



Australian Government

Australian Fisheries Management Authority

Australia's Electronic Monitoring Program: Lessons and New Direction

In 2015 the Australian Fisheries Management Authority (AFMA) implemented mandatory use of electronic monitoring (EM) in four fisheries: Australia's Eastern and Western Tuna and Billfish fisheries (ETBF and WTBF respectively); Gillnet, Hook and Trap Fishery (GHATF); and in the Small Pelagic Fishery (SPF). The move to EM followed approximately seven years of trials, pilots and testing of EM in these fisheries, including simultaneous deployment of observers and EM, to ensure that the footage was capturing all relevant data required by the managers to manage and monitor these fisheries effectively.

Now in its eighth operational year, the EM program has proven to be an effective monitoring tool for AFMA's fisheries managers and compliance teams. With the current end-to-end contract expiring and no option to extend the contract under the Australian Government Procurement rules, in 2020 AFMA took the opportunity to undertake a comprehensive review of the EM program. This review considered how AFMA has used the program and would like to use the program in the future, the cost of the program, the developments and progress in EM globally, stakeholder perspectives, and the changing consumer demands and expectations.

The completion of the review of the EM program coincided with an additional AUD 10 million dollar investment into AFMA's EM program, including expanding and enhancing the program to include other Commonwealth fisheries. This commitment further reinforced the decision of the AFMA Executive to move to a standards based EM program. This paper sets out the lessons learnt over the past eight years and where AFMA is now moving to, with a focus on the tuna fisheries.

EM in Australia's Commonwealth Fisheries 2005-2022

AFMA first considered EM as early as 2005 in response to alleged interactions between the GHATF operators and Australian Sealions, an endangered species under Australian law. Seeing the benefits and success of the EM trial in the GHATF, a series of 'proof of concept' pilots were then conducted in the ETBF, WTBF, SPF, Antarctic longline fishery, the Northern Prawn Fishery. These pilots demonstrated that EM was able to be deployed in a range of fisheries and on various configurations of fishing vessels to provide the necessary data for management and monitoring requirements. In 2009 AFMA undertook a comprehensive trial in the ETBF that considered the selection and installation of EM systems and data collection, processing, interpretation and planning. Overall, AFMA and the Commonwealth fishers conducted approximately seven years of pilots and trials before, in 2015, AFMA made EM mandatory in the ETBF, WTBF, GHATF and SPF.

Following a competitive tender procurement process, AFMA implemented an end-to-end contract with Archipelago Marine Research (AMR), and specifically with its Asia Pacific subsidiary, Archipelago Asia Pacific (AAP) for the delivery of AFMA's EM program. Implementing an end-to-end contract with AAP provided AFMA with expert support and program delivery enabling AFMA to build a strong reliable program that stakeholders have confidence in. Under the contract, AAP provided end-to-end services as the exclusive EM vendor for Commonwealth fishing vessels, where industry was required to install an EM system to meet fisheries management regulations in specified fisheries. Under the contract, AAP has sole responsibility for the provision, installation and maintenance of the equipment (EM system) and the analysis of all footage (EM review) according to AFMA's policy and procedural requirements.



AFMA's EM program is designed to collect data for logbook verification, protected species interaction monitoring, monitoring the deployment of protected species mitigation measures, and monitoring any untoward behaviours generally, which are referred to AFMA's compliance team. AFMA's EM program relies on 100% coverage, meaning that all vessels in the relevant fisheries, with a minimum effort threshold, are required to install an EM system and AFMA conducts a 10% random review per fishery.

Over the past eight years AFMA has continued to prove the efficacy of EM as a monitoring tool for fisheries management and compliance purposes. AFMA has proven EM:

- as a data collection and monitoring tool that provides verified, independent, and reliable data from those fisheries where it has been employed
- as a verification tool of fishery dependent data, such as logbooks, interactions with protected species, discarding, and crew based data collection programs
- can replace other at-sea monitoring tools, for example observer coverage, but biological data collection continues to be supplemented by port sampling, and
- can support compliance monitoring, for example through monitoring the use of protected species mitigation measures (e.g., torri lines) and compliance with protected species handling procedures.

A fulsome discussion of the benefits AFMA has realised from its EM program can be found in [Background Paper XXX](#).

