

Ms. Charlina Vitcheva
Director-General for Maritime Affairs and Fisheries
European Commission
Rue Josef II 99
1000 Brussels
Belgium

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NSAC Advice on REM and CCTV

This advice paper was approved with consensus by the NSAC Executive Committee on 26 January 2021.

1. Background

1.1 Legal basis

The Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy (“the Control Regulation”) was adopted in 2009, before the entry into force of the Lisbon Treaty, and entered into force on 1 January 2010. This was well before the adoption of the present framework regulation no. 1380/2013 for the Common Fisheries Policy (CFP) in 2013. As a result, it still contains several outdated provisions and a REFIT evaluation conducted in 2015/2017 by the Commission concluded that it was no longer fit for purpose and needs revision.

1.2 Commission’s proposal

The Commission proposes a thorough revision of the fisheries Control Regulation reflecting that the current arrangements are not fully coherent with the revised CFP. The opportunity is also taken to propose other changes deemed necessary to simplify and render more efficient the control system, and to improve the data and information systems upon which effective control and fisheries management rely. The Commission also proposes to facilitate the work of control authorities and attain better documentation of catches through increased use of electronic monitoring. Simplification is to be achieved by replacing paper-based systems with electronic, real-time transmissions from all vessels, irrespective of size. Attention is devoted to incorporating the inshore fleets into the system of monitoring and control by such means, and this extends also to the recreational fisheries. The Council and the European Parliament are currently working on the Commission’s proposal for revision of the Control Regulation.



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The landing obligation (LO) was introduced in the CFP with Regulation no 1380/2013, in which the Commission proposes that *“on the basis of risk assessment, a certain number of fishing vessels should be equipped with continuous recording electronic devices, including CCTV”*.

1.3 Trial programmes

The use of cameras on boats has been subject to extensive testing for over 20 years. In the EU, at least 16 REM trials¹ (see Annex 1 and 2) have demonstrated the technology’s ability to monitor e.g. for discard events and bycatch of Endangered Threatened Protected (ETP) species. These trials have been conducted on a variety of fisheries, although mainly in demersal, mixed species fisheries. Different types of vessels have been involved, including both larger vessels and small-scale vessels less than 10 m in length. It is also worth noting that in other geographies, fully fledged REM programmes are mandated (e.g. in Australia, Canada, New Zealand, and the United States) and have significantly strengthened regulatory decision-making by providing managers and operators with a shared understanding about what is happening at sea.

2. Advice

The North Sea Advisory Council gave a broad advice² on the Commission proposal in April 2019, covering several important aspects of the proposal for a new regulation. While the previous advice gave general recommendations on several control aspects, the aim of this new advice is to focus on the use of CCTV and electronic monitoring as part of the control regulation.

The NSAC is of the general opinion that there is still a need for further consultations and advice with regards to the introduction of REM, in particular CCTV. However, REM has shown to have benefits above other Monitoring and Control System (MCS) tools, including cost-efficiency in relation to human observers, the ability to provide a more representative coverage of the fleet than observer programmes, and efficiencies for data analysis³. While modern electronic information systems most certainly have their role to play in fisheries, they carry with them their own technical, legal, and ethical challenges, which must be fully understood and addressed.

The NSAC believes that the new European Maritime, Fisheries and Aquaculture Fund (EMFAF) should provide support with funding for assistance and support that drives best practices with respect to inspection schemes, data collection and data exchange for the purposes of a culture

¹ <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12425>

² <https://www.nsrac.org/wp-content/uploads/2018/11/02-1819-20190304-NSAC-Advice-on-the-EC-proposal-for-a-revision-of-the-Control-Regulation.pdf>

³ <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12425>



of compliance. At the same time, the EMFF should cover the installation, running and maintenance costs of the system.

Below we elaborate further on different aspects to be considered in relation to onboard CCTV.

2.1 Control of the Common Fisheries Policy, including the Landing Obligation

2.1.1 Control and enforcement

Control and enforcement are the end stages of a process of compliance with a policy. In this respect, the Commission's proposal is *"to equip, on the basis of a risk basis assessment, a certain percentage of fishing vessels with continuous recording electronic monitoring devices including Close Circuit Televisions (CCTV) systems"*. This seems also to be the focus of the ongoing discussions in the Council and the Parliament. Here the NSAC would like to stress that the policy must be workable to be enforceable. Resolving the risk of chokes - the exhaustion of one quota, leading to the premature closure of the fishery - in mixed fisheries is crucial for achieving compliance with the CFP.

