

Australia's electronic monitoring program**Summary**

This paper updates the SPRFMO Scientific Committee on the electronic monitoring program implemented for Australian demersal automatic longline vessels.

Australia notes that electronic monitoring is a cost effective data collection and logbook verification tool that improves the accuracy and reliability of fisheries data. Australia will continue to use on-board observers to collect biological data in high seas to meet SPRFMO observer requirements.

Australia recognises that as electronic monitoring becomes an established data collection and verification tool, there is an opportunity to review how data is collected in the SPRFMO Convention Area. This includes consideration of how electronic monitoring and on-board observers can be used together to ensure that scientific data needs are met in a cost effective way for both trawl and demersal longline fisheries.

Background

Electronic monitoring is a system of sensors and video cameras (Figure 1) capable of monitoring and recording fishing activities which can be reviewed later to independently verify logbook data. The specific configuration varies with gear and individual boat layouts, but an electronic monitoring system typically includes several key components: three or more video cameras, a hydraulic gear sensor, a drum sensor, a GPS receiver, satellite communications and a control centre.

The electronic monitoring cameras are activated during fishing operations, specifically when the hydraulics are running during the set and haul. The cameras remain activated for a period of time after the haul to record the processing of catch and all video and sensor data is recorded to a hard drive on the boat. Hard drives are encrypted and tamper evident.

Sensor data is transmitted back to the regulatory authority in real time and includes information on whether the system is fully operational, the location of the boat and whether fishing gear has been set or hauled. Hard drives with video data are exchanged frequently (monthly or at the end of any trip longer than 4 weeks) and submitted to the regulatory authority for analysis.

A random portion of the video footage is analysed and the data on catch, effort and protected species interactions is compared to logbook reports. This provides independent verification of catch, discards and interactions with protected species, and ensures that the same reporting standards are followed across the fleet. Applications of e-monitoring within the Australian EEZ analyse at least 10% of the video footage at random (per vessel trip) with a risk based approach used to audit more footage from boats that are suspected of misreporting.

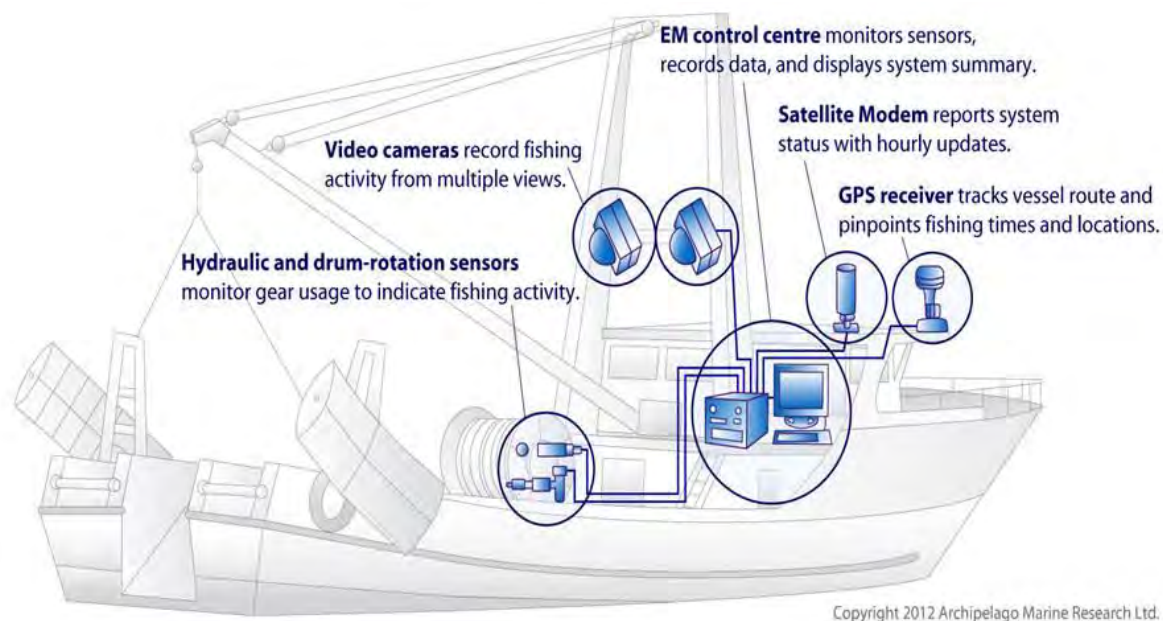


Figure 1: Example of an electronic monitoring system vessel setup.

After the hard drives have been analysed, operators receive individual reports on their accuracy of reporting to encourage improved logbook reporting. With improved accuracy in the logbook reporting in the fishery, more accurate data will go into the stock assessments for target species and there will be more reliable information on protected species interactions in the fishery.

Australia's electronic monitoring program

Electronic monitoring is operational in Australian demersal longline, demersal gillnet and pelagic longline fisheries managed by the Australian Government through the Australian Fisheries Management Authority. A more detailed overview of how electronic monitoring is used in the domestic fisheries is included at **Attachment A**.

Since September 2014 electronic monitoring has been installed on two Australian demersal automatic longline boats that fish on the high seas. The electronic monitoring systems monitor 100% of fishing activity.

Data collection

Vessels are provided with regular feedback reports on their performance with respect to the accuracy of their logbooks (see example feedback in Table 1), as well as the operation and maintenance of the on-board EM system (on issues such as operational status, camera obstruction and cleaning). The final step in the cycle is an improvement in the compliance of vessels with data reporting and fishing practice requirements through the feedback process and, if necessary, through enforcement actions. In cases where catches are recorded in the log but not in the EM data, there is also a feedback process to modify the camera views or change deck handling practices to improve EM accuracy.

