

TIME FOR A U-TURN

The first assessment of the economic, social and ecological performance of French fisheries

For a social-ecological transition of fisheries

BLOOM

THE SHIFT PROJECT

L'INSTITUT agro

AgroParisTech

L'ÉCOLE DES HAUTES ÉTUDES EN SCIENCES SOCIALES

L'Atelier des Jours à Venir



This report is the result of the work of a multi-disciplinary, partnership-based research group on the social-ecological transition of fisheries, made up of researchers from L'Institut Agro (Didier GASCUEL, Florian QUEMPER, Quentin LE BRAS, Romain MOUILLARD), AgroParisTech (Harold LEVREL) and EHESS-CNRS (Roberto CASATI).

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EXECUTIVE SUMMARY

FISHING SHOULD MAXIMIZE SOCIAL BENEFITS AND MINIMIZE ENVIRONMENTAL IMPACTS

Scientists have developed an innovative methodology to establish an unprecedented assessment of the fishing industry in metropolitan France. Their study is based on the calculation of ten key indicators, which measure the environmental footprint and economic and social performance of each of the fishing fleets operating on the Atlantic coast. The study thus provides the first reliable multi-disciplinary state of the art of 70% of metropolitan fisheries. [01]

This research highlights the clearly negative assessment of large-scale industrial fishing (vessels over 24 meters) and fleets using demersal trawls. [02] Demersal industrial trawlers have considerable environmental, economic and social drawbacks: the destruction of the seabed, overexploitation of fished species, huge catches of juvenile fish, low job creation capacity, low added value, high carbon impact (CO_2 emissions). For the same level of catches in a wild environment (the ocean), deep-sea and industrial bottom trawlers create 2 to 3 times fewer jobs and almost half the added value than fleets using passive gear [03] (lines, traps and nets). Conversely, fishing fleets using passive gear produce 23% of total landings and 37% of added value, while accounting for only 17% of greenhouse gas emissions, 10% of overexploitation and 0.2% of seabed abrasion. However, they do have a significant footprint in terms of the catch of sensitive species (marine birds and mammals), which must be reduced if we are to make an effective transition.

01 The study covers fleets in the North-East Atlantic; Mediterranean fleets are not included at this stage.

02 The demersal trawl or bottom trawl is a conical net towed by a ship that catches marketable species on or near the seabed, such as sole, cod, monkfish or langoustine. This gear, which scrapes the seabed, should not be confused with the pelagic trawl, which is towed in open water and catches species such as herring, sardines, mackerel...

03 In terms of fishing gear, the fishing industry is divided into passive gear (nets, traps and lines) and trailing gear (dredges, trawls and seines). Source: https://archimer.ifremer.fr/doc/00784/89603/96190.pdf. Dormant gear traps target species passively, relying on their movement or hunting behavior.

In addition, bottom trawls and seines [04] depend on public subsidies for their profitability: 1 kg of fished resources is subsidized at between 50 and 75 euro cents, while other fleets are subsidized at less than 30 euro cents per kilogram landed. The amount of subsidies, essentially linked to the tax exemption for diesel fuel, is higher than the gross operating surplus for all industrial trawlers and deep-sea bottom trawlers. The profitability of these fleets is therefore artificial, and has an exorbitant social and environmental cost, which is borne by taxpayers and natural ecosystems. In contrast, the profitability of all passive gear does not depend on public funding. In this respect, the multi-factorial assessment drawn up by the research group argues for an end to the large-scale subsidization of industrial vessels using trawls, especially bottom trawls.

At the other end of the spectrum, small-scale inshore fishing (vessels from 0 to 12 meters long) using passive gear, which accounts for the majority of vessels, represents a small volume of catches (10% of the total) but is able to generate added value and employment (19% and 21% of the total, respectively). For illustrative purposes, the industrial pelagic trawler fleet [05] generates 10 times fewer jobs per tonne landed, although it receives 7 times more subsidies per job. As for the industrial bottom trawler fleet, it receives 5 times more subsidies per job than coastal vessels using passive gear, and almost twice as much per kilogram landed.

For decades, public authorities have been supporting the most socially, economically and ecologically damaging fisheries, rather than passive fishing, which is mostly inshore and undeniably more responsible by most standards.

Based on publicly available data, the researchers have drawn up an assessment of the economic, social and ecological irrationality of the current management of the fishing industry, and have indicated the way to a possible future, both in France and in other European Union Member States. The fishing industry can reverse the trends at work and put an end to its structural bankruptcy, provided that resources are deployed to support the development of a truly ‘sustainable’ fishery, or a "pêchécologie" (ecofishery), as term coined by Didier Gascuel in his manifesto for sustainable fishing, [06] i.e. a fishery that minimizes impacts on the climate and living organisms while contributing to European food sovereignty, maximizing employment and offering dignified socio-economic and human prospects.

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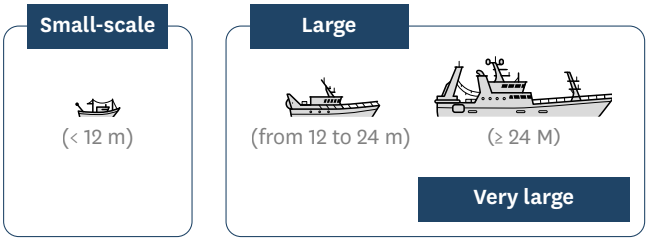
04 Demersal or bottom seining is a technological evolution of the bottom trawl. It consists of placing a funnel-shaped net on the seabed, connected at both ends to a cable which is deployed on the seabed as well, encircling an area of 3 km². The cable is then vibrated to create a wall of sediment and pulled down to concentrate the fish into an increasingly smaller area. The final stage traps the fish in the net.

05 The pelagic trawl is a towed net that moves in open water, between the surface and the seabed, without coming into contact with it.

06 Gascuel Didier, *La Pêchécologie. Manifeste pour une pêche vraiment durable*, Quae, 2023

KEY TAKEWAYS

ENVIRONMENTAL FOOTPRINT





84%

of landings from overexploited resources come from large trawls and seines.



57%

of CO_2 emissions from the vessels studied come from large bottom trawls and seines.

>1 IN 2 JUVENILES...

...fished is caught by a large trawl or seine.



60%

OF ACCIDENTAL CATCHES

...of sensitive species are caused by small-scale passive gear (excluding traps and pots)

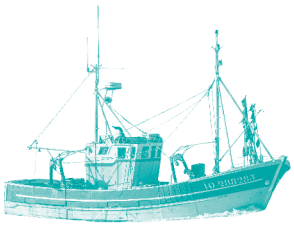
90%

of bottom abrasion is caused by large bottom trawls and seines.