The landing obligation (LO) involves a shift in the focus of the control regime from the point of landing to the activities of the fleets at sea during fishing operations. This is a major change, as the point of landing, to date, has been used as a gateway for monitoring control and enforcement. Monitoring the ongoing activities of vessels at sea involves a logistical and resources challenge well-recognised by the control authorities. For that reason, and as an example, onboard control observers are only deployed to a very limited degree in EU fisheries, and, as a tool, are generally deployed on less than 1% of fishing activities.

2.1.2 Risk-based approach

The NSAC believes that the use of CCTV should be accompanied by incentives and more flexible technical measures, such as in choice of fishing gear. The NSAC wants to emphasize that in many countries CCTV does not have the support of fishers. The NSAC at the same time recognizes that there is an issue with the effective control of the Article 15 of the CFP. While recognizing that there are significant differences between fleets in terms of acceptance of REM, we believe that any monitoring system should be implemented in collaboration with its end-users (fishers) and that its setup should include sensible communication and involvement of fleets at an early stage. REM should be deployed on any (individual) vessel (not on fleet segments), independent of size, identified by the control experts of MS in cooperation with EFCA as being of a certain risk of non-compliance⁴⁵. Finally, in addition to their risk assessment of vessel categories at risk of non-compliance with the landing

⁴ <https://bit.ly/2JiqCx5>

⁵ <https://www.efca.europa.eu/en/content/pressroom/evaluation-suggests-non-compliance-landing-obligations-certain-fisheries-north-sea>



obligation, EFCA should also conduct risk assessment regarding spatial and temporal interactions with ETP species.

2.1.3 Evaluation of effectiveness

After a period of 3 years following the implementation, an evaluation of the effectiveness of the electronic monitoring systems should be carried out by the Commission, including the importance of REM (including CCTV) in improving data collection. The evaluation should also include recommendations for possible technological developments, including enhancements of CCTV by new available technology.

2.2 REM and data collection

2.2.1 Data collection for improving evidence

The NSAC acknowledges that monitoring and control is an important component of the smooth implementation of the CFP, including the landing obligation. Furthermore, better and more comprehensive monitoring and reporting of catches represents an opportunity to enhance scientific evidence and to improve the knowledge on which stock assessments, fisheries management and policy is based. This can include Remote Electronic Monitoring (including continuously recording Closed-Circuit Television (CCTV), intelligent sensors on board, net sensors, and systems incorporating data storage and/or the ability to send camera footage in real time).

2.2.1 Cost efficiency

While at-sea human observer programmes currently produce the most accurate data on discards, REM can provide results whilst its deployment is at much lower costs than human observer programmes. In that respect, REM is considered to be cost-efficient in relation to human observers⁶. Moreover, REM improves the accuracy of self-reported data and is independently verifiable. Additionally, REM can help effective mitigation of Endangered, Threatened and Protected (ETP) bycatches which requires identification and quantification of the problem. REM with CCTV is a means of providing the data needed to inform bycatch mitigation. This is distinct difference from using CCTV systems as a straightforward control instrument. There is little doubt that different forms of remote sensing equipment will provide one important means through which fishers will be able to demonstrate compliance and contribute to improved evidence base.

⁶ Plet-Hansen, K., Bergsson H., Ulrich, C, 'More data for the money: Improvements in design and cost efficiency of electronic monitoring in the Danish cod catch quota management trial', Fisheries Research, Volume 215, 2019, <https://doi.org/10.1016/j.fishres.2019.03.009>.

2.3 Legal, technical and ethical considerations

2.3.1 Legal and ethical aspects

Despite the multi-purpose function of REM, the discussions reveal legal, technical, and ethical questions that need to be resolved, particularly in relation to the use of CCTV. These questions relate to the personal privacy of the people onboard, including constitutional protection of onboard employees in some Member States, the access, security and ownership of the data collected, including The General Data Protection Regulation (GDPR). Clarification is needed on how the potential misuse of the footage captured by the CCTV cameras can be avoided.

2.3.2 Technical aspects

With respect to coverage, the NSAC believes that CCTV recordings should be limited to the parts of the vessels where the fishery or processing activities take place. Footage from CCTV cameras should be stored locally and should be made available exclusively to officials or Union inspectors upon request, in particular in the context of inspections, investigations or audits. This should be done through REM viewing systems. Furthermore, the NSAC is concerned that, as it will be impossible to monitor the footage in full, the sampling and calculation process from video sample, via haul calculation to trip calculation (and onwards to fleet (segment) calculation) might present a distorted picture of fisheries operations.

In parallel and with a view to technical optimization it is advised that existing monitoring and inspection practices, which at present are not being utilized to its full extent, are reviewed.

