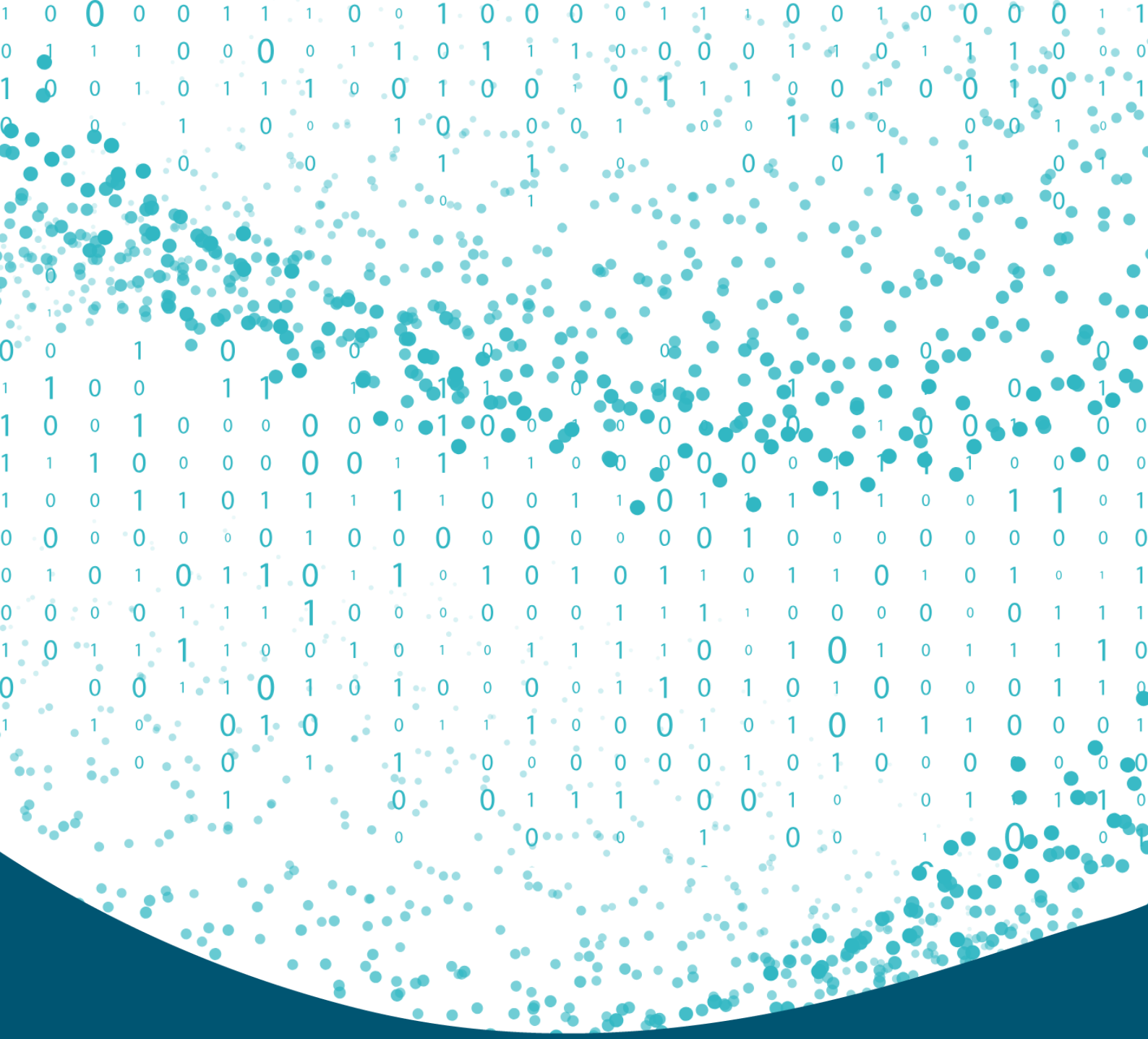

Options to implement independent onboard monitoring in Queensland trawl fisheries

Consultation impact analysis statement

July 2025

Queensland Government

This publication has been compiled by Fisheries Queensland.

The Department of Primary Industries proudly acknowledges all First Nations peoples (Aboriginal peoples and Torres Strait Islanders) and the Traditional Owners and Custodians of the country on which we live and work. We acknowledge their continuing connection to land, waters and culture and commit to ongoing reconciliation. We pay our respect to their Elders past, present and emerging.

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Executive summary

Independent monitoring and validation of commercial fishing activities is critical to improve the understanding of protected species interactions, the ecological risks associated with fishing activities and confidence in the logbook information being reported, as well as ensuring that accurate and reliable information is available to inform evidence-based management decisions.

While Fisheries Queensland has existing processes support the independent monitoring and validation of commercial fishing activities and data, there are still challenges with the ongoing validation of some data – specifically interactions with threatened, endangered and protected (TEP) species and monitoring non-retained catch (bycatch). This is because TEP species and bycatch are discarded while fishing at sea, and there are no mechanisms currently in place to validate or monitor these interactions.

Evidence from the implementation of improved independent monitoring and validation methods in other commercial fisheries, such as the Queensland NX fishery and Fisheries New Zealand, suggests that self-reporting of TEP interactions is underestimated before establishment of such methods.

Independent onboard monitoring (IOM) methods, including onboard camera systems and independent onboard observers, are the primary tools available to independently validate commercial fishing interactions with TEP species and bycatch.

The East Coast Otter Trawl Fishery (ECOTF) (T1, T2, M1 and M2 symbols) and Commercial Fin Fish Trawl Fishery (CFFTF) (T4 symbol) are priority fisheries for IOM due to their associated risk with the collection of non-target species and TEP species interactions and the need to satisfy time-bound *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) approval conditions to maintain export approvals. The ECOTF and CFFTF are important contributors to the Queensland economy contributing an estimated $127.85 million (indexed to 2024) in Gross Value of Production (GVP) to the State and employing 1,170 Full-Time Equivalents (FTE) (direct and indirect).

Failure to implement IOM methods is expected to have several implications for the commercial fishing industry and broader Queensland economy, including:

- loss of approvals under the EPBC Act, which is required to permit the export of product harvested from the fishery (Part 13A) and protect commercial fishers from prosecution under the Act for unintentional interactions with TEP species (Part 13)
- potential review of access arrangements within the Great Barrier Reef Marine Park (GBRMP) under Commonwealth legislation
- reassessment implications regarding the World Heritage status of the Great Barrier Reef (GBR).

This consultation impact analysis statement (IAS) examines feasible options to achieve the objective of government action to maximise the social, economic and ecological values of Queensland's fisheries resources through improved monitoring and independent validation of commercial fishing data, which requires balancing between competing uses both now and through the future.

This consultation IAS presents **2 options** for consideration.

Option 1 - Maintain the status quo

This would mean NOT implementing any new independent monitoring and validation methods across high-risk trawl fisheries. Failure to implement IOM is expected to have several consequences for the east coast trawl fisheries, including the loss of export approval, potential access to regions of the GBRMP and may impact the World Heritage status of the GBR.

Option 2 - Implement IOM in the ECOTF and CFFTF

This would mean the use of electronic monitoring (e-monitoring) systems onboard priority trawl vessels to monitor and validate interactions with protected species. The following 3 effort-based scenarios have been considered, including:

- Level 1 – 100% of CFFTF and ECOTF vessels
  or
- Level 2 – 100% of CFFTF vessels and ECOTF vessels that account for 90% of fishing effort
  or
- Level 3 – 100% of CFFTF vessels and ECOTF vessels that account for 25% of fishing effort.

The consultation IAS recommends Level 2 as the preferred option to achieve the objective of government action. The use of e-monitoring systems is proposed over other methods, such as onboard observers, as they are a more cost-effective method over the long term and can support an ongoing representative monitoring and independent validation program. Key IOM program components are also discussed including program objectives and other key design considerations, including scope, implementation timelines and other operational requirements.

Combined Queensland and Australian government funding is available to support the establishment of an IOM program over 4 years. It is proposed that part of this funding would be applied over 4 years to support establishment of the program. This proposed funding arrangement will mitigate any impacts of the direct cost of establishing an IOM program over the first 4 years. It is also proposed that a review would be undertaken after 2 years of implementation and further consultation to support a decision regarding the ongoing costs and management arrangements of a program.

The following table indicates the present value (PV) costs over 10 years associated with the establishment of an IOM program under each effort-based scenario and the expected annual ongoing costs (all valued at 2024 prices). The table is divided into costs associated with the 4-year establishment stage, and then ongoing average annual costs (and ongoing benefits). The financial benefits associated with the establishment of IOM are the same for each option, estimated at $204,575,426 in terms of current GVP – the value of landed catch, but only $2,786,957 in terms of Net Economic Return (NER) – which includes total GVP less costs for labour, materials and services, depreciation and opportunity costs of capital, but excludes government management costs.

This consultation IAS will help inform the preparation of a decision IAS, which will be used to develop the regulatory framework of an IOM program for the ECOTF and CFFTF.

Any legislative changes required to introduce an IOM program across high-risk trawl fisheries would be made according to the regulatory assessment requirements with respect to competitive impacts, fundamental legislative principles, and human rights considerations.

Option	Total establishment costs (4 years)	Ongoing average annual costs*
100% all vessels (361)	$19,969,364	$3,225,142
100% active (245)	$14,805,510	$2,481,885
90% (166 vessels)	$10,942,993	$1,891,634
25% (32 vessels)	$3,647,375	$702,753
	Total establishment benefits	**Ongoing annual average benefits**
GVP	$204,515,426	$29,215,241
NER	$2,786,957	$398,120

**These are indicative costs across all vessels (361) not just vessels fitted with e-monitoring systems.*

Purpose of this consultation IAS

What is an IAS?

An IAS is an assessment of the potential impacts of a regulatory proposal. An IAS must be completed for new and amendment regulatory proposals, with the level of information, analysis, and consultation proportionate to the likely impact of the proposal.

For more information on the IAS process, visit gpc.qld.gov.au/.

This consultation IAS is about the proposal to introduce a regulatory framework under the **Fisheries (Commercial Fisheries) Regulation 2019** to support the establishment and delivery of an IOM program across high-risk trawl fisheries.

A crucial element in developing any regulatory proposal which may have substantial impacts is the preparation of a consultation IAS, which uses a systematic approach to critically assess the impacts of proposed regulatory options. It is designed to obtain feedback, through a public consultation process, to provide government with information about the expected impacts of a range of policy options to address a particular issue.

The consultation IAS seeks to determine a preferred course of action, considering the costs and benefits of each option:

- It assesses the impacts associated with introduction of a mandatory IOM program (for an initial 4 years) across high-risk trawl fisheries, compared to the base case of maintaining the status quo.
- It identifies where the impacts of introducing these new regulations may have a cost or benefit to commercial fishers, fishing businesses, the broader commercial fishing industry, the general public, and Queensland and Australian governments – specifically addressing the impacts on fisher privacy.

Next steps

Industry consultation will be undertaken to support submissions and feedback on the options proposed.

We will collate the feedback provided by industry on this consultation IAS and develop a decision IAS outlining the final options.

More information

Email: datavalidation@dpi.qld.gov.au

Call: **13 25 23**

Have your say

The Queensland Government will consider the impact of the proposed reforms and all public feedback provided on the consultation IAS before deciding on a recommended option or making regulatory changes.

Questions are provided below and throughout this document to help you provide feedback in response to this consultation IAS. Please provide any evidence you can to support your comments.

To submit your feedback:

- **complete the online survey** at dpi.engagementhub.com.au
- **email** your feedback to datavalidation@dpi.qld.gov.au
- **post** your written feedback to:

  Independent Onboard Monitoring IAS
  Fisheries Queensland
  GPO Box 46
  Brisbane QLD 4001

Consultation closes **5 pm, 24 August 2025**.

Questions to consider

- **Do you support the proposal to establish an IOM program across the ECOTF and CFFTF that uses e-monitoring systems?**
  Are there other options or methods to support the monitoring and independent validation of commercial fishing data that should be considered?
- **Do you agree with the risk-based staged implementation of an IOM program across priority trawl fishing vessels?**
  How should vessels be prioritised? What other considerations should be included in the rollout of a program?
- **Do you support the draft IOM program objectives?**
  What changes or other program objectives should be considered?
- **Do you agree with the proposed roles and responsibilities of government and commercial fishers to support delivery of an IOM program, including the operational requirements of commercial fishers?**
  Are there other requirements that should be considered? Should government be responsible for other components of a program?
- **Do you support government funding the establishment of an IOM program, with a review after 2 years of implementation to inform ongoing management?**
  Who should be responsible for the ongoing funding of an IOM program?
- **Do the identified benefits and costs for the options in this consultation IAS adequately capture the factors that should be considered in making a decision?**
  Are there any inaccuracies? What other factors should be considered?
- **Any other questions or comments?**

1 Introduction

1.1 How to use this document

References to information used to compile this consultation IAS are marked with numbers – e.g. (1) – which correspond to the reference list at the end of this document.

To help you provide feedback, a series of coloured boxes are used to highlight questions to consider, proposed government actions and other key information.

Questions to consider

Proposed government action

Important and supporting information

1.2 Background

Commercial fishing plays an important role in supporting Queensland's economy, coastal communities and the supply of fresh seafood to domestic and international markets. Like any primary industry, there are ecological and environmental risks that need to be considered, particularly given Queensland's unique marine environment and stewardship of the Great Barrier Reef World Heritage Area (GBRWHA).

Accurate and reliable data is a cornerstone of the sustainable management of fisheries resources and the assessment of the risks of commercial fishing to broader ecological communities (1). Enhanced validation of commercial fishing data improves confidence that the data being used to support scientific assessments is accurate and reliable, and any subsequent management action is supported by science.

In the context of commercial fisheries data, data validation is the process of verifying that the catch and effort information provided by fishers is accurate and can be relied upon to make evidence-based management decisions. Independent data validation achieves this by comparing data from 2 different sources – for example, data provided by fishers (e.g. logbook records) and data provided by a third party or another independent source (e.g. observer records or observations from the review of onboard camera footage). The independent validation of commercial fishing data enhances our ability to detect any errors or biases in the data, subsequently improving confidence in the information being reported and used for scientific assessments to support management decisions.

Fisheries Queensland has operated a formalised statutory data collection program since 1988, requiring commercial fishers to complete and submit logbooks with daily catch and effort records. Commercial catch and effort information prior to 1988 is available through a variety of methods, including records from the Queensland Fish Board and surveys conducted by Fisheries Queensland. Since 2000, fishers have also been required to report the number and fate of any interactions with TEP species as a requirement of the EPBC Act. Mandatory vessel tracking devices were also implemented in 2018 and support the monitoring of vessels and fishing effort.

While daily catch and effort data has been provided by Queensland's commercial fishers for more than 30 years, only a handful of these records have been independently validated and, at present, there are limited mechanisms for confirming the accuracy and reliability of this important data. This is particularly true for non-retained catch and TEP species interactions, which cannot be validated unless the event is independently observed or captured on camera at the time it occurs. In contrast, retained catch can be validated when the fishing vessel returns to shore via port inspections and other reporting measures, while effort data can be validated using vessel tracking data or 'effort signatures' derived from this data. See **Table 1** for an overview of the independent data validation methods available and the commercial fishing data to which they apply.

E-monitoring systems and onboard observers are the 2 methods commonly used to independently validate all aspects of commercial catch (i.e. target species and byproduct, non-retained catch, interactions with TEP species and effort (**Table 1**). While there are existing data validation methods and measures in place, there is currently no method in use to independently validate non-retained catch or TEP species interactions across most of Queensland's commercial fisheries.

The need to provide independent monitoring and validation of interactions with TEP species and bycatch is under increasing scrutiny from Australian Government agencies (2), environmental organisations and the wider community (3). Effective methods to independently validate this data are required to improve the ability to monitor and validate interactions with these species and ensure the data being recorded and used for fisheries management decisions is accurate and reliable.

Table 1: The different methods of independent monitoring and the data to which they apply

Independent monitoring method	Catch			Effort		
	Target species & byproduct	Non-retained catch	TEP species interactions	Fishing location	Fishing duration	Type and amount of gear used
Vessel tracking				●	◒	
Effort signatures*				●	●	◒
E-monitoring systems	●	●	●	●	●	●
Onboard observers	●	●	●	●	●	●
Port inspections	●					◒
Forensic audits**	●					

Notes:

- ◒ Inferred information
- ● Methods currently in use
- ● Methods being considered

* Effort signatures are algorithms that use vessel tracking data in conjunction with detailed knowledge of fishing practices and vessel speed rules to identify patterns that typify fishing activity. Originally developed for trawl fisheries they also show promise for use in other fisheries (e.g. line, net, trap).

** Forensic auditing involves the comparison of catch disposal records with sales dockets to independently confirm the catch weight of quota-managed species.

1.3 High-risk fisheries

Proposed government action

- Prioritise the establishment of an IOM program across the ECOTF and the CFFTF.
- Consider establishing an IOM program for the Gulf of Carpentaria inshore fishery and remaining east coast inshore fishery fishing symbols following field trials.

Fisheries Queensland manage 27 wild-harvest commercial fisheries across the Queensland east coast and Gulf of Carpentaria. These fisheries differ significantly in the gear used, target species and risk to TEP and bycatch species. While the introduction of improved monitoring and independent validation may be desirable across all commercial fisheries, there are costs associated with the establishment and ongoing delivery of a program. For this reason, a risk-based assessment was undertaken to prioritise the high-risk fisheries. Key considerations included in the prioritisation processes included fisheries that:

- have a higher likelihood or risk of interacting with bycatch, TEP species and/or other ecological communities identified through ecological risk assessment (ERA) processes
- operate under EPBC Act approvals with conditions requiring the independent validation of TEP species and bycatch
- operate within, or have significant spatial fishing overlap with, regions of the GBRWHA or represent a greater risk to its ecological values.

This risk-based assessment has identified the large mesh gillnet and trawl fisheries as high-risk fisheries to be prioritised for IOM (**Table 2**). This is largely because they represent a high risk to TEP species and bycatch or operate under EPBC Act approvals with conditions requiring IOM programs to provide independent monitoring and validation of data.

A detailed overview of the analysis is provided in Attachment 1, which identified that stationary large-mesh netting activities in the east coast inshore fishery and Gulf of Carpentaria inshore fishery are high risk and a high priority for improved monitoring and independent validation. These fishing operations are authorised under the NX and N15 symbols (formerly N1, N2 and N4) in the east coast inshore fishery and N3, N12 and N13 symbols in the Gulf of Carpentaria inshore fishery. Other netting operations in the east coast inshore fishery (i.e. tunnel netting (N10) and small mesh netting (N11) symbols) and ocean beach fishery (K symbol) present a lower risk and are therefore not a priority.

The ECOTF (T1, T2, M1 and M2 symbols) and CFFTF (T4 symbol) have been classified as intermediate–high and intermediate risks respectively (Attachment 1). These trawl fisheries are considered the highest priority for IOM due to:

- the risk associated with the collection of non-target species and TEP species interactions
- the need to satisfy time-bound EPBC Act approval conditions to maintain the ability to export (4)
- the need to maintain access to the GBRWHA for the ECOTF, which derives more than $56.29 million in GVP from these valuable fishing grounds.

In the CFFTF, a voluntary program using onboard observers has been established to satisfy the EPBC Act approval conditions in the short term and maintain export approvals.

Other fisheries have not been prioritised improved monitoring and independent validation at this time, as they are not as high a risk to TEP and bycatch species, and do not require improved independent monitoring and validation under EPBC Act approval conditions.

While not all commercial fisheries have been prioritised, Fisheries Queensland continues to improve the independent monitoring and validation of commercial fishing data across all Queensland commercial fisheries under the *Fisheries Data Validation Plan* issued in 2018, including continued improvements though time – see section 3.1 for more information on *Fisheries Data Validation Plan*.

Table 2: Summary of high-risk fisheries and fishing symbols prioritised for IOM programs

Fishery	Fisheries symbols	Activity
East coast otter trawl fishery	T1, T2, M1, M2	Trawling
Commercial trawl fin fish fishery	T4	Trawling
East coast inshore fishery	NX, N15	Large mesh netting
Gulf of Carpentaria inshore fishery	N3, N12, N13	Large mesh netting

1.4 Types of IOM

IOM includes the use of e-monitoring systems or onboard observers to support the independent monitoring and validation of commercial fishing interactions with TEP species and bycatch. A detailed description of each validation method, as well as a general overview of how an IOM program operates, is provided below.

1.4.1 E-monitoring systems

The use of e-monitoring systems began around 20 years ago on Canada's west coast (5). There are now around 2000 e-monitoring systems in use in fisheries around the world on vessels large and small.

E-monitoring involves the use of digital camera systems to monitor and record fishing activities. The e-monitoring systems used across fisheries differ based on vessel size, the availability of permanent power to operate the equipment and the length of fishing trips (i.e. single or multi-day trips).

E-monitoring systems for smaller vessels often only consist of a small battery powered camera with limited integration into vessel components. For large vessels, e-monitoring systems often include a central control unit, video monitor, several cameras, GPS aerials and winch and hydraulic sensors.

Video footage is captured during at-sea fishing operations, generally during the times when fishing apparatus is being used and any interactions with TEP species or bycatch are able to be observed. The recorded camera footage is later reviewed for any interactions and compared to the reported logbook information, which would ideally be entered and submitted electronically. The comparison of observations made during the review of camera footage with the information reported by the fisher supports the independent validation of commercial data.

1.4.2 Onboard observers

Onboard observers are trained personnel with fishing industry experience and/or fisheries management or environmental science qualifications. Observers are deployed on a commercial fishing vessel to observe fishing practices and document information about catch (both target and non-target species) and effort (i.e. the amount and type of gear used, fishing location and duration).

They work according to standard methods and protocols to ensure data collected by different operators is consistent and comparable. Observers may also collect biological information such as the length and sex of a fish, or otoliths (fish ear bones) that can be examined later under a microscope to determine their age.

Observers have been used in fisheries worldwide for several decades. They provide fisheries managers with reliable, verified and independent data and information on fishing practices that can be used to validate logbooks, inform fisheries management decisions and provide greater confidence in fisheries data.

Onboard observers are only suitable for larger boats that can safely accommodate an additional person. They are not suitable for the majority of Queensland's large mesh net fleet, which is predominantly comprised of small (5–8 m) boats.

1.4.3 How IOM methods are used to validate commercial fishing data

Logbook data is validated in slightly different ways, depending on the IOM method used. Onboard observers record data on catch, effort and fishing methodology while they are onboard the vessel. Observers can often also collect samples of the catch to support the collection of additional biological information, such as length and weight. They generally record the information on paper or digital equipment such as iPads or tablets. After the fishing trip is complete, the observer records are uploaded to a database and compared against the logbook records.

E-monitoring systems automatically collect camera footage and other sensor data while the vessel is fishing. Recorded video footage and sensor data is encrypted by the e-monitoring systems once recorded (meaning it is protected from being accessed by others) and saved to the onboard systems internal memory. When a vessel returns to port following the end of a fishing operation, the camera footage is transferred to an independent third party. Data can be transferred wirelessly through satellite or the 4G network, as well as physically transferred by ejecting and posting the hard drives.

Once the independent reviewer receives the camera footage, they use specialised computer software that de-encrypts the files and supports the review of data. The independent reviewer records their observations while watching the footage and then compares their observations with the logbook records. Following the end of the review, some files are saved for educational purposes (such as species identification or machine learning training), with files deleted following mandatory retention timeframes. An example of the independent logbook validation process using e-monitoring systems is provided in **Figure 1**.

The proportion of e-monitoring footage reviewed or observer trips undertaken will vary according to the objectives and management of an IOM program. However, both of these methods are a critical way of ensuring the accuracy of commercial fishing logbooks. By comparing independent monitoring data with logbook entries, fisheries managers can detect discrepancies, assess compliance and improve data reliability. This helps ensure that fishing quotas, stock assessments and sustainability measures are based on accurate and verifiable data.

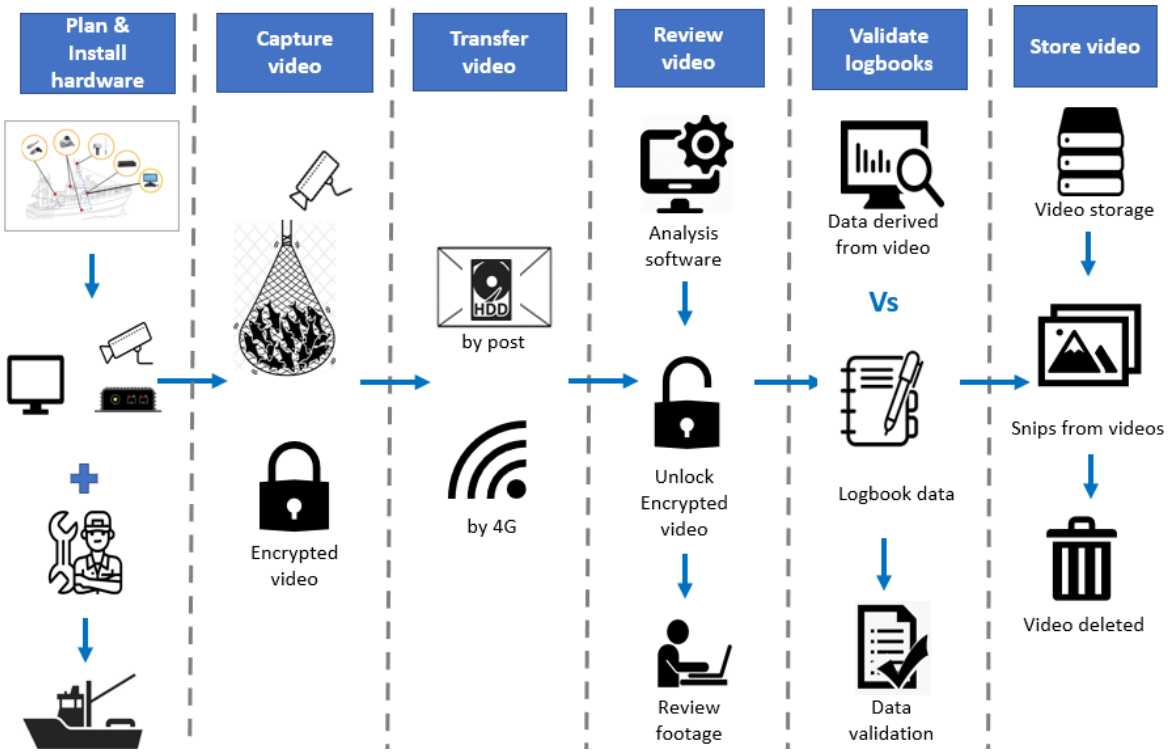

Figure 1: Data validation process using e-monitoring

1.4.4 IOM program services

IOM programs are comprised of several operational and administrative components that differ between each validation method (i.e. onboard observers or e-monitoring systems). For example, onboard observer programs require coordination and deployment of observers onto vessels, onboard collection of structured data, and review and validation of that data against logbook records.

E-monitoring system programs involve the installation and refinement of onboard hardware, training of fishers to use and operate the onboard equipment, IT infrastructure to support the transfer, storage and access of camera footage and other data, review and validation of footage using dedicated e-monitoring software, and ongoing troubleshooting and customer support.

When considering an IOM program that involves the use of e-monitoring systems, there are several providers that might be able to provide the required services. A detailed description of the goods and services required for an IOM program focusing on the use of e-monitoring systems is provided in **Table 3**.

Table 3: Overview of goods and services required as part of an IOM program using an e-monitoring system

Goods/services	Description
E-monitoring hardware and onboard software	All hardware components that are installed onboard the vessel to record at-sea fishing operations. Includes, but is not limited to, cameras, central control units, satellite/GPS aerials, inductive and/or hydraulic sensors, firmware licencing, cabling and brackets.
Data transfer, storage and access	Infrastructure required to support the transfer, storage and access of captured video footage, including the wireless transfer of video footage from onboard hardware and remote access into system central control units for troubleshooting services.
E-monitoring review software	Computer application or cloud-based software/programs to support the transfer, storage and review of onboard camera footage and validation of commercial fishing data.
Installation and maintenance services	Electrical marine contractors and fabricators to install camera hardware on vessels and undertake maintenance of e-monitoring hardware and onboard systems post-installation.
Troubleshooting support and customer support services	Support services for the troubleshooting of e-monitoring systems.
E-monitoring review services	Supply of personnel to manage data transfer, review footage and record derived data.

