Fish-X

Fish-X White Paper 1 – The Digital Transition of small-scale fisheries in the European Union

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Abstract	This white paper is a concise policy document presenting the state-of-the-art on the digitalisation of small-scale fisheries in the European Union. It provides policy recommendations supported by the Fish-X consortium. The revision of the Control Regulation represents a turning point for EU fisheries, especially the small-scale fishing fleet, to move towards more digitalisation. Within this context, this white paper explores the meaning of the digitalisation of EU small-scale fisheries (SSF), what it concretely entails for SSF and how the Fish-X project can provide a meaningful contribution to this change. The document provides an overview of the EU's broader push for a digital transition for the fishery sector while characterising the specific challenges of the EU's small-scale fishers. The paper details the EU fishery regulatory and political context, the new provisions contained in the revised EU Fisheries Control Regulation and the changes expected from SSF to comply with the new measures. Given the increasing amount of data that will be generated, the Gaia-X framework is important to set standards for data collection and exchange that will be applied by Fish-X when developing the data space. The main takeaways of the Fish-X conference have been considered in preparing the policy recommendations presented at the end.

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1. Fish-X White Paper Series

This white paper is the first of a series of four publications from Fish-X, a technology and open-source driven project. It is a 3-year project and is co-funded by the Horizon Europe Programme. The project aims at developing a Fisheries Dataspace, an Insight Platform, and a Traceability Application to support the objectives of the European Union (EU) Common Fisheries Policy (CFP), EU Green Deal, and Farm to Fork Strategy. It aims to overcome key sets of challenges including data collection and sharing, particularly from small-scale and recreational fisheries, as well as accessing, managing, and utilising data to strengthen the monitoring and control as well as the sustainability of EU fisheries.

A white paper is a concise policy document that provides a forward-looking position on a given topic for a specific organisation or entity. The Fish-X series of white papers reflects the exchange of information and opinions between stakeholders around the implementation of the and other related regulations, pointing to improvements needed for industry bodies and regional fisheries organisations. This white paper series is also a tool for mapping out policy priorities within a specific field in the medium to long term. Within Fish-X, each white paper precedes the organisation of a conference to provide common ground and food for thought for the event discussion. The white paper is then complemented with the conference's outcomes to present the position of the Fish-X consortium on key topics. Ultimately, the set of white papers will feed into the writing of final policy recommendations.

The present white paper was put together prior to Fish-X's first conference, entitled "The digital transition: New technologies to support sustainable small-scale fisheries" which took place in Brussels on 29 September, 2023[1]. The document was then complemented with outcomes from the discussions that took place with the speakers and the audience, who attended both in person and online. This white paper is dedicated to informing decision-makers at European, national, regional and local levels, as well as external stakeholders such as non-governmental organisations, fishing and seafood industry actors, scientific organisations and think tanks on the state of play of the digitalisation of small-scale fisheries in the EU.

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[1] The summary of the conference is accessible here: https://fish-x.eu/wp-content/uploads/2023/12/Report-Fish-X-Conference-27Oct2023-final.pdf

2. Introduction

On 17 October 2023, the European Parliament approved the revision of the EU Fisheries Control Regulation in a landmark vote that followed five years of interinstitutional effort to review this key piece of legislation. The fisheries control rules are a cornerstone of the CFP to ensure the full and complete implementation of its provisions via monitoring, control and surveillance measures that deliver more sustainable fisheries management. The agreement of the revised Control Regulation also represents a turning point for EU fisheries, especially the small-scale fishing fleet, to move towards more digitalisation. In essence, the use of digital tools while fishing will become more predominant.