2.4 Financial aspects of CCTV deployment

The NSAC believes that any costs incurred by the deployment of CCTV should be borne by the regulators. For data collection on e.g. ETP species, the NSAC would like to underline the role of the EMFF in providing funding for trials, procurement and training for REM. Moreover, the NSAC believes in general that the costs of introducing REM tools should primarily be covered by the EMFF, including the costs of installation, running costs and maintenance of REM.

3. Key messages

- Despite its proven benefits, **further consultations** with regards to the introduction of REM, in particular CCTV, are needed.
- The use of CCTV should be accompanied by incentives and more **flexible technical measures**, such as in choice of fishing gear.



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- While modern electronic information systems most certainly have their role to play in fisheries, they carry with them their own **technical, legal, and ethical challenges**, which must be fully understood
- Control and enforcement are the **end stages** of a process of compliance with a **policy, which must be both workable and enforceable**.
- Any monitoring system should be implemented in **collaboration with its end-users**.
- REM should be deployed on vessels identified by the control experts of MS and EFCA as being of a certain **risk of non-compliance**, including the risk of spatial and temporal interactions with ETP species.
- **An evaluation of the effectiveness** of the REM systems should be carried out after a period of 3 years following the implementation.
- There is a need to seriously consider the questions on personal **privacy** of the people onboard, **constitutional protection** of onboard **employees**, the **access, security** and **ownership** of the data collected.
- CCTV recordings should be **limited to** the parts of the vessels where the fishery or **processing activities** take place.
- Footage from CCTV cameras should be **stored locally** and should be made available exclusively to officials or Union inspectors **upon request** through **REM viewing systems**.
- As it will be **impossible to monitor the footage in full**, the potential **distortion of the view** of fishing operations due to sampling and calculation processes should be considered.
- **Existing** monitoring and inspection **practices** should be **reviewed**.
- **Costs** incurred by the deployment of CCTV should be borne by the regulators through **EMFF**.





Annex 1: Overview of EM trials worldwide⁷⁸ (excerpt relevant for North Sea)

⁷ <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12425>

^{8a} A single trial can have multiple monitoring objectives.

^b EM = effort monitoring; CM = catch monitoring; CH = catch handling; PS = protected species; GM = gear modification (mitigation devices); VA = automated video analysis (computer vision technology).

^c Some of the EM records collected from the NC EM trial vessel were used in an automated video analysis competition. At this stage, none of the EM trials in the WCPO include automated video analysis, although EM service providers are focusing their R&D in this area.



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Country/region	Source	No. of trials	Years	Gears	No. of vessels	Monitoring objectives (a)					
						EM (b)	CM (b)	CH (b)	PS (b)	GM (b)	VA (b)
Denmark	Dalskov and Kindt-Larsen (2009); Kindt-Larsen et al. (2011); Ulrich et al. (2015); Plet-Hansen et al. (2019); Mortensen et al. (2017), Mortensen et al. (2017)	3	2008–2016	Bottom trawl, gill net, purse seine	6–27	2	2		1	1	
Germany	Götz et al. (2015); Oesterwind and Zimmermann (2013)	2	2011–2016	Bottom trawl, gill net	2–3	2	1		1		
The Netherlands	van Helmond et al. (2015, 2017); Bryan (2015); Scheidat et al. (2018)	4	2011–2017	Bottom trawl, gill net, purse seine, midwater trawl	2–12	33	2		1		
Sweden	Tilander and Lunneryd (2009)	1	2008	Gill net	2	1			1		
UK	Needle et al. (2015); French et al. (2015); Course et al. (2011); Marine Management Organisation (2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2015c, 2016); Hold et al. (2015)	6	2008–2015	Bottom trawl, gill net, longline, trap	1–27	6	6				1



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Annex 2: Overview of European EM trials, including references and study objectives for the studies describing the trials⁹