Reviewing AFMA's EM program

The impending expiry of the end-to-end contract provided an ideal opportunity to undertake a comprehensive review of AFMA's EM program. The review allowed AFMA to:

- revisit the role of EM in AFMA's fisheries management framework, including related to legislative obligations and policies such as harvest strategies, protected species mitigation measures and interoperability with other onboard systems
- consider the demonstrated benefits and lessons learnt from the EM program including its use in fisheries data collection and monitoring, fisheries management and compliance activities (e.g., greater confidence in logbook data, implementation of targeted risk assessment and risk mitigation activities, more discrete and/or vessel level management arrangements)
- consider where EM had not achieved its anticipated benefits (e.g., artificial intelligence and machine learning in respect of improving EM footage analysis times and therefore associated costs), including, critically, industry expectations
- how the global and national EM landscape had changed in the preceding eight years, including the position of RFMO's to which Australia is a party
- consider and understand stakeholder perspectives on EM, and
- cross reference expectations of supply chains, third party certification schemes and consumers.

Key to the review was understanding the current state of EM versus predicting where EM might be in the future and therefore positioning AFMA's EM program to reap the benefits of these advancements. International EM experts suggest that the long-term goal of EM is to:



- provide cost effective and efficient fisheries monitoring based on risk and that is interoperable with other on-board management systems
- automatically generate specified data required for fisheries management using AI-ML technology to review EM footage in real time or near real time, and
- verify and monitor fishing activities with near real-time satellite information sent directly to the compliance monitoring centre.

AFMA's review highlighted that a one-size fits all approach to independent monitoring is not going to meet AFMA's fisheries management requirements. AFMA recognises that EM be considered as a continuum with range of options and potential set-up arrangements (e.g., still images only on nano systems, sensors only on lite systems, or full EM systems integrating cameras and sensors) depending on the monitoring requirements of the fishery under consideration. The review identified that implementing a flexible EM program would likely strengthen AFMA's ability to develop and implement discrete 'boat level' management measures and/or innovative approaches to address identified risks at the fishery level (e.g., climate change or protected species mitigation measures).

Focusing on the data required to manage fisheries, the review clearly identified that EM be considered one of a range of possible data collection and monitoring tools available to AFMA, alongside for example, the observer program, port monitoring, logbooks, catch documentation schemes, licencing, and vessel monitoring systems (VMS). EM is not a panacea; other data collection and monitoring programs (e.g., port collection of biological data and/ samples) are needed to collect all required fisheries data. A range of external pressures, for example costs, social licence, retaining independent third-party certification (e.g., MSC), and/or traceability required for international markets, may also incentivise the use of EM as it provides auditable independent monitoring. Stakeholders applaud the use of EM due to its independence and provision of definitive and impartial data and monitoring.

The review provided AFMA with the confidence to transition to a standards based EM program. EM is one of a suite of monitoring tools used by AFMA to support the implementation of efficient and cost-effective fisheries management consistent with the principles of ecological sustainable development while maximising the net economic return to the Australian community and being accountable to the fishing industry and the Australian community. AFMA continues to take the view that EM, like other monitoring and regulatory tools, must provide for effective fisheries management while also providing industry with an effective enabling environment in which the fisheries management arrangements meet non-government, community and consumer expectations.

Charting a new course – AFMA's Standards Based Electronic Monitoring Program

The standards based program aims to provide a reliable, flexible, adaptable, interoperable and cost-effective EM program that is responsive to the specific data needs and management objectives of individual fisheries. AFMA's standards based EM program is being co-designed with industry and will enable each fishery to use EM to achieve its specific data and monitoring objectives, for example protected species monitoring and/or catch verification, to independently verify fishing activities, and monitor compliance. A standards based program enables AFMA to realise any advancements in AI-ML and is scalable allowing AFMA to take advantage of growth in EM domestically, regionally or globally.

AFMA's standards based EM program continues to be data driven and data focused. EM is a data collection tool used for verification and monitoring, and is one of a suite of possible monitoring tools available. AFMA will continue to use EM to provide independent and verified data and monitoring, while port monitoring or observer coverage will be used to collect biological data and/or data required



at specified depth strata. AFMA recognises that EM cannot achieve all data collection, verification and monitoring requirements but remains a powerful tool nonetheless.

The program specifically aims to provide flexibility, adaptability and interoperability to enable each fishery to consider how EM might work in their specific situation in relation to:

- The type of EM system used. For example, full, lite or nano systems, which would depend on the monitoring objective of the fishery, the vessel's specifications, cost versus the benefit provided to the specific fishery.
- What EM data is required. For example, logbooks verification, TEP interaction reporting, the use of TEP mitigation measures, fishing and bycatch handling practices, spatial monitoring or various combinations of the above. This, ideally, should also be linked to how AFMA will meet the changed policies and how EM is being integrated with other monitoring tools.
- How EM is used. For example, primary versus secondary data source providing the independent verification and how it is integrated with other monitoring tools.
- The compliance risk profile for the fishery, how precautionary the management and monitoring program needs to be to achieve the desired data confidence and accuracy. This is likely to link to the level of stakeholder (e.g., NGO, recreational fishers etc.) engagement in the fishery and therefore the need to be able to demonstrate compliance, monitoring and independent data collection/verification.
- Interoperability with other management systems on board the vessels and with AFMA systems, e.g., VMS, e-logs, e-CDRs.
- Adaptability to the policy and legislative obligations and to the specific needs of individual fisheries.