2 Identification of the problem

2.1 Context of the problem

One of the key risks associated with commercial fishing is the impact of interacting with non-target catch, including TEP and bycatch species. Unfortunately, some level of non-targeted catch is difficult to avoid in some commercial fisheries. This catch can be damaging to marine animals and the wider environment, especially if it is unmonitored or unregulated. Queensland, like all jurisdictions, should be taking steps to collect accurate data on non-target species. This information is critical to understanding the sustainability of fishing operations and making good, evidence-based management decisions.

The simplest form of data gathering is to ask fishers to record their catches. Queensland commercial fishers have been required to submit daily logbooks since 1988. Logbooks provide data on the volume of fish harvested, the amount of effort expended and the number and outcome of TEP species interactions. Reporting all interactions with marine mammals, or any other protected species, has been a legal requirement for commercial fishers since the EPBC Act came into effect in 1999.

Although the reporting of commercial fishing catch, effort and TEP species interactions is generally mandatory in most commercial fisheries, studies within Australia and overseas have shown that commercial fishing logbooks can be subject a number of biases and errors, which diminishes the quality of the data they provide and affects the fisheries management decisions based on these data. Discards recorded in fishing logbooks are often underreported (6; 7; 8), by as much as 90% in some cases (9). Underreporting of catch is likely to occur if discarding catch is illegal (e.g. high-grading in quota-managed fisheries), or if it is known that collecting high levels of non-target species or interactions with TEP species may have negative consequences (including tighter management controls or loss of fishing access rights). On other occasions, underreporting may occur due to the inability to identify non-target species correctly.

For some species, fisheries managers and scientists have found ways to improve the quality of the data or supplement it to provide a more reliable data for management decisions. For example, retained catch can be verified using port inspections, at-sea inspections or improved reporting processes, and cross-checked with sales documents and other evidence. While it is possible to estimate the catch of some non-target species by using information about retained catch population models and data collected from fishery-independent surveys, this information is difficult to validate without accurate data from real at-sea fishing observations. This is particularly true for rarer events such as interactions with TEP species.

These potential data deficiencies can have serious consequences. Decisions based on poor data pose a risk to the sustainability of individual fish stocks, TEP species populations and the broader marine ecosystem. Without accurate and reliable data, fisheries managers may be forced to take a precautionary approach and introduce heavier restrictions until more data is available. This includes precautionary decisions in response to unknown sustainability impacts to target, bycatch or TEP species. Other management authorities responsible for conservation of regions or habitats accessed by commercial fishers may also be required to act under the precautionary approach and review access arrangements. However, with access to high-quality data, fishery managers and other management authorities can be confident in their assessment of stocks and less conservative in the allocation of catch.

A lack of data may lead to non-action and unsustainable practices, with long-term consequences for fisheries resources, the marine ecosystem and the profitability of the fishing industry. Many issues of sustainability are better addressed as early as possible, as any delay in action due to data deficiencies may lead to harsher restrictions. Sustainability risks may also produce concerns among the community, which can lead to loss of public confidence in the sustainability and ethics of fishing practices, lower demand for seafood and further pressure to implement restrictions on fishing.

At present in Queensland, there is limited capacity to support the independent monitoring and validation of commercial fishing operations, specifically with regards to TEP and bycatch species as they are discarded while fishing at sea (**Table 1**). The introduction of IOM methods is required to improve the ability to monitor and validate interactions with these species, ensure data being recorded and used for fisheries management decisions is accurate and reliable, and ensure fishing is not having a detrimental impact on ecological communities. Overall, the lack of mechanisms to independently monitor and validate commercial fishing interactions with TEP and bycatch species falls short of Australian Government requirements (2) and the community's desire for best practice fisheries management as indicated through the *Green paper on fisheries management reform in Queensland* (10) consultation process.

Continued inaction to improve the monitoring and validation of commercial fishing interactions with TEP and bycatch species may have negative implications for the health of the marine environment and will result in the loss of EPBC Act export approvals for trawl fisheries, which are valued at around $8 million per annum. Other estimates suggest the export value of the ECOTF is significantly higher at around $40 million per annum (11).

Also, the future of Queensland's valuable commercial fishing industry, would be significantly impacted if access to fishing grounds in the GBRMP is restricted. Approximately 44% of the annual ECOTF catch is accessed within the marine park boundaries (valued at $56.29 million), including the value of external exports from the marine park (apportioned midpoint from total exports). Clearly any limitation on access to the GBRWHA will have a significant financial impact on the ongoing viability of these fisheries.

2.2 Key drivers for implementing IOM

There is an ongoing need to provide for the independent validation of commercial fishing data. At present, there are limited ongoing fishery monitoring or validation methods established across Queensland's commercial fisheries that can monitor and validate TEP species interactions and bycatch.

There are several drivers behind the need to introduce IOM programs across some of Queensland's commercial fisheries, including:

- conditions of EPBC Act approvals
- commitments in the *Reef 2050 long-term sustainability plan: 2021–2025*
- recommendation 7 of the United Nations Educational, Scientific and Cultural Organization (UNESCO) 2023 *Report on the reactive monitoring mission to the Great Barrier Reef, from 21–30 March 2022*
- commitments in the *Queensland Sustainable Fisheries Strategy: 2017–2027*.

There is also evidence that suggests inaccuracies and/or deficiency in some fisheries data affects the sustainable management of commercial fisheries and the broader marine environment. These issues are discussed below.

2.2.1 Commonwealth EPBC Act approvals

The EPBC Act requires the Australian Government to assess the environmental performance of fisheries and promote ecologically sustainable fisheries management (12). All Australian fisheries that export product or have the potential to interact with TEP species in Commonwealth areas must be assessed and approved under the EPBC Act.

To demonstrate this, the management arrangements of each fishery are assessed against the Commonwealth *Guidelines for ecological sustainable management of fisheries* (13). These guidelines outline specific principles and objectives for evaluating the ecological sustainability of fishery management arrangements.

An export approval is generally under a 3-year wildlife trade operation (WTO) approval under Part 13A of the EPBC Act, while the Part 13 (TEP species interactions) accreditation does not have an end date. Any outstanding risks to target stocks, bycatch or the ecosystem identified in the assessment may be addressed as the conditions of approval. Conditions can be applied to the Part 13A export approval, the Part 13 accreditation, or both.

An EPBC Act approval may be revoked if approval conditions have not been achieved within the specified timeframe.

The revocation of, or failure to obtain, EPBC Act approvals can have significant implications on commercial fisheries.

- A WTO approval under Part 13A of the EPBC Act permits export of product harvested from the fishery. Without this approval, no product from the fishery can be exported. This can have significant implications for fisheries, or individual commercial fishing businesses that rely on the export of product. In some circumstances, the access to export markets can also improve the domestic price of products, with less stock sold on local markets.
- Part 13 accreditation provides commercial fishers protection from prosecution under the EPBC Act for any unintentional interactions with TEP species while legally fishing in Commonwealth waters. Deliberate interactions with TEP species, or interactions that occur without Part 13 accreditation are subject to serious penalties (fines of up to $330,000 or 2 years imprisonment) (12).

Apart from direct costs to fishers and the broader seafood industry from the loss of exports, the loss of EPBC Act approvals and the ability to demonstrate the sustainable management of commercial fisheries could also reduce public support and community acceptance of commercial fishing activities.

Currently, there are 13 commercial fisheries within Queensland that have export approvals under the EPBC Act, 8 others have expired and 4 have been revoked (14). The expiry of other fishery export approvals occurred as these fisheries did not rely on the export of product and subsequently did not require the Part 13A accreditation to do so. Details of all the WTO approvals for Queensland fisheries, visit the Australian Government **Department of Climate Change, Energy, the Environment and Water** (DCCEEW).

Under some of the existing WTO and Part 13 approvals for Queensland commercial fisheries, timebound conditions relating to the design, commencement and/or delivery of improved monitoring and data validation programs exist. These fisheries include the ECOTF and the CFFTF – both of which export product:

- ECOTF (approx. $8 million in exports per annum) – requires independent data collection and validation of TEP species interactions to commence by 15 June 2026 (details below)
- CFFTF (estimated to be approx. $2 million in exports per annum, however no economic statistics are available to support this assumption) – required independent data collection and validation to commence from 31 August 2024 (in the short term, this requirement is being addressed through the voluntary use of onboard observers).

Current data validation methods in these fisheries only address retained catch (through port inspections) and fishing location (using vessel tracking) (see **Table 1**). There is no permanent mechanism to independently monitor and validate TEP species interactions and bycatch, and effectively address the EPBC Act approval conditions. The need to design and implement IOM methods across these fisheries that support the independent monitoring and validation of commercial data is not new – it has been an ongoing requirement. For the ECOTF, an onboard camera field trial was delivered to satisfy previous WTO approval conditions. For the CFFTF, industry have implemented an onboard observer program, and participated in the camera field trial.

Failure to introduce IOM by 15 June 2026 is expected to result in the loss of export approvals for the ECOTF and may jeopardise the ongoing accreditation of the CFFTF. Any loss of export approval for these fisheries is expected to significantly impact fishery profits, jobs and industry's long-term viability. For example, since September 2020, the east coast inshore fishery, Gulf of Carpentaria inshore fishery and blue swimmer and mud crab fisheries have all had their WTO approvals revoked by the Australian Government, in part due to the lack of IOM programs being established to monitor and validate TEP species interactions and bycatch (14). Most of these fisheries were not significantly impacted as industry did not heavily rely on export markets. In comparison, both the ECOTF and CFFTF rely in part on the export of product and loss of their accreditations would have more pronounced impacts.

EPBC Act approval conditions

The following conditions relate to the need to implement IOM programs (2). For more information, visit the **DCCEEW's website**.

East coast otter trawl fishery

In December 2024, the ECOTF had its WTO approval renewed by the Australian Government with included conditions related to IOM. A subsequent amendment to the delivery timeframes of the IOM related conditions was also approved on 6 June 2025. The IOM related conditions include:

Condition 7, repeated in Condition A (Part 13 accreditation) – The Queensland Department of Primary Industries must:

a) By 15 January 2026, provide an implementation plan to the Department for the establishment of an ongoing independent monitoring and validation program across the East Coast Otter Trawl Fishery. The plan must demonstrate how the ongoing program will:

   i) provide independent data that is reliable and representative across all regions of the fishery; and

   ii) independently monitor and validate data collected via protected species logbooks, with a particular focus on protected species interactions demonstrated within this Wildlife Trade Operation approval period.

b) By 15 June 2026 commence implementation of the independent monitoring and validation program, this may involve the use of electronic monitoring, independent onboard observers, or other means.

c) As part of annual reporting under Wildlife Trade Operation Condition 4, provide a summary of the level of independent monitoring coverage across the fishery, protected species interactions and the validation of protected species logbooks with independent data.

Commercial fin fish trawl fishery

In August 2023, the CFFTF had its WTO approval renewed by the Australian Government, which includes the following condition related to IOM:

Condition 6 – by 31 August 2024, the Department of Primary Industries must develop and implement an annual robust, independent, quantitative, and validated monitoring and data collection program in the Queensland Commercial Trawl (Fin Fish) Fishery. This may involve the use of electronic monitoring, onboard observers, or other means.

The information collected must be sufficient to reliably demonstrate the accuracy of all reported catch, effort and protected species interaction data collected via logbooks. This program needs to gather suitable data on the level of catch, discards and interactions in the fishery to inform the sustainable management of target, byproduct and bycatch species (including protected species).

Performance of the program, including comparative analyses of fishery dependent and independent data sources must be included in annual reports provided to the Department of Climate Change, Energy, the Environment and Water as part of condition 4.

One benefit of implementing IOM is being able to provide evidence about the environmental performance and sustainability of commercial fisheries and fishing activities in Queensland. This will provide greater community confidence in continued export of seafood products harvested from within Queensland. For those fisheries that no longer have export approvals, it would also enable industry to more confidently reapply for,

and maintain, export approvals in the future. Renewed export access may support greater return on investment for our commercial fisheries through greater market access.

2.2.2 Reef 2050 long-term sustainability plan

The purpose of the *Great Barrier Reef Marine Park Act 1975* (15) is the long-term protection, ecologically sustainable use, understanding and enjoyment of the GBR. Fisheries that operate in a World Heritage Area have a special responsibility to reduce the impact of fishing on the ecosystem that must be acknowledged and reflected in their management arrangements. Similarly, all fishing activities within the GBR should be reflective of the unique opportunity and obligation associated with operating in a World Heritage Area.

There is concern that higher risk commercial fishing activities pose a threat to non-target and TEP species, and this is considered to be the most significant fisheries sustainability issue within the GBRWHA (16). The Great Barrier Reef Marine Park Authority (GBRMPA) 2020 fishing position statement (16) identifies that fishing continues to negatively affect the health and resilience of the Reef through incidental impacts on species of conservation concern, over-fishing of some species, illegal fishing, impacts on discarded catch and damage to habitats (see excerpt below).

> **Excerpt from GBRMPA fishing position statement**
>
> "The Reef is a refuge for many threatened, migratory, iconic and at-risk species. These species of conservation concern include inshore dolphins, whales, dugongs, sawfish, sea snakes, marine turtles and some fish and sharks.
>
> Species of conservation concern may be injured or killed by fishing activities. For example, the use of large mesh-nets in the East Coast Inshore Fin Fish Fishery is a high risk to species of conservation concern due to potential entanglements and death. Impacts may be underestimated even though mandatory reporting is in place. Even low levels of mortality may significantly affect the rate of recovery and population status of these species. The Authority considers the incidental catch of species of conservation concern to be the most significant fisheries sustainability issue in the Marine Park."

The Queensland Government has committed to a range of strategic actions through the *Reef 2050 long-term sustainability plan: 2021–2025* (17) to ensure any threats to the Reef associated with legal and illegal fishing are reduced. The actions include implementing measures that reduce impacts from fishing activities, verify data and improve understanding to strengthen management of fishing activities, including:

- develop and implement robust systems of independent data validation for the mesh net and trawl fisheries, including independent verification of levels of interaction with species of conservation concern, potentially including e-monitoring
- complete a proof-of-concept trial for IOM, including e-monitoring, for commercial mesh net and trawl fisheries
- improve data and understanding of recreational and commercial fishing catch and effort, and broader ecosystem impacts, to inform management arrangements and protection of Reef values
- support development and encourage the adoption of new technologies that improve understanding and reduce the ecological impact of fishing activities
- develop and encourage responsible commercial and recreational fishing practices in partnership with fishers.

Without progressing implementation of IOM for commercial fisheries that operate within the GBRWHA, there is a risk that other spatial or temporal restrictions may be imposed by federal agencies on fishing activities that rely on access to the GBRWHA. IOM is a clear action for delivery under the Reef 2050 long-term

sustainability plan, and non-delivery of this action would likely result in a review of fishing access (full or partial restrictions) to reduce the ecological risk of fishing in the GBRWHA.

A benefit of implementing IOM is being able to provide evidence about the risk of fishing to the ecosystem and demonstrate that management strategies are appropriate to minimise the risk of fishing to ecological communities within the GBRWHA. This would provide greater community confidence in continued fishing access for commercial fisheries.

2.2.3 UNESCO reactive mission recommendations

The GBR contributes $6.4 billion to the Australian economy every year and supports more than 64,000 full-time jobs (18). About 90% (or about $5.7 billion) of this contribution is from tourism. Protecting the Reef is a priority for the Queensland and Australian governments.

On 28 November 2022, the International Union for Conservation of Nature and the UNESCO released the *Report on the reactive monitoring mission to the Great Barrier Reef, from 21–30 March 2022* (19). The report recommended the Reef be added to the list of 'World Heritage in Danger' and identified 10 priority and 12 additional recommendations for urgent implementation. Impacts from the commercial fishing sector on threatened species is a key consideration for UNESCO in determining whether to list as 'in danger'. Such a listing would have major economic and reputational impacts on the Queensland tourism industry and the Queensland Government. A priority recommendation from the report relating to IOM was:

> Recommendation O7: Develop and implement appropriate mandatory independent mechanisms for discard and bycatch monitoring, such as e-monitoring via vessel-based cameras, on all gill-net and trawl vessels within the property (GBRWHA).

To address this priority recommendation and additional recommendations, the Queensland Government made 6 key commitments, including legislating the requirement for mandatory IOM (20).

On 25 June 2024, UNESCO released its draft decision and did not recommend the Reef be added to the list of 'World Heritage in Danger' (21). The draft decision recognised the continued efforts of the Queensland and Australian governments to make significant progress on climate change, water quality and sustainable fishing. As part of the decision, Australia submitted a progress report on the implementation of commitments made to the World Heritage Committee in January 2025 (22), which acknowledges the ongoing establishment of IOM across the ECOTF. Impacts to the ongoing establishment may jeopardise the listing status of the Reef, which could have significant impacts on Queensland's economy as it relies on tourism from the Reef.

2.2.4 Queensland Sustainable Fisheries Strategy

The *Queensland Sustainable Fisheries Strategy: 2017–2027* (1) outlines a vision to deliver a more modern, responsive and consultative approach to fisheries management, which ensures fishing is a low risk to Queensland's aquatic resources and that these resources are used in a way that optimises benefits to the community. The strategy was developed based on consultation on the *Green paper on fisheries management reform in Queensland* (10), which saw strong support (86%) for enhanced data collection and independent validation programs to improve the basis for fisheries management decisions (10). More than 65% of commercial fishers who responded were supportive of this proposal. As a result, one of the key actions under the strategy is improving the accuracy and reliability of fisheries data through the development of mechanisms to independently validate data on catch and interactions with TEP species.

As well as committing to improved independent validation of data, the strategy has involved the introduction of several best practice management measures, including:

- fishery harvest strategies
- protected species management strategies
- ERAs

- stock assessments.

IOM is a crucial component of improving each of these management measures, as they all require accurate validated data on fishing effort, behaviour and retained and discarded catch.

Independently validated information on non-retained catch and interactions is particularly important for ERAs, which are a key deliverable under the strategy and are conducted to identify and measure the risks of fishing activity to target, byproduct, non-target and TEP species, and marine habitats. ERAs are used to inform management actions to mitigate ecological risks though harvest strategy decision rules (e.g. catch or effort limits) or other regulatory mechanisms (e.g. spatial closures and gear restrictions).

Most of Queensland's fisheries are now managed under harvest strategies and all include decision rules to undertake management in response to high-risk ERA outputs. For high ecological risks and protected species management strategies are developed to address specific fishing activities, for example, the strategy for the east coast inshore fishery (23).

Information on non-retained catch can also form an important part of stock assessments, as information about non-retained target species and non-target species is factored into calculations of catch rates and the overall health of fish stocks.

For these reasons, accurate and reliable data on all aspects of commercial catch forms a crucial element of the fisheries management framework and is necessary to manage the ecological risks of fishing.

2.2.5 Recovery of TEP species and access to fishing grounds

The EPBC Act (12) provides for the identification and listing of key threatening processes, which is a process that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community. For example, incidental catch (or bycatch) of listed species during fishing operations may be listed as a key threatening process as it threatens the species in Australian waters where the fishing practice is undertaken.

A fish species may also be listed under subsection 179(6) of the EPBC Act as 'conservation dependent' if it is the 'focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so its chances of long-term survival in nature are maximised' (12). Listing in this category is dependent on jurisdictions implementing additional measures recommended by the Threatened Species Scientific Committee to ensure sustainability in Australian waters.

Without progressing the implementation of IOM for commercial fisheries that interact with TEP or conservation-dependent species, there is a risk that other restrictions may be imposed on fishing activities (e.g. additional area or seasonal closures, additional no-take species, restrictions on processing or filleting at sea, or other fishing rules). More accurate information on the risk and rate of interactions with TEP species through IOM would enable targeted fishing rules to be developed rather than introducing precautionary broadscale limitations or restrictions on fishing activities.

Recently, the Australian Government's Threatened Species Scientific Committee reassessed the conservation status of scalloped hammerhead shark under the EPBC Act and decided that the scalloped hammerhead shark will be retained in the 'conservation dependent' category (24).

Implementation of IOM in Queensland's east coast trawl and Gulf of Carpentaria inshore fisheries was an outstanding action, and non-delivery of this action may result in a precautionary listing of the species (i.e. moving from 'conservation dependent', which still allows the species to be harvested, to 'threatened' or 'endangered', which means the species would become no take). While scallop hammerhead shark is now no take in Queensland, a change in the conservation status, potentially caused by an ongoing lack of accurate information, would affect Queensland's commercial fisheries, and also have national ramifications with conservation groups and the general public.

2.3 Benefits of IOM

Independent validation of commercial fisheries data is an important aspect of best practice fisheries management and has the potential to provide a range of benefits to sustainable fisheries management, commercial fishers and the Queensland community, including:

- more accurate and reliable data for ERAs, harvest strategies, stock assessments and protected species management strategies, which would improve confidence in the data and decisions based on the data
- improved data on bycatch composition and volume to support the development of bycatch monitoring strategies
- improved understanding and management of higher risk fishing activities and their effect on the wider marine ecosystem
- improved knowledge of, and the ability to, mitigate interactions with TEP species
- satisfying the requirements of the EPBC Act and WTO approvals, resulting in ongoing access to export markets
- supporting the sustainable management of the GBRWHA and maintain access to fishing grounds
- supporting third-party sustainability certifications and opportunities to improve seafood traceability and demonstrate provenance
- strengthening the reputation of Queensland's fisheries and increase community confidence in commercial fishing
- increased likelihood of more flexible fisheries regulations rather than blanket restrictions to all operators.

Without IOM in Queensland, particularly in high-risk commercial fisheries, it will be increasingly difficult to demonstrate environmental performance and sustainability.

This is inconsistent with the best management practice principles outlined in the Queensland Sustainable Fisheries Strategy and will continue to result in lost export approvals, changes to fishing access, and precautionary fisheries management if there is insufficient evidence to develop targeted approaches.

3 Progress to date

Fisheries Queensland has made significant progress with the design and delivery of improved processes and strategies to support the independent validation of commercial fishing data and the establishment of IOM programs across high-risk fisheries.

3.1 Data validation plan

The *Fisheries Data Validation Plan* (25) was established in 2018 as part of the *Queensland Sustainable Fisheries Strategy: 2017–2027*. Since the plan's publication, Queensland's fisheries legislation has undergone significant reforms, resulting in numerous changes to commercial fishing reporting requirements, including mandating vessel tracking for all major fisheries, the introduction of additional quotas, updates to the quota reporting process, and new and revised catch and effort logbooks. With the launch of the commercial fishing app (Qld eFisher) in 2021, reporting systems also evolved to support more electronic data submissions. In response to these substantial changes, a comprehensive review of the plan was conducted in 2023.

Fisheries Queensland has implemented several strategies to enhance the accuracy and validation of commercial fishing data.

3.1.1 Education

Education is the foundation of obtaining accurate data by ensuring commercial fishers are equipped with the knowledge to provide reliable and timely data. Fisheries Queensland is committed to supporting and educating industry on current reporting requirements through various channels. Education resources and activities specific to TEP species interactions include:

- workshops and video resources for fishers on species identification, handling and safety
- fact sheets for fishers with key information about TEP species reporting and easy step-by-step instructions for reporting interactions
- providing clear and simple identification information to assist fishers with correctly identifying TEP species
- Queensland Boating and Fisheries Patrol (QBFP) staff providing education and support for fishers to understand and undertake the required TEP species interaction reporting
- customised support and training activities based on fishers' interests and expressed needs.

3.1.2 Electronic logbooks

The Qld eFisher app, which includes electronic logbooks, is available for most fisheries. This app offers a modern alternative to paper logbooks, helping to reduce errors by simplifying data entry. The app allows for direct data input by fishers, minimising double handling and input errors. It also includes built-in validation checks to ensure data quality and facilitates timely data submission through cellular networks. Reporting via Qld eFisher is mandatory for the NX fishery, while all other fisheries can choose between using the app or paper logbooks. The app provides rapid availability to check data, resolve errors and access validation processes as well as other business needs (e.g. stock assessment and compliance).

3.1.3 Data checks

A variety of ranges and cross-checks (e.g. checks for outliers and incomplete records) are currently applied during data entry. These checks focus on parameters such as fishing methods, catch weights or quantities, fishing location and effort. To further identify data entry errors, additional checks are incorporated into automated post-data entry validation reports.

3.1.4 Inspections

The QBFP also conducts in-port inspections to verify the accuracy and completeness of logbook, quota and vessel tracking data. These inspections and compliance actions are also an important deterrent to reporting false or misleading information.

3.2 Onboard camera field trial

The trawl fishery onboard camera field trial was conducted over 18 months on board vessels of volunteer commercial trawl fishers, finishing in December 2024. The trial was undertaken on vessels from the ECOTF and the CFFTF. The trial involved testing 5 dedicated e-monitoring systems and one 'off the shelf' CCTV system. The objectives of the trial were to test the performance of onboard camera systems to independently validate TEP species interactions and record bycatch, as well as provide an understanding of e-monitoring installation costs and maintenance requirements (26).

The trial was a collaborative project funded by Fisheries Queensland and the DCCEEW. A technical focus group was established, which included field trial participants and officers from both funding agencies, which allowed the participants to provide feedback and seek troubleshooting advice during the trial.

E-monitoring systems were successfully deployed and tested during fishing operations on board 11 vessels across each management region of the ECOTF and across several gear types and target species. Participating vessels were highly diverse in terms of vessel configuration, the fishing gear used, catch composition and fishing areas/times. This meant that e-monitoring systems were tested across a range of different operational conditions and vessel types typically encountered in the ECOTF.

Over the course of the trial, 66 hard drives containing e-monitoring footage were collected from participating vessels, with an additional 7 nights of fishing footage collected using electronic transfer (e-transfer). In total:

- 266 catch-sorting events across 75 fishing nights were reviewed for TEP species interactions
- fishing effort was estimated for 365 trawl shots occurring over 100 nights
- bycatch reviews were completed for 25 catch-sorting events across 11 fishing nights.

The 2 methods tested for transferring camera footage collected at sea to the reviewer were – physically swapping hard drives and e-transfer. E-transfer enabled the reviewer to select the specific video footage for review and send a request to the system on the vessel. The requested data was then securely transmitted from the vessel to the reviewer via the 4G data network when the vessel was within range. If vessels were operating outside 4G range, footage was captured and stored onto the system's internal hard drive and transmitted from the vessel once it returned to 4G range.

The field trial provided proof of concept regarding the deployment and use of e-monitoring systems as independent data validation tools on board vessels in the ECOTF and CFFTF, and identified the following key learnings:

- E-monitoring systems easily detected interactions with large bodied TEP species; however, identifying smaller TEP species and observing their release condition and fate was more challenging.
- Robust monitoring of full bycatch composition is only likely to be feasible for vessels with conveyor sorting systems and those sectors of the fishery with low relative diversity and volume of bycatch. However, achieving more targeted bycatch monitoring objectives may be feasible.
- The installation of systems must account for the unique layout and fish-handling processes of each individual vessel, and consider the objectives of the monitoring program, to determine camera placement options.

- The deployment of systems involves a ‘settling in’ period, during which systems and processes are established, personnel receive training and fishers familiarise themselves with the technology.
- The review and validation process was enhanced with dedicated systems that included data from GPS and winch sensors, and customised review software.
- Compared to physically swapping hard drives, the e-transfer of video footage and sensor data significantly reduced program management time and data management tasks for the reviewer and streamlined the review process. It also limited the amount of footage requiring access, transfer and storage.
- Regular cleaning of camera lenses during fishing operations ensured good quality video footage was recorded and available to monitor catch-processing activities.

An objective of the trial was to compare data collected by independent observers with data derived from camera footage to evaluate the ability of cameras to provide accurate estimates of bycatch. Due to unforeseen complications and compliance with national safety standards, onboard observers were not able to be deployed on participating vessels during the trial period. As such, the trial was unable to compare the performance of IOM methods (e-monitoring vs onboard observers) to monitor bycatch.