Table 1: An example of individual fisher feedback on the accuracy their logbooks. Data are counts of fish species retained, released and total. On the left are counts from analysis EM data and on the right from the vessels logbook.

| Haul Event: 24 October 2015 @ 10:10 AM | | | | Haul Event: 24 October 2015 @ 11:00 AM | | | |
|--|----------------|----------------|-------------|--|----------------|-------------|---------------|
| EM Catch Review | | | | Vessel Logbook | | | |
| Species | Retained (pcs) | Released (pcs) | Total (pcs) | Retained (pcs) | Released (pcs) | Total (pcs) | Release (kgs) |
| Quota Species | | | | | | | |
| Gummy Shark | 49 | 1 | 50 | 51 | 0 | 51 | 0 |
| School Shark | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Common Sawshark | 5 | 0 | 5 | 2 | 0 | 2 | 0 |
| Elephantfish | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Non - Quota Species | | | | | | | |
| Bluntnose Sixgill Shark | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Broadnose Shark | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Port Jackson Shark | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Draughtboard Shark | 22 | 1 | 23 | 22 | 0 | 22 | 0 |
| Longsnout Boarfish | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Boarfishes | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Stargazers | 0 | 1 | 1 | 0 | 0 | 0 | 0 |

Comparison between observers and EM

A trial was conducted between October 2009 and August 2010 EM to determine the viability of using EM in on pelagic longline vessels in the Australian Eastern Tuna and Billfish Fishery. The trial examined the efficacy of EM for specific monitoring tasks, developed an approach to use EM data to audit logbooks and undertook a cost benefit analysis of EM compared with at-sea observers. Research was conducted on ten vessels and involved parallel data collection with both EM and at-sea observers.

A total of 3794 catch items were compared between EM and at-sea observer data. Catch identification was aligned for 70.2 per cent of items, 4.8 per cent of items were detected by EM viewers but not the observer and 25 per cent of the items were recorded by the observer but not by the EM analyst. Most (75.7 per cent) of the catch items that were absent from the EM data were recorded as *released*. Differentiating the species of tuna for smaller sized fish (southern bluefin tuna, bigeye tuna and albacore) from video footage was difficult (noting that trials at this time were undertaken using lower resolution cameras than those currently used).

Limited comparison has been undertaken on automatic longline vessels to determine the efficacy of EM compared to on-board observers. One automatic longline trip analysed to date found more individual fish were counted using EM data compared to the on-board observer, though fewer species were identified compared to the on-board observer. However, it is worth noting that there were protected species interactions identified by the EM reviewer that were not detected by the on-board observer which highlights the effectiveness of EM for detecting these types of interactions due to its full-time coverage.

Comparison between EM and logbook

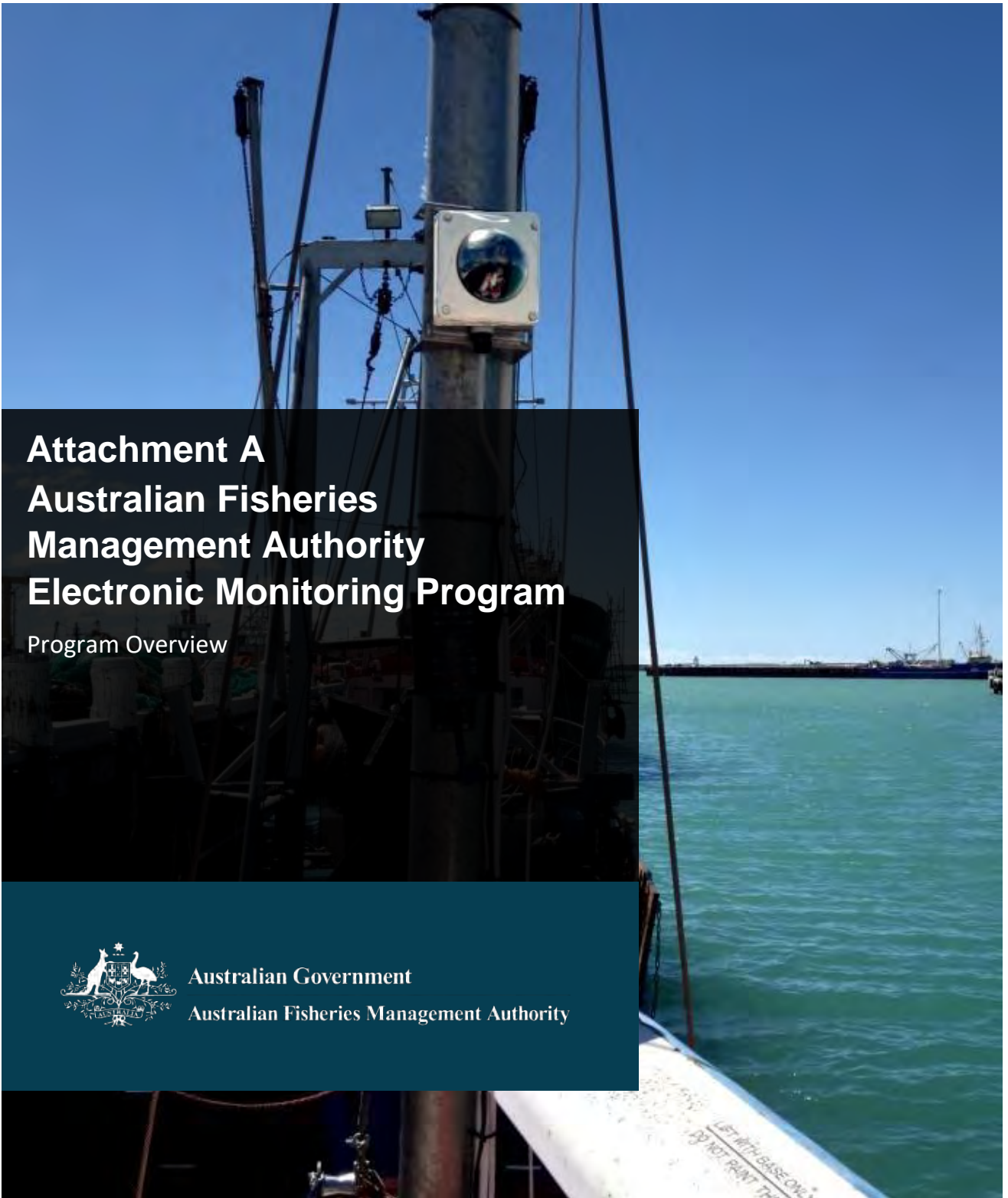
Preliminary results from the Australian demersal gillnet sector indicate that there are no significant differences between logbook and EM data when considering quota species either retained or discarded. However, due to changes in the fishery logbooks there were very limited data for discards so further analysis will be required in the future.

