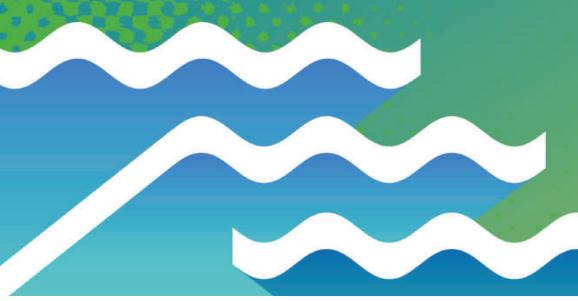
Ending "temporary cessation" for good: How an EU subsidy is driving overfishing

September

2020







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Seas at Risk and BirdLife Stichting BirdLife Europe & Central Asia gratefully acknowledge funding from Funding Fish, the Mava Foundation and the EU. The content of this report is the sole responsibility of Seas At Risk and Birdlife Europe and can under no circumstances be regarded as reflecting the position of the funders.









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1. Summary

This report explores and demonstrates, how EU payments for "temporary cessation" of fishing are not only an ineffective management tool for reducing fishing effort, but also ineffective in supporting marine conservation efforts. Instead, as detailed below, cessation payments maintain fishing overcapacity, which in turn drives overfishing. Other factors, such as setting fishing limits in line with scientific advice, would likely be substantially more relevant to reducing fishing effort, and hence have a larger impact on recovery of fish populations. Temporary cessation subsidies, rather than being a conservation management tool, are an economic measure that uses public money to support the private business of a fisher, or fishing company.

Two main conclusions can be drawn from the analysis below: firstly, there are documented cases of public money paid to fishers to cease fishing, with no evident benefits for the recovery of fish stocks and the environment, as they were paid during periods when fishers were unlikely to have been fishing in the first place.

Secondly, while the fishing efforts of most individual vessels, as well as that of fleets, decreased during months when temporary cessation subsidies were granted, the overall fishing effort for the year examined stayed the same compared to the previous year, when no subsidies were given. This suggests that there has simply been a shift of fishing effort from one month to another, demonstrating how temporary cessation is an ineffective management tool for restoring collapsed fish populations that have collapsed due to overfishing.

Information from EU Member States on what, how and why temporary cessation subsidies are granted has proven difficult to access, which makes it difficult to ascertain whether these funds are linked to delivering the objectives of the Common Fisheries Policy. Furthermore, the different systems in place in each Member State increases the difficulty for the European Commission to effectively analyse and compare all subsidies.

The research was intended to be carried out with case studies for six countries. However, given the limited access to data from Member States, no in-depth conclusions could be drawn for Poland, Croatia and Italy. It is also important to note that those Member States did not respond to further inquiries related to the data.



Fishing net © David Clode, Unsplash

Policy recommendations:



Temporary cessation subsidies should be removed from the EMFF 2021-2027, as they are an inefficient conservation tool and do not tackle fishing overcapacity effectively. Fishers should be provided with schemes that allow them to diversify their economic activity, or even completely change activity.



Member States and Commission must ensure that fisheries subsidies respect EU financial principles, including the principle of transparency, in order to facilitate the access of all EU citizens to information about how EU funds are being granted, as set out in the Common Provisions Regulation¹. With regard to the EMFF, details provided on payments that have been granted should be linked to specific conservation objectives, such as information on which fish populations are benefiting from the measures. Likewise, the impact of EMFF spending should be evaluated, documented and made publicly available, including on the reduction of fishing effort and recovery of fish populations and the benefit to the wider ecosystem.



All data related to EMFF spending should be standardised among Member States to control the granting of funds at national level, as well as to facilitate the monitoring of the effectiveness of spending at EU level by the European Commission.

The authors strongly recommend that EU Member States, the EU Parliament, the EU Council of Ministers and the European Commission ensure that the temporary cessation subsidy is not re-introduced in the next European Maritime Fisheries Fund.

^{1.} https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1303

2. The problem with temporary cessation

Temporary cessation is one of the EU's most used fisheries subsidies, yet it is considered an "ambiguous" subsidy by scientists, as payments such as this "artificially increase profits by reducing the cost of fishing and/or increasing the revenue received by fishers result[ing] in overcapacity and lead[ing] to overfishing"². Conversely, decision makers in the EU view temporary cessation as a necessary subsidy to prevent the fishing sector from collapse.

