishery rent (€/kg) by GSA for *Engraulis encrasicolus* (ANE), *Thunnus thynnus* (BFT), *Spicara maena* (BPI), *Spondyliosoma cantharus* (BRB) and *Dentex dentex* (DEC), 2013–2021. Bars show point estimates; whiskers indicate confidence intervals.

Figure 6.

Unit fishery rent (€/kg) by GSA (GSA10, GSA11, GSA16, GSA17, GSA18, GSA19, GSA9) for *Phycis phycis* (FOR), *Muraena helena* (MMH), *Mullus surmuletus* (MUR), *Mullus barbatus* (MUT) and *Pagellus erythrinus* (PAC), 2013–2021. Bars show point estimates; whiskers indicate confidence intervals.

Figure 7.

Unit fishery rent (€/kg) by GSA (GSA10, GSA11, GSA16, GSA17, GSA18, GSA19, GSA9) for Sparus aurata (SBG), *Pagellus bogaraveo* (SBR), *Spicara smaris* (SPC), *Lithognathus mormyrus* (SSB) and *Diplodus sargus* (SWA), 2013–2021. Bars show point estimates; whiskers indicate confidence intervals.

Table 1.

Summary of fleet economic variables.

Variable group	Economic Variables	Description
Expenditure	Consumption of fixed capital	Decline in value of vessel and equipment, as a result of normal wear and tear and obsolescence.
	Energy costs	Costs incurred by the fleet segment for fuel and other energy-inputs to fishing operations (e.g., diesel, electricity).
	Lease/rental payments for quota	Payments made by fishing vessels or fleet segments for access rights, quotas or leasing of fishing rights (where applicable).
	Other non-variable costs	Costs that do not vary directly with fishing activity volume (e.g., insurance, licences, overheads).
	Other variable costs	Costs that vary with fishing activity (e.g., bait, ice, small gear items, variable maintenance).
	Personnel costs	Wages, salaries and crew shares paid to crew and other employees engaged in the fishing operations.
	Repair & maintenance costs	Expenditure on regular maintaining and repairing vessels, gear and equipment to keep them operational.
	Value of unpaid labour	The imputed cost value of labour provided without direct monetary compensation (e.g., family labour, owner-operator labour) in the fleet segment.
Income	Gross value of landings	The total revenue from the sale of landed fish and seafood products by the fleet segment before other income items and before cost deductions.
	Income from leasing out quota	Income derived by fleet segments or owners from leasing or renting out fishing rights/quotas to other vessels or operators.
	Operating subsidies	Government subsidies or public support payments made to fishing fleet segments in the course of normal operations (excluding capital grants) as per CFP/DCF data.
	Other income	Other miscellaneous income associated with the fishing operation that is not included in landings revenue or quota leasing (e.g., secondary activities).
Capital	Total asset	The value of all assets held by the fleet segment including vessels, gear, equipment, and any other fixed capital used in the fishing operations.

Table 2.

Selected species object of the analysis.

Scientific name	Common name	Code
Engraulis encrasicolus	European anchovy	ANE
Thunnus thynnus	Atlantic bluefin tuna	BFT
Mullus barbatus	Red mullet	MUT
Pagellus erythrinus	Common pandora	PAC
Pagellus bogaraveo	Blackspot(=red) seabream	SBR
Lithognathus mormyrus	Sand steenbras	SSB
Mullus surmuletus	Surmullet	MUR
Muraena helena	Mediterranean moray	MMH
Spicara smaris	Picarel	SPC
Spicara maena	Blotched picarel	BPI
Spondyliosoma cantharus	Black seabream	BRB
Dentex dentex	Common dentex	DEC
Sparus aurata	Gilthead seabream	SBG
Phycis phycis	Forkbeard	FOR
Diplodus sargus	White seabream	SWA

Table 3.

Exchange value (€ current value) of fisheries provisioning ecosystem service in Italy 2017-2020 across fishing areas.

FISHERIES PROVISIONING ES (€)				
year	**2017**	**2018**	**2019**	**2020**
Italy (all species)	**258,907,725**	**251,161,169**	**130,350,235**	**103,439,063**
Targeted species	**77,529,242**	**64,748,312**	**41,175,553**	**22,455,096**
% respect to total	**30%**	**26%**	**32%**	**22%**
GSA 10	12,552,395	7,309,823	8,192,599.5	4,863,391
GSA 11	2,603,322	3,326,445	1,296,823.4	614,857
GSA 16	8,120,285	8,329,847	5,130,031.4	2,097,322
GSA 17	25,968,817	22,751,543	12,974,313.3	7,640,063
GSA 18	12,878,972	11,237,150	6,763,989.3	3,350,661
GSA 19	3,558,127	1,983,112	2,153,572.3	888,841
GSA 9	11,847,325	9,810,393	4,664,223.4	2,999,963

Supplementary materials

Suppl. material 1: Literature review

Authors: Valentina Di Gennaro, Gaetano Grilli, Silvia Ferrini, Robert Kerry Turner
Data type: DOCX
Download file (22.21 kb)

Suppl. material 2: Additional result tables

Authors: Valentina Di Gennaro, Gaetano Grilli, Silvia Ferrini, Robert Kerry Turner
Data type: XLSX
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