Australian demersal longline

There have been an insufficient number of trips to date for a comparison between demersal longline data obtained from electronic monitoring, logbook and observers.

Potential applications for other fishing methods

Australia considers that in the future a similar electronic monitoring program could be used to complement SPRFMO's existing arrangements with on-board observers and to strengthen monitoring for other high seas fisheries including the high seas trawl fisheries. Electronic monitoring can monitor 100% of fishing activity and be used to audit logbook records of discards, bycatch and interactions with protected species and vulnerable marine ecosystems. When used in conjunction with on-board observers on trawl boats, the tasks allocated to the observer coverage could be prioritised to biological and catch composition data required by the Scientific Committee. This would ensure that data continues to be collected to support future stock assessments, is enhanced and its collection is cost effective.



Attachment A
Australian Fisheries
Management Authority
Electronic Monitoring Program
Program Overview



Australian Government
Australian Fisheries Management Authority

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1 Executive Summary

During the 2014-15 financial year, AFMA commenced the implementation of e-monitoring in the Eastern Tuna and Billfish Fishery (ETBF), Western Tuna and Billfish Fishery (WTBF) and Gillnet Hook and Trap (GHAT) sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF). This is in accordance with the *Fisheries Management Act 1991* that allows the use of electronic monitoring (e-monitoring).

The AFMA e-monitoring program will use video and sensor data to independently validate fisheries' logbook information. This program will provide accurate and near real time fisheries data, which can be incorporated into fisheries management decisions and be used as a tool to monitor compliance within the fisheries to which it is being implemented.

The data obtained from each fishing trip will assist in collecting reliable information on the:

- total catch and discards for all commercial species and bycatch
- total fishery interactions with protected species.

Requirement for the installation of e- monitoring on boats

ETBF and WTBF boats that have fished for more than 30 days in the previous or current fishing season will be required to operate an e- monitoring system.

Gillnet and autoline boats in the GHAT fishery that have fished for more than 50 days in the previous or current fishing season will be required to operate an e- monitoring system. Manually baited longline boats in the GHAT fishery that have fished for more than 100 days in the previous or current fishing season will be required to operate an e-monitoring system.

Costs

Between December 2014 and June 2015, AFMA will fund the cost of installing e- monitoring systems to qualified boats. The ongoing e- monitoring program will be cost recovered from industry.

Requirements of operators Operators

will be required to:

- Undertake a Functionality Test
- Perform a data drive exchange and return used data drives to AFMA
- Maintain their e- monitoring System in good working order
- Complete Daily Fishing Logs and Catch Disposal Records as required in management arrangements for the fishery.

If there is an e- monitoring system breakdown, the operator of the boat must report to the contractor, Archipelago Asia Pacific (AAP), as soon as it is known, to resolve the issue. Conditions for operating a boat with a non-operational e-monitoring system can be found in section 5.4 of this document.

Misreporting and breaches

Data from e- monitoring will be compared with the data from daily fishing logbooks for quality assurance purposes. Fishers are still required to record all their catch in their logbook or E-log. Where significant misreporting is detected, higher levels of e-monitoring review will be undertaken for those boats at the cost of the concession holder.

Any intentional harm to protected species and/or bycatch species that are released will be noted and referred to the AFMA Compliance Section.

The focus of e- monitoring is on fishing activities, however if the footage observed is suspected of contravening an Australian or International law, it will be reported to the relevant authority.

2 Introduction

The purpose of this document is to provide an overview of the e-monitoring program. This document details the policies and procedures governing the e-monitoring program, it describes the operational components of the e-monitoring program and it informs concession holders, boat masters and crew of their obligations for the use and maintenance of e-monitoring systems.

Important note

Every effort has been made to ensure that the information contained in this booklet is correct and accurate at the time of printing. However, the information provided is intended to serve as a guide only, and therefore AFMA and its contractors will not be liable for any loss caused, whether due to negligence or otherwise, arising from the use of, or reliance upon, this document.

Please contact AFMA to ensure you have the most recent version of the document.

This document is not intended to replace any conditions or requirements of an operator's concession of the relevant management plan, *Fisheries Management Act 1991* and the *Fisheries Management Regulations 1992*. Some of the items in this booklet may not apply to a particular fishing operation. Operators should refer to the key documents listed in this document.

3 Program Background

This section describes the overarching aspects of the program, including objectives and outcomes. It will provide the basis for defining the operational features of the program.

3.1 Program Objectives, Outcomes and Deliverables

3.1.1 Objectives

E-monitoring can provide both efficient and cost-effective data collection and monitoring for fisheries management, ensuring fishing and related activity is consistent with the principles of ecologically sustainable development.

There are several key specific objectives that this program will realise:

- cost reductions by providing a cost effective alternative to observers in some circumstances
- increased confidence in data quality achieved through cross validation with data captured in logbooks and observer records
- reduced regulatory burden through: enabling fishery restrictions to be applied at an individual boat level; more efficient and cost effective rules; removal of the need for observers in some cases;
- a higher level of monitoring that is capable of scaling to 100% coverage with opportunity for review and secondary assessment
- greater compliance with management arrangements such as the use of bycatch mitigation devices
- helping the fishing industry to monitor their performance through reports which encourages self-correction of low performers
- reduced work place health and safety risks to AFMA through reduced risk of having less observers
- the ability to better demonstrate to the community that boats are operating sustainably and assist in achieving third party certification (e.g. MSC).

Through these objectives, e-monitoring can help demonstrate accountability of the fishing industry to the Australian community. Further, it enables better decision making capability to inform management arrangements and ensure fishing sustainability.

3.1.2 Outcome

The AFMA e-monitoring program will use video and sensor data to independently validate fisheries' logbook information. The e-monitoring program will generate accurate and near realtime fisheries data which can be incorporated into fisheries management decisions and verification of compliance with regulations.

3.1.3 Deliverables

The program will develop and implement a monitoring system that generates verified, accurate and near real-time fisheries data.

E-monitoring systems will:

- be fitted to qualifying boats fishing in the Eastern Tuna and Billfish Fishery (ETBF), Western Tuna and Billfish Fishery (WTBF) and Gillnet Hook and Trap (GHAT) sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF)

- identify when a boat engages in fishing activity, including
 - identification of the boat
 - the location of fishing activity
 - the date and time of fishing activity
 - the species being caught
 - the quantity, both retained and discarded of each species
 - the type of fishing gear used.