The European Maritime and Fisheries Fund (EMFF) is a financial tool of the European Union (EU) dedicated to the protection of the marine environment and the sustainability of the maritime sector. As a public fund, the EMFF intervenes at national levels to support the implementation of the EU's maritime and fisheries policies, such as the Common Fisheries Policy and the Integrated Maritime Policy. The EMFF also supports the implementation of other environmental policies relevant to the marine environment, such as the Marine Strategy Framework Directive and the Birds and Habitats Directives. With a budget of €6.4 billion for the 2014-2020 period, the EMFF is one of five European Structural and Investment (ESI) Funds.

"Temporary cessation" is one of the "fleet measures" used within the current EMFF to compensate fishers/vessel owners for the temporary closure of a fishery - or more precisely, where a fleet segment that targets a specific species is required to cease fishing to let a stock recover or to spawn - in order to maintain activity and jobs during periods where activity is interrupted for reasons beyond the control of fishers. While the idea behind subsidies such as temporary cessation is to ease pressure on fisheries, and thus to stop overfishing, and are usually framed by EU decision-makers as financial aid linked to conservation measures, in practice the aid is mainly used as a tool for fishers when fishing provides insufficient income.

Temporary cessation subsidies as defined by Regulation (EU) 508/2014 are allowances and financial compensation provided to fishers and ownersof fishing vessels in cases of temporary interruption to fishing activities, if such cessation is the direct consequence of certain conservation measures, excluding the fixing and allocation of fishing opportunities, and is provided for in certain EU or national fisheries' management plans, or results from the non-renewal of Sustainable Fisheries Partnership Agreements or protocols thereto.

^{2.} Sumaila, U. Rashid, et al. "Updated estimates and analysis of global fisheries subsidies." Marine Policy 109 (2019): 103695. www.sciencedirect.com/science/article/pii/S0308597X19303677

However, many problems have been identified with these fisheries subsidies.³ Cessation subsidies artificially maintain excess fishing capacity, while promoting its associated environmental and socio-economic damaging effects. This has been recognised by EU institutions⁴. Through the capacity enhancing subsidies that it has granted in the past, the EMFF has harmed marine ecosystems by supporting overfishing and unsustainable fishing practices⁵. Currently, about 40% of the fish populations caught in the Atlantic, and more than 80% caught in the Mediterranean are considered overfished⁶.

Despite the volley of reported problems surrounding harmful subsidies, they are currently on the verge of being renewed by EU institutions for the post-2020 EMFF. Additionally, permanent cessation subsidies, which were phased out in 2017 due to their harmful impact⁷, is on the verge of being reintroduced.





^{3.} See: Client Earth's July 2018 report "The post-2020 European Maritime and Fisheries Fund: how to ensure that EU financial aid serves the objectives of the Common Fisheries Policy?", <a href="https://www.documents.clientearth.org/library/download-info/the-post-2020-european-maritime-and-fisheries-fund-how-to-ensure-that-eu-financial-aid-serves-the-objectives-of-the-common-fisheries-policy/; Seas at Risk's July 2020 report "How subsidy mismanagement is threatening EU fisheries", https://seas-at-risk.org/images/pdf/publications/SAR_Subsidy_Mismanagement_Theatening_EU_Fisheries.pdf; and Ligue pour la Protection des Oiseaux's September 2020 report "The use of the European Maritime and Fisheries Fund (EMFF) in France in relation to the protection of the marine environment and its resources", https://www.birdlife.org/sites/default/files/lpo_report_use_of_emff.pdf.

^{4.} Court of Auditors, Special Report No 3/93 concerning the implementation of the measures for the restructuring, modernization and adaptation of the capacities of fishing fleets in the Community, OJ C 2, 04.1.1994, p. 48; Special Report No 12/2011 "Have EU measures contributed to adapting the capacity of the fishing fleets to available fishing opportunities?" 12/12/2011, point 76.

^{5.} Skerritt, Daniel J., et al. "A 20-year retrospective on the provision of fisheries subsidies in the European Union." ICES Journal of Marine Science (2020).