The trial also provided valuable insights to support the design and establishment of an e-monitoring program across the ECOTF and CFFTF, and informed the following recommendations:

- Clear objectives and scope would be required to support program design and establishment.
- Increased support and resourcing would be required during the ‘settling in’ period and a risk-based, staged implementation would be recommended across a large fleet of vessels such as the ECOTF.
- The e-transfer of video footage and sensor data should be used, rather than the physical delivery of hard drives.
- Increased uptake of electronic reporting of commercial fishing logbook data by operators should be prioritised to support a timely and responsive monitoring program.
- While trialling multiple systems proved highly valuable in testing relative strengths and weaknesses, the trial showed that using multiple e-monitoring providers would add layers of complexity to the design, management and larger rollout of a program.
- Extensive and ongoing engagement between industry, Fisheries Queensland and e-monitoring providers would be essential to support effective establishment and ongoing delivery of a program.

These key learnings and recommendations from the trial have been used to inform the design and establishment of a potential IOM program across Queensland’s trawl fisheries.

> The field trial report and webinar provide detailed explanations of the key learnings and recommendations – visit **dpi.engagementhub.com.au**.

3.3 East coast inshore gillnet (NX) fishery IOM program

An IOM program across Queensland’s east coast inshore fishery (NX symbol) was successfully established in 2024. It is now a requirement of NX licence conditions, issued under section 61 of the *Fisheries Act 1994*, that onboard camera systems are installed on each authorised vessel and operated to record each ‘monitored fishing event’. An observer must also attend a fishing operation if directed by the Chief Executive and all authority holders are required to report catch, effort and TEP species interactions electronically via the Qld eFisher app.

Axon Body Worn 3 camera equipment was deployed across the fleet of 28 licence holders operating 45 individual tender vessels. Cameras are used by fishers during each fishing trip and footage is wirelessly

transferred to secure servers via the fisher's home Wi-Fi. Cameras on board each vessel are aimed at the areas where fishing gear is deployed and retrieved, and retained catch, bycatch and TEP species are handled and/or discarded.

Fisheries Queensland review the camera footage and compare it with the logbook data. The online Axon evidence.com platform is used to review the footage, with derived data recorded in an IOM database through a custom-built data entry application.

The primary focus of the NX IOM program during the 2024 fishing season was to independently validate TEP species interactions. This included the review of camera footage to validate:

- TEP species interactions reported by NX fishers – including the validation of species identification, number, interaction type and release condition
- a random 10% of monthly fishing effort per fisher.

High priority events are also prioritised for review and validation, and fisher compliance with the IOM NX conditions is monitored and recorded, with follow-up compliance actions undertaken if required. Comprehensive review and validation procedures have been developed and documented to support the delivery of consistent processes during review of footage, data entry and delivery of program outputs.

> A review of TEP species validation records from the 2024 fishing season is now underway and will be published soon. For more information on the NX IOM program, visit **business.qld.gov.au**.

3.4 Legislative amendments

In April 2024, the *Agriculture, Fisheries and Other Legislation Amendment Act 2024* (27) approved amendments to the *Fisheries Act 1994* to support the design, establishment and ongoing management of an IOM program across high-risk fisheries. Among other things, the amendments introduced the following changes:

- a head of power to introduce a regulatory framework supporting the establishment of an IOM program involving the deployment of onboard cameras and/or onboard observers to validate interactions with TEP species and monitor bycatch
- chief executive powers to amend, and impose conditions on, a fishing licence in response to repeated interactions with TEP species.

These amendments represent significant progress towards the establishment of an IOM program across high-risk fisheries and support the delivery of key protected species management arrangements under protected species management strategies.

In general, the regulatory framework of an IOM program would need to include the following key components:

- identification of the fisheries that require onboard monitoring and/or onboard observers
- times when e-monitoring systems must be operating to record a commercial fishing operation
- e-monitoring system installation requirements, including the position and way in which cameras must be installed
- e-monitoring maintenance requirements (i.e. functioning, cleaning)
- camera footage transfer timeframes and requirements
- process to be followed in the event of a system malfunction.

4 Objective of government action

The objective of government action is to maximise the social, economic and ecological values of Queensland's fisheries resources through improved monitoring and independent validation of commercial fishing data, which requires balancing between competing uses both now and through the future.

The government recognises that there are wider interests in the management of Queensland's fisheries resources, which are reflected in the institutional arrangements performed by the Commonwealth through EPBC Act approval conditions and management of the GBRWHA, and internationally by UNESCO in respect of the world heritage status of the Reef.

5 Case studies from other jurisdictions

5.1 Australian Fisheries Management Authority

The Australian Fisheries Management Authority (AFMA) has conducted e-monitoring trials in 6 different large-boat fisheries, including the Commonwealth trawl sector (one of the 4 sectors in the southern and eastern scalefish and shark fishery (28) and northern prawn fishery (29). Systems from 4 different manufacturers were tested in each fishery. These trials aimed to assess the effectiveness of e-monitoring systems to gather necessary fisheries management data, including detection of fishing activities, identification of catch composition and monitoring interactions with protected species. The project successfully equipped vessels with e-monitoring systems, collected and analysed video footage and sensor data, and evaluated findings to guide further implementation.

AFMA found that e-monitoring could effectively detect fishing activities and observe larger protected species interactions, as well as verify mitigation device use and handling practices. Installation and maintenance practices, such as proper lighting and camera positioning over processing areas, were essential to the quality and reliability of footage. Crew-based catch-handling practices and adherence to e-monitoring upkeep were also identified as critical for maximising data quality. For smaller species and detailed catch composition, e-monitoring alone proved insufficient. AFMA's trials emphasised that, with adjustments to camera settings and crew handling protocols, e-monitoring could be a valuable, complementary tool in sustainable fisheries management.

E-monitoring systems are now compulsory for most commercial fishing boats that export catch in the eastern and western tuna and billfish fisheries, the gillnet, hook and trap fishery, and the midwater trawl sector of the small pelagic fishery (30). These fisheries have also been assessed and are approved wildlife trade operations under part 13 (protected species) and part 13A (export) provisions of the EPBC Act. Other fisheries still have human observers; however, they are more costly and limit the representative coverage needed in these fisheries.

Watch the AFMA video on e-monitoring.

5.2 Fisheries New Zealand

In 2019, Fisheries New Zealand began a major initiative to implement onboard cameras across priority fisheries, with the aim of outfitting up to 300 commercial vessels to monitor up to 85% of the inshore fishery's total catch volume. This government-supported investment aimed to strengthen New Zealand's sustainable fisheries management, increase regulatory compliance and ensure the accurate verification of interactions with protected species. Initially launched as a proof-of-concept in critical Māui dolphin habitats (31), this successful trial laid the groundwork for a wider rollout in 2023. New Zealand's program reflects consumer and regulatory expectations for responsible sourcing of seafood and environmental stewardship.

New Zealand's onboard camera program objective is to provide independent, accurate data on commercial fishing impacts, focusing specifically on protected species interactions, compliance with landing and discard regulations, and the use of mitigation measures. Cameras target essential areas on board, such as setting, hauling, sorting, processing and discarding areas, enabling precise monitoring of high-risk activities. The program was carefully tailored, prioritising fisheries posing the greatest risk to protected species, including trawl vessels under 32 m and surface and bottom longlines, with additional restrictions in areas critical to dolphin and penguin populations.

Since implementation, the program has shown promising results, including improved accuracy in protected species reporting and enhanced compliance (32). Notably, 98% of observed protected species capture events have been reported by fishers, aligning well with New Zealand's bycatch estimates (33). Additional measures (such as feedback to fishers on reporting and handling practices) have supported positive behavioural changes within the industry, with low referral rates for compliance issues. Innovations introduced by Spark (a New Zealand telecommunications company working with Fisheries New Zealand), such as sensors and AI-driven fishing activity recognition, have further optimised the system by reducing the recording of non-essential footage and enhancing data relevance.

New Zealand's program has strengthened the nation's commitment to sustainable fishing, contributing valuable insights into the management of at-risk species and ensuring seafood sourcing practices meet global environmental expectations.

Read more about the New Zealand program.

6 Options considered

The following options analysis only relates to the **ECOTF** and the **CFFTF**.

Options for other high-risk fisheries will be considered following field trials.

A key component of an IAS process is the evaluation of options that can achieve the objective of government action. To support the evaluation, several high-level actions and priorities were identified that would support the development of a final option that would meet the government objective, including:

- the preservation of EPBC Act approvals
- maintaining commercial fishing access to the GBRWHA
- the delivery of recommendations required to maintain the world heritage listing status of the GBRWHA
- improvement in the accuracy and reliability of data recorded by commercial fishers which is used for management decisions
- the introduction of methods and strategies that support commercial fishing businesses with improved market access and economic performance
- improved reputation of Queensland's fisheries and increased community confidence in sustainable commercial fishing practices

Options that introduce strategies or processes to achieve these actions or priorities were considered to be viable. However, in the consideration of options it was determined that while there are several individual strategies and processes available, individually no single option was able to achieve the objective of government action. For this reason, the most viable option considered is a combination of options that introduce improved monitoring and independent validation of commercial fishing data, while also improving community confidence and supporting the economic performance of industry.

The following sections provide an overview of the individual options that were considered and provides context as to why some options, when implemented alone, were not considered to be viable. Descriptions are also provided to explain why some options were considered to be more appropriate than others, for example the comparison of onboard observers and e-monitoring systems.

6.1 Improved education, reporting and awareness

6.1.1 Education and awareness

Research has shown that educational approaches such as species identification guides, redesigned logbooks, educational videos, training courses and at-sea education via observer programs can have a positive impact on the accuracy of commercial fishing data (34). While improved education, reporting and awareness is not specifically an independent monitoring or validation method, these strategies can still contribute to improvements in commercial fishing data.

Strategies that can improve the accuracy of reporting will ensure more accurate information is available to inform management and provide confidence to the community that the information reported is accurate.

Fisheries Queensland continue to design, implement and improve educational strategies for commercial fishers that support improved reporting, including:

- workshops and video resources on species identification, handling and safety
- fact sheets about TEP species reporting
- identification information to assist fishers with correctly identifying TEP species

An option could involve a rapid investment in educational activities and resources to support improvements in reporting. While improvements in the availability of educational resources would be helpful, their uptake and use would still rely on the voluntary involvement, participation or uptake by industry. Although uptake may increase overtime, and improvements with reported information be realised, the timeframe for which improvements are likely to be seen may fall short of expectations within timebound EPBC Act approvals. Should these approvals not be achieved, export approvals would be lost and the government objective would not be achieved.

An option could include the mandating of specific training modules or courses to support uptake. An example of this recently occurred in Queensland managed NX gillnet fishery on the east coast. A master fisherman training program was developed and fishers received training and certification to support the safe handling and release of TEP species, among other best practice management principles. While making such educational strategies mandatory would increase uptake and influence fisheries practices, discrete verifiable data is not available without monitoring fishing operations. Strategies that support the onboard monitoring of an operation will be required to ensure the reported information is accurate.

While improved education and awareness represents as critical options to improve the accuracy of commercial fishing data, if implemented alone these, strategies would not achieve the objective of government action.

Education and awareness should be a key aspect of any ongoing independent monitoring or validation program. However, on its own, it is not enough to satisfy the data validation conditions required by the Commonwealth for ongoing export approvals and continued access to GBR fishing grounds.

- **On its own, an education and awareness approach would not satisfy the objectives of government action and has not been considered further as a standalone option in this consultation IAS.**

6.1.2 Commercial fishing app (Qld eFisher)

Other measures that do not involve the use of independent data sources are currently in development to improve data accuracy. An example is the development of electronic logbooks to make it easier for fishers to submit accurate data, reduce input errors and enable some degree of data cross-checking. The commercial fishing app, Qld eFisher, was released in December 2021 to fulfil this function (35).

While the introduction of Qld eFisher will improve the timeliness of data delivery and help with the accuracy of reported commercial fishing data, it does not independently validate data or guarantee improvements in the reporting of bycatch or TEP species interactions. Also, it does not satisfy the conditions of EPBC Act export approvals and provides no additional incentives for accurate reporting.

At present the Qld eFisher reporting platform is voluntary. While uptake and use of Qld eFisher is increasing, with 10% of the ECOTF and 100% of the CFFTF using the platform in January 2024, considerable

improvements would be realised if the Qld eFisher app was made mandatory. The mandatory use of the Qld eFisher app is consistent with the new gillnet fishery on the east coast and other national and international fisheries.

While the **Qld eFisher app** is an important part of a broader program to improve the quality of data, it does not fulfill the requirements or objectives of IOM.

- **On its own, the Qld eFisher commercial fishing app would not satisfy the objectives of government action and has not been considered further in this consultation IAS.**

6.2 Vessel tracking

Vessel tracking systems provide a form of independent monitoring, where the onboard systems record the vessel location and this information can be used to validate information reported by fishers. While it provides some independent validation, this is limited to spatial information only, such as the location where catch has been reported.

While supporting the validation of spatial information is extremely valuable, improvements in the monitoring and validation of catch and TEP species interactions is not realised through vessel tracking systems (**Table 1**), and their ongoing use would not achieve the objectives of government action.

6.3 Compliance monitoring

The QBFP is a business unit within Fisheries Queensland that delivers compliance and enforcement functions. Compliance with fisheries laws not only ensures the sustainability of Queensland's fisheries but also the safe use of Queensland's waterways.

Unlike earlier options, compliance monitoring has the capability to be undertaken while at sea, which provides the opportunity for catch, bycatch and protected species interactions to be observed and validated by compliance officers before they are discarded. At present, QBFP employ several monitoring strategies that would support the monitoring and validation of bycatch and TEP species, including at sea boarding inspections and the use of drones.

Drones are able to be flown above active vessels to monitor a fishing operation, with the footage later reviewed and able to be validated against the logbook. At sea inspections also allow for the monitoring of catch, bycatch and TEP species interactions, if the officers are on the vessels at the time catch is hauled onboard and sorted.

Under the ECOTF EPBC Act approval, a representative monitoring and independent validation program is required. While both these strategies are an option, their application at a scale that would provide a representative program across the entire ECOTF fleet would be challenging. In 2023, there were 361 active ECOTF vessels fishing more than 27,000 days. To develop a representative compliance monitoring program for this fleet would require extensive resourcing.

The use of drones is also limited by the range and length of time they can be deployed. The majority of at sea fishing occurs offshore and deployment of drones would be required from other at sea vessels. Their flight times are limited by battery life and a single drone is not likely to be able to monitor an entire night's fishing. Drones also introduce safety risks, if flying in and around active commercial fishing vessels with large nets being hauled and deployed. The majority of ECOTF vessels operate at night, introducing further complications for drone pilots.

Finally, these options only provide validation of the events that occur when inspected or a drone is used to monitor. When no monitoring is occurring, there is no way to know if the commercial fishing data being

reported is accurate. Due to the extensive resource implications and limitations with provide a representative program, these options have not been considered to be feasible.

6.4 Onboard observers vs. e-monitoring systems

As outlined in **Table 1**, IOM methods, consisting of e-monitoring systems and onboard observers are the primary methods available to monitor and independently validate interactions with TEP species and bycatch.

Onboard observers are a well-known and widely used method to monitor and validate commercial fishing data. E-monitoring systems are also being adopted and tested throughout national and international fisheries. When comparing the performance and capability of these IOM methods, there are several benefits and limitations of each data validation measure (**Table 4**).

Table 4: Comparison of onboard observers and e-monitoring

	Onboard observers	E-monitoring
Cost	Observers are more cost-effective for short periods.	E-monitoring is more cost-effective than observers in the medium and longer term due to reduced labour costs.
Scalability	It is difficult to expand an observer program across a large fleet due to logistical challenges and the limited number and availability of trained and experienced observers.	E-monitoring is readily scalable across a large fleet – 100% of fishing activity can be captured and there is potential to value-add (e.g. review additional footage) at minimal cost.
Data confidence	Fishers have been known to change fishing behaviour (e.g. location, equipment) when observers are on board. These changes distort the data collected and appear to be more likely to occur if observers are only deployed for short periods.	Provides improved confidence in data accuracy. Fishers are less inclined to change behaviour when cameras are installed, although some have blocked/blurred the camera's view to limit data capture.
Safety	Observers are required to work at sea on slippery/unstable surfaces and the safety of personnel needs to be carefully managed.	E-monitoring poses no safety risks when correctly installed and maintained. Footage has been used to identify risks and improve workplace health and safety.
Suitability	Suitable for large boats on which observers can be legally and safely accommodated.	Suitable for boats of all sizes but requires reliable power to operate.
Privacy	Few privacy concerns as observers are only collecting fisheries data.	Fishers have concerns regarding privacy; however, personal information is protected through camera positioning, data encryption, legislation and data management protocols.
Operational	Well-suited for collecting biological data and identifying and estimating non-target catch from trawl fisheries.	Highly suitable for identifying non-target catch from net fisheries and TEP species interactions from most fisheries.

While onboard observers have been, and continue to be, used to collect at-sea catch and effort information, and to validate commercial fishing data in Queensland, their use as a wide-scale fishery validation method has not been ongoing. In recent years, the use of onboard observers across the ECOTF has been limited to specific scientific research projects or independent fishery surveys, and only included a small number of commercial fishing vessels.

Between 2005 and 2012, Queensland ran a fisheries observer program that documented non-retained catch composition and weights and interactions with protected species across multiple fisheries. The program

relied on voluntary cooperation by fishers and was limited in coverage – for example, covering only 0.34% of all fishing days in the east coast trawl fishery from 2007 to 2009 (36). The program ceased in 2012.

More recently, the IOM program established for the NX fishery required the use of onboard observers. Their use was primarily to support the validation of fishing operations that did not have cameras installed at the commencement of the program, as well as to validate the performance of onboard cameras to validate TEP species interactions. While the observers supported the validation of fishing operations at the commencement of the program, their ongoing deployment was discontinued in response to safety implications and increased costs and resources. In addition, the comparison of camera footage observations and fishery observer records from the same NX fishing operations identified that the cameras were able to appropriately observe and validate interactions (37).

The primary benefit of onboard observers, when compared to onboard cameras, is their ability to collect additional biological information on catch data and provide improved validation of species release condition. They are also more cost-effective than e-monitoring systems if used as a validation method over a short period of time.

Observers cost $1,200 to $1,500 per day and are logistically challenging to implement and manage, and according to fisheries literature, the data collected is not always reliable due to documented 'observer effects' (fishers changing behaviours and fishing grounds when observers are present) (38).

Other jurisdictions, such as AFMA and Fisheries New Zealand, continue to operate onboard observer programs in conjunction with e-monitoring. Both agencies require fishers to carry observers when requested. AFMA's observer coverage is proportional to fishing effort within and between fisheries (39), while Fisheries New Zealand revises their 'seadays' plan annually according to management priorities.

Although there are some benefits of onboard observers, the benefits of e-monitoring systems far outweigh those of observers.

6.4.1 Cost comparison of onboard observers and e-monitoring systems

Compared to onboard observers, e-monitoring is generally more cost-effective. While there may be significant upfront costs for hardware, comparisons have shown that e-monitoring is around half the cost of observers in the medium term (over several years) and even more cost-effective over the longer term (5).

Analysis of operational costs obtained from the onboard camera field trial identified that once cameras were installed and operational, they are more than 3 times more affordable than using onboard observers to validate TEP species interactions when 10% of all fishing effort was independently validated (**Table 5**).

Table 5: Comparison of estimated onboard observer and e-monitoring footage review costs to validate 10% of annual fishing effort for the ECOTF (for TEP species interactions)

Validation method	Annual estimated cost ($)
Onboard observer	$5,400,000
E-monitoring	$1,600,000

Note: Cost estimates do not include the establishment costs of e-monitoring systems, but do include general program management and reporting costs (a detailed overview of the IOM cost analysis is provided in section 9.2.1).

6.4.2 Scalability

E-monitoring has advantages over observers in both scalability and suitability. Onboard camera systems can be implemented across a large fleet far more readily than an observer program, which is limited by logistical challenges and the fact that observers are only suitable for large boats. Also, e-monitoring systems can potentially be used on boats of all sizes to capture up to 100% of fishing activity, while observers only collect

data when deployed. In addition, there is the potential to value-add to an e-monitoring program (e.g. by reviewing additional footage at little additional cost).

The scalability limitations of onboard observers, combined with the additional costs, impact the ability to design and implement a cost-effective program that would meet the ECOTF EPBC Act approval conditions. For example, the independent monitoring and data validation program across the ECOTF must be representative across all the sectors of the fishery. Deploying observers across a representative number of vessels across all regions of the fishery would be impractical in terms of both resourcing and financial costs. Considering the size and spatial scale of the ECOTF, the use of onboard observers is not considered to be operationally viable.

6.4.3 Data confidence

Observer effects (fishers changing their behaviour or fishing grounds when observers are onboard) can be difficult to avoid, particularly when onboard observers are only present for short periods. However, these effects appear to be reduced for e-monitoring – perhaps because of the constant and discreet presence of the camera.

An added benefit of using e-monitoring systems compared to observers is not only the improved accuracy of logbook data that corresponds to the reviewed footage, but also the improved accuracy of all reported logbook data (32). This occurs as fishers are unaware which fishing days and events will be reviewed, and subsequently change their behaviour to record all their logbook information more accurately. This behaviour change is a key benefit of IOM using e-monitoring systems, and an important reason why broad and representative coverage of the fleet is important.

Establishment of the NX IOM program has identified that once cameras are installed and operating during fishing events, the reporting of TEP species interactions improves (37). The operation of the cameras during all fishing events drives the change in fisher reporting behaviour and supports the improved reporting of interactions. Onboard observers are limited in this respect, as they would not be deployed for every fishing operation. This reduces the confidence in the data recorded during times without an observer, as a fisher may be less inclined to report interactions when no independent monitoring methods are on board the vessel.

6.4.4 Safety considerations

An added complication for onboard observers is that they are only suitable for larger boats that can safely accommodate additional people. They are not suitable for the majority of Queensland's large mesh net fleet, which mainly uses small (5–8 m) boats. It is also the responsibility of each commercial skipper to ensure their commercial fishing vessel complies with national safety standards outlined in the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* administered by the Australian Maritime Safety Authority (40).

Current national safety standards require a vessel to be surveyed to carry an onboard observer (40). Across Queensland, specifically the ECOTF, there are expected to be many vessels that have not been surveyed under these national safety standards. In some instances, resurvey of a vessel may be required before it can safely accommodate an observer, with modifications required. Costs are likely to be associated with this, which could be significant in some circumstances. Skippers are able to apply for a temporary exemption to hold an observer; however, each application is reviewed by Australian Maritime Safety Authority on a case-by-case basis and the outcome of each application is not known.

In addition, if onboard observers are not welcome on a vessel this makes for an uncomfortable and potentially stressful trip for both the crew and the observer. There are also significant safety and logistical challenges with the deployment and retrieval of onboard observers while at sea, requiring additional resources and expenditure.

Introducing an IOM program that requires skippers to carry onboard observers is not considered appropriate when a large proportion of the fleet may not able to safely carry one. This would limit the use of observers to only those vessels that are able and willing to carry one. This would not support the representative deployment of observers across the fisheries active vessels and therefore not achieve the objectives of the various independent data validation conditions prescribed by the Commonwealth (e.g. WTO approval).

The use of e-monitoring systems avoids these safety complications when installed in consultation with skippers to ensure fishing operations are not impacted. E-monitoring systems can also support 100% monitoring, improving fisher reporting behaviours.

6.4.5 Bycatch monitoring

While observers provide advantages over e-monitoring systems in regards to the monitoring and estimation of bycatch (such as improved species identification and the ability to collect additional biological information), the onboard camera field trial has demonstrated that e-monitoring systems can be used to monitor and estimate bycatch in some sectors of the fishery (26).

Moving forward, e-monitoring systems will have the capability to help monitor bycatch species and will be able to support the collection of information required to support fisheries management needs.

The use of onboard observers is not proposed as a viable option under an IOM program. While not considered feasible as part of this impact analysis process, there may still be a requirement for the future use of onboard observers to support the collection of information consistent with management needs of the fishery.

- **The use of onboard observers would not satisfy the objectives of government action and has not been considered further in this consultation IAS.**

7 Proposed options for consideration

This consultation IAS presents 2 overarching options for consideration:

Option 1 Maintain status quo (NOT implement IOM)

Option 2 Implement IOM in the ECOTF and CFFTF (with a review after 2 years), installing e-monitoring systems on:

- 100% of CFFTF and ECOTF vessels
  or
- 100% of CFFTF vessels and ECOTF vessels that account for 90% of fishing effort
  or
- 100% CFFTF vessels and ECOTF vessels that account for 25% of fishing effort

➡ **Option 2 is the PREFERRED OPTION.**

7.1 Option 1: Maintain status quo

Maintaining status quo means that no new laws or regulations would be introduced that require an IOM program to support the monitoring and validation of commercial fishing data. However, all existing processes and strategies that support improved monitoring and independent validation would continue, such as education, training and awareness, the *Fisheries Data Validation Plan* issued in 2018 and existing compliance monitoring.

Establishing a non-regulatory approach would rely on fishers voluntarily opting in to an IOM program or up taking processes and strategies that would support improved monitoring and independent validation of data.

7.2 Option 2: Implement IOM across vessels in the ECOTF and CFFTF

➡ **PREFERRED OPTION**

The use of e-monitoring systems is likely to be the most effective approach to provide independent monitoring and validation of commercial fishing data, specifically TEP species interactions and bycatch.

The following 3 levels of vessel coverage with e-monitoring systems are presented for consideration in this consultation IAS (**Table 6**):

- 100% of CFFTF and ECOTF vessels
  or
- 100% of CFFTF vessels and ECOTF vessels that account for 90% of fishing effort
  or
- 100% CFFTF vessels and ECOTF vessels that account for 25% of fishing effort

All would require regulatory amendments to establish an IOM program framework and all would involve the review and validation of onboard camera footage that represents 10% of annual fishing effort for each active vessel with an e-monitoring system.

The proposed IOM program would prioritise the validation of reported TEP species interactions. Bycatch monitoring and review would be delivered in select regions of the fishery, as required to address management needs. Commercial fishing data validated from the program would be used to support sustainable management decisions and improvements in community confidence. Advanced technology advancements provided by e-monitoring systems would also be investigated to improve commercial fishing economics and performance.

Offences for failure to comply with IOM requirements (e.g. interference with e-monitoring systems) would also be introduced. As with any new regulation, an incremental approach (i.e. educate, encourage, enforce) would be applied to offences.

Table 6: Summary of proposed IOM program under each level of vessel coverage based on 2023 data (the number of vessels may change depending on the number of active and inactive vessels)

	VESSEL COVERAGE		
	Level 1	**Level 2**	**Level 3**
ECOTF			
Annual effort (days fished)	100%	90%	25%
Fishery symbols	T1, T2, M1, M2	T1, T2, M1, M2	T1
Number of vessels required to have e-monitoring	243–361*	166	30
Effort threshold for e-monitoring system (number of days fished)	0–1	72	204
Proportion of active vessels required to have e-monitoring equipment	100%	68%	12%
CFFTF			
Annual effort (days fished)	100%	100%	100%
Fishery symbols	T4	T4	T4
Number of vessels required to have e-monitoring	1	1	1
Effort threshold for e-monitoring system (number of days fished)	NA	NA	NA
Proportion of active vessels required to have e-monitoring equipment	100%	100%	100%

* The exact number of vessels requiring e-monitoring systems for level 1 (100% coverage) includes a range to account for the variation between the total number of licences with a fishery symbol and those licence holders that are actively fishing. During 2023, there were 243 active vessels and 118 inactive vessels (361 total) in the ECOTF.

Proposed government action

- E-monitoring systems are installed on all active CFFTF vessels, due to a lower number of licences and only 1 active vessel in the fishery.
- The government covers all costs of the IOM program for the first 4 years during the establishment phase.
- The program is reviewed after 2 years, using updated data and information to inform ongoing program costs and operations.

7.2.1 Level 1: 100% of CFFTF and ECOTF vessels

Based on 2023 data, e-monitoring systems would be installed on **1 CFFTF vessel** and **243–361 ECOTF vessels.** The number of vessels requiring e-monitoring systems for 100% coverage includes a range to account for the variation between the total number of licences with a relevant fishery symbol and those licence holders that are actively fishing – for example, there were 243 active vessels and 118 inactive vessels (361 total) in the ECOTF during 2023. All fishing activity would be recorded by onboard cameras and a **minimum 10% of footage** from each vessel would be reviewed initially.