The data management and analysis components of the program will:

- identify trips and fishing events
- ensure AFMA regularly makes logbook data available to the contractor, Archipelago Asia Pacific (AAP), in a secure form
- ensure regular and timely exchange of data drives occur (monthly exchanges)
- ensure data drives are tracked and handled to meet chain of custody requirements
- determine, for all fishing events, if fishing has occurred in a closed area
- analyse a proportion of sensor and video footage as defined in this document.
 - record all catch events and other required data as annotations
 - supply annotation data to AFMA
- compare e-monitoring data with fishing logbook data
- provide timely feedback to skippers and boat owners about data quality
- provide timely exception reports where discrepancies between logbook data and e-monitoring data are seen.

Longer-term program deliverables may include:

- an evaluation strategy including special analyses and reports using data generated from the program to determine
 - changes in logbook data quality over time
 - the cost effectiveness of the program
- potential to remove the need for integrated computer vessel monitoring systems (VMS) over the long-term.

3.2 Governance

The following agencies or entities have responsibilities from a management, planning, or operation perspective:

- Industry consultative group: Support the development of program policy, implementation and review of the program
- Commonwealth Fisheries Association: Review the implementation of e-monitoring in the ETBF, WTBF and GHAT fisheries, support communications
- AFMA –Service One: Project management, program implementation(operations)
- AFMA Fisheries Management: Management actions, policy development, input into program design
- AFMA and Resource Assessment Group: Data requirements, input into management and program design
- AFMA Compliance: Enforcement issues, input into program design
- AAP: Designated contractor for delivery of equipment, maintenance and data services.

3.3 Communications

AFMA and AAP highly value stakeholder engagement and have jointly developed a communication strategy. The key points of the communication strategy have been drawn from this overview. An e-monitoring industry consultative committee has also been formed to ensure that there is consistent engagement from industry throughout the program.

3.3.1 E-monitoring Industry Consultative Committee

In addition to existing Management Advisory Committee (MAC) and Resource Advisory Group (RAG) processes, an industry consultative committee has been formed. This committee serves as the main vehicle for communication and program interaction between AFMA, AAP, and the fishing community. Industry committee members are representatives from the CFA and nominated members of relevant MACs. Its main function is to:

- provide direct industry feedback on program operational matters to AFMA and AAP
- act as a consultative group for operational changes
- disseminate important program issues to and from individual fishers
- provide direct input into the development of this document and the program review process.

3.3.2 Ongoing Feedback Processes

AFMA and AAP are committed to providing feedback to concession holders, MACs, RAGs and the industry consultative committee. This includes:

- program and technical updates
- feedback on the performance of their e-monitoring system
- feedback on logbook catch reporting (as compared to e-monitoring).

3.4 Financial Management

Costs of the initial implementation of the e-monitoring program are being funded by AFMA.

The ongoing e-monitoring program costs, including; installation and maintenance of the e-monitoring systems, routine costs for shipping data drives and routine data processing; will be cost recovered from industry. Details of cost recovery arrangements are outlined in a separate cost recovery document.

3.4.1 E-monitoring Installations

Costs of the initial installations of e-monitoring systems for qualified boats are being funded by AFMA. The initial install period is between December 2014 and June 2015. Alterations to fishing boats to assist the installation (such as the installation of hydraulics or camera booms) of e-monitoring systems are the responsibility of the concession holder and will not be funded by AFMA.

Boats not installed during this period will be subject to the cost of labour and equipment for e-monitoring installation.

3.4.2 E-monitoring Equipment Support and Maintenance

E-monitoring systems are covered under standard equipment warranties. These warranties cover things like manufacturing defects. It is expected that boats maintain the equipment with reasonable care. Replacement and repair of damaged equipment, and associated labour, outside of warranty will be cost recovered.

3.4.3 Data Processing and Reporting

Ongoing data processing costs will be recovered from industry by AFMA. AFMA is consulting with industry through the e-monitoring industry consultative committee on the mechanism for recovering these costs. This will commence in the 2015/16 financial year.

3.5 Contractor Arrangements

AFMA has contracted Archipelago Asia Pacific Pty Ltd. for the provision of e-monitoring equipment, installation and support, and data processing. Archipelago Asia Pacific is based in Canberra:

Archipelago Asia Pacific Pty Ltd

Unit 1, 6 Phipps Close,

Deakin, ACT, 2600

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Web: www.Archipelago-ap.com.au

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4 Electronic Monitoring

4.1 System Description

E-monitoring is a system of sensors and video cameras capable of monitoring and recording fishing activities which can be reviewed later to verify logbook data. Although specific configuration varies with gear and individual boat layouts, an electronic monitoring system typically includes several key components: three or more video cameras, a hydraulic gear sensor, a drum sensor, a GPS receiver, satellite communications and a control centre. The data collection software monitors the e-monitoring system, and stores relevant fishing activity data on a removable data drive for later review.

Trials have shown that e-monitoring can accurately monitor fishing operations and has the ability to improve scientific data collection. E-monitoring will be more cost effective than using human observers in longline and gillnet fisheries.

The current program design is being implemented on 70 boats in the ETBF, WTBF and the GHAT.

4.2 Benefits

Benefits of e-monitoring include:

- reduced regulatory burden
 - E-monitoring will allow AFMA to introduce individual accountability. This means management responses can be targeted to individual boats rather than broad measures that affect the whole fleet.
 - E-monitoring will result in more efficient and cost effective management measures. E-monitoring will allow operators to demonstrate they are using efficient and sustainable practices (e.g. safe release of sharks) that may be more effective than specific controls on gear.
 - E-monitoring will reduce requirements to carry observers and have boats surveyed for extra crew.
- increased accuracy of data – Continual feedback on logbook reporting through e-monitoring will lead to higher quality self-reported logbook data. Improved quality data will lead to better fisheries management decisions.
- scalable – e-monitoring programs are easily and cost-effectively scalable (to both decrease or increase monitoring within a fishery and include additional fisheries).
- community acceptability – E-monitoring will assist industry to demonstrate to the community they are operating sustainably and assist in achieving third party certification (e.g. MSC).
- improved compliance - E-monitoring will result in better compliance with existing AFMA rules and improved reporting. Good operators will be able to demonstrate they run low risk operations.
- reduced work place health and safety risks to AFMA and industry – having fewer observers at sea will reduce the risk to AFMA and industry.