^{6.} Scientific, Technical and Economic Committee for Fisheries (STECF): The 2019 Annual Economic Report on the EU Fishing Fleet (STECF 19-06), Dentes De Carvalho Gaspar, N., Keatinge, M. and Guillen Garcia, J. editor(s), EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-09517-0.

^{7.} In recognising the many limitations linked to permanent cessation aid, particularly the difficulty in verifying that conditionality is respected, legislators decided to phase out this subsidy from December 2017 onwards (Article 33 and Article 34 of the EMFF Regulation).

Reintroducing cessation aid not only goes against the ambition of the Common Fisheries Policy (CFP) to ensure that fishing and aquaculture activities are environmentally, socially and economically sustainable⁸, but would also go against governments' commitments to UN Sustainable Development Goal 14.6 (prohibit harmful fisheries subsidies by 2020 and refrain from introducing new such ones in the future⁹). Allowing such harmful subsidies to be part of the new EMFF would be counterproductive and a step backwards for the EU.

It is estimated that the marine environment provides up to two-thirds of the ecosystem services provided by the planet's natural capital¹⁰. The marine environment in EU waters includes a vast and diverse area that is rich in resources. The social and economic importance of the marine environment extends well beyond fisheries. The EU's coastal regions are home to 214 million people (45% of the population) and generate €6.2 trillion in EU GDP (43% of the total)¹¹. Allowing such retrograde harmful subsidies in the EU will be damaging not just the fishing industry, but also all the coastal communities dependent on a healthy marine environment.

This report has been compiled in the context of this environmental and socio-economic threat. It aims to provide yet further evidence of the harmful impacts of temporary cessation subsidies, and the need for these to be phased out. The report analyses national-level fishing effort data for vessels receiving temporary cessation subsidies in 2016 in Portugal and Spain, and in 2017 and 2018 in Germany, to demonstrate how temporary cessation is an ineffective fisheries management tool which lacks structural transparency and oversight, and fails to reduce fishing effort and conserve the marine environment.



Large trawl with fish dragged onto the deck of a vessel @Alena Litvin

^{8.} The Common Fisheries Policy (CFP), European Commission https://ec.europa.eu/fisheries/cfp_en

^{9.} Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development https://sdgs.un.org/goals/goal14

^{10.} The Economics of Ecosystems θ Biodiversity, 2012. Why value the oceans? A discussion paper.. https://www.cbd.int/financial/values/g-valueoceans-teeb.pdf

^{11.} European Commission, 2019. The EU blue economy report. European Commission. https://op.europa.eu/en/publication-detail/-/publication/676bbd4a-7dd9-11e9-9f05-01aa75ed71a1/language-en/

3. Temporary cessation does not tackle overcapacity and is not a conservation measure

One of the purposes of cessation is to decrease fishing effort by keeping fishing vessels in port for a certain period, therefore relieving pressure on the marine environment, including fish populations. However, temporary cessation is failing to tackle overcapacity within EU fishing fleets, or to relieve pressure on the fish stocks and the marine environment.

When looking at the whole fleet on a yearly basis - i.e. the hours spent fishing over the course of a given year - fishing effort decreased or stayed the same in several countries, compared to the previous year (fishing effort decreased by 9% and 13% in Portugal and Poland, respectively, while remaining the same in Italy and Spain). By definition, temporary cessations cover a short, specific period. While such cessations indeed lead to a decrease in fishing effort during the month that vessels received the cessation subsidy, thus relieving the fish stocks from high fishing pressures for a short period of time, the payments did not lead to a decrease in overall fishing effort. This was because vessel owners could shift their fishing efforts to other periods of the year, to make up for the "lost" time (for examples of shifts in fishing effort, see case studies of Spain and Portugal). It is noteworthy that the trend in fishing effort is more linked to decisions on how much fishers can fish that year for certain species (e.g. fishing opportunities) and hence these being probably a much more important conservation measure and driver of fishing effort.