7.2.2 Level 2: 100% of CFFTF vessels and ECOTF vessels that account for 90% of annual fishing effort

Based on 2023 data, e-monitoring systems would be installed on **1 CFFTF vessel** and **166 ECOTF vessels**. All fishing activity would be recorded by onboard cameras and a **minimum 10% of footage** from each vessel would be reviewed initially.

The ECOTF vessels identified for e-monitoring systems would be determined by applying **effort thresholds** based on the number of days fished in a year. Based on 2023 data, the effort threshold would be **72 days fishing**. This means that any vessel that fishes more than 72 days in the future would be required to have an e-monitoring system installed. Vessels under the threshold would not require an e-monitoring system.

This option aligns closely with the effort-based approach to e-monitoring adopted by AFMA in Australia's most established IOM program. For example, in AFMA's gillnet, hook and trap fishery, e-monitoring is only required on vessels that annually fish for 50 days or more if they use automatic line equipment, or 100 days or more if they use manually baited longlines (41).

7.2.3 Level 3: 100% of CFFTF vessels and ECOTF vessels that account for 25% of annual fishing effort

Based on 2023 data, e-monitoring systems would be installed on **1 CFFTF vessel** and **30 ECOTF vessels**. All fishing activity would be recorded by onboard cameras and a **minimum 10% of footage** from each vessel would be reviewed initially.

The ECOTF vessels identified for e-monitoring systems would be determined by applying **effort thresholds** based on the number of days fished in a year. Based on 2023 data, the effort threshold would be **204 days fishing**. This means that any vessel that fishes more than 204 days in the future would be required to have an e-monitoring system installed. Vessels under the threshold would not require an e-monitoring system. Based on 2023 data, only active ECOTF licences holding a T1 symbol would be included in this scenario. This would exclude T2, M1 and M2 symbol holders.

8 Program design considerations

IOM programs involve several operational and administrative components and consist of a combination of strategies – For example, in IOM program should not only focus on the use of e-monitoring systems to validate data, it should also include improved reporting and educational strategies to enhance the commercial fishing data that is reported by fishers.

The following sections provide an overview of key IOM program components that have been considered, and where necessary proposed key program components. Feedback on the key program components will be considered as part of this consultation IAS before a final decision is made.

8.1 Program principles

Under the state and federal funding agreement supporting the establishment of a multi-year independent monitoring and data validation program, specific principles are referenced to guide design and establishment (43). Failure to meet these program principles would risk achieving related funding milestones and, in turn, impact the ability to comply with program expectations under EPBC Act approvals.

The 6 program principles are:

1. **Independent** – that independence and transparency underpin the design and operation of the program, and the program is conducted by persons with no material interest in the fishery.
2. **Robust** – that information is provided from the program that is defensible and representative.
3. **Risk-based** – that the design and implementation of the monitoring program applies an appropriate level of fleet coverage and data validation commensurate to the risk to the environment (including target species, bycatch species, and ecological values)
4. **Accurate** – that the information provided from the program is accurate and current.
5. **Integrated** – that the findings from the program are integrated into the fisheries management cycle to support responsive and adaptive fisheries management.
6. **Collaborative** – that the program is collaborative and engages with funding partners and industry.

Other key considerations that have been applied to the design of an IOM program include:

- key learnings and recommendations from the onboard camera field trial (26) and implementation of IOM in the NX fishery (summarised in section 3)
- key drivers and operational delivery timeframes for IOM (summarised in section 2)
- approaches taken by other jurisdictions, including AFMA and Fisheries New Zealand, including consistency with existing IOM program design and operational delivery components where appropriate (section 5)
- feedback received from stakeholders (summarised in section 9).

8.2 Program objectives

Draft objectives of an IOM program

- Support monitoring of commercial fishing activities and validation of commercial fishing data, with a primary focus on TEP species interactions.
- Provide accurate and reliable data to support the sustainable management of the fishery through ERAs, harvest strategies, stock assessments and protected species management strategies.
- Increase the accuracy of commercial fishing data and support fisher improvements in the identification, reporting and handling of TEP species.
- Reduce non-compliance with regulatory requirements, focusing on the use of bycatch mitigation devices and monitoring actions that would have perverse outcomes for the sustainable management of catch, bycatch or TEP species.
- Increase community confidence in commercial fishing practices and help improve the economic performance of commercial fishing businesses.

Experience from the onboard camera field trial indicated that clear program objectives are required to support the design and establishment of any future program. The objectives of an IOM program are a key consideration in the design phase and will inform key components, such as the way e-monitoring systems are installed onboard vessels, the number and position of cameras on each vessel, the type of footage reviews undertaken, the proportion of footage to be reviewed and the number of reviewers and associated training required (26).

Outlining clear program objectives will not only support program design and establishment, but will support the ongoing management and delivery of a future program post roll-out. Clear objectives will also improve transparency, with commercial fishers, key stakeholder groups and the community aware of how the program is being managed and the information is being used.

Recommendations from the onboard camera field trial included:

> Future IOM program objectives should focus on using e-monitoring systems to monitor and validate TEP species interactions across all sectors of the ECOTF and the CFFTF. The monitoring of bycatch using e-monitoring systems should be targeted and used in conjunction with other monitoring methods, depending on the fisheries data needs.

Other program objectives should outline the way IOM data will be used and how the program will support industry.

8.2.1 Monitoring and validation

E-monitoring systems can be used to validate a range of commercial fishing data, including retained catch, fishing effort, bycatch and protected species. The review and validation of each component of an operation increases the time and subsequent program operating costs. It would be important to be clear about the data validation priorities of the program.

An IOM program would adopt program objectives similar to those recommended by the field trial, with the primary objective of the program focusing on the monitoring and validation of TEP species interactions. The monitoring of bycatch will be considered in specific regions of the fishery, or under specific monitoring objectives, in proportion to the management needs of the fishery.

Prioritising the validation of TEP species aligns with requirements under the ECOTF EPBC Act approval conditions, which specifically reference independent validation of TEP species. Other components of commercial fishing data should be validated if operationally viable and within the program operating budget.

8.2.2 Improved reporting and confidence in logbook data

While an IOM program can support the independent validation of commercial fishing data, it is also important to focus on improvements in fisher reporting, specifically TEP species interactions. Improved accuracy of reporting, including species identification and counts, will also contribute to improved confidence in the logbook information being reported. Further, training and education about best practice handling techniques will improve the likelihood of TEP species being release alive and unharmed.

For these reasons, the future objectives of a program should also focus on improving commercial fishing reporting, species identification and focus on the education of best practice handling processes for TEP species to further improve the confidence in logbook information and support industry.

Improvements in logbook information will inform sustainable management decisions and reduce the need for precautionary management decision to be made.

8.2.3 Sustainable management of the fishery

Introduction of an IOM program will improve the accuracy of commercial fishing data being reported and subsequently improve confidence in the use of the information when undertaking ERAs and implementing key fishery management tools, such as harvest strategies and protected species management strategies.

A key objective of any independent data validation program should relate to the use of the information to support improved management of the fishery.

8.2.4 Non-compliance

Several best practice management measures are regulated to minimise impacts on catch, bycatch and TEP species during general fishing operations. In the ECOTF this includes a combination of input and output controls such as spatial and temporal closures, gear restrictions and the use of turtle exclusion devices and bycatch reduction devices. Although most commercial fishers strive to operate in a way that minimises ecological impacts on the marine environment, reports of untoward behaviour and non-compliance with regulations are often received or observed.

The deployment of e-monitoring systems introduces the ability to monitor if key mitigation devices are being used during fishing operations, as well as ensuring general compliance with other best practice management measures developed to mitigate impacts. For this reason, it is considered appropriate for the objectives of a program to include monitoring for compliance with best practice management measures that achieve beneficial ecological outcomes. This program objective is consistent with those under national and international e-monitoring programs managed by AFMA (30) and Fisheries New Zealand (42).

For example, if a fisher is consistently handling TEP species in a way that would impact their survival post-release, or not using bycatch reduction devices or turtle exclusion devices, IOM may prompt voluntary behaviour change in some fishers and help to ensure compliance with these measures. In the event of observed repeat non-compliance, or the undertaking of actions that are expected to have adverse impacts on TEP species, bycatch or other ecological communities, actions should be undertaken to mitigate future occurrences (should an educational approach not be working). This approach is consistent with the Queensland Boating and Fisheries Patrol's compliance processes and policies (43).

8.2.5 Community confidence and industry improvements

Introduction of an IOM program would introduce several benefits for the commercial fishing industry and any future program should focus on supporting industry to realise these benefits. A key benefit described above

is the improved confidence in logbook data. IOM data should be used in a positive way to promote and strengthen the reputation of the commercial fishing industry.

IOM benefits also relate to the improvement of efficiencies for commercial fishing businesses. For example, being able to support components of third-party sustainability certification can improve market access and support economic improvements. E-monitoring systems also have the capability to automate reporting processes, potentially reducing operational reporting burdens and improving operational capabilities. These additional benefits can improve the economic and operational performance of commercial fishing businesses and should also be prioritised as part of a program, ensuring industry are supported by the programs outputs and capabilities.

Questions to consider

- Do you support the IOM program objectives?
- Are there changes or other objectives that should be considered?

8.3 Prioritisation of vessels

Proposed government action

- Onboard cameras are made mandatory across all vessels in the CFFTF and vessels within the ECOTF that represent the highest effort (fishing days).

A key consideration in the design of an IOM program is the identification of vessels within a fleet that should have onboard cameras installed.

Prioritisation of vessels in the CFFTF is more straightforward than the ECOTF as there are fewer fishing symbols (**Table 7**). For this reason, it is only feasible to recommend that all vessels within the fishery should be included in an IOM program. Further, as the CFFTF has only 5 fishery symbols, it may be more appropriate to recommend that all future vessels in the fishery require IOM. This recommendation would ensure future vessels that become active are captured, supporting a representative program across the active fleet. Alternatively, an effort threshold could be considered; however, this is likely to be less appropriate with a low number of active vessels. For these reasons, e-monitoring systems should be installed on all CFFTF vessels.

In comparison, there were 361 individual authority holders and 243 active fishing vessels across the ECOTF in 2023 (**Table 7**). While it is an option to recommend establishment of an IOM program across all 361 individual authority holders with trawl fishing symbols, 118 of these are inactive and do not represent an impact to TEP or bycatch species. The inactive vessels introduce complications with program design and cost estimates, as although they are inactive, they possess rights to operate in the fishery (if they hold the required effort units) and could be become active at any time. For a program that seeks to have complete coverage of fishing effort, it is likely to be more cost-effective to target only the active fishing vessels and not install e-monitoring systems onboard inactive vessels that are not intended to be used to fish.

Table 7: Summary information on the number of symbols and licences in the ECOTF and CFFTF (in 2023)

Fishery	Fishery symbols	Total no. of licences with fishery symbols	No. of active licences with fishery symbols	Inactive fishery symbols
ECOTF	T1, T2, M1, M2	361	243	118
CFFTF	T4	5	2	3

While it may be appropriate to recommend that e-monitoring systems are installed on all active vessels, there is a large proportion of the active fishing fleet that does not represent a large proportion of effort and only fish a limited number of nights. Vessels that fish a low number of days likely represent a lower risk of interacting with TEP and bycatch species, compared to vessels that fish more nights. This assumption is made on the basis that less time with nets in the water is likely to result in a lower risk of interaction. However, this assumption does not take into consideration spatial and temporal considerations across the fishery, including the species distribution and biology of TEP or bycatch species, which may change risk.

Further analysis of fishing effort across the ECOTF fleet indicates that a smaller proportion of active fishing vessels are responsible for the majority of the fisheries effort (**Figure 2**). For example, only 68% of active fishing vessels were responsible for 90% of the fisheries effort in 2023.

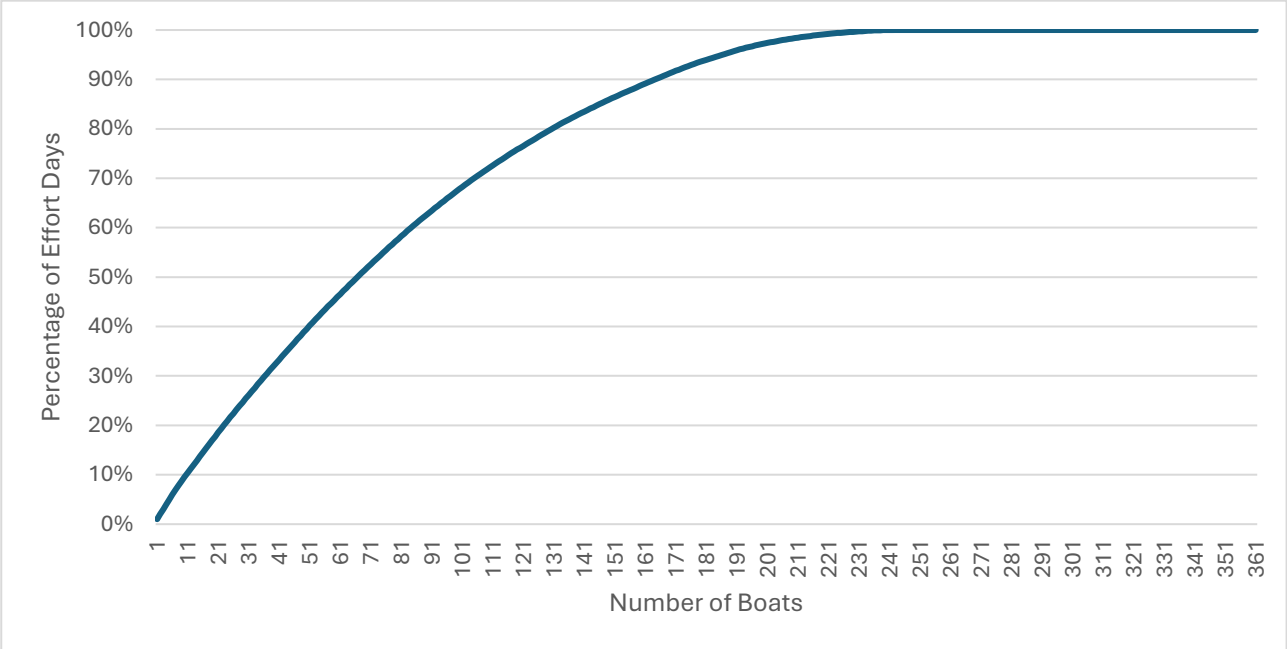

Figure 2: Fishing effort across trawl vessels in the ECOTF

However, the number of fishing days is not the only measure of fishing effort across the fleet, as vessels are different sizes and have different engine capacity, allowing larger vessels to use larger gear and potentially fish with a higher risk to TEP and bycatch species. An alternative measure of fishing effort that could be used to prioritise vessels is the number of effort units used by each vessel, which would include consideration of larger vessels that are able to use larger gears.

While effort is a commonly used method for monitoring and reporting commercial fishing activities, there are other ways that vessels could be prioritised. For example, a fisher's compliance history could be considered, and those with a history of non-compliance and who may be more likely to do the wrong thing are prioritised for e-monitoring installation.

Alternatively, historic reporting of TEP species could be used to prioritise vessels, with those fishers who have not historically reported any interactions being prioritised over those who have reported. This option may present some complications, as a fisher may have implemented improved processes or strategies to avoid interactions. Alternatively, vessels that are reporting interactions could be prioritised, as they are interacting with TEP species. However, if fishers are already reporting their interactions, they may not need to be prioritised for e-monitoring systems.

Questions to consider

- Do you support the use of fishing effort (day fished) as an appropriate way to prioritise vessels for e-monitoring installation?
- If not, what other measure(s) should be considered (e.g. compliance or TEP reporting history)?

8.4 Implementation schedule

Proposed government action

- A risk-based, staged implementation of an IOM program occurs over 4 years (beginning 15 June 2026), prioritising active CFFTF and ECOTF vessels within the northern, central, southern inshore and southern offshore management regions.

A key recommendation from the onboard camera field trial was the risk-based, staged implementation of an IOM program across a large fleet of vessels such as the ECOTF (26). This recommendation was in response to the challenges encountered when initially installing e-monitoring systems on board vessels. A staged implementation allows time to optimise camera system configurations and train crew on how to operate the equipment.

Although the final scope of an IOM program is yet to be decided, including the number of vessels to have e-monitoring systems installed, up to 361 vessels could be included in a future IOM program across the ECOTF. While it would be desirable to install cameras across all prioritised vessels as soon as possible, the field trial has suggested that any rollout must occur in a risk-based, staged approach. This recommendation ensures that specific vessels can be prioritised before others. For this reason, a prioritisation process was undertaken to identify how the rollout of cameras would be undertaken.

8.4.1 Risk-based prioritisation

Prioritising the rollout of an IOM program across the CFFTF is straightforward as there is only one active vessel. However, the ECOTF is extremely diverse, operating across a large spatial and temporal range with different target species and gear types used across the fishery, so different risk profiles need to be considered.

Recent reforms implemented across the ECOTF involved the introduction of regional management arrangements and harvest strategies for the northern, central, southern inshore, southern offshore (A and B) and Moreton Bay regions of the ECOTF (44; 45; 46; 47; 48). The harvest strategies, among other things, establish regional effort limits, define decision rules/trigger limits for the sustainable management of harvested species and provide mechanisms for the ongoing monitoring and management of ecological risk. The spatial separation of the various regions of the fishery allows the application of individual management arrangements that are more appropriate to the risk profile of the individual regions. **Figure 3** shows the individual management regions of the ECOTF in relation to the boundary of the GBRMP.

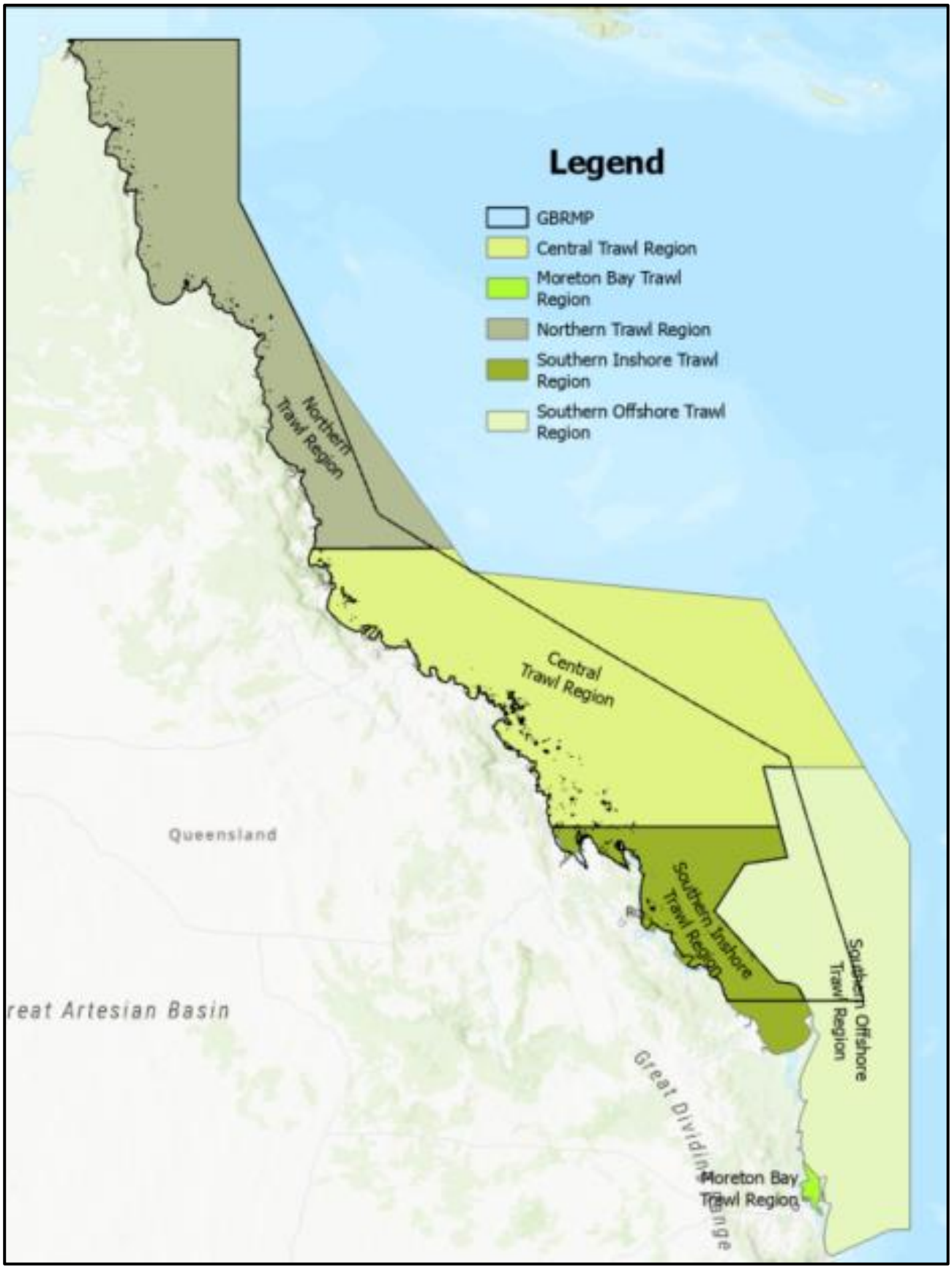

Figure 3: Map of the 5 ECOTF management regions (the black line is the GBRMP boundary)

The prioritisation of rollout across the ECOTF considered several components across the fishery's individual management regions. These included risks to TEP and bycatch species identified through regional ERAs (49), fishing effort within and between regions, and the spatial overlap of the management regions with the GBRWHA. **Table 8** provides a comparison summary of the results.

This comparison across management regions identified that the northern, central, southern inshore and southern offshore management regions sustain the largest fleets, overlap with the GBRMP and represent a higher risk to TEP and bycatch species (**Table 8**). In contrast, the Moreton Bay management region is located outside the marine park and supports the smallest fleet, accounting for only 5% of the total fishing effort.

Fishing activity varies among vessels within the fleet in area and number of days fished. During the 2023 fishing year, there were 243 active vessels in which 98 (39.5%) fished in more than one management region and 35 (14%) that fished in 3 or more regions.

Given the even spread of risk across the management regions of the ECOTF, it has been proposed that the rollout of cameras prioritise vessels from the northern, central, southern inshore and southern offshore management regions first. With a small spatial footprint and the lowest risk rating to TEP species, the Moreton Bay region is the lowest priority for implementing e-monitoring systems.

An alternative to the prioritisation of several management regions could include the prioritisation of an individual management region. This option would mean all vessels within that region, and over the proposed effort threshold, would have e-monitoring systems installed first – before other management regions are prioritised. This would be advantageous from an operational perspective at the time of installation, with more vessels likely to be located in or nearby similar ports.

In addition, approximately 40% of vessels fish within 2 management regions, providing some level of representative coverage across the fishery's sectors. A consequence of this option may see operators avoid a specific management region for the following season to avoid installing an e-monitoring system, which would result in effort shift in other regions. This effort shift may increase risks to TEP and bycatch species in these regions and impact other operators.

Although the northern, central, southern inshore and southern offshore regions are a high priority based on their risk factors (**Table 8**), the central region could be prioritised first as it has the most significant and largest spatial footprint of fishing effort, the highest (equal) TEP species risk score and 66% of the area is within the GBRMP. Under this approach, the central region would receive cameras first, then the northern, and southern inshore/offshore regions, with Moreton Bay (the lowest risk) last.

Table 8: Risk factors assessed for each trawl management region

Management region	Fishery symbol	Overlap with GBRMP*	TEP species risk score**	No. of vessels	Total ECOTF fishing effort	Additional reasons
Northern	T1	89.94%	72	73	16%	Highest overlap with GBRMP
Central	T1	66.06%	93	88	19%	Risk ratings for sea snake complex higher in central region where fishers target reef-species like red spot king prawns
Southern inshore	T1	84.83%	78	100	11%	Batoid (ray) complex and carpet shark (Colcough's shark) higher average risk rating in more southern trawl regions due partly to fishers interacting with more diverse range of species
Southern offshore	T1, T2	27.94%	93	159	50%	Batoid (ray) complex higher average risk rating in more southern trawl regions partly due to fishers interacting with more diverse range of species
Moreton Bay	M1, M2	–	56	50	4%	Small area, spatial footprint and fishing effort, and outside the GBR – therefore lowest risk to TEP species

*TEP species risk scores sourced from regional ERAs – all interactions allocated a score of high risk = 4, medium risk = 3, low–medium risk = 2 or low risk = 1, not assessed = 0

8.4.2 Staged rollout

Another key consideration is the timeframes to establish a program and how individual vessels are prioritised. While immediate implementation is desirable, the field trial has demonstrated that this would be extremely challenging (26).

Consistent with the recommendations of the field trial, implementation would be staged across 4 years, beginning 15 June 2026 (with a review after 2 years). To support the establishment of a program that is representative, an even distribution of vessels from each management region would be prioritised, with vessels representing the highest effort (days fished) prioritised first.

Implementation would occur in a ramped-up approach, in which e-monitoring systems would be installed on a small number of vessels from each priority region during the first year, with the number of installations increasing each year. While the final scope of a program is yet to be decided, an implementation scenario that gradually increases in scope is expected to experience far fewer issues, making the program more practical for both fishers and program managers.

Under a program model that prioritises vessels based on effort (fishing days), e-monitoring systems would be installed on vessels with the highest effort within each region first (**Table 9**).

A 4-year rollout across the fleet would be required for vessel coverage levels that involve a large number of vessels – levels 1 and 2 (**Table 9**). For fewer vessels (level 3), the rollout is likely to be achievable in a shorter timeframe (**Table 9**).

Table 9: Regional breakdown of proposed IOM rollout for the ECOTF under each level of vessel coverage

Vessel coverage level	Total number vessels (2023)	Management region	Year 1	Year 2	Year 3	Year 4
Level 1 (100% of ECOTF vessels)	243–361*	Northern	10	15	60	36
		Central	10	15		
		Southern inshore	10	15		
		Southern offshore	10	15		
		Moreton Bay	0	0	0	47
		Inactive vessels	0	0	0	118
		Total	**40**	**60**	**60**	**83–201***
Level 2 (ECOTF vessels that account for 90% of effort)	166	Northern	10	15	48	–
		Central	10	15		
		Southern inshore	10	15		
		Southern offshore	10	15		
		Moreton Bay	0	0	12	6
		Inactive vessels	0	0	0	0
		Total	**40**	**60**	**60**	**6**
Level 3 (ECOTF vessels that account for 25% of effort)	30	Northern	30	–	–	–
		Central				
		Southern inshore				
		Southern offshore				
		Moreton Bay	0	0	0	0
		Inactive vessels	0	0	0	0
		Total	**30**	0	0	0

* The exact number of vessels requiring e-monitoring system installation in the final year of the rollout would depend on the number of active vessels in the fishery. If only active vessels require e-monitoring systems, there will be approximately 83 vessels requiring installation in the final year. If all vessels (including inactive) need e-monitoring systems, there will be 201 remaining.

Questions to consider

- Do you support the staged implementation of an IOM program across 4 years? If not, what should the timeframes be?
- Do you support the risk-based prioritisation of vessels from the northern, central, southern inshore and southern offshore management regions of the ECOTF?
- Do you support staged implementation across vessels that represent the highest fishing effort within each management region?

8.5 Program responsibilities and operational requirements

Proposed government action

- Government would be responsible for the establishment of an IOM program, the review and validation of data, and general program management and delivery.
- Fishers would be responsible for operating e-monitoring systems during all fishing events and reporting electronically via the Qld eFisher reporting app.

There are several operational and administrative components to an IOM program (section 1 provides a description of what is included under each program component). **Table 10** provides an overview of key program components and responsibilities.

Table 10: Overview of proposed program responsibilities

Program components	Government	Licence holders
Installation and maintenance of onboard camera systems	✓	–
Operation of systems during fishing events	–	✓
Submission of footage and data	–	✓
Data storage	✓	–
Footage review, validation and reporting	✓	–
Fisheries management, science and data management	✓	–
Artificial intelligence research and development	✓	–
Project implementation	✓	–
Other	✓	–

The majority of IOM program components would be managed by government, covering the installation and maintenance of e-monitoring systems, the footage review, validation and reporting, the use of validated data and ongoing improvement of the program. Licence holders would only be responsible for reporting electronically, ensuring the e-monitoring systems are operational during fishing events, and transferring camera footage for review (either physically via a hard drive or electronically).