Within this context, this white paper explores the meaning of the digitalisation of EU small-scale fisheries (SSF), what it concretely entails for SSF and how the Fish-X project can provide a meaningful contribution to this change. The document will first provide an overview of the EU's broader push for a digital transition for the fishery sector. The second section will focus on characterising the EU's small-scale fishery and its current challenges. The third section will zoom out on the EU fishery regulatory and political context, which will be followed by a close-up in the fourth section on the new provisions contained in the revised EU Fisheries Control Regulation and the changes expected from SSF to comply with the new measures. Given the increasing amount of data that will be generated, the fifth section will give special attention to the Gaia-X framework which sets standards for data collection and exchange that will be applied by Fish-X when developing the data space. The main takeaways of the Fish-X conference will be detailed in the sixth section, which have been considered in preparing the policy recommendations presented in the final section.

3. The EU digital transition applied to the fishery sector

In its Communication on the Shaping of Europe's digital future, the European Commission identified the digital transition as a key policy priority[2] that would deliver benefits for every citizen, businesses and the planet. Digitalisation can be understood as the "integration of digital technologies into everyday life where contemporary technologies can transform socio-economic, environmental, sustainability and climate research applications"[3], which would generate novel opportunities and accelerate the transition towards a more sustainable fishing sector and reverberate along the seafood supply chain[4].

Applied to a fishery context, digitalisation refers to electronic catch data collection and transmission systems (e-logbooks, and any relevant use of technological tools such as smartphones); electronic monitoring systems or Remote Electronic Monitoring (REM), including closed-circuit television (CCTV) or sensors in nets; and spatial data collection tools such as satellite vessel localisation systems, e.g. automatic identification system (AIS), vessel monitoring system (VMS). A digital transition in the sector implies a gradual and ongoing process to build up the skills, technologies, and the necessary infrastructure to monitor, collect and process generated data for monitoring fishing activities. EU SSF are directly concerned by the digital transition due to requirements introduced in the revised EU Fisheries Control Regulation to better enforce Monitoring, Control and Surveillance (MCS) measures.

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[2] European Commission, Shaping Europe's Digital Future, February 2020. Accessible here:
https://ec.europa.eu/commission/presscorner/detail/en/fs_20_278

[3] René Ceipek, Julia Hautz, Antonio Messeni Petruzzelli, Alfredo De Massis, Kurt Matzler,
A motivation and ability perspective on engagement in emerging digital technologies: The case of Internet of Things solutions, Long Range Planning, Volume 54, Issue 5, 2021, 101991, ISSN 0024-6301, https://doi.org/10.1016/j.lrp.2020.101991.

[4] Neil J. Rowan, The role of digital technologies in supporting and improving fishery and aquaculture across the supply chain – Quo Vadis?, Aquaculture and Fisheries, Volume 8, Issue 4, 2023, Pages 365-374, ISSN 2468-550X, https://doi.org/10.1016/j.aaf.2022.06.003.

4. The EU small-scale fleet

Small-scale coastal fishing is defined by the European Maritime, Fisheries and Aquaculture Fund (EMFAF) Regulation as fishing activities carried out by marine and inland fishing vessels of an overall length of less than 12 metres and not using towed fishing gear, and by fishers on foot, including shellfish gatherers[5]. This definition provides a baseline to characterise SSF, even though national definitions can have an expanded scope. The Food and Agriculture Organisation (FAO) goes beyond a technical definition and emphasises the socio-economic and cultural importance of SSF for coastal communities[6].

In the EU, even though SSF employed 62,650 fishers in 2022, accounting for 75% of active fishing vessels and 48% of the crew, it only represented 7.5% of the gross tonnage and around 5.4% of landings[7]. SSF are facing several challenges, including the difficulty to access fish quota, competition with recreational fisheries, an aging workforce and a lack of digital literacy. SSF is not only an economic sector, it is also deeply embedded into the livelihoods of coastal communities and produces unique traditional ecological knowledge[8].