Case study - Spain

In Spain, there were several cessation periods for the analysed vessels, all of which were registered in Mediterranean ports (Tarragona, Girona, Barcelona, Valencia, Alicante and Murcia), where the management system is not based on fishing quotas, but on fishing effort (amount of time spent at sea, closed areas, etc.). In this type of management system, where the amount of fish extracted from the sea is not limited in amount but in fishing effort, harmful subsidies that increase fishing capacity, or maintain overcapacity, are particularly damaging as there is a direct effect on the capacity of the vessels to catch fish and as a result fish populations overexploitation. In 2016, purse seiners¹² ceased fishing activities in December, January, and the first half of February, while bottom otter trawlers¹³ ceased their activities either in January, February or June in 2016. While fishing effort did not change significantly over this year in comparison to 2015, it did decrease significantly during the cessation periods, with bottom otter trawlers completely stopping fishing activity in February and June. This indicates that, as noted in the Portuguese case study above, fishing effort is merely shifted between months rather than reduced overall. This clearly suggests that cessation payments are not fulfilling their purpose as a conservation measure and do not reduce fishing effort.

^{12.} Purse seines are used to surround a school of fish after which the net is closed underneath the school targeting aggregated pelagic species of various sizes (from sardines to tunas). Further information: http://www.fao.org/fishery/geartype/249/en

^{13.} Bottom Otter Trawls are constantly dragged over the seafloor while fishing to target bottom and demersal species. Further information: http://www.fao.org/fishery/geartype/306/en

Furthermore, in several cases, vessels received temporary cessation payments for periods where they were not fishing in the previous year (see the case study for Portugal and Germany). As far back as 1994, the European Court of Auditors had already highlighted that vessels received temporary cessation subsidies during periods, when, according to records from the previous year, they were unlikely to have been fishing.¹⁴

To complicate matters further, member states provide no information on why certain companies are receiving money for temporary cessation, and there is no obligation for EU Member States to report why a specific company or fisher is receiving EMFF funds. In some cases, this public money can be used to artificially keep businesses afloat that would otherwise not manage to stay in business, due to overcapacity in the European fishing fleet and depleted fish populations, as shown in a previous investigative report by Seas At Risk 'How Subsidy Mismanagement is Threatening EU Fisheries' This mismanagement of subsidies allows the ongoing maintenance of fishing overcapacity. For example, in Poland, of the nine vessels analysed, the government specifically states that the temporary cessation payment is for increasing the competitiveness of the vessels, which is irrelevant to the biological needs of fish populations.

Case study - Germany

In Germany, there were two major cessation periods in 2017-2018. One was in January in 2017 and 2018, with an additional period of 20 days in August in 2018. The August cessation period coincided with a newly introduced closure for Eastern Baltic cod for the months July and August, however, the cessation period in January does not coincide with any fisheries closure known to the authors (closures for Western Baltic cod were in February and March in 2017 and 2018). In August 2018 there was no fishing effort observed during the cessation periods, and it is striking that most vessels were also not fishing during the same period a year previously, when there was no temporary cessation. As the important German fisheries on herring and cod are mainly taking place during spring and autumn, it seems that Germany has been providing funds to fishing companies for the cessation of fishing during periods when fishing activity is normally low. Therefore, there appears to not have been any added value to this payment with regard to the recovery of fish stocks, in this case Eastern Baltic cod, nor the environment.

^{14.} Court of Auditors, Special Report No 3/93 concerning the implementation of the measures for the restructuring, modernization and adaptation of the capacity of fishing fleets in the Community, OJ C 2, 04.1.1994

^{15.} How subsidy mismanagement is threatening EU fisheries https://seas-at-risk.org/24-publications/1080-how-subsidy-mismanagement-is-threatening-eu-fisheries.html

Case study - Portugal

In Portugal, in general, there are two major cessation periods, one in October for bottom otter trawlers¹⁶, and one starting in November for purse seiners¹⁷, linked to sardine fisheries¹⁸. All bottom otter trawlers that received cessation payments in October 2016, indeed decreased their fishing effort massively in this month due to the cessation period. However, those same vessels increased their fishing effort substantially in September 2016 compared to the previous year, when these vessels had a low fishing effort in September. Hence, receiving cessation payments only led to a shift in fishing effort from October to September, with no overall decrease of fishing effort, which would have been beneficial for fish populations. In addition, shifting overall fishing effort from one month to another rather than decreasing it is especially perverse, given that bottom-contacting fishing gears have been recognised to have high level of impacts on the seafloor and on the species who depend on it.19 The cessation period for the sardine fisheries started in November in 2016. While the cessation period led to a large decrease in fishing effort for some vessels, several others that were not recorded as fishing during these months were also found not to be fishing during the same period in the previous year. Hence, public money was paid without any additional value for the recovery of fish populations or the marine environment.