5 Program Fisheries

5.1 Gillnet Hook and Trap Fishery (GHAT)

The GHAT sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF) targets a range of species. Boat operators in the South East of Australia target gummy shark, pink ling and blue-eye trevalla. The methods of harvest are demersal gillnet, demersal longline and dropline. Landings occur in about 35 ports, the main ones being Lakes Entrance, San Remo, Robe, and Port Adelaide. The effort in the fishery is composed of two major groups; those that are active year round depending on the available quota and those that are active for a limited period, outside those times they might for example be engaged in state managed rock lobster fishing. The GHAT consists of the following gears:

Gillnet - The gillnet sector is the largest in the GHAT fishery by number of boats, with an estimated 30 boats suitable for e-monitoring implementation. This fishery uses demersal gillnets to target gummy sharks and has significant commercial byproduct of school shark, elephant fish and saw shark.

Automated longline - The automated longline (autoline) sector has a limited number of boats suitable for e-monitoring implementation with two currently suitable. These boats use automatic baiting machines that allow up to 15,000 hooks to be set per day in Commonwealth waters greater than 183m deep. The primary target species are pink ling and blue-eye trevalla. Ribaldo, ocean perch, gemfish and hapuka are all key commercial byproduct species.

Dropline - Operators using droplines set a limited number of hooks in each shot. Many operators using droplines also fish with demersal longlines. Effort in the dropline sector is sporadic and relatively low on a fishery wide scale. The dropline sector targets blue-eye trevalla, with hapuka and bass groper being key commercial byproduct species.

Manual Longline – Manual (demersal) longline boats target both scalefish and shark depending on the type of concession that they hold. Operators permitted to target shark using hook methods must operate in waters less than 183m. The target species is gummy shark with key commercial byproduct species of school shark, elephant fish and saw shark. Operators permitted to target scalefish using demersal set manual longlines do not have depth restrictions.

5.1.1 Monitoring needs

The major monitoring needs for the GHAT sector are to collect reliable information on the:

- total catch and discards for all commercial species and bycatch
- total fishery interactions with protected species.

The primary protected species of interest are Australian sea lions and dolphins when using gillnets and seabirds and gulper sharks when longlining.

Australian Sea Lion - There are permanent gillnet fishing closures in place around all known Australian sea lion (ASL) colonies and larger areas called ASL trigger zones can be closed if the number of ASL mortalities reaches the specified trigger. The ASL trigger zones (A to G) are regions where all gillnet operations may be closed for 18 months should the specified ASL mortality triggers be reached. Within part of the Sea Lion Zone E (state waters) there is a restriction on the continuous length of net (1800m) allowed

Program

Dolphins - AFMA has developed formal arrangements to minimise dolphin bycatch that are outlined in the AFMA Dolphin Strategy. This strategy includes performance criteria that individual operators must abide by if they are fishing in the Dolphin Zone between Kangaroo Island and Robe in South Australia. To fish in this area, operators must have 100% monitoring in place and they incur escalating management responses for any dolphin bycatch.

Gulper Sharks - In regard to gulper sharks the strategy includes a network of fishery closures and management measures to minimise impacts across fisheries. Those fisheries where gulper sharks are noted are subject to increased monitoring, trigger limits, move-on provisions and mandatory handling practices designed to maximise post release survival. While not common, the practice of finning some non-quota shark species and discarding the trunk has been noted in the past and any such instances observed during the e-monitoring analysis will be reported to AFMA.

Seabirds – All longlining activities are covered by the seabird Threat Abatement Plan (seabird TAP). The seabird TAP includes a mandatory minimum monitoring target of 10 per cent of effort in the GHAT and escalating management responses if the bycatch rate of 1 seabird per 100,000 hooks is exceeded. This rate can be maintained individually or at a fishery level.

Other Closures and Restrictions - There are a number of bays and gulfs across Southern Australia that are closed to fishing to protect pupping grounds for the school shark and elephant shark nurseries

The primary objectives of e-monitoring during shark gillnet and longline operations are to:

- identify and record any protected species interactions during the haul □ determine the catch composition/piece count of fish being caught □ record whether fish are retained or discarded.

The required views of the cameras on board are:

- the area outboard of the roller, such that potential dropouts will be observed □ a view of catch retrieval from the net or de-hooking area in the case of line fishing □ a view of the processing area.

The primary objectives of e-monitoring during autoline operations are to:

- record any seabird capture on the haul
- verify whether offal is discharged during setting and record the deployment of mitigation devices (tori lines) on the set
- record the deployment of the mitigation device (brickle curtain) on the haul □ determine the catch composition/piece count of fish being caught □ record whether fish are retained or discarded.

The required views are of:

- the area behind the boat such that the deployment of the tori line might be determined
- the area outboard of the roller, such that there is a view of the brickle curtain and where the line exits the water □ the de-hooking area □ the processing area.

5.2 Tuna and Billfish Fisheries (ETBF and WTBF)

The ETBF and WTBF operate throughout the Australian Exclusive Economic Zone (EEZ) and several different species are targeted. These fisheries primarily consist of pelagic longline gear, however, other gears include

trolling, polling or hand-lining. The five key target species are yellowfin tuna, bigeye tuna, albacore tuna, broadbill swordfish and striped marlin. Operators fishing in the ETBF also take southern bluefin tuna (SBT) along the New South

Wales coast during the colder months. Ray's bream, mahi mahi and escolar fishes are also important components of the non-targeted catch.

The ETBF extends through much of the eastern coast of Australia, with major ports including Cairns, Mooloolaba, Coffs Harbour, Ulladulla and various other New South Wales southern coast ports.

The WTBF includes the waters off South Australia, Western Australia and the Northern Territory. Landings predominantly occur in Fremantle, Western Australia.

The major monitoring needs for the tuna and billfish fisheries are to collect reliable information on the:

- total catch and discards for all commercial species and bycatch
- total fishery interactions with protected species.