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[5] Regulation (EU) 2021/1139 of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and amending Regulation (EU) 2017/1004

[6] See the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, FAO, 2015. Accessible here: https://www.wto.org/english/tratop_e/rulesneg_e/fish_e/2015_fao_ssf.pdf

[7] Committee on Fisheries, REPORT on the small-scale fisheries situation in the EU and future perspectives, December 2022. Accessible here: https://www.europarl.europa.eu/doceo/document/A-9-2022-0291_EN.html

[8] Said, A., Peri, I. and Molina, M., 2020. MedTEK: Traditional Ecological Knowledge of Mediterranean Small-scale Fishing Communities. Preliminary Findings in Cabo de Gata (Spain), Malta and Pantelleria island (Italy) sites. Published by Low Impact Fishers of Europe.

5. Overview of the EU fisheries legal and policy context

To ensure the sustainable management of marine biological resources and the long-term viability of the fishing sector, fisheries in the EU are managed by the CFP[9]. As stated in article 2 of the CFP, its ultimate objective is "to ensure that the activities of the fishing and aquaculture sectors are environmentally sustainable in the long term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits". The CFP is a comprehensive legal framework complemented by other pieces of legislation focused notably on funding, fisheries control, and the marketing of fisheries and aquaculture products[10].

When evaluated against its own objectives established under article 2, the CFP has not fully delivered on its ambition. First, although EU fisheries remain profitable[11], economic performance has been deteriorating since 2019[12] and almost half of all EU fishers earn less than minimum wage[13], while EU marine biodiversity is still under threat[14]. On this basis alone, the CFP's objective of achieving economic sustainability cannot be considered as achieved. Second, while the state of many fish populations has improved, overfishing persists in most

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[9] Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy

[10] Regulation (EU) 2021/1139 (and predecessors); Regulation (EC) No 1224/2009 (revision to be adopted); Regulation (EU) No 1379/2013.

[11] https://op.europa.eu/en/publication-detail/-/publication/bba413d1-484c-11ed-92ed-01aa75ed71a1

[12] Ibid. Due notably to the adverse impacts of the COVID-19 pandemic and the war in Ukraine on the sector.

[13] https://wwfeu.awsassets.panda.org/downloads/wwf_cfp_socio_economic_impact_study_2021.pdf

[14] https://www.eca.europa.eu/Lists/ECADocuments/SR20_26/SR_Marine_environment_EN.pdf

sea basins and many stocks remain outside safe biological limits[15], contrary to the objective of sustainably managing fisheries. In line with its objective to improve the collection of scientific data, the CFP did lead to a strengthened data collection regime and framework, but this has yet to be sufficiently implemented[16]. Finally, the more specific objectives listed under article 2(5) are only partly achieved, such as the gradual elimination of discards, given the persisting high levels of reported discards[17]. Further, the poor implementation of the so-called landing obligation (article 15), which aims to minimise unwanted catches and reduce the wasteful practice of discarding has, overall, not been complied with[18]. Modern tools such as REM and digital reporting tools can help address these shortcomings, as well as significantly improve data collection and SSF visibility.

Finally, fully documented fisheries and effective control is of utmost importance to ensure transparency and compliance by the sector. To deliver this, implementing the measures laid out in the EU Fisheries Control Regulation, which mandates the use of the most efficient digital control tools (e.g. REM, VMS, e-logbooks), and enhanced catch recording and reporting is critical.

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[15] https://oceans-and-fisheries.ec.europa.eu/system/files/2022-06/com-2022-253_en.pdf

[16]https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0664&qid=1604498138038. *'The overall focus for the next years of the DCF should be on solidifying its implementation in continued cooperation with the MS. This includes addressing upcoming challenges (such as on protected, endangered and threatened species or broader ecosystem knowledge); responding to and integrating evolving data needs (as identified by end users); streamlining and simplifying processes; and further improving and harmonising methods and their application at sea-basin level.'*

[17]https://op.europa.eu/en/publication-detail/-/publication/89868cc6-015f-11ec-8f47-01aa75ed71a1, Fish-X Deliverable 2.6 providing a Summary & Best Practices on Discards accessible here: https://fish-x.eu/wp-content/uploads/2024/01/FISH-X_D2.6_Discards-Paper_Final.pdf