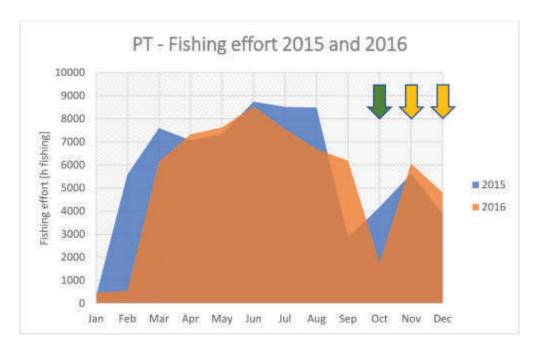


Figure 1: The fishing effort in hours of fishing per month for the 60 Portuguese vessels analysed for 2015 (blue) and 2016 (orange). The arrows indicate the cessation periods. The green arrow indicates the cessation periods for bottom otter trawlers and the yellow arrow the cessation period of purse seiners.

^{16.} Bottom Otter Trawls are constantly dragged over the seafloor while fishing to target bottom and demersal species. Further information: http://www.fao.org/fishery/geartype/306/en

^{17.} Purse seines are used to surround a school of fish after which the net is closed underneath the school targeting aggregated pelagic species of various sizes (from sardines to tunas). Further information: www.fao.org/fishery/geartype/249/en

^{18.} Frota do cerco pára a pensar no próximo ano, CM, Portugal, 16 de Outubro de 2016 https://www. cmjornal.pt/economia/detalhe/frota-do-cerco-para-a-pensar-no-proximo-ano

^{19.} ICES: EU request on indicators of the pressure and impact of bottom-contacting fishing gear on the seabed, and of trade-offs in the catch and the value of landings http://ices.dk/sites/pub/Publication%20 Reports/Advice/2017/Special_requests/eu.2017.13.pdf

4. Lack of transparency hinders the monitoring of temporary cessation effectiveness

It is difficult to draw conclusions regarding the rationale for the purpose of cessation periods, due to the lack of information and transparency in beneficiaries lists provided by Member States²⁰. For example, in some countries payments are made on the basis of pre-agreed cessation periods (such as fishery recovery areas in multiannual plans) or extraordinary cessation periods (e.g. an emergency closure because of overfishing). Given the amount of funding provided for the reduction of fishing effort, it is concerning that Member States are not sufficiently transparent with their data, given that it pertains to the exploitation of public goods by private companies using public money.

To assess the effectiveness of temporary cessation as a conservation measure, the practice should be reviewed in the context of the exact management framework, including detailed knowledge on the management scale and precise rules (who can apply for this money, when, and what species are they fishing for), information on which populations and quotas the temporary cessation applies to, and also the biological situation (population status, whereabouts of the population, size of fish etc.). However this information is not easily available from any EU Member State, which makes it close to impossible to understand what exactly is happening, or to assess the effectiveness of temporary cessation payments. Due to the lack of any clear proof that it is effective in making EU fisheries more sustainable, temporary cessation should not be reintroduced in the new EMFF.

Northern gannet, Morus bassanus ©Lian Tomtit



20. The European Maritime and Fisheries Fund (EMFF) is managed by national authorities under a system known as 'shared management'. Each year, countries that receive such funding were required to publish relevant information on their websites, including information on natural persons who are beneficiaries of the funds. https://ec.europa.eu/fisheries/contracts_and_funding/the_european_transparency_initiative_en

As details on payments are not made available in a transparent manner, and the data provided on the beneficiaries list by each Member State do not state what each payment is for, it is unclear whether any monitoring of the recipients of payments takes place or the rationale behind the provision of disbursements. Furthermore, the way in which information is provided is not standardised across EU member states, with governments providing differing types and levels of data.

This systemic lack of clarity suggests that EU Member States are not analysing how disbursements are achieving the EMFF and CFP's stated conservation objectives of aiding the recovery of fish populations, and the European Commission does not appear to provide any oversight.