Key concerns with the tuna and billfish fisheries include:

Protected Species - Interactions with protected species such as seabirds, turtles and some shark species is a key concern for pelagic tuna fisheries. There is a need to ensure that mitigation procedures are followed to minimize interactions. There is also a need to determine spatially based capture rates for protected species to comply with reporting requirements of the Threat Abatement Plan.

Catch Handling - Finning of sharks and the disposing of trunks is illegal and accordingly the discarding of shark trunks or mutilated sharks is a monitoring requirement. Similarly, there are concerns related to discarding of tuna and billfish species which is permitted but must be recorded in logbooks.

Catch Per Unit Effort – CPUE is a key tool to monitor stock status and is used to drive the harvest strategy. Information provided in logbooks and catch disposal records is the primary source but separate monitoring information such as hooks, bait type, set time, light sticks and fishing area are used to standardise CPUE.

The number of cameras that will be needed on each boat will vary, depending on the configuration of each boat. The required camera views are of:

- the area behind the boat such that the deployment of the tori line might be determined
- the area outboard of the hauling stations
- the processing area.

The primary objectives of e-monitoring during pelagic longline operations are to:

- detect any seabird interaction on the haul
- detect the deployment of mitigation devices (tori lines) on the set
- determine catch composition/piece count of fish being caught.

5.3 Boat qualification, e-monitoring coverage percentages and audit rates

5.3.1 Monitoring coverage

Monitoring coverage refers to the proportion of effort in a sector or fishery that is to be covered by an operational e-monitoring system. The specified coverage can vary between fisheries and sectors depending on identified risks, data needs and cost efficiency.

For the ETBF, WTBF and the GHAT, AFMA will ensure that a minimum of 90 per cent of fishing effort is covered by e-monitoring.

In the gillnet sector of the GHAT, the Australian sea lion management zones and dolphin zones in South Australia are considered higher risk areas due to the consequences of catching sea lions and dolphins. In these areas, 100 per cent of total fishing effort is covered by e-monitoring. All boats in this sector must have an operational e-monitoring system in order to fish.

5.3.2 Shot Selection and audit rates

The baseline audit rate for all fisheries is a minimum 10 per cent of shots for each boat. This will include analysis of full catch composition for each shot selected for review. Catch composition, discards and interaction with protected species on audited shots will be compared to logbook records with discrepancies flagged and reported to AFMA. A report summarising any discrepancies will also be provided to the fisher after each data drive has been audited. The logbook data that will be audited is outlined in Table 1.

Table 1 Logbook data audited

| Catch composition | Protected species |
|---|------------------------|
| Species ID and piece count reported | ID and number reported |
| Fate (retained/discarded) | |
| Life status (recorded by e-monitoring analyst only) | |

Operators are required to report all protected species interactions. Any failure to report an interaction with a protected species may result in compliance action.

5.3.3 Requirement for the installation of e-monitoring on boats

In order to meet the required coverage in a fishery, ETBF and WTBF boats that fished more than 30 shots, in the previous or current fishing season will be required to operate an e-monitoring system.

In the GHAT fishery, gillnet and autoline boats that have fished more than 50 days in the previous or current fishing season will be required to operate an e-monitoring system. Manually baited longline boats in the GHAT fishery that have fished for more than 100 days in the previous or current fishing season will be required to operate an e-monitoring system.

5.3.4 Qualification for fully subsidised e-monitoring equipment and installation

AFMA will pay for equipment costs, installations and initial standard service events on any boat that meets the fishing day qualification before 1 July 2015, subject to the following conditions:

- The boat owner/operator will be responsible for the repair or replacement of damaged equipment.
- The boat plans to or is likely to fish more than the prescribed amount of days during the next fishing season.
- The boat notifies AFMA if it exits an AFMA managed fishery so that equipment, such as control centres and cameras, can be recovered.
- The boat maintains an operational e-monitoring system at all times, regardless of whether it is fishing in or between AFMA and State managed fisheries during the year. □ The boat is made available for installation during the specified installation periods in 2014-15.

The cost of purchasing and installing an e-monitoring system on a boat that does not meet the above criteria must be met by the owner/operator. The e-monitoring system must be installed before the boat reaches the fishing day qualification threshold in the ETBF/WTBF or the GHAT.

5.4 Compliance arrangements

Compliance arrangements relating to the misuse of e-monitoring equipment will be similar to those for the misuse of VMS equipment.

5.4.1 Fishery related breaches

Data from e-monitoring will be compared with the data from daily fishing logbooks for quality assurance purposes. Fishers are still required to record all their catch in their logbook or E-log. Where significant misreporting is detected, higher levels of e-monitoring review will be undertaken for those boats at the cost of the concession holder.

Any intentional harm to protected species and/or bycatch species that are released will be noted and referred to compliance.

5.4.2 Non fishery related activities

The focus of e-monitoring is on fishing activities. However, if, in the process of viewing footage, behaviour that contravenes Australian or International law is observed, it will be reported to AFMA. AFMA may report serious instances to the appropriate authority.

6 Operational Requirements

6.1 Installation Preparation

In order to ensure that system installations are done as efficiently and cost-effectively as possible, there are a number of preparations that boatowner/operators should perform on the boat prior to the installation. This information will also be distributed to boats and is available through the Archipelago Vessel Operators Guide.

The contractor will not perform any direct work on hydraulics or electrical systems

The owner/operator should ensure that any interfaces with the boat hydraulic or electrical systems are completed by qualified personnel at their own cost. The boat will be responsible for making any arrangements for these tasks.

6.1.1 System Installation

An e-monitoring system is determined as installed once:

- the technician confirms that all required system components have been installed
- an initial function test is performed and passed
- a health statement message for the data drive is received and viewed by AFMA

6.2 System Operation

6.2.1 Function Tests

In order to ensure that the e-monitoring system is functioning properly, the system is equipped with a user-interactive diagnostic process called a Functionality Test. The test will identify any issues with the system. This test should be performed:

- after any data drives are exchanged
- prior to starting a new trip
- after any lengthy periods of inactivity greater than 14 days □ if there are any suspected issues with the system.

The e-monitoring system logs the results of the Functionality Test for further analysis if required. Regular use of the function test will ensure the e-monitoring system continues to operate effectively, minimising any down time for repairs.

Boat crew will be instructed about how to perform these tests. Detailed instructions will also be distributed to boats and are included in the Archipelago Vessel Operators Guide.