[18] https://cinea.ec.europa.eu/publications/synthesis-landing-obligation-measures-and-discard-rates_en ; https://cinea.ec.europa.eu/publications/synthesis-landing-obligation-measures-and-discard-rates-mediterranean-and-black-sea_en

6. The digital transition foreseen by the revised EU Fisheries Control Regulation

The revision of the EU Fisheries Control Regulation addressed the need for better monitoring and control[19]. Following the European Commission's proposal to revise the Regulation, released on 30 May 2018, it took five years of interinstitutional negotiations to come up with an agreement. On 27 June 2023, the European Parliament Committee on Fisheries endorsed the provisional agreement. During the plenary session on 17 October 2023, the European Parliament approved the new EU Fisheries Control Regulation with 438 votes in favour, 146 against and 40 abstentions[20]. Given the green light of the European Council of the EU to the revised EU fisheries control system on 13 November 2023, the Regulation entered into force on 9 January 2024. The approved text contains a set of new requirements in terms of monitoring and control measures, including for the SSF segment which was previously exempted.

When it comes to the tracking of fishing vessels mandated by the new Regulation, there will be a gradual implementation until all EU fishing vessels have installed a tracking device on board to enable localisation at sea. There are three thresholds of these installations that need to be reached: all vessels under to 12 meters in length must be equipped by 2026, all vessels between 9 and 12 meters by 2028, and finally the entirety of the EU fishing fleet by 2030.

Whereas previously vessels under than 10 meters long were exempt, the new EU Fisheries Control Regulation enforces the mandatory electronic reporting of all catches within 4 years (i.e. by 2028), which will ensure accurate data on seafood catches. As stated in Article 15 of the Regulation, vessels below 12 meters shall electronically submit their fishing logbooks after the last fishing operation has been completed and before the landing starts. If requested by Member States within four weeks after the entry into force, the Commission will develop a system for a fishing logbook for SSF. By means of implementing act and six months after the

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[19] Regulation (EU) 2023/2842: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302842

[20] Press release of the EU Parliament, Parliament approves new EU fisheries control rules, 17 October 2023, accessible here: https://www.europarl.europa.eu/news/en/press-room/20231013IPR07124/parliament-approves-new-eu-fisheries-control-rules

date of entry into force of this amending Regulation, the Commission would lay down detailed rules, including on the frequency of fishing logbook data submissions.

With regards to REM and the installation of CCTV, these will be required for vessels above 18 meters in length or for boats which constitute a "high risk" of being non-compliant with the rules (with "high risk" being defined at a later stage via an implementing act). Concerning traceability, the law requests additional key data elements (KDE) for catch certificates such as the common fleet register (CFR) number, the estimated quantities of each fish species retained on board with the quantities or individuals below the applicable minimum conservation reference size, and the estimated quantities of each species discarded. All catch certificates will have to be digitalised and encoded into the EU's electronic database. Finally, within five years after entry into force of the Regulation, a digital traceability system will need to be up and running to collect several KDEs for all seafood products, including processed and preserved, wild-caught and aquaculture products.

Fully documented fisheries cannot be achieved without the digital transition. Digital technologies, such as VMS, electronic logbooks, onboard sensors and traceability systems play a vital role in achieving full documentation. Digital technologies enable SSF to participate in fully documented fisheries by providing the means to collect and transmit real-time tracking and recording data accurately, efficiently, and transparently. Digital tools will ensure that all fishing activities are fully documented and traceable from catch to market, reducing the chances of illegal, unreported, and unregulated (IUU) fishing. Effective fisheries control measures are strengthened by the availability of reliable digital data, allowing authorities to make informed decisions, allocate resources effectively, and enforce regulations more rigorously. In summary, the digital transition of SSF, when coupled with fully documented fisheries and effective fisheries control measures, contributes to improved sustainability, transparency, and governance in the fishing industry. These elements work together to address key challenges such as overfishing, IUU fishing, and resource management in a more comprehensive and effective manner.