In addition, it is concerning that the European Commission does not seem aware of specific and exact cessation dates for each country, given that it needs to ensure that the EMFF delivers on the objectives of the CFP. The Commission also has a duty to ensure that the payments are not misspent, in particular, to guarantee that EU money is spent wisely and lawfully, in particular with the intention to also align public spending to its sustainable finance taxonomy.²¹

Case study - Transparency

While most countries analysed provided a more or less exact period where cessation took place, Italy did not provide any exact period in which vessels were paid to cease their fishing activity, other than the years involved, which makes it difficult to understand the effects of the cessation period on the recovery of fish populations. Furthermore, Croatia, Poland and Italy did not respond to any requests for clarification or further information. While the Portuguese government answered to an initial information request, they did not respond to any follow-up questions regarding how they monitor and manage payments or further clarification questions related to specific observations the authors noticed within their data. While Spain responded to information requests, it was nevertheless difficult to obtain a detailed understanding of how the system works, and reasons for why certain cessation periods were determined. Overall, while researching this study, it proved impossible to gain clarity from any country regarding which species cessation payments were attached to, which is an essential piece of information in terms of control and monitoring of the effectiveness of this management tool. The fact that only Germany, out of the six case studies, provided the exact dates when the vessels ceased their fishing activities in relation to the cessation payment, raises questions on how Member States ensure that fishing vessels are not actually fishing while receiving temporary cessation subsidies.

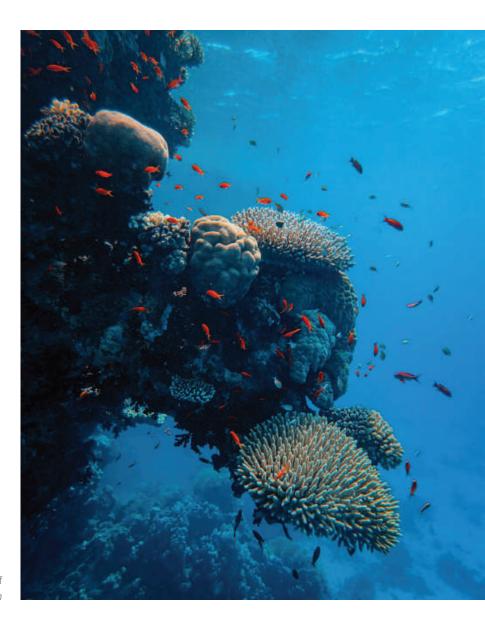
^{21.} The European Green Deal Investment Plan and Just Transition Mechanism explained, European Commission, January 2020 https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24

5. Conclusion

Payments for temporary cessation of fishing are not only an ineffective management tool for reducing fishing effort in the long run, it is questionable how effective such payments are in supporting marine conservation efforts. Reintroducing temporary cessation is counter productive to achieve the objectives of the Common Fisheries Policy (CFP) and the commitments of the UN Sustainable Development Goals. As detailed in the policy recommendations above, permitting such harmful subsidies to be part of the new EMFF would be a counterproductive step for the EU - and a shameful misuse of EU taxpayers' money.

Further reading: Seas At Risk's investigative report "How subsidy mismanagement is threatening EU fisheries" published in July 2020²².

22. Available at: https://seas-at-risk.org/images/pdf/publications/SAR_Subsidy_Mismanagement_Theatening_EU_Fisheries.pdf.



Coral reef ©Francesco Ungaro, Unsplash

6. Methodology

The data that underlies this study was retrieved from the beneficiaries list for each analysed country²³. A subset of data was extracted which included all payments for temporary cessation listed from 2014 until the time the list was updated²⁴. This list was then cross-referenced with the fleet registry to compare the structure of the vessels receiving temporary cessation payments to the overall fleet, including the distribution of gear type and vessel size.

The fishing effort was calculated on the basis of hours of fishing per vessel receiving temporary cessation, using Global Fishing Watch (GFW)²⁵. Fishing effort in hours spent fishing was analysed on a yearly and monthly basis. The monthly analysis focused on the months where cessation payments were obtained, which were then compared with the fishing effort during the same months the previous year where no cessation payments were obtained. The "hours spent fishing" only account for the time where vessels were actually fishing, and excludes time they spent moving to or from fishing grounds. A more detailed analysis of fishing effort looking at the exact cessation periods could only be done for Germany, as all other analysed Member States did not make available the specific and exact dates when the vessels were supposed to cease their fishing.