6.2.2 Maintenance

Boat owners/operators are expected to maintain their e-monitoring system in good working order. This includes ensuring any technical issues or damage is reported as well as cleaning camera lenses and ensuring views of catch handling and gear deployment are unobstructed and well-lit.

6.3 Data Drive Management

Data drives will contain all of the sensor data (cruise track and sensor inputs) as well as the video imagery of fishing events. These drives will need to be sent to a central location, AFMA's Canberra offices, for

processing in order to produce a final record of fishing activities and catch. Pre-addressed satchels will be provided to send data drives to AFMA, similar to the envelopes used to send logbooks in.

6.3.1 Data Drive Exchange

Boat crew will be instructed about how to perform the drive exchanges. Detailed instructions will also be distributed to boats and are included in the Archipelago Vessel Operators Guide.

Drives will be exchanged on a monthly basis or as directed by AFMA.

6.3.2 Shipping

Data drives will need to be shipped to AFMA's Canberra office within 24 hrs of the drive being removed or the boat returning to port. Pre-paid, addressed bags will be provided to boats for this process.

Blank drives will be returned to boats. Return addresses for data drives must be included on the Vessel Registration form provided to boats. As with other documents, these will be distributed to boats and available through the contractor, Archipelago Asia Pacific (AAP).

6.4 Operational Requirements

6.4.1 Regulatory Aspects

When is e-monitoring required?

A boat must have an e-monitoring system installed if it meets the qualification criteria set out in this document.

Once the system is installed by AAP, the unit must remain switched on at all times unless an exemption is granted by AFMA.

When fishing in a fishery that is subject to e-monitoring, the e-monitoring system on that boat must be fully operational at all times unless there is a system interruption as defined below.

Provided an operational VMS unit is fitted to the boat, e-monitoring systems may be powered off, when the boat is in port.

How is e-monitoring mandated?

The requirement to fish with an operational e-monitoring system is set out in concession conditions, fishery directions and the *Fisheries Management Act 1991*.

How is a boat notified that it must have an e-monitoring system?

AFMA will write to all operators that meet the qualification criteria for 2014-15 advising them of the requirement to operate e-monitoring equipment. In addition to fishing concession conditions, information will also be included in the Management Arrangements Booklet for each fishery as well as on the AFMA website.

What paperwork do I need to do?

Operators are required to continue to complete Daily Fishing Logs and Catch Disposal Records as specified in management arrangements for their fishery. Operators that catch Southern Bluefin Tuna also need to complete SBT Catch Monitoring and Catch Tagging forms.

6.4.2 System Interruptions

Where an e-monitoring unit is not fully operational the operator must contact AAP immediately and make all reasonable attempts to repair the system. Where the system cannot be immediately repaired the operator must take all reasonable steps to make the boat available for the e-monitoring unit to be repaired at the earliest time agreed with AAP.

What if the e-monitoring system is not fully functioning prior to departing for a new trip?

A boat may only commence a fishing trip without a fully functioning e-monitoring system where:

- the area to be fished is not in the Australian Sea Lion Management Zones, the Coorong Dolphin Zones or 100% monitoring zones specified in the Upper Slope Dogfish Strategy
- AAP has been notified on the contact details below □ a time has been scheduled with AAP to repair the unit.

Should the fault be identified out of business hours and the boat intending to depart, the operator must contact AAP on the next business day to schedule a time for the unit to be repaired.

What if the e-monitoring system ceases to be fully functional mid-trip?

In the event that the e-monitoring system ceases to be fully functional during a trip the operator may finish their trip provided:

- the boat is not fishing in the Australian Sea Lion Management Zones, the Coorong Dolphin Zones or 100% monitoring zones specified in the Upper Slope Dogfish Strategy
- AAP have been notified on the contact details below
- a time has been scheduled with AAP to repair the unit before commencing a subsequent fishing trip.

For the purposes of satisfying the above notification requirements AAP and AFMA contact details are as follows:

Archipelago Asia Pacific

Operations Manager

Phone: 02 6162 1192

Email: service@archipelago-ap.com.au

Australian Fisheries Management Authority

E-monitoring Manager

Phone: 02 6225 5555

Email: emonitoring@afma.gov.au

6.5 Technical Support

6.5.1 Communication

The e-monitoring system will enable the boat's crew to determine if the system is working properly. There will be a screen on the boat that displays the health of the system and what the cameras are recording.

If there is an e-monitoring equipment breakdown, the boat must report to AAP, as soon as it is known, to resolve the issue. After returning to port the boat must not depart from port again unless it is in area with coverage less than 100% and a service appointment has been booked with AAP.

The contractor will respond quickly to requests for e-monitoring repair and will maintain a number of spare systems to minimise any delay to fishing operations. In cases where the delay is longer and the fisher is not in an area requiring 100% monitoring, AFMA will consider allowing a boat to go fishing.

The e-monitoring equipment has a warranty, however, if it has been determined that damage has been caused by or as a result of the concession holder not taking proper care of it, or by intentionally damaging it, then the cost of repairs or replacement will be charged directly to the concession holder.

6.5.2 Service Ports and Responses

AFMA and AAP will advise industry on which ports will be fully supported with service technicians and what arrangements will apply in other ports.

7 Data Processing and Delivery

There are two different aspects to processing e-monitoring data. Firstly, e-monitoring health statements are near real time reports of boat position, boat activity and e-monitoring system status. This data is monitored routinely, primarily to assist in e-monitoring program operational planning. This data informs fleet activity, the e-monitoring system data storage capacity of different boats and the e-monitoring system operational status. This information will be used to help plan communications with boats, arrange service trips when boats are in ports, and determine optimal strategies for planning field service activities.

The second aspect of e-monitoring data processing occurs with the review of video and sensor data by an analyst.

7.1 Data Processing Requirements

7.1.1 GHAT

In order to determine the fishing activity for any given trip, the sensor data (locations, gear activity) on all trips will be processed in order to determine:

- data set completeness
- presence of any time gaps (i.e. temporal breaks in the data set, indicating periods when the e-monitoring system was not operating)
- time and location of all fishing events
- fishing operations occurred in permitted areas.