KEY TAKEWAYS

SOCIO-ECONOMIC PERFORMANCE



2 TIMES +

...added value per tonne landed: this is what small-scale passive gear generates compared to large bottom trawls and seines.



PROFITABILITY

Profitability and capital: in relation to the capital invested, very large trawls and seines (over 24 m) are 3 to 4 times less profitable than small-scale gear.



JOBS

For the same level of catches, large bottom trawls and seines create 2 to 3 times fewer jobs than small passive trawls.



€50-75 CENTS PER KILO

...it's the amount of subsidy per 1 kg of resources fished that large bottom trawls and seines receive. In contrast, other fleets receive €30 cents per kg landed.

WAGE COSTS



The gap between salary levels is relatively small, with average salary costs ranging from €50,000 to €85,000 per fisher per year. Yet, the employment of a fisher working on a deap sea trawl of over 24 m benefits from a subsidy of around €60,000 when employment with nets, lines, traps is aided from a subsidy of between €9,000 and €14,000.

KEY TAKEWAYS

COMPARISON OF 3 FISHING TECHNIQUES

ENVIRONMENTAL FOOTPRINT

Overex-ploitation | 'Juvenile' risks | Seabed abrasion | Sensitive species | Carbon footprint

NO FOOTPRINT | LIGHT FOOTPRINT | AVERAGE FOOTPRINT | IMPORTANT FOOTPRINT

SOCIO-ECONOMIC PERFORMANCE

Added value | Employ-ment | Wage cost | Surplus | Subsidies

VERY GOOD | GOOD | AVERAGE | BAD

INSHORE FISHING (- 12 m) PASSIVE GEAR

FISHED VOL. 36.600 t/year

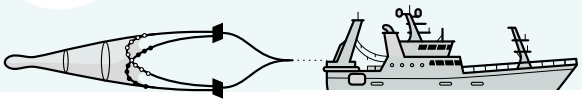
VAL. TOT. CAPTURES 160.900.000 €

VESSELS 1.270

ENVIRONMENTAL FOOTPRINT

SOCIO-ECONOMIC PERFORMANCE





INDUSTRIAL FISHING (+ 24 m) PELAGIC TRAWLS AND SEINES

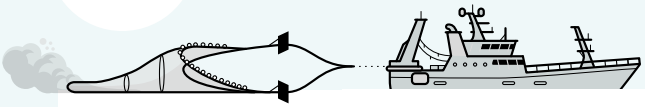
FISHED VOL. **57.800 t/year**

TOT. VAL. CATCHES **41.800.000 €**

VESSELS **10**

ENVIRONMENTAL FOOTPRINT

SOCIO-ECONOMIC PERFORMANCE



INDUSTRIAL FISHING (+ 24 m) BOTTOM TRAWLS AND SEINES

FISHED VOL. **61.500 t/year**

TOT. VAL. CATCHES **163.200.000 €**

VESSELS **65**

ENVIRONMENTAL FOOTPRINT

SOCIO-ECONOMIC PERFORMANCE





“All people on Earth depend directly or indirectly on the ocean and cryosphere.”

—

IPCC Special Report on the Ocean and Cryosphere (2019).

FOREWORD

THE WORLD DEPENDS ON THE OCEAN

1. The transition of the fishing industry: an environmental, social and economic emergency

Climate change and the accelerating extinction of the Earth's biodiversity are forcing humankind to rapidly transform the way it inhabits the planet. Every sector of the economy must assess its impact and rethink its production model and the real needs on which it is based, so as to aim for sustainability from an ecological, social and economic point of view. This 'transition' imperative[07] is even more pressing for an activity which, like sea fishing, directly impacts a wild ecosystem – the ocean – the health of which determines the very stability of the 'Earth System'.

Yet the ocean is bearing the full brunt of biodiversity erosion and global warming.

The world's oceans are our best climate ally: they absorb 20% to 30% of our CO2 emissions and over 90% of the heat generated by our activities,[08] but they are overheating. The ocean has been warming steadily since 1970. The rate of warming has more than doubled since 1993.[09,10] Marine heat waves have also doubled in frequency since 1982[11] and are increasing in intensity has led to increased acidification of the ocean's surface waters[12] Oxygen levels have decreased between the surface and a 1000m depth.[13,14]

All the physical changes occurring in the ocean are documented in scientific literature, in particular by the Intergovernmental Panel on Climate Change (IPCC) in its *Special Report on the Ocean and Cryosphere*.[15] These changes have **dramatic consequences for marine and terrestrial ecosystems. Ocean acidification is completely destroying food chains, threatening planktonic calcifying organisms**

07 By 'ecological', we mean a transition that responds simultaneously to the effects of climate change on the one hand, and to the effects of the collapse of biodiversity on the other, given that these two closely intertwined crises are part of a global crisis whose causes and repercussions are shared and mutually reinforcing. Consequently, the sector's transition must integrate the challenges of decarbonization and adaptation of the sector to the effects of climate change and respond to the challenges of the collapse of biodiversity, to which it is both contributing and suffering the consequences.

08 United Nations, https://www.un.org/en/climatechange/science/climate-issues/ocean

09 IPCC, 2022, special report 'The ocean and the cryosphere'.

10 Ibid.

11 Ibid.

12 Ibid.

13 Ibid.

14 Laffoley, D. & Baxter, J.M. (eds.) (2019). 'Ocean deoxygenation: Everyone's problem - Causes, impacts, consequences and solutions'. Full report. Gland, Switzerland: IUCN. 580pp

15 IPCC, 2022, special report 'The ocean and the cryosphere'.

and coral reefs, which are home to around 25% of the world's marine biodiversity.[16] In addition to intensifying cyclones, hurricanes and storms, ocean warming is leading to the **deterioration of coral reefs and mangroves**, generating increasingly frequent **marine heatwaves** that cause **mass animal mortalities,** and directly affecting **fish migrating towards the poles, jeopardizing the food security** of the poorest populations in tropical zones, particularly local communities who make their living from fishing.[17]