The program is centred on the development of (a) technical standards, (b) fishery specific performance standards (FSPS) and (c) internalisation of the EM footage analysis/review component of the program

a. Technical Standards

AFMA is developing technical standards that will articulate the capability and minimum requirements of the EM system, hardware and maintenance requirements (articulated for example as a threshold for down time of the system). EM vendors or industry will need to ensure that their EM system meets these technical standards. These are the technical specifications required from EM vendors or that industry will need to ensure their EM system is capable of.

The maintenance of the EM systems is being included in these technical standards to ensure that there is a reliable service being provided to industry, thereby minimising any deleterious impact of poor service to licence holders operating from remote ports.

The technical standards will need to work in concert with the FSPS and the EM footage analysis component to ensure the integrity of the entire program. For example, the technical standards will need to define the data standards (e.g., file formats, naming conventions, etc) and transmission requirements so that it can be ingested into AFMA's footage analysis software.

Defining the technical standards enables industry to choose their own EM system and vendor. AFMA is seeking to provide industry with greater flexibility and choice. As Australian industry is required to pay for their own EM systems, this approach also supports a direct relationship between the licence holder and the vendor and may improve ongoing maintenance of the system onboard the vessel.



b. Fishery Specific Performance Standards

The Fishery Specific Performance Standards (FSPS) will be designed to be performance or outcomes focused. These standards will articulate the data needs (e.g., logbook verification), fishing activities (e.g., deployment of protected species mitigation measures), and specific events (e.g., discards, interactions with protected species) that the EM footage needs to capture.

AFMA is moving to performance or outcomes focused standards for the EM program to support the implementation of a single EM program that can be tailored to meet the fishery specific data and monitoring needs across Commonwealth fisheries and accommodate future developments. A performance based approach can better accommodate for varying vessel configurations, allowing industry and vendors to install the EM system to meet these requirements without compromising the outcomes of the program. The FSPS approach also enables the program to be scalable across a range of Commonwealth fisheries, for example tropical trawl fisheries to sub-Antarctic trap fisheries, without fundamentally changing the program itself.

c. EM Footage (EM Records) Analysis

AFMA will be internalising the EM footage (EM records) analysis component of the program, which may utilise existing fisheries observers or specific EM analysts or a combination of both. Utilising fisheries observers not only makes use of the skills and experience of this workforce, but also creates divergent work opportunities for these AFMA employees.

The planned approach for AFMA's EM footage analysis involves ingesting footage from a range of EM systems into a single EM footage review platform. The data generated from the analysis will also need to be incorporated into and with other empirical data sets and broader management framework to support evidence based and timely fisheries management decision making.

AFMA will be looking to ensure that the review software enables ongoing enhancement of the AI-ML capabilities through, for example, incorporating bounding boxes into the analysis component during the EM footage analysis process.

Ancillary aspects of AFMA's EM Program

Alongside well known issues of data confidentiality and data sharing, the collection of personal information (faces, boat names etc.) through the implementation of the EM program has required AFMA to address a range of ancillary issues previously not triggered by other data collection programs. These have included: privacy legislation, footage storage, system and footage ownership. These issues have required AFMA to address the legislative requirements that have, until now, been outside of fisheries management.

AFMA has been required to undertake Privacy Impact Statements alongside the Regulatory Impact Statement processes. AFMA secured an exemption from the Commonwealth Archives Act to hold EM footage/EM records for six months. For the system ownership, this has been addressed by implementing an arrangement where AFMA requires industry to purchase their own systems and the maintenance and EM footage analysis costs are paid through industry levy's. AFMA has obtained legal advice regarding the ownership of the footage, but to support co-management, AFMA also amended the Fisheries Management Regulations in 2019 to allow AFMA to provide the licence holder access to their own EM footage.

AFMA's experience with EM has also highlighted the opportunities to streamline monitoring tools, specifically the collection of geolocation data. Both EM systems and VMS units provide geolocation



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information via integrated satellite polling. Although some differences remain, for example dual polling, trials conducted by AFMA compliance teams recently have demonstrated the benefit of using EM as a geolocation data source particularly with the sensor data linked suggesting that EM could replace VMS in some cases.