While licence holders would only be responsible for limited components of an IOM program, they will need to undertake some operational requirements as part of a program.

8.5.1 Fisher support

E-monitoring systems require active support from fishers during installation, as well as before, during and after a fishing trip to ensure the systems function properly and issues are addressed in a timely manner (26; 50; 51). Technical support and an effective feedback loop between the reviewer, skipper and technicians is critical when addressing troubleshooting issues (26).

During installation, skippers would be required to engage with licenced tradespeople to plan the system installation and provide access to the vessel to enable the installation. After installation, fishers would be required to undertake system health checks before commencing a fishing trip, periodically clean camera lenses while at sea, troubleshoot issues and operate the systems (including electronic transfer of camera footage when vessels return to port).

8.5.2 Camera positioning and operation

To ensure an effective program, e-monitoring systems must be recording and operational during all components of a fishing operation that could potentially interact with TEP or bycatch species. Cameras need to be installed and positioned to capture all locations where interactions with TEP and bycatch species are likely to occur. While the field trial identified that the installation of cameras on each vessel is unique, an average ECOTF vessel would require up to 3 cameras to capture all areas of the fish handling and processing areas where TEP species and bycatch interactions may occur.

8.5.3 Malfunction provisions and industry operational support

Experience from the onboard camera field trial suggests that camera malfunctions occur for several reasons (26). Previous experience with the implementation of vessel tracking (which is a similar monitoring and data validation program) found that it is important to have appropriate exemption processes to allow fishers to operate in the event of a malfunction or other circumstances, such as not having stock of a particular system component (52).

Preventing fishers from commencing or continuing a fishing operation in response to a unit malfunction outside of their control is unfair and unreasonable, and would introduce additional economic impacts and burdens on business profitability as access to catch would be lost.

Considering the importance of minimising vessel downtime, a proposed IOM program must be well designed and have appropriate processes in place to minimise the frequency of malfunctioning e-monitoring systems and their impact on fishing operations. Should fishers follow the required processes and procedures, they should not be prevented from fishing if a malfunction occurs that is outside their control.

Support mechanisms that should be considered include, but are not limited to:

- provision of well-designed e-monitoring systems that allow remote oversight, remote configuration and electronic transfer of footage to support remote troubleshooting and investigation
- support during the sectors' fishing times (including at night) and establishing support entities that can provide troubleshooting both remotely and on vessels
- clear expectations and responsibilities for fishers regarding e-monitoring systems, including troubleshooting and operational guides that are clear and have reasonable steps fishers can take to troubleshoot malfunctioning systems
- a clear process to approve temporary exemptions for fishers if troubleshooting a malfunctioning system cannot be completed after reasonable steps have been taken.

8.5.4 Electronic logbook reporting

Consistent with the recommendations of the onboard camera field trial, all logbook reporting in the ECOTF would be transitioned to electronic reporting (e-reporting). In 2021, e-reporting was introduced in a voluntary capacity in Queensland and allows commercial fishers to use a mobile device to report notices and catch data, and access information linked to their licence (such as quota use).

A key principle of an IOM program is the provision and validation of accurate and current logbook data. The field trial demonstrated that the validation of logbook data was much faster for vessels that submitted their logbook data using the Qld eFisher app compared to paper logbooks.

Compulsory e-reporting was introduced in the NX fishery in 2024. NX fishers enter the catch and effort information directly into Qld eFisher on their phone or tablet and can customise pre-set fields (such as species caught regularly), which makes reporting quicker and easier.

The rapid availability of reported catch and effort information, in particular interactions with TEP species, combined with rapid availability of onboard camera footage uploaded regularly (mostly daily), enables data availability for responsive reporting, monitoring, compliance, assessment and management. For more information, visit business.qld.gov.au.

A detailed list of proposed fisher requirements are listed in **Table 11**.

Table 11: IOM program fisher requirements

	Fisher requirements
Installation	• Provide access to vessel for Fisheries Queensland and licensed technicians for planning and installation at a nominated location, date and time • Provide formal notification if nominated location, date and time cannot be met
Camera operation	• Ensure camera systems and hardware components (including winch sensors) are operational and systems are recording during all fishing events
Footage storage and transfer	• Monitor storage space on memory hard drives (for e-transfer) • Enable electronic upload of footage when returning to port to unload between trips • Ensure footage has completely uploaded prior to leaving port on your next trip
Ongoing system maintenance	• Perform regular function testing before starting a new trip, after periods of inactivity, and if there are any suspected issues with the system • Report technical issues to the designated equipment provider and/or Fisheries Queensland • Clean camera lenses regularly to provide a clear vision of the field of view • Ensure camera views of fishing gear retrieval and catch handling are clear of obstructions and well-lit/adequate lighting, and cameras are in good working order • Do not tamper or interfere with any equipment or data
Malfunction provisions	• Troubleshoot system issues using operational guides provided • Report any system issues or malfunctions as soon as possible, particularly during active fishing operations and follow process to report equipment that is not working
Privacy	• Provide privacy collection notice to all skippers, crew members and other people onboard during active fishing operations when cameras are recording
Reporting	• Report TEP species interactions accurately in logbooks • Report catch and effort (including TEP species interactions) electronically via Qld eFisher
General	• Keep contact details up to date with Fisheries Queensland and the supplier, and ensure ability to electronically upload footage when returning to port to unload between trips

Questions to consider

- Do you support the proposed responsibilities of government and licence holders to deliver an IOM program?
- Should government or licence holders be responsible for other program components?
- Are any program components not included?
- Do you support the introduction of mandatory e-reporting via the Qld eFisher app?

8.6 Cost contributions

Proposed government action

- All IOM program costs are covered by government for the first 4 years (establishment stage).
- A review is undertaken after the first 2 years of implementation, in which updated data is used to assess the ongoing costs and program funding post-establishment stage.

The Queensland and Australian governments have committed funding to support the implementation of an IOM program across the ECOTF (53). While this funding is available to support implementation, no funding has been committed to support the ongoing management of a program post-implementation or expenditure of these funds.

With the current funding available, it is proposed that all IOM program costs associated with implementation and ongoing management would be covered by government for the first 4 years. This includes all components of the IOM program summarised in section 1, covering hardware purchase and installation, operating software, system maintenance, troubleshooting support, data connectivity, review of camera footage, and general support and education services.

There would be no direct costs or impacts to industry through the establishment of an IOM program. Camera hardware would be purchased by the Queensland Government.

Funding for the ongoing management of a program after 4 years is yet to be determined. The final costs of an ongoing program are subject to the final design, which would be informed by the outcomes of this IAS process.

8.6.1 Program implementation review and ongoing cost contribution

Analysis of the costs and benefits associated with an IOM program have been based on the best information available at the time this consultation IAS was prepared. This includes the current landscape and uncertainty about the accuracy of TEP species reporting, as well as cost estimates obtained from the field trial, an economic survey completed in 2021–22 by BDO (an independent group of researchers with experience monitoring economic and social indicators for fisheries in Australia), and a limited number of benefits that are challenging to monetise and include in a cost-benefit assessment.

While the analysis used robust estimates and the best available information to inform program design and ongoing cost estimates, implementation of an IOM program has the potential to provide improved data and information that may change the way a future program is managed and its associated costs. For example, improved economic information may become available that better represents the economic performance and affordability of an IOM program for commercial fishing businesses. An opportunity to review program affordability should be provided in the event that improved economic information is received.

In addition, the establishment of an IOM program will improve the baseline level of TEP species interaction data reported by fishers, and TEP species logbook records will be independently validated to further support an improved understanding of potential interaction rates and subsequent risks across the fishery's operating regions. Current program design and ongoing operational requirements and costs have been based on the current level of information, or in the instance of TEP species interactions, the lack of information.

As with the availability of any new or improved economic information, there should be an opportunity to review any improved interaction data being received and reassess fishery risks and program design accordingly. These reviews would identify if any modifications to program implementation and ongoing management would be required to better manage risk across the fishery and improve ongoing management arrangements and cost estimates of an IOM program.

E-monitoring systems also have the capability to improve the automation of reporting and validation of interactions through the application of AI or other improved reporting processes. The application of these future advancements will impact and change the way an ongoing program may be managed, along with its ongoing costs. For example, if AI could automatically validate all TEP interactions, the ongoing management costs of a program would be reduced. Automation may also reduce the need for manual reporting, improving business operations.

It is for these reasons that IOM program design and ongoing costs would be reviewed after the first 2 years of implementation. A formal IAS process would occur as part of that processes, with a full cost-benefit analysis completed and industry given another opportunity to provide feedback. A key consideration during a 2-year review would include proposals of how future cost-recovery arrangements might be improved once ongoing cost estimates of a program are available.

Questions to consider

- Do you support the proposal for all IOM program costs to be covered by government for the first 4 years?
- Do you support the proposal to review ongoing program costs after 2 years of implementation?
- What cost-recovery options would you recommend for ongoing program costs?

9 Impact analysis of options

This section analyses the benefits and costs for commercial fishers, seafood businesses, government and the community associated with the options presented in this consultation IAS, including potential changes in fishing activity and the likelihood of each option achieving the objectives of government action.

9.1 Option 1: Maintain status quo

While this option would not see any legislation intervention or regulatory change, some fishers may take voluntary action to establish IOM in order to maintain export approvals or improve market access opportunities. This approach may become more common and attractive as fishers seek industry certification, access to export markets, a higher price for their products and to improve their public image. Evidence of this has already occurred in the ECOTF, with one business with a fleet of vessels installing their own e-monitoring systems to support accreditation under a third-party sustainability framework (54).

Others may choose to make their fishing operations more transparent to the public, providing a way to further validate their catch. There are examples outside Queensland of commercial fishers voluntarily 'livestreaming' their fishing operations to build public confidence in their commitment to sustainability and ethical practices (55). There are reports these fishers have achieved a markedly higher price for their product.

While it is preferable that IOM is voluntarily adopted by industry, it is unlikely due to the costs involved and privacy concerns of fishers. While a select number of individuals across the industry have introduced IOM, and others have started to explore the introduction of e-monitoring, voluntary uptake is likely to be too slow to satisfy conditions under EPBC Act approvals. Also, EPBC Act approvals apply to a whole fishery and are not allocated on a business-by-business basis, so the approval would not be maintained if only a select number of fishers (such as only those operators who export) adopt IOM methods. Further, a review of access arrangements to the GBR is also expected to apply to the entire fishery.

Maintaining the status quo would mean a financial cost relating to the loss of export markets, valued at $8 million annually to the ECOTF. The emphasis placed on non-regulatory approaches, such as educational programs and improvements to the commercial fishing app under this option, would potentially see modest improvements to the accuracy of catch data, but would fail to address any of the incentives for under-reporting of catch, specifically interactions with TEP species.

While there are existing stock assessment outputs and ERAs, improvements in the accuracy and confidence of commercial fishing data used for these assessments would not be realised or improved, and associated actions would still be based on the precautionary principle. There would also be no improvement in the ability to monitor bycatch in some components of the fishery.

The need to implement IOM programs that support the independent validation of commercial fishing data, specifically TEP species interactions, are incorporated as a time-bound condition of EPBC Act approvals and the DCCEEW has demonstrated a willingness to revoke existing WTO approvals if such conditions are not met. Similarly, the GBRMPA has issued a position statement on fishing that raises concerns about the potential impacts of higher risk fisheries in the GBRWHA. In addition, the 'do nothing' option will not achieve recommendations made by UNESCO with respect to the GBRWHA being listed as 'in danger' (19), potentially jeopardising the world heritage listing status of the Reef.

For these reasons, maintaining the status quo will not meet the expectations of Australian Government agencies and is unlikely to meet the requirements of some non-government organisations or the broader community, so the pressure to introduce data validation would be likely to increase. It is difficult to know what impact the loss of defence against prosecution for unintentional TEP species actions might have on fishers' ability to operate or access fishing grounds.

Maintaining the status quo is likely to result in the loss of WTO approvals, which would have a direct financial impact on those fishers that export product. While these operators could seek alternative domestic buyers, domestic prices may not be as high as those of export markets and such occurrences are likely to disrupt the domestic supply chan.

Maintaining the status quo means that no new laws would be introduced that require the independent validation of commercial catch data. Independently validated catch data would not be available to underpin evidence-based fishery management decisions, satisfy the conditions of export approvals, support industry certification, demonstrate sustainable fishing practices to the wider public or gain any of the other benefits of IOM. Maintaining the status quo may result in an Australian Government review of access to valuable fishing grounds in the GBRWHA.

Approximately 44% of the total ECOTF catch is accessed within the GBRMP boundaries valued at $56.29 million, including the value of external exports to the marine park (apportioned midpoint from total exports). While CFFTF fishers do not operate in the marine park, they do export their product. Due to privacy concerns, there is no data on the amount of CFFTF catch that is exported.

9.1.1 Assessment against objective of government action

This approach is not considered feasible for the following reasons:

- **A voluntary approach would not satisfy the time-bound conditions associated with EPBC Act approval for the ECOTF fishery**. Establishment of a representative IOM program focusing on the validation of TEP species is required to commence by 15 June 2026. The Federal Government issues WTO approvals on a whole-of-fishery basis. So unless a sufficient number of fishers across the fishery opted in, this approach would not satisfy the export approval condition requirements and fishers could not export product. Loss of the ECOTF export approval (Part 13A) would also jeopardise the Part 13 approval, which protects commercial fishers from prosecution under the EPBC Act for unintentional interactions with protected species.
- **Fishers are unlikely to opt in due to the additional costs associated with IOM, as well as concerns regarding information privacy and data security**. This would mean that the fishery management benefits associated with more accurate and reliable data, and improved data confidence, would not be achieved. Fishery management decisions could not ensure ecologically sustainable outcomes with the same level of confidence as they could if all, or a high number of, fishers participated in an IOM program. Also, opportunities would be missed to improve fisheries management through a broader understanding of fishery operations at sea.
- **Fishers who may be inclined to under-report interactions with TEP species are not likely to opt in**. This would mean that data derived from the program would not be truly representative and management decisions could be based on skewed data.
- **Fishers who opt in may only provide footage some of the time**. For example, they may not submit footage of a rare encounter with a TEP species for fear the information may result in changes to fisheries management policy. This is likely to result in fisheries management decisions being based on data that is not complete or accurate.

Although some individual businesses and fisheries in other jurisdictions have voluntarily implemented IOM methods, their size and scope differ to that of the ECOTF, which operates across a large spatial range (with more than 260 active vessels operating in 2023). For such a large fishery, it is not operationally viable to

design and deliver a voluntary program that would ensure independent and representative data across the entire fishery, and within the timeframes outlined under EPBC Act approval conditions.

Finally, such an approach is unlikely to allay concerns about the unintended impacts of commercial fishing in the GBRWHA, and it would not satisfy the requirements of the Australian Government's Threatened Species Scientific Committee, which is seeking independently validated data on protected species interactions from higher risk commercial fishing operations.

Under this option, methods to support monitoring and validation of TEP and bycatch species would not be introduced, and **independently validated data would not be available** to:

- satisfy the conditions of EPBC Act approvals
- support continued access to GBR fishing grounds
- underpin evidence-based fishery management decisions
- help mitigate catches of non-target species or protected species interactions
- support fishers to obtain third-party industry certification (e.g. sustainable fisheries accreditation)
- demonstrate sustainable fishing practices to the wider public
- gain any of the other benefits of IOM.

This option relies on accurate and improved self-reporting of all aspects of commercial catch, which is difficult to enforce or evaluate without independent validation. As such, this option would place a greater emphasis on non-regulatory approaches such as educational programs and improvements to the Qld eFisher app.

A non-regulatory approach to implementing IOM would not satisfy EPBC Act approval requirements and is unlikely to satisfy the unique obligation and responsibility associated with operating in a World Heritage Area.

Failure to implement IOM is expected to result in the loss of export approvals and a Commonwealth review of access to the GBRMP, which could significantly impact fishery profits, jobs and industry viability.

- **A non-regulatory approach would not satisfy the objectives of government action and has not been considered further in this consultation IAS.**

9.2 Option 2: Implement IOM across ECOTF and CFFTF

Proposed government action

- Government will cover all costs associated with the establishment of an IOM program.
- After 2 years, the cost-benefit analysis will be updated with improved information to inform ongoing management arrangements and associated costs and benefits.

A cost-benefit analysis was undertaken across various effort-based (days fished) scenarios. Cost estimates generated from the onboard camera field trial were used to support the analysis, along with economic figures from BDO surveys (56).

While the cost-benefit analysis outcomes are a key consideration, the introduction of IOM includes several other benefits that are not easily monetised and for this reason were not included in the analysis. However, it

is important they are considered, so these other benefits are described qualitatively and monetised if possible.

9.2.1 Cost-benefit analysis

A short summary of the cost benefit analysis assumptions, methods and results are provided in the following sections.

A copy of the full cost benefit analysis report is provided at Attachment 2.

9.2.1.1 Key assumptions and scenarios

Effort-based (days fished) scenarios were investigated under the cost-benefit analysis for the 3 levels of vessel coverage presented in this consultation IAS:

- Level 1 – 100% of CFFTF and ECOTF vessels
  - Level 1A – all active and inactive vessels included
  - Level 1B – only active vessels included (inactive vessels excluded)
- Level 2 – 100% of CFFTF vessels and ECOTF vessels responsible for 90% of fishing effort
- Level 3 – 100% of CFFTF vessels and ECOTF vessels responsible for 25% of fishing effort.

For each modelled scenario, the analysis used an underlying assumption that 10% of total camera footage would be reviewed.

Program costs were separated into 2 stages – establishment and ongoing. The establishment stage included the first 4 years of a program, during which time e-monitoring systems would be rolled out. The ongoing stage includes the years following the rollout of the program.

Under each scenario, the Queensland Government would pay for the program costs associated with the establishment stage. No decisions regarding who would pay for ongoing costs would be made until after a review following the first 2 years of establishment. A review would be undertaken once more accurate data is available to inform an evaluation into ongoing program costs, including future cost-recovery options.

Other effort-based scenarios were considered and analysed as part of the full cost benefit analysis, including an 80% effort scenario and a scenario that includes only active vessels within the GBRMP. These scenarios are summarised in the full report provided at Attachment 2.

For this section of the repot, only the effort scenarios that relate to Level 1, Level 2 and Level 3 are presented.

9.2.1.2 Methods

The cost-benefit analysis methodology incorporated a discounted cash flow framework over a 10-year period (2026–2035). In this case, the approach estimates the cost of the investment in IOM (using 2025 prices) to identify whether the identified impact to the fishery and fishing businesses outweighs the benefits of undertaking the investment. This method is applied when analysing program options.

The economic modelling calculated the net present value (NPV) of the future stream of costs and benefits using the compound interest method. The rate used to calculate the NPV was the discount rate. The difference between costs and benefits generates a net benefit, which is the standard method of comparing costs and benefits that occur at different times (over 10 years in this instance) and assumes that a dollar today is worth more than a dollar tomorrow. This approach reduces a future stream of costs or benefits to an equivalent amount in a specific price year. This is the year the dollar units all represent the same purchasing

power. It is the same as the base year, which is the year for which the evaluation is conducted. For the purpose of the modelling exercise, the discount rate was set at 7% (57) as set out in the Queensland Government cost-benefit analysis guidelines. Sensitivity analysis using 4% and 10% was also carried out in accordance with the guidelines.

9.2.1.3 Benefits

To understand the impact of the proposed options on commercial trawl operators, the net benefits were firstly examined at an enterprise level, considering the costs of establishment and the ongoing maintenance, management and delivery of a program (10-year program timeline supported by 4 years of government funding). Impacts to the business level from implementation of an IOM program were also considered, namely the ability to absorb program costs and the effect on profitability.

At the industry level there were 2 approaches used to value the benefit component of the cost-benefit analysis – NER and GVP. While there are arguments for the use of either, the Office of Best Practice Regulation advised to apply NER when estimating benefits for the implementation of an IOM program as it accounts for the costs of operating the fishery and its management. NER provides insight into the performance of the fishery as a whole, given that it extracts private benefit from a public resource. However, it should be noted that there are significant concerns about the accuracy of the NER data, despite it being the best available information. As such, it is recommended that the greatest weight be given to results at the enterprise level when examining the impact of the proposed IOM scenario.

Net economic return

NER examines the performance of a whole fishery, in this case the CFFTF and ECOTF, and represents the long-run profit from a fishery (GVP less total fishery costs) – including labour and consideration of unpaid labour by family members and owners, materials and services, fishery management costs, depreciation and the opportunity cost of capital, which is set at 10%. For the purpose of this analysis, the NER has been adjusted to exclude the management cost component, as it will be included as part of the IOM program.

Gross value of production

The alternative option is to use GVP (including exports) for the CFFTF and ECOTF. In Queensland, the portion relating to catch taken within the GBRMP was calculated to be $60.32 million annually. The premise for using this benefit is that the rollout of an IOM program that achieves the objectives of government action would maintain access to the marine park for fishing purposes and avoid the revocation of WTO approvals – allowing the ECOTF to continue to access that value and continue to export product.

Additional benefit

An additional benefit (a companion to both GVP and NER measures) is the introduction of e-reporting. Currently, the majority of fishers continue to use paper-based logbooks that incur additional hardware and management costs with the printing and distribution of logbooks and manual data entry of sheets once received. As part of an IOM program, e-reporting would become the only method of collecting catch data. This change is expected to provide an additional benefit of $141,223 per year and has been included as part of the cost-benefit analysis.

9.2.1.4 Results

Present Value and Annualised Costs of the IOM Program

In this section a PV calculation is applied to costs only, as benefits accruing to the program from the GBRMP are not considered in this part of the assessment. This method reduces the future stream of costs over the designated period to a singular PV. The discount rate used to calculate the PV is 7%. **Table 12** provides a summary of PV cost components separated by establishment, ongoing and total combined.

Table 12: PV of cost components over 10 years split into establishment and ongoing of the IOM program for the trawl fishery (ECOTF + CFFTF) across scenarios

Cost component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
Total Cost	$44,110,874	$33,361,275	$25,071,972	$8,903,699
Establishment Cost	$19,969,364	$14,805,510	$10,942,993	$3,647,375
Ongoing Cost	$24,151,511	$18,555,766	$14,128,979	$5,256,323

The total cost over the full 10 years of the IOM program ranges from $8.9 million over 10 years to $44.1 million, covering 25% of fishing effort to 100% of fishing effort (total licenses applied) respectively. The establishment cost in years 1 to 4 ranges from $3.65 million to $20 million. The ongoing costs (pending a review of the program) are provided for reference only.

Table 13 outlines the annual costs (converts PV to equivalent annuity value) of the IOM program where the components have been summed, with establishment and ongoing costs also presented, noting the costs are all annualised over 10 years.

Table 13: Annual costs of the IOM program over 10 years (sum of cost components)

Annual Component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
IOM Program Annual Costs	$5,889,080	$4,458,705	$3,353,858	$1,189,842
Establishment Cost	$2,663,938	$1,976,820	$1,462,224	$487,089
Ongoing Cost	$3,225,142	$2,481,885	$1,891,634	$702,753

Cost-Benefit Analysis of the IOM Program

The economic modelling undertaken to assess the coverage of various effort scenarios across the ECOTF and CFFTF utilises a discounted cashflow framework to assess the viability of the investment in IOM. The PV of the future stream of cost outflows and cash inflows is calculated over 10 years (split into establishment and ongoing phases) using a discount rate of 7%. Subtracting the future sum of cost outflows from the sum of future cash inflows generates the NPV for the range of scenarios being investigated.

While costs were investigated across varying fishing effort scenarios, consideration is also given to 2 benefit scenarios, NER (GBRMP portion of Queensland) and GVP derived from the GBRMP access plus exports realised outside of the GBR.

Cost-benefit analysis of the IOM program based on NER

The NER for the ECOTF and CFFTF, based on the portion of harvest within the GBRMP (44% of Queensland total NER) is estimated at $627,000 annually. The total benefits include the additional benefit of e-reporting at approximately $141,000 annually. This figure was provided by BDO (56) for the 2021-22 financial year and indexed to 2024. The PV of the NER benefit over 10 years is $5.78 million (includes e-reporting benefit)**.** As the program is proposed to be reviewed after year 4, a comparative NPV result is provided for the establishment phase of the IOM program that would be funded, and an estimate for the expected NPV for the ongoing portion of the program to year 10. The total benefit for the establishment phase of the program is $2.79 million over 10 years (PV of NER over years 1-4) rather than the benefit stated above for the full 10-year analysis of $5.78 million (**Table 14**). The estimated benefit for the ongoing phase of the program (years 6-10) is $3.0 million.

In applying NER and e-reporting benefits to calculate the NPV for the total cost IOM program, the results show that all generate a negative NPV, the largest being Level 1A at -$38.3 million which covers all licenses in the ECOTF and CFFTF (100% effort coverage – all licenses active and inactive).

Table 14: NPV result for the IOM program using NER (10 years at 7% discount rate)

Annual Component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
Benefit (NER + e-reporting)	$5,778,919	$5,778,919	$5,778,919	$5,778,919
Costs of IOM	$44,110,874	$33,361,275	$25,071,972	$8,903,699
NPV results (Total Program)	**-$38,331,955**	**-$27,582,356**	**-$19,293,053**	**-$3,124,779**
NPV result for Establishment	**-$17,182,407**	**-$12,018,552**	**-$8,156,036**	**-$860,418**
NPV Result for Ongoing	**-$21,149,548**	**-$15,563,804**	**-$11,137,017**	**-$2,264,361**

Cost-benefit analysis of the IOM program based on GVP

The alternative option is to use the GVP (plus external exports and e-reporting) for the ECOTF and the CFFTF in the Queensland for the portion relating to the catch taken within the GBRMP. The total GVP for the Queensland ECOTF and CFFTF is $127.85 million of which $56.29 million is attributable to the catch taken within the bounds of the GBRMP. Total benefit, including export value plus e-reporting is $56.43 million. The premise for using this benefit is that the rollout of an IOM program would maintain access to the GBRMP for fishing purposes and avoid revocation of export approvals. With the addition of the e-reporting benefit the PV of the GVP over 10 years is $424 million (**Table 15**).

Table 15: NPV result for the IOM program using GVP (10 years at 7% discount rate)

Annual Component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
Benefit (GVP)	$424,074,751	$424,074,751	$424,074,751	$424,074,751
Costs of IOM	$44,110,874	$33,361,275	$25,071,972	$8,903,699
NPV	**$379,963,877**	**$390,713,476**	**$399,002,778**	**$415,171,052**

Business Profit Analysis for ECOTF Vessels

No decisions regarding future cost-recovery models for an IOM program have been made.

Another review of costs and benefits would be undertaken following 2 years of establishment.

The outcomes of the review would be used to inform the ongoing programs costs after establishment (the first 4 years), with stakeholders afforded another opportunity to provide feedback during the review.

For each of the fishing effort scenarios assessed there are a certain number of trawl vessels that provide the effort coverage across the scenarios (**Table 16**). The following section looks at the number of boats per effort scenario but apportions the annual costs of the IOM program across the total number of licenses in the fishery which is 361 according to 2023 data. A comparative analysis of the potential financial impact to the fishing businesses is also provided, noting no final decisions on the ongoing costs of an IOM program have been made. Note that T4 is excluded from analysis of business profit due to a paucity of information relating to financial data.

Table 16: Number of ECOTF vessels per effort scenario based on 2023 data

Annual Component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
Number of vessels (ECOTF)	361	245	166	32

Based on the number of boats described in **Table 16** and the associated effort scenarios, an annual cost per vessel to implement the IOM program was derived. As stated, in this analysis the cost per vessel is spread across the whole fishery (all T1, T2, T4, M1 and M2 licenses) so that the IOM program is equitable. This information is present for information purposes only, as no decisions regarding the ongoing IOM costs have been made.

This annual cost will be compared to the financial performance (business profit including depreciation) of the ECOTF for the 2021-22 financial year (indexed to 2024) which is detailed in BDO reports. For the purpose of this report the profitability measure is indexed by inflation (14.92%) to reflect a more current profitability measure. The prices were indexed by inflation from mid-2021-22 to the latest available data to mid-2023-2024 and deemed to be representative of current prices.