Rising sea levels threaten to submerge archipelagos and coastal areas less than 10 meters above sea level. These regions, which are home to approximately 11% of the world's population[18] are currently subject to an intensification of **extreme phenomena such as deadly storms and other coastal hazards** (flooding, erosion and landslides). Recent studies suggest that these events are now likely to occur at least once a year in many locations.[19] At the same time, research indicates **that changes to the Gulf Stream** and the potential **disruption of the Atlantic Meridional Overturning Circulation (AMOC)** could lead to colder winters for some populations and fewer monsoons, as well as the emergence of prolonged intense droughts for others.[20]

In addition to the lasting consequences for ecosystems, these changes also impact **the lives and livelihoods of entire communities.** Some 680 million people live in coastal areas at risk of flooding, while almost two billion people located in half of the world's megacities live in coastal zones. What's more, **almost half the world's population relies on fishing to meet its protein needs.**[21] These observations underline the far-reaching societal implications of the environmental changes currently underway. **In addition to these physical changes, the ocean is also experiencing significant degradation of marine biodiversity due to human activities.** The main cause of this alteration lies in **the exploitation of marine organisms, mainly through fishing, which is the factor that has had the greatest relative impact on this environment.**[22] According to the FAO, the sustainability of the exploitation of the world's fishery resources has decreased from 90% in 1974 to 64.6% in 2019. The IPBES estimates that over **55% of the oceans are exposed to pressures exerded by industrial fishing.** In the North Atlantic, overfishing has led to a 90% reduction in the abundance of predatory species (such as cod and halibut) since 1900.[23] In the North Sea, the biomass of fish weighing over 16 kg has fallen by 99% compared with the pre-industrial period.[24]

16 IRD, https://en.ird.fr/ird-celebrates-international-year-reef

17 IPCC, 2022, special report 'The ocean and the cryosphere'.

18 Glavovic, B.C., R. Dawson, W. Chow, M. Garschagen, M. Haasnoot, C. Singh, and A. Thomas, 2022: Cross-Chapter Paper 2: Cities and Settlements by the Sea. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2163-2194, doi:10.1017/9781009325844.019.

19 United Nations 'How is climate change impacting the world's ocean', https://www.un.org/en/climatechange/science/climate-issues/ocean-impacts

20 Piecuch Christopher, Beal Lisa, 'Robust Weakening of the Gulf Stream During the Past Four Decades Observed in the Florida Straits', Geophysical Research Letters, September 2023

21 United Nations 'How is climate change impacting the world's ocean', https://www.un.org/en/climatechange/science/climate-issues/ocean-impacts

22 Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on its seventh session IPBES/7/10/Add.1

23 Christensen *et al.*, 'Hundred-year decline of North Atlantic predatory fishes', 2003

24 Jennings Simon, Blanchard Julia L., 'Fish abundance with no fishing: predictions based on macroecological theory', Journal of Animal Ecology, 73, 2004, pp. 632-642

This unprecedented environmental degradation caused by fishing has had disastrous social repercussions, due to poor management, damaging fishing practices and methods, as well as harmful subsidies granted to the most impactful fishing methods, particularly bottom trawling.

Employment in the sector, particularly in small-scale fishing, continues to decline significantly, having been cut substantially by a factor of 5 since the 1950s. [25]

These findings highlight the complexity of today's climate challenges, underscoring the imperative need for a systemic approach based on scientific methodology to guide adaptation strategies. In view of the challenges of decarbonizing production sectors, and in particular the fishing industry's predominant responsibility for the erosion of biodiversity and the destruction of marine habitats, initiating the sustainable transition of this sector is imperative if we are to save the ocean, the climate, jobs and public finances.

2. A new approach: an exhaustive 'marine assessment'

Faced with the ecological and social emergency, and in the absence of a multi-disciplinary research unit proposing concrete scenarios for thinking about the future of fisheries, BLOOM took the initiative of setting up a research group dedicated to planning the social-ecological transition of French fisheries.

Conceived with the support of the *L'Atelier des Jours à Venir* cooperative, this research group now brings together researchers and professor-researchers specializing in fisheries science, marine ecology, environmental economics and cognitive science from the Institut Agro, AgroParisTech and the École des hautes études en sciences sociales (EHESS). The group is supported by methodological advice from *The Shift Project* association, which is a participant in this process.

Inspired by the 'carbon footprint', which has become a universal reference tool for assessing the climate footprint of human activities, the research group set itself the challenge of **establishing a 'marine footprint' through a new way of measuring the environmental and socio-economic performance of maritime activities, starting with fishing fleets, so as to reflect their multiple environmental impacts and measure their economic and social performance** from a resolutely multidisciplinary and integrative perspective. This challenge has been taken up through an initial case study, which establishes **an unprecedented multifactorial assessment of the French fleets in the North-East Atlantic,** which represents 70% of the national fishery, with France also being the third largest state in the European Union in terms of catch volumes. **This ground-breaking report is the first stage in the work carried out by the research group for the social-ecological and economic transition of fisheries.**

25 https://www.ocapiat.fr/wp-content/uploads/Dossier-Observatoires-Peche-chiffres-2020.pdf

A SECTOR AND ECOSYSTEMS IN CRISIS THROUGHOUT THE EUROPEAN UNION AND FRANCE

General state of European marine environments

Europe's seas are under constant threat from the loss of marine biodiversity and the disappearance of habitats. In 2020, a special report by the European Court of Auditors on the protection of the ocean[26] stated that **"while a framework was in place to protect the marine environment, the EU's actions had not restored seas to good environmental status, nor fishing to sustainable levels".**

The Common Fisheries Policy (CFP) and the main environmental policies applicable to the marine environment, set out in the Marine Strategy Framework Directive and the Habitats and Birds Directives, which aim to protect essential ecosystems and habitats, have not led to their regeneration: **so-called 'protected' marine areas offer little protection.** In fact, in 59% of these areas, commercial trawling is practiced more intensively than in unprotected areas.[27] Efforts to coordinate **fisheries and marine protection policies remain limited**, and only a relatively small proportion of available public funds is allocated to financing conservation measures.[28] The EU Marine Strategy Framework Directive's objective of "[achieving] a good environmental status" in all EU marine waters by 2020 has also not been met in terms of the state of marine biodiversit[29] In 2015, the International Union for Conservation of Nature (IUCN) reported that **7.5% of European marine fish species were threatened with extinction**, and that the scientific information available was insufficient to assess the extinction risk of a further 20.6% of fish species.[30] European waters, long considered to be inexhaustible, are now drained. According to the European Environment Agency in 2019, **the situation is deemed 'problematic' in 84% of areas surveyed, while 65% of supposedly 'protected' seabeds remain in an 'unfavorable' condition.**[31] In the North Atlantic, 90% of

26 European Court of Auditors, Special Report 'Marine Environment: EU protection is wide but not deep', 2020

27 Ibid.

28 Ibid.

29 State of Europe's seas, https://water.europa.eu/marine/state-of-europe-seas/state-of-biodiversity

30 IUCN, European Red List of Marine Fishes, 2015.

31 EEA Report No 17/2019, Marine Messages II, ISSN 1977-8449, 'Navigating the course towards clean, healthy and productive seas through implementation of an ecosystembased approach'

marine predator species have disappeared since 1900.[32] In the North Sea, the current biomass of fish weighing between 4 and 16 kilograms has fallen by a massive 97.4%[33] compared with the pre-industrial period. This decline reaches 99.2% for fish weighing between 16 and 66 kilograms.