Only vessels who received temporary cessation payments and whose fleet register returned a vessel identifier number (IRCS or MMSI²⁶) were analysed, as this allowed them to be tracked with Global Fishing Watch and to determine their fishing effort. To further the analysis, only vessels that received temporary cessation payment in a certain year, but not the previous year, were taken into account. This allowed the authors to draw conclusions on the effect of temporary cessation on fishing effort and hence on the effectiveness of the subsidy to decrease fishing effort. Also, due to lack of information in the beneficiaries list, only vessels that had sufficient information on the cessation period were analysed.

Additional restrictions in the data availability and nature of the data on Global Fishing Watch allowed only for a comparison of the years 2016 to 2015, and 2018 to 2017. Requirements for Automatic Identification System (AIS) on board of vessels changed between 2014 and 2015, so Global Fishing Watch recommends to only use data from 2015 onwards. Furthermore, data available for the years 2017 onwards are provisional, and hence cannot be compared to data of previous years. Therefore comparisons of data for 2015 to 2014 and of 2017 to 2016 would be less reliable and hence were excluded from this analysis.

^{23.} European citizens are entitled to know how their money is used. Making public the information on who receives EU funding is one of the key objectives of the European transparency initiative.

The European Maritime and Fisheries Fund (EMFF) is managed by national authorities under a system known as 'shared management'. Each year, countries that receive such funding were required to publish relevant information on their websites, including information on natural persons who are beneficiaries of the funds.

https://ec.europa.eu/fisheries/contracts_and_funding/the_european_transparency_initiative_en

24. Italy: 15/05/202; Poland: 12/03/2020; Germany: 31/12/2019; Spain: 30/06/2020; Portugal: 30/06/2020

25. Global Fishing Watch is an independent, international non-profit organisation that is promoting ocean sustainability through greater transparency. They use cutting-edge technology to visualise, track and share data about global fishing activity in near real-time and for free. https://globalfishingwatch.org/

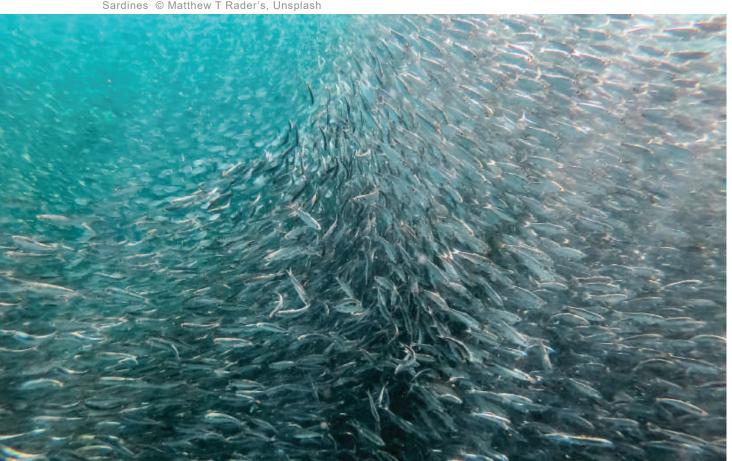
26. Vessel identifiers are assigned by the flag State when a vessel is registered. These include International radio call sign (IRCS) and Maritime mobile service identity (MMSI)

As a final step, all vessels for which no data could be retrieved from Global Fishing Watch were excluded. For those countries where the data was analysed in more detail, vessels were excluded from the data set that showed no fishing effort for a period of three months or more at the start of the previous year, or at the end of the cessation year. This was carried out to account for possible intermittencies in the fishing effort of certain vessels, which could have an effect on the overall fishing effort.

The above described steps in data treatment dramatically reduced the amount of vessels that could be analysed, so that an extrapolation to the wider fleet has to be viewed with caution.

For further clarification on the datasets, national authorities have been contacted and national experts have been consulted to help with the analysis.

To account for at least some variables that could influence the fishing effort, the authors sought further clarification with GFW and to their knowledge, factors such as satellite coverage, availability of receiver stations for the AIS signal, or cloud coverage are very unlikely to have changed the fishing effort measured during the years analysed. Furthermore, the possibility of extreme weather events that could have influenced fishing effort for the periods considered for each of the countries analysed was explored. The authors were unable to identify any noteworthy climatic events that could explain changes in fishing effort.



Sardines © Matthew T Rader's, Unsplash