The BDO report reported the following business profit measures for ECOTF for quartiles (number of active businesses ranked by effort) of the fishery, as well as the average profit estimate for the fishery (**Table 17**).

Table 17: Annual business profitability of the Queensland ECOTF by quartiles of active businesses that are ranked by effort (days fished) (excludes IOM cost)

Average	Lower Quartile (1)	Quartile 2	Quartile 3	Upper Quartile (4)
$43,587	-$18,886	$3,014	-$59,841	$249,599

Quartile 3 would be expected to be profitable given the higher effort expended (132 days fished annually) but due to significant unpaid labour and depreciation costs, is unprofitable. Quartile 4 demonstrates the highest effort at 283 days per year on average while Quartile 1 fished 21 days fished on average.

It is proposed that the first 4 years of the IOM program are funded by government, with a review to commence after 2 years of implementation, with the outcomes used to inform the ongoing program costs after the establishment stage (first for years). From year 5 onward it is unknown how the program costs will

be recovered (industry) or funded (Government). For information purposes, the analysis has investigated 2 options at either end of the spectrum being (**option 1**) that Government would commit to fully fund the program, or (**option 2**) full cost recovery for IOM would be borne by the trawl fleet. There is a potential mix of options for partial cost sharing of the IOM program between parties. What would be apportioned between Government and industry is speculation beyond the scope of this analysis and would be determined during the 2-year review. As such the following analysis is based on full cost recovery impacts to trawl industry business profitability. **Table 18** outlines the per vessel cost across each of the effort scenarios for the IOM program under full cost recovery conditions.

Under the premise that all licenses in the trawl fishery equally share the cost of the IOM program Level 3 is the least expensive option on a per vessel basis as it spreads the smallest cost over the 361 total number of licenses/vessels and would cost $3,296 per vessel. Under Level 1A (all licences) the cost of the IOM program on all vessels would be $16,313. However, under the proposed arrangement for government to fund the costs of establishment, this total cost is presented for information purposes only.

The establishment phase of the IOM program runs for the first 4 years (2026 to 2029). As a comparison to the full cost recovery option and the associated cost per vessel, further analysis was conducted whereby the Queensland Government would subsidise the first 4 years of the IOM program. Government would provide funding to support the rollout including hardware (based on a schedule of 25% per year, increasing to 100% by year 4), data storage, review costs, and program management. The subsidisation of the establishment phase decreases the financial costs to vessels across the scenarios of between 55% and 59%. Under the expected mandatory scenario (S1.5 – see Attachment 2) the expected decrease to cost per vessel is 55%.

Table 18: Annual cost of the IOM program per trawl vessel in the ECOTF across T1, T2, M1 and M2

Annual Component of IOM	Level 1A (All licences)	Level 1B (Active licences)	Level 2 (90% of effort)	Level 3 (25% of effort)
Cost per trawl vessel – full cost recovery - all licenses pay	$16,313	$12,351	$9,290	$3,296
Cost per trawl vessel – Government subsidised establishment – all licenses pay ongoing costs	$8,934	$6,875	$5,240	$1,947
% reduction through government subsidy	55%	56%	56%	59%

9.2.1.5 Cost-benefit analysis results

Given the government commitment to fund the initial 4 years of implementation and rollout of the IOM program, the introduction of IOM is not expected to result in any additional costs to enterprises during this period.

The establishment costs will be incurred by government and have been included in the cost benefit analysis.

A review of the program implementation will be undertaken to inform the ongoing costs.

Outcomes of the cost-benefit analysis provide valuable information that should be considered as an IOM program is designed and implemented. Based on the proposal for government to fund the establishment stage of an IOM program and the commitment to undertaking a review to information the ongoing costs of a

program, the establishment of an IOM program is not expected to result in any additional costs to licence holders.

Based on the costs and benefits included, the overall analysis indicates that the additional costs of an IOM program, if recovered from industry, would place additional burden on trawl licence holders under all effort-based scenarios (100%, 90% and 25%), with the higher effort coverage scenarios representing the greater costs. Given that existing profitability is either negative or marginal across all but the top quartile of fishers, current employment levels are premised on operating with little or no profit margin, suggesting employment in the sector is at risk (prior to consideration of establishing an IOM program).

While the economic information used to inform the assessment is the best available, it should be viewed with caution due to the limited sample size that contributed to the survey. An example of other economic estimates that differ to the BDO survey results used in the analysis have been provided by a key industry representative group, which considered the export value of the ECOTF to be significantly higher at around $40 million (11). Application of this figure would have a significant difference to the cost benefit analysis outcomes.

The cost-benefit analysis found that NER showed a loss across all scenarios (**Table 14**), while using GVP as the benefit showed profitability, depending on the coverage scenario (**Table 15**) – noting that GVP is simply a measure of total revenue of the fishing activity. This trade-off between overall profitability (NER) and total revenue (GVP) and employment must be carefully considered when deciding whether to implement IOM in the ECOTF and CFFTF. NER assumes that fishers affected by changes to their business operations can contribute equally to the Queensland economy elsewhere.

It is also important to note that while the outputs of the cost-benefit analysis are a key consideration, there are several assumptions that have been applied to the analysis, which have resulted in the calculated program costs and subsequent estimated economic impacts. Changes or modification to the cost inputs of the model would change the model outputs. For example, the ongoing management costs of a program included the assumption that 10% of all video footage will be reviewed. While this is the proposal under the initial stages of a program, it may not be required long term should fishers demonstrate accurate logbook reporting, independently validated by IOM. Any reduction in the proportion of footage manually reviewed would reduce ongoing costs. Further, the use of AI to support the review and validation of interactions has capabilities to reduce ongoing program operating costs, as footage is automatically flagged by a model as requiring further review in the instance that a TEP species is observed.

The cost-benefit analysis has also assumed that the costs of the IOM program under each scenario are spread evenly across all licence holders. This includes those that hold a licence who may not be active (i.e. the 118 inactive licence holders in 2023), or under the 90% and 25% scenarios it also includes licence holders under the relevant effort threshold who would not actually have an e-monitoring system installed on board their vessels. While it is considered fair and equitable to share the program costs across all licence holders, imposing cost burden of an IOM program on licence holders that are currently not generating an income, or are included in the lower quartile with lower profitability, creates disproportionate economic impacts compared to those who are more actively participating in the fishery and generating an income.

A further complication is the program cost estimates being based on the total licences at a point in time. Should changes be introduced, or total licences numbers decrease, this would change the final program cost estimates.

9.2.2 Other benefits of implementing IOM

It's not often that all impacts and benefits associated with the introduction of new regulations be monetised. Under the *Queensland Government better regulation policy*, if monetisation is not possible, impacts should be quantified and if quantification is not possible, impacts should be qualitatively assessed with sufficient justification and argument provided (58).

The introduction of an IOM program across the CFFTF and ECOTF would have several other benefits that, while it may be challenging to provide a monetary figure, still need to be considered.

9.2.2.1 Assessments of ecological risk

Recent regional ERAs completed by Fisheries Queensland across each management region of the ECOTF used a likelihood and consequence analysis, which examines the consequence of a species interacting with the ECOTF and the likelihood of it (the consequence) coming to fruition within the current fishing environment (49). Previous ERAs for the ECOTF used a productivity and susceptibility analysis method, which takes into consideration a range of biological and fisheries-specific attributes (availability, encounterability, selectivity, post-interaction mortality and conservation status) (59).

A key driver of risk for individual species under ERAs often occurs from of a lack of data. Most commonly, this is associated with the lack of understanding of interaction rates under current and historic fishing operations. Without information, it is common and best practice to apply a precautionary measure, which can often result in precautionary risks being applied during the ERA process. Generally the species risk category is elevated when a precautionary risk is applied.

The management of ERA risks in the ECOTF is directly linked to each region's harvest strategy, in the way that any new or identified risks require management action to mitigate the risk as much as possible.

A benefit of IOM across the ECOTF would be improved understanding of species interaction rates and potentially their release condition. This includes interactions with TEP species across all regions of the fishery and bycatch in specific locations. Improved data on interaction rates could be used to support new ERAs and a more data-rich and informed analysis of risks.

As described above, a key driver of risk is the lack of information. In most cases the improved confidence and knowledge of interaction rates would reduce precautionary risk ratings in ERAs and potentially support a downgrade to the overall species risk. A reduction in species risk rating could result in positive changes to the fisheries management arrangements, should the risks continue to be monitored and mitigated. This could include changes to spatial and temporal closures. Examples of this have occurred globally, where e-monitoring systems have been used to demonstrate that fishing operations were not an ecological risk to specific bycatch species (60).

While the financial benefits of providing improved data and reducing ERA risks is challenging to quantify, the management of these risks often requires action that is precautionary, which generally increases the impacts on industry. For example, seasonal closures to large areas of a fishing region may be implemented in light of perceived impacts on a particular species. These closures could be proposed over areas of the fishery that are highly productive for industry and contribute to a significant amount of annual catch. However, if e-monitoring systems are able to demonstrate there is no or a low risk, management intervention may not be required and fishing operations would be able to continue with no impact. This ensures there are no economic impacts to operations.

In addition, it can improve the social licence for fishing operations, with IOM data able to provide statistically significant information to demonstrate fishing-related risks are low, improving community confidence that fishing practices are not having a detrimental impact on other ecological communities.

9.2.2.2 Compliance

QBFP adopts a risk-based compliance approach in order to ensure the most effective use of its limited resources (limited in comparison to the 7,000 km of coastline, hundreds of inland fishing areas, 250,000 recreational vessels, 639,000 recreational fishers and over 1,400 commercial fishing vessels) (61). A risk-based approach means that the resources available are directed towards addressing the highest risks (where risks are assessed for individual fisheries) based on those which threaten the:

- sustainability of target fish stocks, including byproduct species
- environment, ecology and conservation value of the fishery ecosystem, including fishery bycatch and protected species
- social and community impacts
- profitability of compliant industry participants.

While compliance is not a primary objective or purpose of e-monitoring systems, their introduction has the potential to improve compliance processes and reduce program expenditure by limiting the operational burden often required to investigate and finalise compliance matters.

An example of this occurred during a recent fishing operation under the NX fishing symbol, involving an interaction with a high priority TEP species (whale). Fortunately, all NX vessels operate with onboard camera systems supporting the review and validation of reported interactions. The fisher immediately reported the event using the Qld eFisher app and notified the fishery manager. Fisheries Queensland were immediately able to validate the interaction and confirm the animal was released alive, as reported by the fisher.

If a similar interaction had been reported before onboard cameras were deployed, an operational exercise would have been required in an attempt to validate the fishers interaction, including open water patrols from the QBFP and potentially other groups such as the Marine Animal Rescue Team, with costs associated to cover wages, allowances and boat and fuel costs. The ability to immediately validate the interaction with the onboard camera removed the need to prioritise operational resources to investigate, as the camera footage was sufficient to confirm the animal was released unharmed.

The compliance benefits of e-monitoring systems could be expected to be closely aligned with those from the implementation of vessel tracking across Queensland's fisheries. Vessel tracking was mandated across all major commercial fisheries between 2019 and 2020, which involved the implementation of vessel tracking units to support the independent validation of fishing effort information and provide real-time data to support compliance capabilities. Similarly, e-monitoring systems support the independent monitoring and validation of commercial fishing data, including effort information.

The compliance benefits of vessel tracking systems, both quantitative and qualitative, were comprehensively considered as part of the post-implementation IAS into the vessel tracking decision (52). A component of the analysis included a comparison of compliance data from individual fisheries before and after the introduction of vessel tracking. This comparison identified a pattern of less patrol days (and less patrol/staff hours), a reduction in vessels inspected and an increase in the number of non-compliance acts identified by QBFP. Ocean water patrol days are expensive, and the comparison identified that more compliance action was being taken after the introduction of vessel tracking with less operational patrols required.

The post-implementation IAS identified several other ways that vessel tracking units supported and improved compliance processes, including:

- monitoring the commercial fleet and adopting an intelligent approach to compliance inspections
- fishing in closed fishing waters
- investigating complaints from the public
- prioritisation of compliance activities
- compliance audits
- prosecuting offences.

The post-implementation IAS also estimated that vessel tracking was saved approximately $1.45 million annually in officer wages, not including the costs associated with use of a boat, fuel and allowances. While it is challenging to relate this financial benefit estimate to IOM, considering the advanced capabilities of e-monitoring systems over vessel tracking systems (such as their ability to provide additional information on fishing activities and actions undertaken during a fishing event), it could be assumed that the compliance benefits of e-monitoring systems would be far greater. With the pattern of less patrol days and reduced spending as a result of the introduction of vessels tracking systems, it could be assumed that similar benefits would be realised by the introduction of an IOM program.

9.2.2.3 Improved market access and third-party sustainability certifications

Independent third-party sustainability certifications are becoming increasingly popular across wild-harvest fisheries on a national and international scale. A popular independent sustainability certification is the Marine Stewardship Council (MSC). A key requirement for MSC certification often includes the need to have a form of IOM established to support the independent monitoring and validation of protected species and/or bycatch interactions, depending on the risk profile of the fishery.

Obtaining MSC certification supports the ability to market product with the MSC logo and can increase access to potential markets with improved sale prices for product. For example, major supermarkets in Australia (Coles and Woolworths) will only sell seafood products that either meet MSC assessment standards or their own independent assessment frameworks.

The financial benefits of MSC certifications have been investigated for other global fisheries. For example, modelling of the benefits of an MSC certification for a South African trawl fishery indicated at the loss of its certification could result in an estimated reduction of 37.6% of the fisheries NPV, representing $3.927 million US dollars (62). While this study was for a fishery that already has an MSC certification, and the CFFTF and ECOTF do not, it provides an example of the benefits that certification can have on market access for an entire fishery and the individual fishing businesses within it.

Other research on MSC-certified Western Australian rock lobster has not only demonstrated the economic contributions of the certification, but highlighted the improved social and political benefits the certification was able to provide (63).

However, there are other considerations of independent sustainability certifications such as MSC. This includes the costs that are typically charged by the businesses and independent assessment agencies that undertake assessments against established frameworks, and that there is no guarantee a fishery will meet the relevant assessment benchmarks to be certified.

Again, while it is challenging to understand the full benefits that a third-party certification would have, such improvements are not just limited to improved economic outputs, but also social improvements.

Maintaining the ECOTF's WTO approval would also support an improved domestic beach price. While this is not an improved market access opportunity, a loss of exports would reduce domestic beach prices as more product would be available and sold on the domestic market, with sale prices expected to reduce as the supply increases (supply and demand). Ensuring the export approval is maintained will support a higher domestic price for product, as more product would be exported and create more demand in the domestic market.

9.2.2.4 Relaxation and removal of other reporting requirements and regulations

E-monitoring systems have the potential to validate most components of a fishing operation, including catch, effort and interactions with TEP and bycatch species (**Table 1**). They are also able to integrate with machine learning software to automatically validate and record data on fishing operations.

Deriving data on fishing activities directly from e-monitoring systems would reduce the reporting burden on fishers, and using machine learning software to automatically derive required data would further reduce program management costs such as reviewer time. Machine learning has been used to reduce the need for the manual review of footage to ensure compliance with the deployment of bird-scaring lines on Australian tuna longline vessels (64). For the ECOTF and CFFTF, machine learning programs could be trained to automatically detect TEP species interactions using footage collected by the onboard cameras, or trained to estimate fishing effort using sensor data from onboard winches or vessel position and speed data (65).

The introduction of vessel tracking is a good example of how an independent monitoring and data validation tool can be implemented and used to support the removal or relaxation of regulations. As vessel tracking data could be used to better understand the fishing activities being carried out, it therefore reduced the need for compliance activities. For example, fishers are no longer required to give prior notice of their catch of quota species 1, 3 or 6 hours before landing at a location to facilitate compliance checks (52).

Using e-monitoring systems to derive data on fishing activities is highly likely to reduce the reporting burden on fishers, increase data accuracy (compared to manual data reporting) and streamline regulatory processes.

9.2.2.5 Product traceability

E-monitoring can improve the traceability of seafood products from origin to port. E-monitoring systems such as onboard sensors, cameras and GPS can capture and transmit real-time data on the location, time and date of catch, species and fishing method. This creates a digital footprint of when, where and how seafood was caught, allowing other stakeholders such as seafood processors, fisheries regulators and consumers to verify the origin of the seafood.

An example of this is major seafood company Thai Union, which has committed to only sourcing tuna from best practice fisheries that use some method of IOM by 2030. They aim to provide this information to consumers, increasing their confidence on the origin and sustainability of their seafood purchases (66).

9.3 Other impacts

The preliminary impacts of the proposed option have been undertaken, including impacts on human rights, competition and fundamental legislative principals. Privacy impact assessment considerations have also been undertaken. These components are attached to this consultation IAS, including:

- Human rights considerations – Attachment 3
- Competition impacts – Attachment 4
- Fundamental legislative principals – Attachment 5
- Privacy impact assessment – Attachment 6

9.4 Impact analysis summary

Table 19 provides a summary of the assessment of the options against the objectives of government action. It shows that option 1 (no IOM) will not satisfy either of the objective of government action. Option 2 with 100% coverage of fishing effort would achieve the objectives, but is also very costly to implement as the fleet has a large number of low-effort and inactive vessels. Option 2 with 90% coverage of fishing effort is also highly likely to achieve the government objectives, but in a more cost-effective manner as only 68% of the fleet would require e-monitoring systems to be installed. This means that data on TEP species interactions could be validated across almost all fishing effort of the trawl fleet, but in a relatively cost-effective way. While option 2 with 25% coverage of fishing effort represents the most affordable option, the reduced coverage of vessels is not likely to deliver program expectations and benefits.

Note: These are preliminary assessments based on our understanding of the Australian Government's requirement, and the DCCEEW and GBRMPA have not been consulted on the extent to which the different scenarios satisfy their requirements.

Table 19: Overview of each scenario and its likelihood of meeting program objectives

Effort scenario	Compatibility with achieving the objective of government action
Option 1: no IOM	Does not achieve the objective
Option 2, level 1: 100% coverage	Achieves the objective
Option 2, level 2: 90% coverage	Highly likely to achieve the objective
Option 2, level 3: 25% coverage	May not achieve the objective

10 Consultation

Stakeholder engagement and consultation with the community is a key element of any consultation IAS process.

Fisheries Queensland have undertaken industry consultation throughout design and delivery of the onboard camera field trial and continue to present the field trial learnings and recommendations to key stakeholder groups.

A technical focus group was established to support the onboard camera field trial and afforded field trial participants the opportunity to discuss the technical aspects of the trial and provide recommendations and improvements. The technical focus group meet 7 times during delivery of the field trial. Field trial participants were also invited to participate in the evaluation of the field trial results and drafting and review of the final report.

Design of the field trial was also undertaken in consultation with industry, resulting in a collaborative model with the DCCEEW, Fisheries Queensland and volunteer commercial fishers.

Responses to this consultation IAS will be used to support the design and implementation of associated regulations required to operate a future IOM program across the CFFTF and ECOTF. A final decision IAS will then be drafted and published.

Face-to-face stakeholder engagement sessions will be organised across all major fishing ports. Impacted stakeholders will be afforded the opportunity to book one-on-one engagement meetings with Fisheries Queensland to discuss the consultation IAS and key proposals, and answer any questions.

More information about stakeholder engagement sessions will be available at dpi.engagementhub.com.au and circulated to licence holders via email.

11 Conclusion and recommended option

RECOMMENDED OPTION

OPTION 2 with level 2 vessel coverage

Introduce a regulatory framework supporting the establishment of an IOM program across 100% of CFFTF vessels and ECOTF vessels that account for 90% of fishing effort.

IOM methods, including e-monitoring systems and onboard observers, are the only tools available that can be used to support the ongoing monitoring and validation of commercial fishing data, specifically TEP and bycatch species. Several drivers exist that require the implementation of an IOM program across the ECOTF and CFFTF.

Establishment of an IOM program also represents serval benefits to commercial fishing businesses and the community through improved confidence in data and opportunities to improve the economic performance of commercial fishing businesses through automation and improved market accesses. The proposal for government to fund establishment of a program limits the direct financial impact on industry, with a review committed to information the ongoing management arrangements and costs.

For these reasons (and because it is the only option that will achieve the objectives of government action), IOM implementation across 100% of CFFTF vessels and ECOTF vessels that account for 90% of fishing effort is the recommended option. This recommendation includes the application of proposed program objectives and other key design considerations, including scope, implementation schedule, operational requirements and cost contributions.

Although other effort scenarios may be more affordable, such as level 3 coverage (25% fishing effort), lower vessel coverage is not expected to achieve the program principles or deliver an IOM program that will achieve WTO approval conditions. While the higher effort scenarios (100% fishing effort – active + inactive vessel / active vessels) may also be considered appropriate, they have not been recommended because of the additional program establishment and ongoing operational costs to cover vessels that contribute a low amount of fishing effort.

Attachment 1: Priority risk assessment

IOM priorities were identified based on the likelihood of collecting non-target species or interacting with TEP species, as determined by ERAs, and the need to satisfy time-bound WTO approval conditions. Other fisheries have also been assessed, but the results have not been included as they are classified as a lower risk.

Table A1: Risk assessment of priority fisheries

Fishery	Fishery components/symbols	ERA risk	Time-bound EPBC WTO requirement for IOM	IOM priority
Coral		**High**		*
Gulf of Carpentaria inshore fishery	Large mesh net (N3, N12, N13)	**High**		2
East coast inshore fishery	Large mesh net (N1, N2, N4**)	**High**		2
	Tunnel net (N10)	**Intermediate**		
	Small mesh net (N11)	**Intermediate–low**		
	Ocean beach (K1–8)	**Intermediate–low**		
East coast trawl	East coast otter trawl (T1, T2)	**Intermediate–high**	15 June 2026	1
	Moreton Bay otter trawl (M1, M2)	**Intermediate–high**		1
Stout whiting trawl	Stout whiting (T4)	**Intermediate**	31 Dec 2021+	1
Crab	Gulf of Carpentaria mud crab (C1)	**Intermediate–high**		++
	East coast mud crab (C1)	**Intermediate**		
	Qld blue swimmer crab (C1)	**Intermediate**		
	Spanner crab (C2, C3)	**Intermediate–low**		
Gulf developmental trawl		**Intermediate**		#
Gulf line	L4	**Intermediate–low**		
River and inshore beam trawl	T5, T6, T7, T8, T9	**Intermediate–low**		
Rocky reef line	L1, L2, L3	**Intermediate–low**		
Reef line	RQ	**Intermediate–low**		
Spanish Mackerel line	SM	**Intermediate–low**		
Deepwater (multi-hook) line	L8	**Intermediate–low**		

* The coral fishery was classified as high risk because it is difficult to distinguish some protected coral species from similar species that can legally be collected. This issue is being actively addressed through port inspections in partnership with coral fishers. E-monitoring and observers are not required because there is no non-retained catch associated with the coral collection fishery.

** N1, N2 and N4 symbols were retired on 1 January 2024 and replaced by the NX and N15 fishing symbols. Former ERAs were completed under previous management arrangements for the former symbols, not those now regulated for the NX symbol.

\+ A voluntary program using onboard observers has been established to satisfy the WTO requirement for IOM in the short term and to maintain export approvals.

++ The Gulf of Carpentaria mud crab fishery was classified as intermediate-high risk due to the potential for interactions with protected speartooth sharks (Glyphis spp.) and sawfish (family Pristidae). Further investigation or research is required to identify the best way to address this risk, given the practical challenges of IOM on small crab boats operating under mangroves in estuaries.

\# The Gulf developmental trawl fishery is required to carry an independent onboard observer as part of its developmental fishery permit.

Attachment 2: Cost Benefit Analysis of IOM for the Queensland ECOTF (+T4)

This publication has been compiled by the Department of Primary Industries.

The Department of Primary Industries proudly acknowledges all First Nations peoples (Aboriginal peoples and Torres Strait Islanders) and the Traditional Owners and Custodians of the country on which we live and work. We acknowledge their continuing connection to land, waters and culture and commit to ongoing reconciliation. We pay our respect to their Elders past, present and emerging.

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Executive Summary

Establishment of IOM, is a priority for commercial fisheries in Queensland with a greater likelihood of harmful interactions with TEP species such as the ECOTF and stout whiting fishery (T4). There are several key drivers for IOM, including conditions of EPBC Act approvals.

The ECOTF + T4 is an important contributor to the Queensland economy contributing an estimated $127.85 million (indexed to 2024) in GVP to the State and employing 1,170 FTE (direct and indirect). There are a total of 361 licenses in the fishery of which there are 245 active vessels with at least one M1, M2, T1, T2 or T4 symbols.

Economic analysis of the IOM program estimates the costs and benefits across a range of effort scenarios and provides insights into the trade-off between the total investment level over time to both industry and government as it relates to the coverage of effort within the trawl fishery and delivery of the intended outcome of limiting TEP interactions (discards and bycatch excluded in this analysis). The Queensland Government is committed to funding the first 4 years of the IOM program (establishment phase) with a subsequent review to determine the ongoing commitment, funding arrangements and potential impact to industry.

Financial affordability of the modelled scenarios for the trawl fishery industry was analysed to determine the impacts and the appropriate level of cost recovery and funding arrangements following a funded establishment phase for 4 years. Profitability measures captured from a BDO report (56) on the financial performance of the trawl fishery was used to gauge the potential impact of IOM at an individual business level for this portion of the work (indexed to 2024). The data utilised in the analysis was the best available data at the time. There will be no impost to industry for the first 4 years of the IOM program. The financial impost to industry in the subsequent years (6-10) will be dependent on a review of the program after year 4. The review will examine the success of the program in its ability to monitor and reduce TEP interactions. The potential options in terms of moving forward after the review would include full cost recovery from the trawl fishery, a potential cost sharing arrangement if the program were to be continued, or a fully funded Government program.

The ECOTF fishery already operates in an environment of increasing input costs and an inability to realise higher prices for catch (price taker). The proposed IOM program design should consider the marginal benefit of increasing coverage to achieve 100% oversight of the fishery with the potential for significant negative profitability implications on the fishery for the lower 75% of vessels in the ECOTF (according to the BDO report in 2021-22).

This economic analysis of the IOM program estimates the costs and benefits across a range of effort (days fished) scenarios and provides insights into the trade-off between the total investment level over time to both industry and government as it relates to the coverage of effort within the trawl fishery and delivery of the intended outcome of limiting TEP interactions (discard composition assessments not included at this time) within the GBRMP. Economic models for the implementation of the IOM program in the ECOTF + T4 in Queensland were developed using cost-benefit analysis methodology incorporating a discounted cash flow framework over a 10-year period (2026 to 2035).

The economic analysis considers the major cost components of implementing IOM including:

- Camera hardware purchase, installation, maintenance and replacement;
- Review of camera footage;
- Data storage fees; and
- Management costs related to the IOM program.

The following 6 effort scenarios have been investigated for rollout of IOM across the Queensland trawl sector:

Table A2.1. Range of ECOTF + T4 effort scenarios modelled in the analysis for T1, T2, T4, M1 & M2

Scenario	Sub-scenario	Effort Coverage (Days Fished)
Scenario 1 Assess the percentage of fishery effort accounted for by boats that are arranged from greatest to least effort (days fished). Maximises effort capture under IOM but minimises impacted vessels. *Note: S1.5 is the preferred scenario for mandatory monitoring of TEP and Discard Composition across trawl.*	1.1	25% of effort covered with IOM
	1.2	80% of effort covered with IOM
	1.3	90% of effort covered with IOM
	1.4	100% - active licenses only (based on 2025 data)
	1.5	100% - all vessels have IOM (active or not)
Scenario 2		74% - Installation of cameras only on trawl vessels with effort expended in the GBR World Heritage Area

These include 25% (S1.1), 80% (S1.2) and 90% (S1.3) coverage of fishing effort through to full coverage of effort in ECOTF and T4 (S1.4) – active vessels only; (S1.5) – all license holders. An additional scenario (S2) was added to investigate the portion of the fishery that access the GBRMP (as opposed to the GBRWHA stated in the International Union for Conservation of Nature report).

The annual cost of operating the IOM program over the 10-year period (full program cost) ranges from $1.19 million for S1.1 (25% of effort) to $5.89 million under S1.5 (100% effort - all vessels), and $3.04 million per annum under S2 which that targets vessels accessing the GBRMP.