Macro-economic data and sector structure

The European Union contributes 5.2% of global catches, with 4.1 million tons of fish caught in 2019. Fishing, aquaculture and seafood processing contribute less than 1% to EU GDP and generate around 267,000 jobs and **6.3 billion euros in revenue** each year, according to the European Court of Auditors. In terms of volume, the Member States that dominate the market are Spain, Denmark, France and the Netherlands.

According to INSEE, the French National Institute of Statistics and Economic Studies, in France, the fishing and aquaculture sector represents more than 640,000 tons produced for a value of around 1.7 billion euros (bn EUR), with Brittany as the leading fishing region (catching around a third of the total volume). The fishing sector's contribution to French GDP is low (less than 1%). The three most popular species sold in France in terms of tonnage are tuna, oysters and mussels. **The French consume around 33.5 kg of seafood per capita per year, of which 24 kg comes from fishing.**[34] **In terms of geographical distribution, 31.5% of vessels are located on the Mediterranean coast, 30.5% on the North Sea and English Channel, and 38% on the Atlantic coast.**

France stands out from other European countries such as Germany and the Netherlands, which have oriented their fishing towards a standardized, industrial model. Indeed, **the French fishing fleet is diverse, combining inshore, offshore and industrial fishing.** It is based on a wide variety of trades (from small vessels using pots and traps or trollers of a few meters long to freezer trawlers of over 80 meters long).[35] However, **almost three-quarters of French vessels are less than 12 meters long** and belong to a fleet considered to be inshore. Regardless of their size, **more than half the vessels use passive gear (63%).**[36] In terms of catches, trawlers and (bottom and pelagic) seiners account for 28% of days at sea and 47% of total catches.[37]

Between 1983 and 2013, the **metropolitan fleet**[38] **fell from 11,660 to 4654 vessels of all sizes, reflecting a sharp decline in the sector.** Data by vessel size shows a drastic reduction in the number of vessels under 12 meters (with the fleet down 30% between 1995 and 2020).[39]

This drastic reduction has gone hand in hand with a decrease in tonnage, reflecting the numerous fleet exit plans financed by European funds, mainly concerning these small vessels of less than 12 meters and a few vessels of 12-25 meters. **Logically, this decline also goes hand in hand with a drop in the number of direct jobs in professional sea fishing.** In 2021, there were 13,777 direct jobs for fishers at sea, including 6,140 in **small-scale fishing. Small-scale fishing is the main victim of this trend,** with a 20% drop in its workforce between 2020 and 2021[40].

In France, small-scale fishing has seen its rights curtailed since the introduction of the CFP and the allocation of quotas based on 'historical' catches.[41] In the virtual absence of any monitoring of catches made by small-scale inshore fishers

32 Christensen V, Guénette S, Heymans J, Walters C, Watson R, Zeller D, Pauly D, 'Hundred-year decline of North Atlantic predatory fishes', 2003

33 Jennings Simon, Blanchard Julia L., 'Fish abundance with no fishing: predictions based on macroecological theory', Journal of Animal Ecology, 73, 2004, pp. 632-642

34 FranceAgriMer, 2022

35 Gascuel Didier, *Pour une révolution dans la mer. De la surpêche à la résilience*, Actes Sud, April 2019

36 FranceAgriMer, 2022

37 The main points of the legislative report on the protection of the fishing industry (CADEC Report, 2023)

38 The overseas territories represent a fleet of 3,438 vessels in 2020 (FranceAgrimer, Chiffres-clés des filières pêche et aquaculture en France en 2022. Production - Entreprises - Échanges - Consommation, Montreuil, 2022.).

39 FranceAgrimer, Chiffres-clés des filières pêche et aquaculture en France en 2022. Production - Entreprises - Échanges - Consommation, Montreuil, 2022.

40 Rapport des Métiers de la pêche et des cultures marines – 2021, Observatoire prospectif des métiers et des qualifications de la Pêche, 2022

41 The 2013 CFP reform introduced the possibility of allocating quotas according to the social and ecological performance of fisheries (Article 17), but this has not yet led to a change in practices, and quotas continue to be held mainly by industrial players.

before 1983, they were allocated fewer quotas than fleets for which such data was available. [42]

In addition to these indicators it is necessary to add that **the Brexit in 2020 has led to a redistribution of fishing rights to the detriment of French fleets,** particularly in Brittany and Normandy. The Covid crisis has accelerated a change in consumer habits, marked by a drop in demand for fresh produce.

The **sector is also suffering from a deteriorating image** among the general public and is finding it increasingly difficult to recruit the young people who are so vital for the next generation. Finally, the high cost of fuel, exacerbated by the war in Ukraine, is threatening the profitability of fishing companies. This is especially true for trawlers, which consume a lot of diesel.

Fishing effort distribution and overall state of exploited resources

When it comes to fishing pressure and impacts on fish stocks, the situation in the European Union is heterogeneous. On average, **between 1950 and 1990, stocks declined drastically and fishing pressure increased, so that by the end of the 1990s, 90% of fish populations assessed in the North-East Atlantic were overexploited.** [43]

While fishing pressure is currently declining for stocks in the Bay of Biscay and off the Iberian coast, **the same cannot be said for stocks in the Baltic and North Seas.** [44] **Some stocks therefore remain in extremely degraded states,** and in 2018, 69% of the 397 community stocks were still subject to continuous overfishing, while 51% of stocks were outside safe biological limits. [45]

Ifremer's 2022 assessment, [46] based on catches in 2021, shows that the proportion of landings from sustainably exploited fish populations is stagnating in mainland France at just 51%. This means that **half of all landings do not come from sustainably exploited populations.** A closer look reveals that some stocks are also overexploited: in 2021, 23% of landings came from overfished fish stocks and 2% were from critically depleted stocks. [47] In the North-East Atlantic in 2020, 28% of the 75 stocks assessed were still overexploited. Northeast Atlantic mackerel, considered to be in good condition in 2020, was classified as overfished in 2021. [48]