7. Gaia-X framework for SSF data production and exchange

With regards to fisheries data exchange in the EU, the FLUX format, which is the official fisheries data format developed by the EU Commission[21], is the norm. As a result of implementing the revised EU Fisheries Control Regulation, more data coming from SSF will be collected, stored, exchanged and processed. Current digital infrastructure will need to adapt to this foreseen change, which is why Fish-X is developing a Fish-X data space to securely and efficiently handle large amounts of data.

There are similarities between the FLUX format and the protocol of the Fish-X data space. Fish-X proposes a general standard for exchanging data in the SSF domain, based on Gaia-X[22]. Gaia-X is an EU initiative focused on crafting a software framework for regulating, governing and hosting cloud and edge technologies. It establishes a shared set of policies and regulations to promote transparency, controllability, portability and interoperability across data and services. Gaia-X's architectural foundation is rooted in the decentralisation principle, whereby the structure is spread over smaller entities, not relying on one single central authority. The result is a cooperative ecosystem of individual platforms that brings together all relevant fisheries stakeholders under a common standard for data input. The Gaia-X standard is dedicated to developing a data infrastructure founded on the principles of openness, transparency and trust. What emerges is not a unique cloud (i.e. computer system resource), but a networked system that links many cloud service providers together.

Through Gaia-X, the formation and enhancement of data spaces are facilitated by trusted platforms that follow stringent and consistent rules. Its framework fosters mutual trust between users and providers on an open technological basis, free to be used by everyone, allowing users to exchange data securely across multiple entities. The Fish-X dataspace builds on the Gaia-X framework and offers its users the accompanying benefits of

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[21] Here for more information on the FLUX format: https://joinup.ec.europa.eu/collection/ifdm-integrated-fisheries-data-management/solution/flux-tl

[22] Website of the Gaia-X initiative: https://gaia-x.eu/

guaranteeing secure data exchanges. Therefore, the Fish-X project aims to incorporate the FLUX standard as one way among others to exchange SSF data in the Fish-X data space.

8. SSF and the digital transition: Takeaways from the Fish-X Conference on 27 September 2023

The Fish-X project seeks to propose concrete applications of digital solutions that empower SSF and enhance the analysis of marine data. The hybrid conference on the digital transition of SSF explored how to operationalise the measures of the revised EU Fisheries Control Regulation that seek to digitalise the small-scale vessel fleet, and to bring more transparency and traceability to fishery products.

During the morning panel discussion, it was highlighted that the enforcement of the new control law will increase data sharing between Fisheries Monitoring Centers within Member States and with those outside the EU which should follow the EU standard, namely the UN/FLUX ((Fisheries Language for Universal Exchange) standard. The OceanStore project, which revamps the Commission's fisheries data ecosystem and underlying applications, delivers common features for all FLUX domains and services to Member States to ensure interoperability and data quality regarding vessel positions, catch reports and aggregated catch data. In addition, DG MARE has been testing the RecFishing programme whereby marine recreational fishers report their catches [23]. Another point was raised about how the increased amount of data generated by and with SSF going digital will make them more visible on a governance level. Regarding the legal aspect of data sharing and data processing, fisheries data may be considered as personal if related with the identification of a natural person and shall comply with protection measures as laid down in the General Data Protection Regulation (GDPR). Finally, the inclusion of civil society in this process was emphasised to ensure SSF buy-in of digital tools.

A breakout session was dedicated to better understanding the challenges and benefits of the digital transition for SSF. Digitalisation could be used to reduce administrative burden, empower fishers to be owners of their own data, improve fisheries management, increase seafood traceability, and improve safety at sea while providing greater market access, including for high-value products. As regards to the challenges, fears revolve around losing control over the generated data, the aging of the fishers, the possible flaws in the digital tools' design, the lack of digital literacy, the costs associated with such tools, the top-down

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[23] https://recreational-fishing.ec.europa.eu/

enforcement and, finally, the incompatibility between tools and the real-life conditions of the fishing sector (i.e. swell, rain, wind). Therefore, to achieve successful digitalisation, efforts should be made to educate and build capacities for fishers and fishers' associations, to build trust, to demonstrate the tangible and clear benefits of embracing new technologies, to co-design the tools, and to seek institutional support whether financial or regulatory.