In terms of examining the annual cost to Government in the establishment phase in the first 4 years of the IOM program, the costs range from $487,000 (S1.1) to $2.66 million (S1.5). In terms of total costs relating to the establishment phase over the first 4 years (cost-benefit analysis methodology applied) the total costs of the IOM program borne by Government would range from $3.65 million (S1.1) to $20 million (S1.5).

In terms of benefits accruing to the IOM program implementation, the cost-benefit analysis undertaken utilises 2 different benefit measures; NER and GVP. The preferred benefit measure is NER as it better reflects the long-run profit after all costs are met (Department of Primary Industries (DPI) management costs excluded) of the trawl fishery and the contribution to the Queensland economy. GVP was used comparatively.

The NER measure for this analysis calculates the benefits of the trawl fishery as denoted by GVP generated within the GBRMP plus export value external to the GBRMP as export licenses would be lost under the 'do nothing scenario', less fishery costs (excluding DPI management costs).

The results of the cost-benefit analysis over the full 10 years of the program (applying NER) show that the analysis generates a net disbenefit for the IOM program that ranges from -$3.12 million under S1.1 to -$38.33 million under S1.5. When looking at the establishment phase only (funded by Government) the net disbenefit ranges from -$860,000 (S1.1) to -$17.18 million (S1.5).

Under the assumption the cost of the IOM program is borne by all license holders for each effort scenario, despite cameras only being installed on varying proportions of trawl vessels in the fleet, this equates to a cost per trawl vessel ranging from $3,296 (S1.1) to $16,313 (S1.5) over the life of the program. As establishment is funded by Government, the potential ongoing cost of the IOM program (years 5 to 10) per trawl vessel (assuming a full cost recovery scenario) range from $1,947 (S1.1) to $8,934 (S1.5).

Background

There are currently 245 active vessels with at least one M1, M2, T1, T2 or T4 symbols (361 licenses in total) in the ECOTF + T4. This equates to 27,914 effort days in the fishery. In 2021-22 the fishery generated $111.25 million in GVP. This has been indexed to 2024 figures estimating a current GVP of $127.85 million. In 2020-21 the trawl industry employed 576 direct FTE and a total of 1,170 FTEs including flow-on employment. From a financial perspective the fishery has an average annual business profit (including depreciation) of $43,587 per vessel (2024). Note that this does not include T4 data due to a paucity of information.

IOM, is a priority for higher-risk commercial fisheries in Queensland such as the ECOTF + T4 and gillnet fisheries on the East Coast (including the new NX fishery) and in the Gulf of Carpentaria. Higher-risk fisheries are those where the fishing methods have a greater likelihood of harmful interactions with TEP species or catching significant amounts of bycatch. The establishment of a method to independently validate commercial logbook data is a key action under the Queensland's Sustainable Fisheries Strategy 2017-2027. Introducing IOM on higher risk fisheries will:

- Maintain access to the GBRWHA and satisfy commitments under the Reef 2050 Long-term Sustainability Plan and the Sustainable Fisheries Strategy 2017-2027;
- Address recommendations of UNESCO's 2023 Reactive Monitoring Mission to the Reef to establish IOM in the world heritage area; and
- Address conditions associated with WTO approvals under the EPBC Act.

IOM has joint funding from State and Commonwealth Governments for the testing, design, and implementation of IOM across Queensland's priority fisheries. A voluntary field trial of camera equipment was conducted to help identify the most suitable solutions for trawl fisheries and provide more accurate establishment and running costs (**Figure 1**). This economic report will focus on the assessment of the costs and benefits associated with the implementation of IOM (e-monitoring / cameras on vessels) across the ECOTF + T4 in Queensland. Future assessments will involve the Queensland large mesh gill-net fishery.

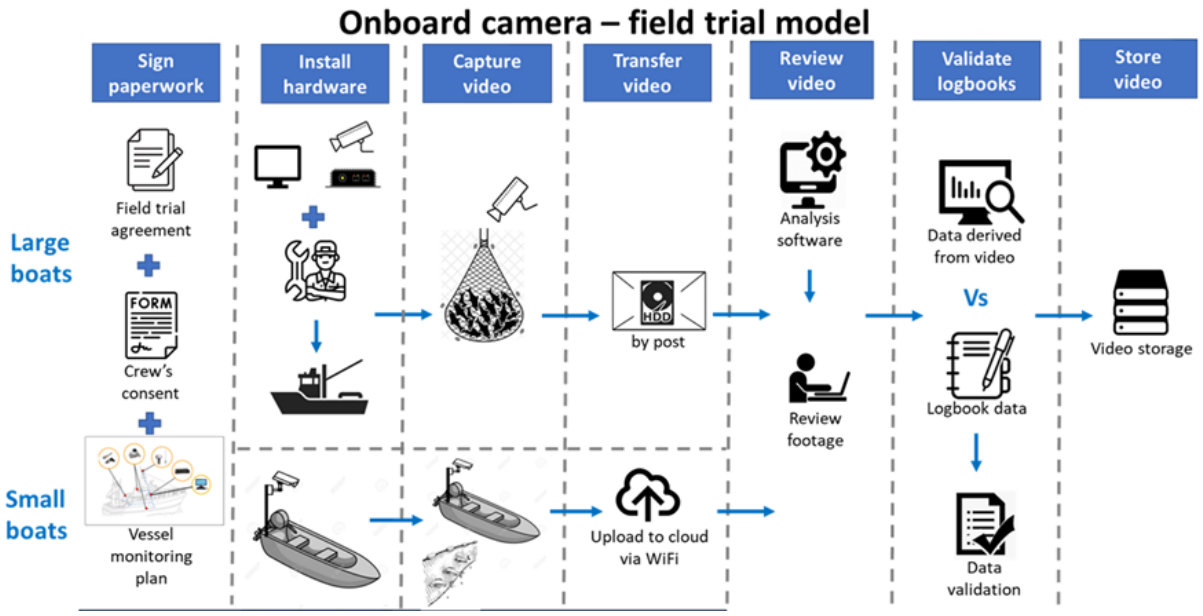

Figure 1. Overview of key components of the IOM field trial in Queensland

The onboard camera field trial on trawl vessels has provided preliminary cost estimates associated with various IOM program components. Logbook data from the fishery shows that a small number of boats will often account

for a large proportion of the fishing effort. If a boat has a high level of fishing effort (days fished) compared to others in the fishery, their risk of interacting with threatened species increases, as well as quantity of discards.

Economic Objectives

Economic analysis of the IOM program estimates the costs and benefits across a range of effort scenarios and provides insights into the trade-off between the total investment level over time to both industry and government as it relates to the coverage of effort within the trawl fishery and delivery of the intended outcome of limiting TEP interactions (discards and bycatch excluded in this analysis). For instance, should only a small number of highly active boats, that account for much of the fishery's effort and risk, be required to have IOM? The economic goal is to minimise cost to the overall fishery but maximise coverage of effort (days fished). Additionally, consideration was also be given to the potential level of investment required by each fishing business and the impact it may have on financial viability. The affordability of IOM for boats that account for various proportions of fishing effort is quantified. Currently, DPI has committed to funding the first 4 years of the program (10-year IOM program) at which time a review will be conducted.

Within DPI, the Economic Policy and Analytics Unit was tasked to apply cost-benefit methodologies using a discounted cashflow framework to evaluate and inform Fisheries Queensland's management of the costs of various scenarios involving establishment of IOM on boats that account for various levels of fishing effort across ECOTF + T4 in Queensland. Additionally, further scenarios relating to e-monitoring of vessels operating solely or partially (days fished) in the GBRMP, as opposed to the GBRWHA which is much larger spatially and beyond the intended scope of IOM, were modelled.

Financial affordability of the modelled scenarios for the trawl fishery industry was analysed to determine the potential impacts beyond the establishment phase (years 1 to 4) of the IOM program. Further financial impact analysis beyond establishment was assumed to be at full cost recovery as a benchmark to determine the potential cost to industry if it were to continue (ongoing phase, years 5-10) understanding that no determination has made at this stage. Profitability measures captured from a BDO report (56) on the financial performance of the trawl fishery was used to gauge the potential impact of IOM at an individual business level for this portion of the work (indexed to 2024).

Detailed economic assessment of IOM scenarios supports decision making regarding an appropriate and cost-effective design and implementation of a broad-scale IOM program across high-risk fisheries, ECOTF + T4 in this instance, commencing in 2026.

Key Assumptions and Scenarios

A range of potential scenarios for rollout of IOM across the Queensland trawl sector have been modelled. **Table A2.1** outlines the modelled scenarios for implementation of IOM from addition of cameras to capture 25% of effort through to full coverage in the ECOTF + T4 (100%). An additional scenario (S2) has been added to investigate the portion of the fishery that access the GBRMP. The analysis is based on the assumption that the Queensland Government will fund the first 4 years of the program followed by a review that will determine the future structure of the program.

For each of the modelled scenarios in **Table A2.1** the analysis uses an underlying assumption that **10% of total camera footage is reviewed** and that **fishery observers are excluded** at this point in the investigation. The standardised parameters vary amongst scenarios depending on the number of vessels they are applied to in the fishery. For the trawl analysis, only vessels holding T1, T2, T4, M1 and M2 symbols are considered. Beam trawl symbols (T5 to T9) are excluded due to low numbers or participants and a low risk of TEP interactions.

The underlying assumption for the analysis was that the implementation of the IOM program be undertaken with DPI funding for the first 4 years. Further, the cost of compliance around the IOM program has not been included in this analysis and requires further investigation.

Methods

Development of the Economic Model

Economic modelling of the IOM program for the ECOTF + T4 in Queensland was developed using cost-benefit analysis methodology incorporating a discounted cash flow framework over a 10-year period (2026 to 2035). In this case, the approach estimates the cost of the investment in IOM (using 2025 prices) over 10 years to identify whether the identified impact to the fishery outweighs the benefits of undertaking the investment. However, further analysis will be applied to the 4-year establishment phase only. This method is applied when analysing program options.

The economic modelling calculates the PV of the future stream of costs and benefits using the compound interest method. The rate used to calculate the PV is the discount rate. The difference between costs and benefits generates a net benefit (NPV) that is the standard method of comparing costs and benefits that occur at different times, over 10 years in this instance, and assumes that a dollar today is worth more than a dollar tomorrow. This approach reduces a future stream of costs or benefits to an equivalent amount in a specific price year. This is the year the dollar units all represent the same purchasing power. It is the same as the base year, which is the year for which the evaluation is conducted. For the purpose of the modelling exercise, the discount rate was set at 7% (57) as set out in the Queensland Government cost-benefit analysis guidelines. Sensitivity analysis using 4% and 10% was also carried out in accordance with the guidelines.

From this baseline a model was developed to test the scenarios. As inputs change, namely effort, it allows the development of a range of policy options that can be used to assess the programs objectives in context of the benefits they generate.

Underlying data was obtained from Fisheries Queensland including catch and effort for all trawl vessels. Analysis was carried out to confirm that 2023 was an appropriate year to use as indicative of future fishing catch and effort. The data showed that there was a total of 361 licenses that held at least a T1, T2, T4, M1 or M2 symbol. Of these total licenses, 245 vessels had commercial logbook entries showing catches in 2023 and were therefore considered active in recent years.

Table A2.2 below shows the interrelatedness of the number of boats actively fishing, sorted from most active to least and the percentage of effort they account for in days. For example, 13% of vessels account for 25% of the fishing effort.

Table A2.2. The proportion of boats that account for effort days, and the commensurate number of vessels associated with the effort

% Effort Coverage (Days Fished)	% of ECOTF + T4 Vessels
25%	13%
80%	53%
90%	68%
100%	100%

‘Do Nothing’ Scenario

As part of the cost-benefit analysis consideration is given to a ‘do nothing’ scenario. In this case the scenario is based on the decision to not proceed with the IOM program in which case vessels in the trawl fleet that access the GBRMP would lose access to the GVP associated with fishing the marine park and the loss of exports for the ECOTF + T4 that are external to the GBRMP due to a revocation of export licenses for the Queensland trawl fleet. A further consideration is that vessels with history of fishing in the GBRMP would potentially move to fish areas external to the GBRMP, placing additional pressure on current stocks as fishing effort increases, or exit the industry due to increased competition for public resources.

Approximately 44% of the total ECOTF + T4 catch is accessed within the GBRMP boundaries valued at $56.29 million, including the value of external exports to the GBRMP (apportioned midpoint from total exports). Note that T4 do not fish in the GBR, however they do export their product. Due to privacy concerns, there is no data on the amount of exports from the T4 fishery.

Benefit Components of the Economic Modelling

There are 2 approaches to value the benefit component of the cost-benefit analysis. They are NER and GVP. While there are arguments for the use of either, it is the preference of Queensland Treasury to apply NER when estimating the benefits for the implementation of the IOM program as it accounts for the costs of operating the fishery and its management. NER provides insight into the performance of the fishery as a whole given that it extracts private benefit from a public resource.

The NER examines the performance of a whole fishery, in this case the ECOTF + T4, and represents the long-run profit from a fishery (GVP less total fishery costs), including labour and consideration of unpaid labour by family members and owners, materials and services, fishery management costs, depreciation and the opportunity cost of capital which is set at 10%. For the purpose of this study the NER has been adjusted to exclude the management cost (DPI) component as it will be included as part of the IOM program.

Table A2.3. Adjusted NER for the GBRMP portion of the Queensland ECOTF + T4 (based on BDO reports 2021-22 indexed to 2024)

NER Components	$ Million
GVP	**$56.29**
Labour	$18.45
Materials and services	$25.95
Depreciation	$5.80
Opportunity cost of capital	$5.45
NER (GBR only)	**$0.63**

The alternative option is to use GVP (including exports) for the ECOTF + T4. In Queensland the portion relating to the catch taken within the GBRMP is $60.32 million. The premise for using this benefit is that the rollout of IOM program, to the satisfaction of stakeholders, would maintain access to the GBRMP for fishing purposes and avoid cancellation of export rights Queensland wide, thus allowing the ECOTF + T4 to continue to access that value and continue to export product.

Introduction of e-reporting

An additional benefit that is a companion to both alternative benefit measures above is the introduction of electronic reporting across the entirety of the ECOTF + T4. Currently, the majority of fishers continue to use

paper-based logbooks which is considered to be an inefficient method of collecting catch data which then must be transformed electronically within Government. As part of the IOM program, it is proposed that e-reporting will become the only method of collecting catch data. This change is expected to provide an additional benefit, regardless of the current scenario analysis (total coverage of the ECOTF + T4) of $141,223 per year and will be included as part of the cost-benefit analysis.

Cost Components of the Economic Modelling

The cost components of the economic modelling include the categories of hardware, data storage, footage review, and management (Government). As part of the modelling, it was deemed appropriate to split the categories of hardware, data storage and management into 2 components – establishment and ongoing. Over the 10-year horizon of the cost-benefit analysis the establishment phase will occur for the first 4 years of the program and have an adoption (or uptake) profile applied so that costs would accrue according to the profile as the number of vessels participating in the IOM program increases during rollout. It should be noted that this adoption curve will not apply to all costs in the establishment phase but directly to those costs that relate to vessel numbers. The following table outlines the proposed adoption curve for the establishment phase.

Table A2.4. Proposed adoption profile for the establishment phase of the IOM program

Year	% Coverage per Year	Cumulative Coverage
2026	25%	25%
2027	25%	50%
2028	25%	75%
2029	25%	100%

The remaining years from 2030 to 2035 were considered as the ongoing phase of the program.

Camera Hardware and Related Costs

The IOM modelling considered the initial installation of cameras and associated hardware on vessels as well as ongoing repairs and maintenance costs, camera replacements if required, software licensing, data connectivity and any additional hardware such as hard drives for storage of video capture. Whichever effort scenario is decided the Queensland Government (DPI) has committed to funding the rollout of the IOM program over 4 years.

Based on the operating environment, it was assumed that camera units would require replacement every 4 years beyond establishment. The unit replacement cost would be lower given that some items (e.g. the camera bracket) could be retained and used again. Replacement cost was deemed to be 80% of the initial unit cost (incl. GST). Replacement unit installation cost was assumed to be only one-fifth of the original installation cost ($5,000), as some of the wiring, conduits and fixtures would already be in place and would require no labour or parts charges. Government employee time taken for initial troubleshooting of camera installations during the establishment phase were assumed to $5,000 per vessel followed by $2,400 per vessel in the ongoing phase ($100 per hour at 24 hours per vessel per year). Annual data connectivity is set at $49 per month.

Table A2.5 outlines the summary of costs related to the installation of cameras on boats and associated costs with the establishment of the IOM program in the first 4 years (2026 to 2029).

Table A2.5. Initial costs associated with establishment of IOM (first 4 years – adoption profile applied where appropriate)

Cost Component	Cost (incl. GST)	Occurrence During Establishment
Initial camera unit (per vessel)	$13,200	All 4 years
Cost of installation (per vessel)	$5,000	All 4 years
Cost of coordination & reporting of installation (per vessel)	$2,000	All 4 years
Troubleshooting installation (per vessel)	$5,000	All 4 years
Server establishment - cloud storage	$100,000	1st year only
Server maintenance	$50,000	Years 2 to 4
Annual fee (software licensing / subscription)	$11,000	All 4 years
Machine user license	$10,000	All 4 years
Data connectivity / transfer (per vessel)	$588	All 4 years
Hard-drive (per vessel)	$500	All 4 years
Firmware license (per vessel)	$1,000	All 4 years

Table A2.6. Summary of ongoing costs related to the IOM program in the remaining 6 years (2030 to 2035).

Cost Component	Cost (incl. GST)	Occurrence
Replacement camera(s) (per vessel)	$10,560	Every 4 years
Replacement camera installation (per vessel)	$1,000	Every 4 years
Annual fee (software licensing / subscription)	$11,000	All 6 years
Machine user license (per vessel)	$10,000	All 6 years
Troubleshooting (per vessel)	$2,400	All 6 years
Data connectivity / transfer (per vessel)	$588	All 6 years
Firmware license (per vessel)	$1,000	All 6 years
Server maintenance - cloud storage and SFTP	$50,000	All 6 years
SFTP operation	$3,000	All 6 years

Data Storage

The Fisheries Retention and Disposal Schedule (2015) (67) states that the monitoring and surveillance of license holders and associated areas must retain records for 7 years. For this analysis, it was assumed that the Microsoft cloud would be used to store the footage. All footage would be retained in “hot storage” for one year and then 5% would be transferred to cheaper “cold storage” for an additional 6 years, after which time it could be deleted.

Hot Storage Costs

Using the Microsoft Azure online calculator, it was determined that the monthly cost of 1,000 GB of data in hot storage is $32.36 or $388 per year. As an example, if all trawlers were to have cameras installed, there would be 27,914 days of fishing footage equating to 837,420 gigabytes (GBs) of data (30 GBs per fishing day). If each 1,000 GBs of data costs $388.32 to store per year the annual cost is $325,187 for hot storage costs. This is only for a new year of data. From the initial year of hot storage, 5% of the footage is moved into cold storage

in the second year right up to the to the seventh year after recording, at which time the footage may be deleted in accordance with Fisheries Queensland's records retention and disposal schedule.

Cold Storage Costs

Using the same calculator, it was determined that the monthly cost of 1,000 GBs of data in cold storage is $12.29 per month (with no retrieval). The additional "retrieval of cold storage" cost is $45.91 per month per 1,000 GBs.

In this model it is assumed that DPI would only retrieve 5% of footage in any one year from cold storage, which brings the retrieval cost to $0.23 per month per 1,000 GBs. The cold storage plus retrieval cost comes to a total of $12.52 per month per 1,000 GBs. This equates to $150.23 per year for cold storage and retrieval per 1,000 GB. Footage is moved into cold storage from the second year of the program and then accumulates as more and more cold storage is required over time. After the seventh year of the program (end of 2031), the first year of footage can be deleted. In 2032 the second year of data can be deleted and so on and so forth.

Review of Onboard Camera Footage

The footage review cost applied in the model was $140 per hour and included the following services:

- Review of onboard camera equipment data - includes recording fishing events and TEP interactions
- Data analysis and validation of footage derived data against logbooks, includes report generation and provision
- Project management - includes development of data protocols and monthly report and provision of derived data
- Hard drive handling and data processing administration, and
- Stakeholder engagement - includes attending meetings and working with DPI and the Customer.

For the trawl fishery the benchmark is set at 10% of trip nights to be reviewed, plus one additional night. For example, if a trip is 10 days in length the total review will span 2 days fished (10% x 10 days fished + 1). Within each day fished a number of 'shots' will be conducted by each trawl fishing vessel (one shot = trawl net down to trawl net up). For each shot conducted during a fishing day there will be 15 minutes of review time allocated to identification of TEP species. These parameters will generate a total review time for the fishery. **Table A2.8** provides a summary of the review parameters.

Table A2.8. Footage review parameters for the IOM program

Review Parameters	Unit
Footage review time (% of fishing trip nights + 1)	10%
Shot review time for TEP	15 minutes per shot
Report of validation process per vessel	6 hours per year
E-Transfer of footage from each vessel	6 hours per year
Project management	12 hours per year

For footage review, the default cost was set at $140 per hour as the reviewer agreement identified a mix of costs per hour for review ($131) and analysis ($148) that composed the footage review definition.

DPI IOM Management Costs

In addition to the applied costs of the IOM program DPI will be required to manage the program over time and will allocate 3 fisheries management staff and 3 technical officers at various levels. **Table A2.9** provides a

summary of the expected management costs to be incurred by DPI post-implementation of the IOM program and ongoing for its expected life. All salaries are based on the Queensland Public Service Officers and Other Employees Award with an on-cost multiplier of 17.38% applied.

Table A2.9. DPI management costs associated with the operation of the IOM program (based on current Queensland Government awards)

DPI Staff	Allocation	Cost
AO8 Principal Fisheries Manager (Trawl and Net)	33.33%	$56,892
AO7 Senior Fisheries Manager	100%	$156,424
TO5 Fisheries Manager	100%	$134,926
TO3 Fisheries Officer	100%	$107,120
TO3 Fisheries Officer	100%	$107,120
TO3 Fisheries Officer	100%	$107,120

Total cost for management of the IOM program each year, at full allocation, is $669,603. It should be noted that during the establishment phase (first 4 years) the allocation of management costs to the IOM program will follow the adoption profile as indicated in **Table A2.4**. As the IOM program is rolled out across the fleet more time, and therefore management effort, will be allocated to the program.

During the establishment phase of the IOM program additional budget has been allocated to fisher education. The aim of the education initiative is to enable fishers to learn about the electronic monitoring systems, receive training around the identification of TEP species, and learn more about the e-reporting of catches, amongst other key educational aspects required for the successful implementation of the IOM program. The educational component has been estimated at one hour per vessel per month at a cost of $100 per hour, or $1,200 per vessel.

Results

Present Value and Annualised Costs of the IOM Program

In this section a PV calculation is applied to costs only, as benefits accruing to the program from the GBRMP are not considered in this part of the assessment. This method reduces the future stream of costs over the designated period to a singular PV. The discount rate used to calculate the PV is 7%.

Table A2.10. PV of cost components over 10 years split into establishment and ongoing of the IOM program for the trawl fishery (ECOTF + T4) across scenarios (S1 and S2)

	Effort Scenarios					
Cost Component of IOM	**S1.1 25% Effort**	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
Hardware and installation (establish)	$1,389,441	$4,737,231	$5,920,793	$8,592,262	$12,514,926	$5,379,736
Hardware and installation (ongoing)	$1,281,978	$4,357,321	$5,444,563	$7,898,624	$11,502,056	$4,947,538
Data storage (establish)	$188,696	$582,893	$656,527	$725,019	$725,019	$535,751
Data storage (ongoing)	$357,597	$1,104,638	$1,244,182	$1,373,980	$1,373,980	$1,015,300

Footage review, analysis & reporting (establish)	$568,908	$2,202,275	$2,719,645	$3,756,304	$4,871,369	$2,373,848
Footage review, analysis & reporting (ongoing)	$1,011,380	$3,915,108	$4,834,867	$6,667,794	$8,660,107	$4,220,124
DPI management (establish)	$1,500,331	$1,607,973	$1,646,028	$1,731,924	$1,858,051	$1,628,631
DPI management (ongoing)	$2,605,368	$2,605,368	$2,605,368	$2,605,368	$2,605,368	$2,605,368
Total Cost	**$8,903,699**	**$21,112,805**	**$25,071,972**	**$33,361,275**	**$44,110,874**	**$22,706,297**
Establishment Cost	**$3,647,375**	**$9,130,371**	**$10,942,993**	**$14,805,510**	**$19,969,364**	**$9,917,967**
Ongoing Cost	**$5,256,323**	**$11,982,434**	**$14,128,979**	**$18,555,766**	**$24,151,511**	**$12,788,330**

The total cost over the full 10 years of the IOM program ranges from $8.9 million over 10 years to $44.1 million, covering 25% of fishing effort to 100% of fishing effort (total licenses applied) respectively. The establishment cost in years 1 to 4 ranges from $3.65 million to $20 million. The ongoing costs (pending a review of the program) are provided for reference.

Table A2.11 outlines the annual costs (converts PV to equivalent annuity value) of the IOM program where the components have been summed, with establishment and ongoing costs also presented, noting the costs are all annualised over 10 years.

Table A2.11. Annual costs of the IOM program over 10 years (sum of cost components).

	Effort Scenarios					
Annual Cost	**S1.1 25% Effort**	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
IOM Program Annual Costs	$1,189,842	$2,825,053	$3,353,858	$4,458,705	$5,889,080	$3,035,817
IOM Program Costs – Establishment (1 – 4)	$487,089	$1,220,345	$1,462,224	$1,976,820	$2,663,938	$1,324,706
IOM Program Costs – Ongoing (5 – 10)	$702,753	$1,604,709	$1,891,634	$2,481,885	$3,225,142	$1,711,112

Table A2.12 provides a sensitivity of the discount rate applied to the PV calculation for the total cost of the IOM program. The discount rate reduces the value of future cash flows, in this case the costs of IOM program (over 10 years). The higher the discount rate, the lower the PV of the future costs, hence a lower PV.

Table A2.12. Sensitivity of the total cost of the IOM program over 10 years to the discount rate for the ECOTF + T4

	Discount Rate		
Fishing Effort Scenario	**4%**	**7%**	**10%**
S1.1	$10,125,376	$8,903,699	$7,900,632
S1.2	$23,919,057	$21,112,805	$18,803,798

S1.3	$28,385,344	$25,071,972	$22,344,683
S1.4	$37,723,301	$33,361,275	$29,768,375
S1.5	$49,802,753	$44,110,874	$39,418,751
S2	$25,705,376	$22,706,297	$20,237,675

Cost-Benefit Analysis of the IOM Program

The economic modelling undertaken to assess the coverage of various effort scenarios across the ECOTF + T4 utilises a discounted cashflow framework to assess the viability of the investment in IOM. The PV of the future stream of cost outflows and cash inflows is calculated over 10 years (split into establishment and ongoing phases) using a discount rate of 7%. Subtracting the future sum of cost outflows from the sum of future cash inflows generates the NPV for the range of scenarios being investigated.

While costs were investigated across 6 varying fishing effort scenarios, consideration is also given to 2 benefit scenarios, NER (GBRMP portion of Queensland) and GVP derived from the GBRMP access plus exports realised outside of the GBR. NER measures the total return to the fishery resource as the difference between fishing revenue and the economic costs incurred in a fishery, detailing its economic performance as a whole fishery, while GVP simply measures the total revenue earnt through the fishing activity. NER is the preferred benefit measure to apply but both will be investigated to provide a comparison.

Cost-Benefit Analysis of the IOM Program (NER)

As outlined in **Table A2.3** the NER for the ECOTF + T4, based on the portion that relates to the GBRMP (44% of Queensland total NER) is estimated at $627,000 annually. The total benefits include the additional benefit of e-reporting at $141,000 annually. This figure was provided in a detailed to report to Fisheries Queensland by BDO (56) for the 2021-22 financial year and indexed to 2024. The PV of the NER benefit over 10 years is $5.78 million (includes e-reporting benefit)**.** As the program will be reviewed after year 4 a comparative NPV result is provided for the establishment phase of the IOM program that is funded by DPI, and an estimate for the expected NPV for the ongoing portion of the program to year 10. The total benefit for the establishment phase of the program is $2.79 million over 10 years (PV of NER over years 1-4) rather than the benefit stated above for the full 10-year analysis of $5.78 million (**Table A2.13**). The estimated benefit for the ongoing phase of the program (6-10) is $3.0 million.