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42 Roose Caroline, *Pour les océans, vers une autre politique européenne de la pêche*, Les petits matins, 2023

43 https://www.ifremer.fr/fr/actualites/bilan-2022-la-surpeche-recule-mais-l-objectif-de-100-de-poissons-issus-de-populations

44 Gascuel Didier, Bilan 2022 de l'état des stocks halieutiques en Europe : la surpêche recule, mais reste forte - Note by D. Gascuel based on the STECF report, April 2022

45 Froese Rainer *et al.*, 'Status and rebuilding of European fisheries', Marine Policy, 93, July 2018, pp. 159-170.

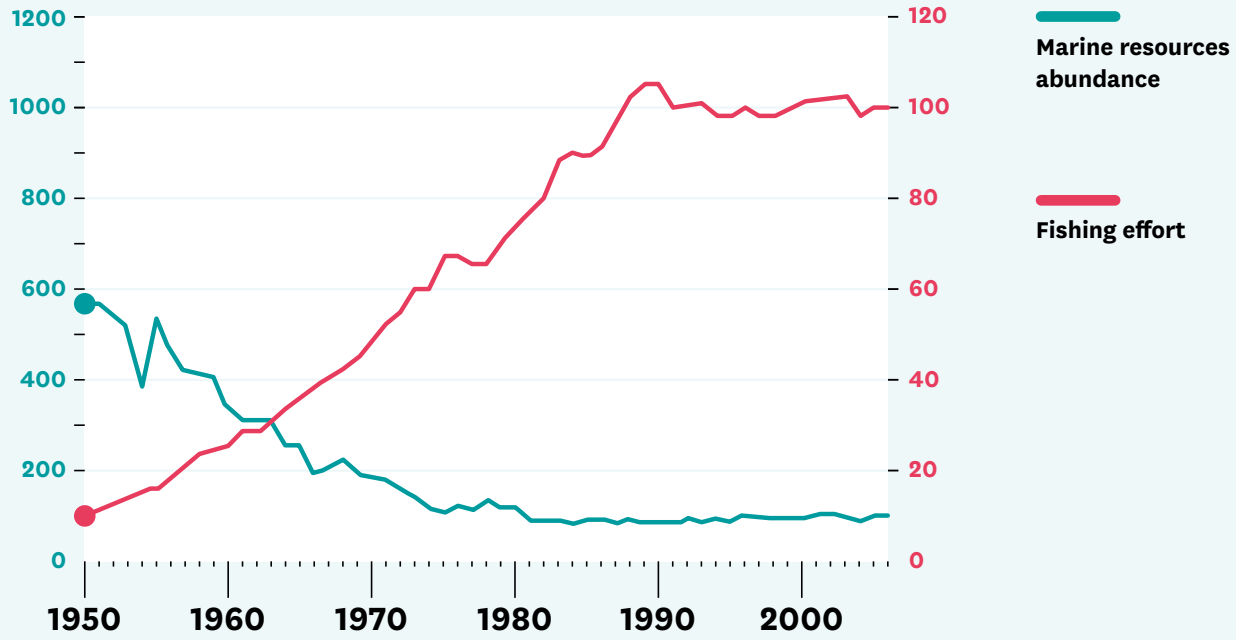
46 https://www.ifremer.fr/fr/presse/comment-se-portent-en-2022-les-populations-de-poissons-pechees-en-france

47 Biseau Alain, Diagnostic 2022 sur les ressources halieutiques débarquées par la pêche française hexagonale, Ifremer, 2023, https://peche.ifremer.fr/content/download/165644/file/Diagnostic_2022_d%C3%A9barquements_fran%C3%A7ais_Vdef.pdf.

48 https://www.ifremer.fr/fr/presse/comment-se-portent-en-2022-les-populations-de-poissons-pechees-en-france

Changes in fishing effort and marine resources abundance between 1950 and 2010

Relative values, compared with an index of 100 in the first year





A PARADIGM SHIFT IN THE WAY FISHERIES PERFORMANCE IS ASSESSED

1. Production sectors should no longer be evaluated solely in terms of productivity

In the same way that a broad trend in economics is moving away from the idea that GDP is an adequate indicator for measuring the wealth of nations, the fishing sector can no longer be examined solely through a production lens. This was the starting point of the research group, which, in the absence of scientific work incorporating a **multidimensional approach to fisheries,** proposed to evaluate them simultaneously according to the three environmental, social and economic dimensions, **without reducing the ecological question to the sole issue of the carbon footprint or the assessment of overfishing.** Through this approach, the research group intends to answer a multitude of questions that must now be considered when assessing the performance of a production system. Do the fleets analyzed create value and jobs? Are they profitable? Do they impact marine biodiversity? Do they degrade the physical integrity of marine habitats? Do they limit bottom abrasion? Do they pose a risk of capturing sensitive species such as birds, marine mammals or turtles? Do they consume a lot of fuel and therefore generate high levels of emissions? Do they enable fishers to earn a decent living? Do they exploit already overexploited species? This resolutely holistic approach breaks with the codes of species-based assessments (often monospecific) or assessments based solely on fishing productivity.

2. The method: a new set of indicators for truly 'sustainable' fishing

The research group has **defined a set of ten key indicators that must now be taken into account in order to make a serious, holistic assessment of the environmental footprint as well as the social and economic performance of a fishing activity. These indicators form the basis for assessing a truly 'sustainable' fishery, i.e. a 'pêchécologie' (ecofishery) that should aim to have the least impact on the climate and living organisms, while offering desirable human and socio-economic prospects.** This set of indicators is the **first multi-dimensional measurement tool for fisheries performance.** In addition, the researchers include an **original indicator** in their analysis, namely the **amount of public subsidies allocated to fleets.** By doing so, they propose to evaluate the efficiency of the allocation of a public resource In terms of its social, economic and environmental dimensions, and examine who actually benefits from this public expenditure actually benefits and how.

ENVIRONMENTAL PERFORMANCE INDICATORS [49]



THE 'OVEREXPLOITATION' FOOTPRINT

This is defined as the number of tons landed by each fleet from overexploited stocks. It is therefore a measure of the contribution of each fleet to the overall phenomenon of overexploitation.