Further discussion took place on Gaia-X and the future Fish-X data space which will collect all VMS data and other fisheries datasets. The data space shall ensure automatic quality control checks to secure data exchanges between fishers, the EU Fisheries Control Center, national authorities and the European Commission.

In addition, a breakout session touched upon the Insight web portal developed by Fish-X, which receives, anonymises, aggregates and displays fisheries data on charts. The process is specific, as it ensures that data providers (fishers, in this case) remain assured of their data ownership and control its usage.

Finally, another breakout session focused on the traceability platform to be developed under the Fish-X project, which aims to provide relevant information regarding all supply chain actors involved in the harvest and production of a given seafood product, as well as additional information such as sustainability indicators. This would bring benefits such as reducing IUU fishing, preventing greenwashing and false green claims, and providing a fair and transparent value chain. Ultimately, the platform will work towards greater sustainability and fairness in the fishery sector.

9. Recommendations

To support new digital requirements in ways that are beneficial for small-scale fisheries in the EU, the Fish-X consortium recommends the following:

Build trusted relationships with fishers: Engaging fishers along the digital transition is key to match the reality of SSF and to effectively comply with EU regulations. Empowering SSF should be at the centre of endeavours to improve their visibility and representativity in fisheries management and maritime spatial planning. Fishers should also be part of the designing process of the digital tools they will ultimately use.

Foster scientific knowledge: The digitalisation of SSF can be of great value to scientific knowledge by collecting quality data to be shared with relevant stakeholders such as maritime authorities or science centres (i.e., on species presence and abundance, stock fluctuations), which would contribute to improved science-based stock management.

Inclusive and sustainable fisheries management: Giving SFF a voice in the decision-making process is essential for better representativity and sense of ownership by the sector. Fishers' socioeconomic and ecological knowledge must be integrated with the collected data to inform policies that value low-impact fisheries and protect marine biological resources, habitats and threatened, endangered and sensitive species.

Interoperability: Careful attention should be given to ensure datasets are interoperable and shareable between systems and across governance levels - whether local, regional or international - with special emphasis on the protection of fishers' privacy. Accessibility to and replication of these systems for wider use is also essential.

Standardisation: Data collection and submission processes must follow a given standard (i.e. be based on the Gaia-X framework) to facilitate exchanges among Fisheries Monitoring Centers, as well as more widely with other stakeholders to ensure quality and reliable data (i.e. collected by VMS, logbooks). For fishery data exchanged within the EU, the FLUX format is the norm and should apply. For seafood traceability, the international standard of the Global Dialogue for Seafood Traceability (GDST) should be the reference.

10. Fish-X project description and goals

Supported by the Horizon Europe Programme, the Fish-X project wants to make a key contribution to sustainable EU fisheries management by supporting a digital transformation in the SSF industry. The project's main goals are to improve data management via new technologies, to empower fishers with the co-design of future seafood supply chain monitoring and traceability systems, and to actively contribute to more sustainable fisheries management. To achieve these objectives, the Fish-X project aims to create a new secure and interoperable digital infrastructure, comprising three components: 1) the Fish-X Data Space, 2) the Insight Platform, and 3) the Traceability Platform.

Fish-X is carried out by seven consortium partners: TransMarTech (TMT, Germany), EU Tech Chamber (EUTECH, Germany), Collecte Localisation Satellites (CLS, France), north.io (Germany), Sciaena (Portugal), OURZ (Germany), and WWF (European Policy Office, ANP/Portugal, Mediterranean Marine Initiative and Adria).