Table A2.13. NPV result for the IOM program using NER (10 years at 7% discount rate)

	Effort Scenarios					
	S1.1 25% Effort	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
Benefit (NER + E-Reporting)	$5,778,919	$5,778,919	$5,778,919	$5,778,919	$5,778,919	$5,778,919
Costs of IOM	$8,903,699	$21,112,805	$25,071,972	$33,361,275	$44,110,874	$22,706,297
NPV Results (Total Program)	**-$3,124,779**	**-$15,333,885**	**-$19,293,053**	**-$27,582,356**	**-$38,331,955**	**-$16,927,378**
NPV Result for Establishment Only	-$860,418	-$6,343,414	-$8,156,036	-$12,018,552	-$17,182,407	-$7,131,010

NPV Result for Ongoing Only - Subsidised	-$2,264,361	-$8,990,472	-$11,137,017	-$15,563,804	-$21,149,548	-$9,796,368

In applying NER and e-reporting benefits to calculate the NPV for the total cost IOM program, the results show that all generate a negative NPV, the largest being S1.5 at -$38.3 million which covers all licenses in the ECOTF + T4 (100% effort coverage – all licenses active and inactive).

Table A2.14. Sensitivity of the NPV for the total IOM program (utilising NER + e-reporting over 10 years) to changes in discount rate (refer **Table A2.12** for changes in cost base under different discount rates)

	Discount Rate		
Fishing Effort Scenario	**4%**	**7%**	**10%**
Change in Benefit (NER)	**$6,486,440**	**$5,778,919**	**$5,197,425**
S1.1 (25% Effort)	-$3,638,936	**-$3,124,779**	-$2,703,207
S1.2 (80% Effort)	-$17,432,617	**-$15,333,885**	-$13,606,373
S1.3 (90% Effort)	-$21,898,904	**-$19,293,053**	-$17,147,258
S1.4 (100% Active Licenses)	-$31,236,862	**-$27,582,356**	-$24,570,951
S1.5 (100% Total Licenses)	-$43,316,313	**-$38,331,955**	-$34,221,327
S2 (GBR Vessels Only)	-$19,218,936	**-$16,927,378**	-$15,040,250

Cost-Benefit Analysis of the IOM Program (GVP)

The alternative option is to use the GVP (plus external exports and e-reporting) for the ECOTF + T4 in the Queensland for the portion relating to the catch taken within the GBRMP. The total GVP for the Queensland ECOTF + T4 is $127.85 million of which $56.29 million is attributable to the catch taken within the bounds of the GBRMP. Total benefit, including export value plus e-reporting is $56.43 million. The premise for using this benefit is that the rollout of IOM program would maintain access to the GBRMP for fishing purposes and avoid cancellation of export rights. With the addition of the e-reporting benefit the PV of the GVP over 10 years is $424 million.

Table A2.15. NPV result for the IOM program using GVP (10 years at 7% discount rate)

	Effort Scenarios					
	S1.1 25% Effort	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
Benefit (GVP)	$424,074,751	$424,074,751	$424,074,751	$424,074,751	$424,074,751	$424,074,751
Costs of IOM	$8,903,699	$21,112,805	$25,071,972	$33,361,275	$44,110,874	$22,706,297
NPV	**$415,171,052**	**$402,961,946**	**$399,002,778**	**$390,713,476**	**$379,963,877**	**$401,368,454**

Given the significant value of GVP calculated over 10 years in comparison to the costs of the IOM program, none of the effort scenarios vary greatly in context. Undertaking a sensitivity analysis would be redundant given the scale of the disparity between the 2 figures. Additionally, calculation of an NPV for the establishment

phase only would be redundant as the benefits, although smaller covering only the first 4 years, would be based on a benefit of $204.5 million.

Business Profit Analysis for ECOTF Vessels

For each of the fishing effort scenarios assessed there are a certain number of trawl vessels that provide the effort coverage across the scenarios. Vessels were ranked from those most active with high levels of fishing days per year to the least active with low number of fishing days per year. The following section looks at the number of boats per effort scenario but apportions the annual costs of the IOM program across the total number of licenses in the fishery which is 361 according to 2023 data. A comparative analysis of the potential financial impact to the fishing businesses is also provided. Note that T4 is excluded from analysis of business profit due to a paucity of information relating to financial data.

Table A2.16. Number of trawl fishing vessels per effort scenario

	Effort Scenarios					
	S1.1 25% Effort	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
Number of trawl vessels	32	131	166	245	361	150

Based on the number of boats described in **Table A2.16** and the associated effort scenarios, an annual cost per vessel to implement the IOM program was derived. As stated, the cost per vessel is spread across the whole fishery (all T1, T2, T4, M1 and M2 licenses) so that the IOM program is equitable.

This annual cost will be compared to the financial performance (business profit including depreciation) of the ECOTF for the 2021-22 financial year (indexed to 2024) which is detailed in a report to Fisheries Queensland by BDO. For the purpose of this report the profitability measure is indexed by inflation (14.92%) to reflect a more current profitability measure. The prices were indexed by inflation from mid-2021-22 to the latest available data to mid-2023-2024 and deemed to be representative of current prices.

The BDO report reported the following business profit measures for ECOTF for quartiles (number of active businesses ranked by effort) of the fishery, as well as the average profit estimate for the fishery.

Table A2.17. Annual business profitability of the Queensland ECOTF by quartiles of active businesses that are ranked by effort (days fished) (excludes IOM cost)

Average	Lower Quartile (1)	Quartile 2	Quartile 3	Upper Quartile (4)
$43,587	-$18,886	$3,014	-$59,841	$249,599

Quartile 3 would be expected to be profitable given the higher effort expended (132 days fished annually) but due to significant unpaid labour and depreciation costs, is unprofitable. Quartile 4 demonstrates the highest effort at 283 days per year on average while Quartile 1 fished 21 days fished on average.

The Government is committed to funding the first 4 years of the IOM program at which time a review will be undertaken. From year 5 onward it is unknown how the program costs will be recovered (industry) or funded (Government). At this point in the analysis the 2 options at either end of the spectrum are (option 1) that Government would commit to fully fund the program, or (option 2) full cost recovery for IOM would be borne by the trawl fleet. There is a potential mix of options for partial cost sharing of the IOM program between parties. What would be apportioned between Government and industry is speculation beyond the scope of this analysis and would be determined during the review. As such the following analysis is based on full cost

recovery impacts to trawl industry business profitability. The following table outlines the per vessel cost across each of the effort scenarios for the IOM program under full cost recovery conditions.

Table A2.18. Annual cost of the IOM program per trawl vessel in the ECOTF across T1, T2, M1 and M2

	Effort Scenarios					
	S1.1 25% Effort	**S1.2 80% Effort**	**S1.3 90% Effort**	**S1.4 100% Active**	**S1.5 100% Total**	**S2 GBR Vessels**
Cost per trawl vessel – full cost recovery - all licenses pay	$3,296	$7,826	$9,290	$12,351	$16,313	$8,409
Cost per trawl vessel – DPI subsidise establishment phase in first 4 years – all licenses pay	$1,947	$4,445	$5,240	$6,875	$8,934	$4,740
% reduction through subsidy	59%	57%	56%	56%	55%	56%

Under the premise that all licenses in the trawl fishery equally share the cost of the IOM program S1.1 is the least expensive option on a per vessel basis as it spreads the smallest cost over the total number of licenses/vessels (361) and would cost $3,296 per vessel. Under S1.5 (expected mandatory scenario) the cost of the IOM program on all vessels would be $16,313.

The establishment phase of the IOM program runs for the first 4 years (2026 to 2029). As a comparison to the full cost recovery option and the associated cost per vessel, further analysis was conducted whereby the Queensland Government would subsidise the first 4 years of the IOM program. Government would provide funding to support the rollout including hardware (based on a schedule of 25% per year, increasing to 100% by year 4), data storage, review costs, and program management. The subsidisation of the establishment phase decreases the financial costs to vessels across the scenarios of between 55% and 59%. Under the expected mandatory scenario (S1.5) the expected decrease to cost per vessel is 55%.

Tables A2.19 and **A2.20** highlight the impacts on business profitability following implementation of the IOM program per effort quartile at full cost recovery and under subsidised establishment.

Table A2.19. Estimated annual business profit post-implementation of the IOM program at full cost recovery for the ECOTF and based on premise of full cost recovery across all licenses that have at least one T1, T2, M1 or M2 symbol

	ECOTF Annual Business Profit (incl. depreciation)				
Fishing Effort Scenario	**Average Profit**	**Lower Quartile (1)**	**Quartile 2**	**Quartile 3**	**Upper Quartile (4)**
Starting Profit	$43,587	-$18,886	$3,014	-$59,841	$249,599
S1.1	$40,291	-$22,182	-$282	-$63,137	$246,303
S1.2	$35,761	-$26,712	-$4,812	-$67,667	$241,773
S1.3	$34,297	-$28,176	-$6,276	-$69,131	$240,309
S1.4	$31,236	-$31,237	-$9,337	-$72,192	$237,248
S1.5	$27,274	-$35,199	-$13,299	-$76,154	$233,286
S2	$35,178	-$27,295	-$5,395	-$68,250	$241,190

Table A2.20. Estimated annual business profit post-implementation of the IOM program for the ECOTF and based on the premise of Government subsidisation in the establishment phase across all licenses that have at least one T1, T2, M1 or M2 symbol

	ECOTF Annual Business Profit (incl. depreciation)				
Fishing Effort Scenario	**Average Profit**	**Lower Quartile (1)**	**Quartile 2**	**Quartile 3**	**Upper Quartile (4)**
Starting Profit	$43,587	-$18,886	$3,014	-$59,841	$249,599
S1.1	$41,640	-$20,833	$1,067	-$61,788	$247,652
S1.2	$39,142	-$23,331	-$1,431	-$64,286	$245,154
S1.3	$38,347	-$24,126	-$2,226	-$65,081	$244,359
S1.4	$36,712	-$25,761	-$3,861	-$66,716	$242,724
S1.5	$34,653	-$27,820	-$5,920	-$68,775	$240,665
S2	$38,847	-$23,626	-$1,726	-$64,581	$244,859

Discussion

Whilst there is a net cost to the program in the first 4 years, with the Government (DPI) proposal to fully fund the establishment phase, the introduction will not have a direct cost impost on industry. Before the end of the establishment phase (2029) there will be a review of the program to determine its efficacy and a future strategy moving forward. While Government subsidisation of the program has decreased costs to vessels by up to 59%, the scenario for full cost recovery (worst case scenario) in the ongoing phase (years 5 to 10) is expected to continue to place significant burden on the trawl fishery (ECOTF) and potentially impact the ability of all but the most profitable quartile to continue to operate. The profitability of the sector is already under strain (see **Table A2.17**) in an economic environment of increasing input costs, amongst other pressures. The proposed IOM program design should carefully consider the marginal benefit of increasing coverage to achieve 100% oversight of the sector with the significant negative profitability impacts on the sector. Given that existing profitability is either negative or marginal across all but the top quartile of fishers, current employment levels are premised on operating with little or no profit margin, suggesting employment in the sector is at risk prior to consideration of an IOM program in Queensland.

The primary focus of this report was to undertake a cost-benefit analysis of the IOM program for Fisheries Queensland to support an IAS and analyse the associated implementation and ongoing costs of the program as well as the direct benefits i.e. NER and GVP. It is the preference of Queensland Treasury that NER be used in the assessment of benefits as it observes the long-run profit from the fishery after all costs from the fishery have been accounted for.

The NER figure was drawn from BDO reports published in 2021-22 for Fisheries Queensland. Adjusted to 2024, the base annual NER figure for GBRMP access (44% of total NER for Queensland) is -$0.38 million annually. However, this figure was adjusted to exclude management costs bringing the NER to $627,000 annually, or $4.7 million over 10 years (PV). Given that the ECOTF generates approximately $56.29 million in gross value from the GBRMP annually, the associated NER figure is a negative result at full cost (including management) or delivers marginal returns for the fishery when adjusted for Government management costs. It could be stated that under these economic conditions the ECOTF (GBRMP component) operates close to a

breakeven point. All 6 scenarios, using NER as the benefit, all return a negative NPV with S1.5 (361 vessels with 100% effort coverage) returning the greatest at -$38.33 million when using NER as the benefit.

Further, it should be considered that the introduction of the IOM program may initiate some natural adjustment of trawl fleet numbers in Queensland with a role for the Queensland and Federal Governments to support the ECOTF + T4 to adjust under the potential impacts (costs) of the IOM program. Under S1.5 the program would cost in excess of $5.9 million per year or $44 million over the 10-year analysis period at a 7% discount rate.

It should be noted that S1.5 according to 2023 data, although providing full IOM coverage of the trawl fishery, indicates that 116 license holders in the fishery did not operate. Given S1.5 is the costliest scenario overall, the distribution of cost is over all licenses/vessels (361). However, 116 of these licenses are currently inactive, thus imposing a significant cost burden on vessels that are currently not generating an income but should be included as they maintain the right to fish.

In the alternative scenario (S1.4), where 100% of active boats are covered by the IOM program, the annual cost is $4.6 million or $33.4 million over 10 years. In this case there are 245 active vessels according to the 2023 data. Many of them have T1, T2 and T4 symbols as well as an M1 or M2 symbol. While the cost is significant per active vessel at full cost recovery ($18,199) it satisfies the 100% coverage requirement, based on applied effort, for the IOM program. As inactive vessels still have the right or potential to engage in fishing activity it is proposed that the costs are borne by all license holders, hence the cost is distributed amongst 361 license holders.

When considering the top performing vessels in terms of effort (days fished), scenarios 1.1 (25% of effort captured) and 1.2 (80% of effort captured) provide the option to capture significant fishing effort within the IOM program while minimising the number of boats required to have cameras installed and thus the financial impact on the ECOTF + T4.

Table A2.21. Number of vessels compared to percentage of fishing effort.

	Effort Scenarios					
	S1.1	**S1.2**	**S1.3**	**S1.4**	**S1.5**	**S2**
% of Effort	25%	80%	90%	100% (Active)	100% (Total)	74% GBR Only
Number of vessels	32	131	166	245	361	150
% of active vessels (ranked by effort)	13.06%	53.47%	67.76%	100.00%	147.35%	61.22%
% of total vessels (all licenses)	8.86%	36.29%	45.98%	67.87%	100.00%	41.55%

As shown in **Table A2.21**, 13.06% and 53.47% of active vessels will provide IOM coverage for 25% and 80% of effort respectively, and the cost per vessel is minimised under these scenarios at $3,300 and $7,800 for the 25% and 80% scenarios respectively. S2 (GBR) has 61% of vessels and represents 74% of effort.

Given the vessels in the upper quartile of fishing businesses (ranked by effort) have the greatest capacity to absorb the IOM costs, the scenario selection should take in to account this 25% benchmark as a point beyond which business profit is severely impacted for vessels representing the lower 75% of effort. The 3 lower quartiles of fishing businesses will experience negative business profit post-implementation of IOM, even with a subsidised establishment phase, with Q1 and Q3 already having negative profit without the additional cost of IOM, and Q2 marginally profitable.

Another consideration is the significant increase in annual fees that would occur at full cost recovery. Currently, fishers in the ECOTF + T4 would pay an annual fee of $367.66 with and additional fee of $0.45 per effort unit or EU (equates to maximum of $41 per day for 93 effort units). M2 symbol holders pay an annual fee of $426.49 per year. Annual costs to operate within the fishery (payable to Government) are minimal and justification would need to be sought to increase annual fees to achieve full cost recovery of the IOM program. Fees increases, according to Queensland Treasury, are required to be 'reasonable'. If the Government were to recover the full cost of the program through annual fees, under the S1.1 scenario the cost of $3,296 per vessel for IOM would increase the average annual fee for the trawl fishery from approximately $2,600 to $6,000. Under S1.5 the annual cost would increase from $8,600 to $22,000.

Attachment 3: Human rights considerations

All proposals involving the introduction of, or change to, Queensland Government legislation need to be accompanied by a consideration of impacts on human rights under the *Human Rights Act 2019* (67). The proposal to introduce IOM requirements will carefully consider and seek to minimise any impacts on human rights.

The introduction of IOM across the CFFTF and the ECOTF has the potential impact on the following human rights:

- right to privacy and reputation (section 25)
- right to recognition and equality before the law (section 15).

Privacy and reputation

The use of e-monitoring systems would involve the collection of information about a person's activities on board a commercial fishing vessel, which has the potential to impact on personal privacy and consequently limit the right to privacy and reputation. However, the impact on the right to privacy and reputation will be limited by legislation (i.e. *Information Privacy Act 2009* (68)*, Right to Information Act 2009* (69)) and strong protocols to ensure the information collected is only used for its intended purpose.

Recognition and equality before the law

IOM of commercial fisheries data would involve an obligation on a certain class of people to either install, maintain and operate e-monitoring systems. This would have the potential to impact on the right to non-discrimination if that obligation was allocated in an arbitrary way, highlighting the need to determine any such obligation in an objective, fair and transparent manner informed by stakeholder consultation.

Summary

The impacts of the proposal to introduce IOM across the ECOTF and the CFFTF have been considered. Should this proposal be concluded as the most appropriate action, further consideration will be given to the development of the legislation and inclusion of appropriate safeguards to protect commercial fishers and other affected parties. Any action must be reasonable and proportionate in order to meet community expectations and government objectives, while minimising the regulatory burden on commercial fishers where feasible. The human rights that may be engaged by this proposal will be addressed during the drafting of the legislation and following further stakeholder consultation.

Attachment 4: Competition impacts

Under the *Queensland Government better regulation policy* (58), an IAS must provide a brief assessment of the consistency of the proposed regulation with clause 5 of the Competition Principles Agreement. Clause 5(1) requires that legislation should not restrict competition unless it can be demonstrated that the benefits of the restriction to the community outweigh the costs, and the objectives of the legislation can only be achieved by restricting competition.

The Organisation for Economic Co-operation and Development Competition Assessment Toolkit helps assess whether a proposal will restrict competition (70). Based on that checklist, the proposal to implement IOM across the CFFTF and ECOTF may have a minor indirect effect on competition, noting that major business decisions are likely determined by multiple factors:

- It would not grant exclusive rights for a supplier to provide goods or services.
- It would not establish a new licence, permit or authorisation process as a requirement of operation, but it would add to existing authorisation conditions.
- It may limit the ability of some types of suppliers to provide goods or services.
- It would raise the cost of entry (capital costs) for new entrants to the fishery.
- It would not create a geographical barrier to the ability of businesses to supply goods, services or labour, or invest capital.
- It would not limit suppliers' ability to set the prices for goods or services.
- It would not set standards for product quality.
- It would raise costs of production (operating costs) for some suppliers relative to others (depending on cost-sharing arrangements between government and industry).
- It would not restrict or reduce the incentive for suppliers to compete.
- It would not limit the choice and information available to consumers.

Attachment 5: Fundamental legislative principles

As defined in the *Legislative Standards Act 1992*, fundamental legislative principles require that legislation has sufficient regard to the rights and liberties of individuals and the institution of Parliament. The proposal to establish an IOM program consisting of e-monitoring systems, may give rise to several fundamental legislative principle issues relating to whether it has sufficient regard to the rights and liberties of individuals.

The requirement to install and operate e-monitoring systems on commercial fishing vessels may give rise to fundamental legislative principle issues in relation to the undue restriction of ordinary activities (including the right to conduct business without interference) and interference with a person's property without sufficient justification. Such requirements associated with IOM have the potential to interfere with a fisher's personal property (fishing vessels) and day-to-day business of their fishing operation.

While there could be limitations, the proposed program design, implementation and ongoing management arrangements are designed to mitigate any regulatory burden on commercial fishers such as:

- installations occurring in locations that will not impact fishing operations and processes
- ensuring automatic operation of equipment to limit fisher intervention and operation
- providing malfunction provisions to support continued fishing in the event of a malfunction that is outside the control of the fisher.

Introduction of new offences may also present an issue; however, any such provisions will be in accordance with other fisheries management offences and penalties will be reasonable and proportionate to the offence.

The issue of privacy pertaining to the rights and liberties of individuals is addressed in greater detail in the privacy impact assessment section of this consultation IAS (section 8). Privacy rights will be protected through a combination of footage and data encryption, operational controls (e.g. policies and procedures), technical controls (including access controls and encryption) and protocols for contractors engaged in IOM systems and services.

While there may be limitations, the proposal is consistent with fundamental legislative principles as the limitations are mitigated through program design. Any remaining limitations to commercial fishers are also justified when considering the benefits gained in maintaining fishery export approvals and fishing access through better management and protection of marine ecosystems. In addition, commercial fishing businesses are accessing a public resource and the improved confidence in logbook data and subsequent management decisions are a benefit to the community.

The benefits of introducing IOM are considered to outweigh the impacts of regulation, and there is no feasible alternative available for independent validation of TEP and bycatch species.

Attachment 6: Privacy impact assessment

A preliminary privacy impact assessment has been performed in accordance with requirements of the Queensland Office of the Information Commissioner (71). It assumes that incidental personal information will be captured through e-monitoring. This document will be reviewed following feedback on this consultation IAS and finalised alongside the preferred implementation option to ensure any requirement for IOM complies with the *Information Privacy Act 2009*. The IOM program will adopt 'privacy by design' principles and seek to minimise the amount of personal information collected.

Protection of privacy is critical to the design and implementation of e-monitoring and observer programs, including industry acceptance of such programs. Protection of information is necessary to minimise the risk of collected data being misused or misrepresented.

A privacy impact assessment was also conducted for the onboard camera field trial, which collected footage identical to that a future IOM program could expect to capture. This included occasionally capturing personal information of the crew and skippers in the form of images of their face or other features that could be used to identify them. Although these instances were minimised by only recording catch-handling events and the use of privacy by design principles, footage collected during the field trial also had the following measures implemented to safeguard the footage and prevent misuse of private information:

- encrypted footage that could only be accessed by specific software/personnel with access/authority
- secure storage of footage and data by the reviewer
- clear guidelines for data use, access and retention
- adjusting camera angles to minimise capture of crew where possible (otherwise known as privacy by design)
- using software applications such as privacy shields
- using sensor-triggered recording or on-demand e-transfer methods to manage the data collected as accurately as possible and only collect what was necessary to achieve the objective of the trial.

The flow for footage and private information captured during an IOM program would be as follows:

- E-monitoring footage would be collected from individual fishing boats, which would contain information identifying the boat concerned. E-monitoring data would identify individual fishers and aspects of the boat and its operations that could be used to identify individual boats. It is unlikely that this identity information could be fully removed from any video footage. However, all footage and identifying information would be encrypted to protect fishers' privacy and stored in a secure environment.

- E-monitoring data would be encrypted and securely transferred from fishers to base – preferably through secure telecommunications. Data collected by observers would be uploaded to the fisheries database using a dedicated software app and secure telecommunications.

- Only authorised personnel, including Fisheries Queensland staff or professional contractors who are bound by laws regarding privacy and confidentiality (72), would have access to, and the ability to view, the encrypted e-monitoring footage. Only authorised personnel would review footage.

- Only a proportion of e-monitoring footage would be reviewed (for example, AFMA reviews 10% of the footage collected). Data analysis would be undertaken to determine the minimum amount of footage to be reviewed to develop an accurate overall picture for each fishery. As data is collected, this percentage could be revised (up or down) using risk assessments.

- Reports based on the data would not include any individually identifiable information during the normal course of business. The only circumstance in which individually identifiable information would be used is if a compliance breach or other offence was detected and was required by law to be released.

- Fishers would have the right to retain copies of the information provided and would have the right to review their own information in accordance with the provisions of the *Right to Information Act 2009*. Fishers would not have the right to amend footage.
- Under the Queensland Government general retention and disposal schedule, e-monitoring data and footage would be kept for 90 days (73).

All data collected would be treated as official government records and Fisheries Queensland would comply with the *Information Privacy Act 2009* (68), *Right to Information Act 2009* (RTI Act) (69) and *Public Records Act 2023* (74). Fisheries Queensland would manage the information collected in accordance with the information privacy principles set out in the *Information Privacy Act 2009,* including:

- Principle 3 – personal information collected is relevant to the purpose for which it is collected.
- Principle 4 – personal information is protected against loss, unauthorised access, use, modification or disclosure, and any other misuse.
- Principles 9 and 10 – personal information is only used for the purpose for which it is created.

To support the application of these principles, Fisheries Queensland would implement:

- legislation requiring data encryption to protect fishers' privacy
- operational controls, including policies and procedures, staff training and communication strategies
- technical controls, including access controls and encryption
- strict protocols for any contractors engaged to provide e-monitoring systems and services (72).

The RTI Act includes protections for information that could be expected to prejudice the private, business, professional, commercial or financial affairs of entities (75), and significant penalties apply if this legislation is breached. While not directly applicable, the Administrative Review Tribunal has confirmed that comparable provisions in Australian Government legislation apply to AFMA's e-monitoring program (76).

If any data collected for data validation purposes is subjected to a 'right to information' request, the involved fishers would be contacted by the Office of the Information Commissioner and consulted about its release. In this case, fishers may request that footage not be released, but they must be able to provide a strong argument for doing so. Fishers also have appeal rights under the RTI Act if such requests are not successful. In addition, there are also provisions in section 41 of the RTI Act to mitigate against requests made without sufficient grounds.

Any data requested under a 'right to information' would need to be appropriately redacted before release to ensure there are no distinguishing features (e.g. boat marks, faces, gear configurations, etc.). Read more about right to information and information privacy at rti.qld.gov.au.

Question to consider

- Are there other measures that could be implemented to improve the security and privacy of information collected under an IOM program?

Glossary

Acronym / term	Description
AFMA	Australian Fisheries Management Authority
BDO	is an independent group of researchers with experience monitoring economic and social indicators for fisheries in Australia
CFFTF	commercial fin fish trawl fishery
Data Validation Plan	the *Fisheries Data Validation Plan* issued in 2018
DCCEEW	the Australian Government Department of Climate Change, Energy, the Environment and Water
DPI	the Queensland Department of Primary Industries (including Fisheries Queensland)
ECOTF	east coast otter trawl fishery (also known as east coast trawl)
e-monitoring	onboard electronic monitoring, including onboard camera systems
e-reporting	electronic reporting of catch and effort
e-transfer	electronic transfer of data
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cth)
ERA	ecological risk assessment – an assessment process that evaluates the relative risk posed by fishing on species, habitats and communities within a fishery
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
GVP	gross value of production – the value placed on recorded production at the wholesale prices realised in the marketplace
IAS	impact analysis statement
independent data validation	comparison of 2 data sets – one provided by fishers and the other derived independently – to confirm data accuracy and reliability
IOM	independent onboard monitoring – can include fisheries observers and electronic monitoring
logbooks	commercial fishers are required to complete daily catch and effort logbooks – detailing where, when and how fishing took place, and what was caught
MSC	Marine Stewardship Council
NER	net economic return
NPV	net present value
non-retained catch	includes non-target species and any target or byproduct species that are not retained (e.g. because they are too small)
output controls	direct limits on the number or weight of fish harvested from a fishery
PV	present value
protected species	a protected animal under the *Nature Conservation Act 1992,* or an animal that is listed as a threatened species, listed migratory species, or a listed marine species under the EBPC Act

protected species interaction	any physical contact between fishing gear or a vessel and a protected species
QBFP	the Queensland Boating and Fisheries Patrol
Qld eFisher app	approved electronic logbook for reporting commercial fishing and TEP species interactions, instead of using paper logbooks
TEP species	a threatened, endangered and protected species is a protected animal under the *Nature Conservation Act 1992,* or an animal that is listed as a threatened species, listed migratory species, or a listed marine species under the EBPC Act
TEP species logbook	logbook used to monitor interactions with non-target species that are subject to mandatory reporting requirements – the TEP species logbook replaced the species of conservation interest logbook in 2021
UNESCO	United Nations Educational, Scientific and Cultural Organization
WTO	wildlife trade operation

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