THE 'JUVENILE' FOOTPRINT [50]

This measures the quantity of juvenile fish caught by each fleet. In other words, the quantity of fish that have not reached sexual maturity and that, if caught too early, are unable to grow in the sea and contribute to the natural productivity of marine ecosystems. These catches contravene Common Fisheries Policy regulations, which stipulate that minimum catch sizes and fishing gear mesh sizes must "guarantee the protection of juvenile fish". In this ecosystem assessment, in the absence of available data, the juvenile footprint is the subject of a preliminary approach.



THE 'SEABED ABRASION' FOOTPRINT

This measures the surface area impacted by each fishing fleet as it drags trawl, dredge or Danish seine gear along the seabed. This abrasion is known to destroy all or part of the flora and fauna present on the seabed, particularly the benthic invertebrates that form the basis of food webs. It thus tends to reduce the biomass and biological production of the seabed and is considered a factor in the impoverishment of the entire ecosystem. In addition, the resuspension and redistribution of sediments contributes to the homogenization of habitats, thus reducing the functional biodiversity of the ecosystem. A distinction is made between surface footprints affecting only the surface part of the sediment (up to 2 cm deep) and deep footprints, which consider the deep penetration of gear into the sediment to 2 cm or more.



THE 'SENSITIVE SPECIES' FOOTPRINT

This quantifies the risk of accidental capture (bycatch) of sensitive species associated with each fishing fleet. This category includes all marine mammals, seabirds and sea turtles, as well as certain fish such as cartilaginous fish (e.g. rays).



CARBON FOOTPRINT

This measures greenhouse gas emissions, in equivalent tons of CO_2 emitted, for each fishing fleet. This footprint is estimated on the basis of annual diesel consumption.

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49 The research group states in its scientific report: "Some of the ecological indicators studied in this report aim to describe the state of the resources exploited by the fleets. However, the management unit in fisheries is not the species but the biological population, or more precisely what is commonly referred to as a fish stock. Catches of a given species can thus be linked to several different stocks, which may themselves be in different states. To calculate the indicators, it is therefore necessary to disaggregate the catches of each species, by attaching them to the different stocks concerned. This is done on the basis of the geographical limits of each stock, which are known for the main stocks and are therefore generally aligned with the division of the North-East Atlantic into zones known as ICES Divisions."

50 It should be noted that, due to the difficulty of accessing data for juvenile footprint indicators and sensitive species indicators, the researchers are proposing preliminary results that will be the subject of further investigation in the next stages of their work.

ECONOMIC AND SOCIAL PERFORMANCE INDICATORS



ADDED VALUE

This enables us to assess the wealth created by each of the French fishing fleets.
It corresponds to the value of landings by each fleet,
minus intermediate consumption.



EMPLOYMENT GENERATED BY FLEETS

This is measured by the number of full-time equivalent fishers per fleet.



THE WAGE COST FOR EACH FLEET

i.e. the cost of one full-time equivalent per fleet (salaries charged).



GROSS OPERATING SURPLUS (EBITDA)

This represents the profitability of a business sector once salaries and production taxes
have been paid and operating subsidies (excluding exemption from TICPE) have been added.
It provides information on the resources available to a company in terms of investment
to renew its productive capital, but also to remunerate the owner(s) of this capital.



PUBLIC SUBSIDIES

This indicator is made up of operating subsidies (which are intended to help a company
in its short-term activity, in particular to lighten the burden of its fees) on the one hand,
and the amount of domestic tax exemptions on the consumption of energy products (TICPE)
on the other. Although the TICPE exemption is not considered a subsidy in France,
it is an indirect subsidy as defined by the OECD (1996) and is therefore included in this report
as part of the 'public subsidy' indicator. [51]

51 "Any measure that reduces costs for both consumers and producers by giving them direct or indirect support".

3. Available data and fleet categories

The research group chose to carry out an **initial case study on French-flagged fleets operating in the North-East Atlantic zone during the 2017-2019 period (i.e. 2,720 vessels representing around 70% of national landings).** The scientists analyzed mainly socio-economic data from the Scientific, Technical and Economic Committee for Fisheries (STECF), [52] based on declarations by European Union Member States. Each fleet is defined as the grouping of all vessels: originating from the same country, operating in the same supra-region (here the North-East Atlantic), belonging to the same class of vessel size and practicing the same main fishing technique. To obtain data on fish stocks, the researchers mainly used information from ICES, [53] ICCAT [54] and Ifremer. [55] The resources assessed represent an annual catch volume of 307,300 tons, or 86% of French catches in the North-East Atlantic, excluding seaweed.

In order to fulfil their assessment and synthesize the results, they then carried out two main groupings to reorganize all the fleets in the area into 12 fleet types, **according to their fishing technique and main gear** [56] **on the one hand, and the size of the vessels** of which they are made up on the other.

This organization has given rise to:

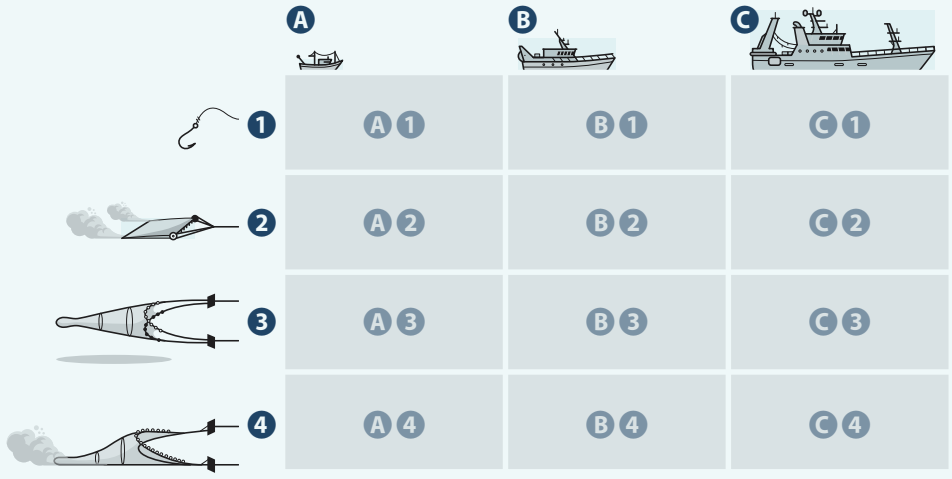
(This classification is used in the remainder of this document.)