Study	Trial	Years	Vessels	Fisheries	Reference	Study objectives
1	German North Sea CQM	2011–2016	2	Demersal trawl	Götz et al. (2015)	<ol style="list-style-type: none"> 1. Evaluate and develop the reliability of information on discards by EM. 2. Test the feasibility of a management approach using a reversal of the “burden of proof.”
2	German trial on by-catch registration of harbour porpoise and seabirds	2011–2013	3	Gill nets	Oesterwind and Zimmermann (2013)	Assess by-catch levels of harbour porpoise and sea birds in gill nets using EM.
3	Dutch North Sea cod CQM trial	2011–2015	12	Demersal trawl and seine	van Helmond et al. (2015)	Evaluate the efficacy of EM as control tool for mixed bottom trawl fisheries.
4					van Helmond et al. (2016)	Provide insight into the effect of the landing obligations prior to implementation and investigate the effect of CQM on fishing behaviour.
5	Dutch trial on by-catch registration of harbour porpoise	2013–2017	12	Gill nets	Scheidat et al. (2018)	Assess the by-catch rates and numbers of porpoises in the Dutch commercial bottom-set gill net fishery.
6	Dutch trial on pelagic freezer trawler	2014	1	Midwater trawl	Bryan (2015)	Develop a methodology to use EM to confirm full retention of catch on-board a freezer trawl vessel (compliance with discard ban).
7	Dutch sole EM trial	2015	2	Beam trawl	van Helmond et al. (2017)	Evaluate the efficacy of EM as control tool for discard of undersized sole in beam trawling.
8	Scottish CQM trial	2008–current	6–27	Demersal trawl	Needle et al. (2015)	<ol style="list-style-type: none"> 1. Focus on the science that can be achieved with EM systems. 2. Preferable system for monitoring the landings obligation (rather than alternatives such as on-board observers).
9					French et al. (2015)	Reduce the viewers' workload as much as possible by automating this tedious and expensive procedure
10	English CQM trials for otter trawls and gill nets North Sea and Western Channel	2010–2015	6–16	Longline, otter trawl, gill net	Course et al. (2011); Marine Management Organisation (2013a, 2015c, 2016), Elson et al. (in press)	<ol style="list-style-type: none"> 1. Test impact of a discard ban 2. Investigate the potential of using market grading data for reference fleet monitoring 3. Development of EM verification method for full documentation of plaice discards.

⁹ <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12425>



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11	English CQM trials for beam trawls in the Western Channel	2011–2015	7–9	Beam trawl	Marine Management Organisation (2015a)	<ol style="list-style-type: none"> 1. Explore the implications of the landing obligation in this mixed demersal beam trawl fishery; 2. Investigate European plaice discard levels by using EM verified self-reported data; 3. Explore CQM trial on demersal species.
12	English EM trials for vessels < 10 m	2012	2	Demersal trawl	Marine Management Organisation (2013b)	<p>Test the reliability of EM equipment on-board commercial fishing vessels and to determine whether this technology could be used to monitor and quantify catches.</p> <p>To test impact of discard ban</p>
13	English CQM trials for Western haddock	2013–2014	1	Twin-rig otter trawl	Marine Management Organisation (2014a, 2015b)	To test impact of discard ban
14					Marine Management Organisation (2014b)	<ol style="list-style-type: none"> 1. Provide insight into the level of high grading and discarding that is typical of the fleet 2. Explore measures to protect recruitment and reduce total haddock catches while maintaining profitable landings in the context of a landing obligation
15	English trial on video capture of crab and lobster catch	2014	4	Crustacean fisheries	Hold et al. (2015)	Evaluated the use of on-board camera systems to collect data from <i>Cancer pagurus</i> and <i>Homarus gammarus</i> .
16	Danish FDF trial for CQM	2008–2016	6–27	Trawl, seine, gill net	Dalskov and Kindt-Larsen (2009); Kindt-Larsen et al. (2011)	<p>Establish whether EM can supply the sufficient documentation for a CQM.</p> <p>Discuss implementation of CQM, in regard to new technologies</p>
17					Ulrich et al. (2015); Plet-Hansen et al. (2015)	Collate and assess the data collected during the FDF trials and estimate discard rates.
18					Bergsson and Plet-Hansen (2016); Bergsson et al. (2017); Plet-Hansen et al. (2019)	<p>Development of EM as a documentation measure for fisheries applicable to the landing obligation.</p> <p>Assessment of whether data can be transmitted by means of 4G network, satellite or WI-Fi.</p>
19					Plet-Hansen et al. (2017)	Describe specific areas of convergence or divergence of perceptions between fishery inspectors and fishers.
20	Minimizing discards in Danish fisheries (MINIDISC project)	2014–2015	14	Trawl, seine	Mortensen et al. (2017)	Analyse the effect of a free gear selection in a CQM setting, using EM as documentation tool.
21					Mortensen et al. (2017)	<p>Analyse observer bias in EM</p> <p>Evaluate the discard estimates made by EM video inspectors for several species and contrast the estimates with the reports of fishers and on-board observers to estimate precision and accuracy of the EM observations</p>



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22	Danish trial on by-catch registration of harbour porpoise	2010–2011	6	Gill nets	Kindt-Larsen et al. (2012)	Assess by-catch levels of harbour porpoise in gill nets using EM.
23	Swedish trial on by-catch registration	2008	2	Gill nets	Tilander and Lunneryd (2009)	To test whether EM is more efficient in by-catch monitoring than on-board observers.



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