Imagery will be randomly sampled to determine:

- compliance with seabird mitigation measures (autoline only)..
- an inventory of catch items by species, number and fate and life status (i.e., retained or discarded) for 10% of the fishing events.
- a measurement of lengths for a sub sample of shots (sampling protocols and handling requirements are currently being developed).

In addition to the above, Gillnet boats with fishing operations within the South Australian sector will be subject to a 100% review of catch retrieval imagery for TEP species (the 10% review for catch inventory shall count as part of this requirement i.e., there will be 90% review for TEP species).

7.1.2 Tuna and Billfish Fisheries

In order to determine the fishing activity for any given trip, the sensor data (locations, gear activity) on all trips will be processed in order to determine:

- data set completeness
- presence of any time gaps (i.e. temporal breaks in the data set, indicating periods when the e-monitoring system was not operating).
- time and location of all fishing events.
- fishing operations occurred in permitted areas.

Imagery will be randomly sampled to determine:

- compliance with seabird mitigation measures.
- the number of catch items by species and dispositions (i.e., retained or discarded).

This will be a random sample of 10% of the fishing events.

7.2 Definitions

7.2.1 Fishing Activity

A fishing trip under the Program will be defined as the period of time between leaving the port to commence fishing activity and returning to port.

7.2.2 Catch Disposition

For the purposes of the e-monitoring program, definitions of catch will be as follows.

Catch item: Any catch item retained on fishing gear and handled by boat crew..

Released: All catch that is released or discarded at-sea and not landed. For items released, the analyst will note following fates:

- discarded (landed onto the boat but not retained)
- jerked free (jerked free without landing)
- cut free (cut free without landing) □ escaped (fish fell off or bitten off) and □ tagged (tagged and returned alive).

Life status: Life status will only be used for animals that are released. These include dead or damaged, Alive and sluggish and Alive and vigorous.

Retained: All catch that is kept by the boat and landed. For e-monitoring, fish retained in view of the camera but subsequently discarded outside of the camera view will be considered to be retained catch.

7.2.3 Shot Selection

A key element to the program will be in resolving catch for 10% of the fishing events. In order to facilitate selection in a practical manner, selected shots to review will be based on a random selection of shots on a single data drive (as the total number required is known). For any drive, a minimum of one shot will be reviewed.

7.3 Data Delivery and Custodianship

Once the e-monitoring data drive is filled with data and footage, or 30 days has elapsed, the data drive will be sent by the operator to AFMA. The data drives that store the e-monitoring data are encrypted so that the data cannot be accessed until it reaches AFMA. At AFMA, an image of the data drive will be made and the data drive will be sent to AAP for analysis.

Once processed, all analysed data are uploaded to AFMA via secure methodologies. AFMA will remain the custodian of data at all times.

7.4 Boat Reporting and Feedback

In order to provide boats with the best information on how their e-monitoring system is performing AAP will provide a report to fishers after each data drive exchange on the quality of the footage and any issues that affect analysis of the video footage. This includes any issues that affect species identification, counts, released and discarded fish and adherence with handling requirements for measuring fish (where applicable).

To inform fishers of how their fishing log data compare to those from e-monitoring, AFMA will provide a report to fishers after each data drive has been analysed that outlines how closely their logbook data matches the e-monitoring audit. This report will cover catch composition and protected species reporting.

7.5 Other Data Elements

Comparison of e-monitoring data to other fishery data, such as logbooks, is dependent on the timely submission of the other data. For example, shot-based release and discard comparisons will require Fishing Log Data to be complete and available.

7.5.1 Fishing Log

Reporting and submission requirements

All Daily Fishing Logbooks in the ETBF, WTBF and GHAT fisheries are required to be completed for each shot whilst fishing. The completed log pages must be returned to AFMA within 3 business days of the completion of each trip.

7.5.2 CDR

Reporting and submission requirements

CDR records are generally required to be complete in the first part by the concession holder or their agent at unload before the fish are moved more than 50 metres from the boat. The Fish Receiver Permit holder must complete their part of the CDR immediately upon receipt of the fish and before the fish are placed with any other fish that are not part of the same consignment.

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Both parts of the CDR or the electronically produced CDR's are required to be sent to AFMA within three business days of the unload date.

8 Privacy and Security

8.1 Privacy safeguards

Various safeguards apply to the disclosure of personal or commercial information. For example, AFMA may prevent or limit this information being passed to others, and where personal information is not relevant to the purpose of the disclosure, the personal information can be obscured.

The *Freedom of Information Act 1982* (FOI Act) applies equally to data in written form or in visual form, such as video footage.

If a request is made under the FOI Act for access to e-monitoring footage, the footage may be exempt from disclosure on a number of grounds. These grounds include that the information has commercial value that could reasonably be expected to be destroyed or diminished if the information were disclosed, or where the footage contains personal information.

In that circumstance, AFMA would first consult with the person(s) who may be affected by the release. The affected person(s) would have review rights in the event that AFMA decided that the information should be released.

8.2 Data Encryption

During the operational phase of the e-monitoring program, e-monitoring footage will be encrypted at the time of recording. This data will only be able to be reviewed with the use of an encryption key. Encryption keys will be held by AFMA and AAP personnel only.

8.3 Data Release and Distribution

As with all information it collects, AFMA must be able to use and disclose e-monitoring data (including video footage) where this is necessary to carry out its functions under the *Fisheries Management Act 1991* and *Fisheries Administration Act 1991*.

This includes disclosure to other government agencies of data that relates to:

- possible breaches of the law
- the administration and management of fisheries and marine environments
- research or monitoring about marine fisheries or environments
- other laws which would potentially require AFMA to disclose data, such as the FOI Act, or by court order.

AFMA cannot lawfully disclose information unless authorised or required by law.

9 Program Performance Review

9.1 Initial Review

The initial review will take place after 30 June 2015. This process will include a review by industry coordinated by the Commonwealth Fisheries Association as well as a review against outcomes and performance measures conducted by AFMA and AAP.

9.2 Ongoing Review and Evaluations

9.2.1 Program Objectives

AFMA and AAP will annually review performance against program objectives. This will include a report against:

- accuracy of logbook reporting and
- efficient and cost effective delivery of services.

9.2.2 Financial Reviews

Financial performance, including cost recovery arrangements will be reviewed annually through AFMA's existing budgetary process. This includes extensive consultation with fishers and industry representatives.