4 main sets of fishing techniques

1. Dormant gear (nets, lines, traps)
2. Dredges and multi-purpose machinery
3. Pelagic trawls and seines
4. Bottom trawls and seines

3 main sets classes for the class of vessel size

- A Inshore (vessels ranging from 0-12 meters)
- B Offshore (vessels ranging from 12 to 24 meters)
- C Industrial (vessels of 24 meters or more)



52 The Scientific, Technical and Economic Committee for Fisheries (STECF) is the European Union's advisory committee. It provides the European Commission, at its request, with recommendations and advice on fisheries management.

53 International Council for the Exploration of the Sea.

54 International Commission for the Conservation of Atlantic Tunas.

55 French Research Institute for Exploitation of the Sea.

56 It should be noted that one fishing technique can include different gears, which can also be found in other fishing techniques.

FIRST RESULTS

INDUSTRIAL FISHING AND TRAWLING HAVE NO SOCIAL, ECONOMIC OR ENVIRONMENTAL FUTURE

The ecosystem assessment of fisheries performance confirms that industrial and deep-sea vessels, which are mainly trawlers, have a considerable impact on marine ecosystems and fishery resources, compared with small coastal vessels working with passive gear.

1. Impact of fleets on marine ecosystems and resources



OVEREXPLOITATION FOOTPRINT

Fleets made up of vessels over 12 meters in length, using mainly trawling techniques, are majorly responsible for the overexploitation of fish stocks. Trawls account for 84% of landings from overexploited stocks. [57] On the other hand, **the contribution of passive gear, dredges and multipurpose gear to the overall phenomenon of overexploitation is low** (10% and 2% of the overexploitation footprint, respectively).

In terms of volumes fished, which are greater for deep-sea or industrial fishing than for inshore fishing, the result remains largely in favor of small inshore fishing vessels using passive gear (6% of the footprint for 10% of catches) compared with large trawlers (84% of the footprint for 62% of catches).

Overall, the findings are alarming: for all fleets combined, almost a third of landings come from overexploited

57 Offshore and industrial pelagic trawlers account for a respective 27% and 17% of landings from overexploited stocks. Deep-sea and industrial bottom trawlers account for a respective 13% and 27% of these landings.

stocks. The fishing pressure indicator shows that trawlers over 12 meters take their catches from overexploited stocks of sardine, horse mackerel or blue whiting for pelagic trawls or seines, and saithe, cod and whiting for bottom trawls.

Inshore pelagic trawls and seines are highly responsible for the decline in biomass (depletion): 90% of their landings come from overexploited stocks (mainly sardines). The impact of inshore passive gears is also significant (with 34% depletion). However, the assessment notes that, overall, the impact of depletion depends more on the exclusive nature of the stocks that each fleet exploits, rather than on the state of these stocks. [58]



JUVENILE FOOTPRINT

One of the key environmental parameters for estimating the environmental performance of fleets is the 'juvenile footprint', i.e. measuring the quantity of fish that have not reached sexual maturity and which, if fished too early, cannot grow at sea or contribute to the natural productivity of marine ecosystems. Preliminary results show that **bottom trawlers alone, both deep-sea and industrial, are responsible for more than half of all juvenile catches by French fishing fleets.** In comparison, passive gear accounts for 22% of the total juvenile footprint (of which only 9% is inshore). **These results confirm the non-selective nature of trawling, which generally uses mesh sizes that are too small.**

On a European scale, STECF records absolute juvenile catch rates in excess of 40% of total catches for three gear categories: bottom trawls, set nets and seines.



SEABED ABRASION FOOTPRINT

French fleets operating in the North-East Atlantic scrape an estimated 500,000 to 800,000 km² of seabed every year, with an average value of 600,000 km², an area equivalent in size to that of mainland France. 90% of this footprint is accounted for by the use of bottom trawls and seines, and only 6% by multipurpose dredgers.

The footprint of bottom trawlers is particularly large for deep-sea and industrial vessels (52% and 22% of the total respectively). This corresponds to an average trawled area for all bottom trawlers estimated at 4.0 km² per ton landed, and 265 km² per job. Small coastal trawlers have the greatest relative impact (8.4 km² per ton and 285 km² per job). In comparison, multipurpose dredgers have a low abrasion footprint, estimated at 0.8 km² per ton and 56 km² per job.

The study also estimates a so-called 'deep' abrasion footprint, associated with gear that penetrates sediments to a depth of more than 2 cm. This is the case for dredges, but also for part of the surface impacted by trawls, notably due to the use of certain rigs (trawl doors, scraper chains, etc.). This deep-sea footprint is estimated at an average of 77,000 km², for all the fleets considered in the study. **Bottom trawls and seines account for 86% of the total, and dredges for 10.5%.**

58 This means that the indicator is not necessarily relevant for a comparative assessment of the impact of fleets on these stocks.



SENSITIVE SPECIES FOOTPRINT

The risk of accidental catches of sensitive species, and of marine mammals and birds in particular, is undoubtedly the black spot for fleets using passive gear. Estimates of this footprint are still fraught with uncertainty, but it is likely that more than three-quarters of catches of sensitive species are linked to gillnetters and trollers. If we take vessel size into account, **more than half of all bycatches would be made by inshore passive vessels.**

However, there is considerable heterogeneity across passive gear. According to ICES data, marine mammals are mainly caught by inshore gillnetters, while birds may be caught mainly by trollers (particularly longliners) and to a lesser extent by gillnetters. For this gear, the accidental capture rate could exceed 100 or even 200 marine mammals and 1,000 birds per 1,000 tons fished. Conversely, and quite logically, **accidental catches are virtually non-existent for vessels using traps and pots.**

The 'sensitive species' indicator shows that passive gear is not perfect, and that it too has room for improvement. If these methods of fishing are to be compatible with the concept of 'pêchécologie' (ecofishery) they must first and foremost reduce their accidental catches.



2. CO2 emissions and fuel consumption

The group's analysis shows that industrial and deep-sea bottom trawlers account for the largest share of CO2 emissions. These fleets, which need a lot of power to pull their trawls, account for almost 400kT of CO2 equivalent, or **57% of total emissions** (bearing in mind that these fleets represent 34% of production in tonnage and 39% in value). Conversely, passive gear and pelagic fleets account for 17% and 12% of total CO2 emissions (for 34% and 11% of production by value). **If we consider catch volumes and values, bottom trawl fleets emit significantly more carbon.** For example, in terms of value per kg of fishery resources landed, bottom trawls account for 0.75 to 1.2 kg of CO2 equivalent per euro landed, compared with 0.5 kg of CO2 equivalent for the rest of the fleets.

On an employment basis, the trend is markedly different. Pelagic trawlers and industrial seines are the worst performers, emitting over 320 tons of CO2 equivalent per employee over one year of activity. Industrial bottom trawlers come second, emitting 250 tons of CO2 equivalent per employee. In comparison, coastal bottom trawls emit almost 2 times less, and fleets using passive gear around 6 times less.



3. Job creation, added value and profitability

Looking at the 'social productivity' of fisheries, in terms of the number of jobs created per ton of resources landed, is essential for the future of the sector, which is also seeking to increase its impact in terms of employment. **For every 1,000 tons caught, passive fishing and inshore fishing create the most jobs.** By way of illustration, the industrial pelagic trawl fleet generates 10 times fewer jobs per ton landed than the inshore nets, lines and traps fleet. In terms of employment costs, salaries are generally higher for the fleets with the lowest number of full-time equivalents (pelagic trawls and seines). However, in general, salary levels are relatively constrained, with an average cost of between €50,000 and €85,000 per sailor per year.

If we look at the added value created by the fleets per ton landed, we see that **inshore nets, lines and traps have twice the added value of the industrial bottom trawler and seiner fleet,** even though the latter has higher landings in terms of value.

The social productivity of inshore passive gear fleets does not come at the expense of a loss of economic rationality. By looking at the gross operating surplus (EBITDA) of fleets, i.e. the capacity of an operation to generate financial surpluses and thus to maintain itself, **researchers have shown that the fleets with the best profitability per unit of capital invested (EBITDA/capital invested ratio) are inshore and industrial nets, lines and traps,** small inshore pelagic trawls and dredger fleets. Industrial trawls and seines are 3 to 4 times less profitable than these fleets. In terms of EBITDA in relation to labor (fishers) or capital, offshore and industrial trawls and seines also appear to be the least profitable, as they are large vessels equipped with expensive gear.



4. Subsidy allocation: environmental, social and economic irrationality

Despite their poor environmental, social and economic performance, the fleets that benefit most from public subsidies (i.e., operating subsidies and the amount of domestic tax exemptions on the consumption of energy products (TICPE)) **are bottom trawls and seines measuring over 12 meters and,** generally speaking, if we look only at the size category: **deep-sea and industrial trawlers.** The first category receives 55% of subsidies, and if we group deep-sea and industrial fisheries together, they receive 85% of subsidies. This may be justified by the social benefits generated by a sector of the economy. In this case, however, some questions may arise.

The ratio of subsidies per fleet is clearer when compared to the fish resources fished and jobs created: **1 kg of resources fished is subsidized at between 50 and 75 euro cents for bottom trawl and seine fleets, while other fleets are subsidized at less than 30 euro cents per kg landed.**

The employment of a fisher working on industrial pelagic trawls and seines, and deep-sea and industrial bottom trawls, indirectly benefits from a subsidy of around 60,000 euros. On the other hand employment with nets, lines, traps and dredges and on inshore multipurpose vessels is indirectly aided from a subsidy of between **9,000 and 14,000 euros.**

Last but not least, **the profitability of most trawl fleets is directly dependent on public subsidies, whereas the profitability of all passive gear is the least dependent on subsidies.** In short, the profitability of trawl nets is artificial and dependent on public subsidies at an exorbitant social and environmental cost, which is borne by the taxpayer and natural ecosystems. **In fact, these subsidies reward the fleets that generate the greatest environmental impact, whether on biodiversity or the climate, while creating the fewest jobs and the lowest income growth in France.**

CONCLUSIONS

BREAKING THE DEADLOCK AND SAVING COASTAL FISHERIES

For the first time, a multi-criteria scientific assessment of fisheries has been carried out, paving the way for a new, systemic means of evaluating fishing activities at sea in order to assess their 'sustainability'. This innovative multifactorial analysis of a productive activity reveals more clearly than ever the social, economic and environmental impasse in which certain fishing activities find themselves. The analysis was recently carried out in France but could be repeated anywhere in the world in the near future.

Looking simultaneously at the three dimensions – social, economic and environmental – **the urgent need to change course is obvious.** The sector's transition must ensure that it retains its most responsible and sustainable component: **small-scale inshore fishing, which accounts for over 70% of the fleet, and which is currently in such decline that it is in danger of disappearing.** However, the analysis does not deny that this fleet has progress to make in terms of accidental catches of marine birds and mammals.

Subsidizing industrial vessels that mainly use trawls is not only costly for public finances, but also environmentally and socially destructive. In a context where a greater fishing effort does not lead to an increase in catches, the contribution of public money does little to increase earnings. On the contrary, financial support encourages industrial fishing to seek ever greater catches from already overexploited stocks, and thus to deploy more carbon-intensive methods without creating more value, fueling a vicious social, environmental and economic circle. **In contrast** to **this unsustainable model, small-scale inshore fishing and passive fishing, in particular, are showing encouraging results** in terms of transition: they combine low impact on the seabed, low GHG emissions, no dependence on subsidies, and job and value creation.

To ensure a rational and optimal transition of the fishing sector, this report highlights the need to put an end to harmful public subsidies, to de-trawl and save rescue inshore fishing, and to support it in limiting by-catches. These conclusions shed light on the path to follow to preserve and even develop employment and maintain the biological and physical functions of the ocean in a context of the biodiversity and climate crisis.

Work will continue to develop operational proposals, provide follow-up guidance to sector players and contribute to the implementation of concrete solutions.

FIND THE COMPLETE REPORTS

You can find the complete reports produced by the researchers of the research group (in French) through the following links:

Évaluation des performances environnementales, économiques et sociales des flottilles de pêche françaises opérant dans l'Atlantique Nord-Est.

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Quemper F., Levrel H., Le Bras Q., Mouillard R., Gascuel D., 2024. Les publications du Pôle halieutique, mer et littoral de L'Institut Agro n° 55.

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https://halieutique.institut-agro-rennes-angers.fr/sites/halieutique.institut-agro-rennes-angers.fr/files/fichiers/pdf/performances.pdf

Transition et adaptation, analyse des modalités du changement de pratiques des acteurs de la pêche professionnelle.

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Le Bras Q., Gascuel D., Quemper F., Levrel H., 2023. Les publications du Pôle halieutique, mer et littoral de L'Institut Agro n° 54, 40 p.

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https://halieutique.institut-agro-rennes-angers.fr/sites/halieutique.institut-agro-rennes-angers.fr/files/fichiers/pdf/adaptation.pdf

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