A brief overview of ER and EM implementation progress in the region

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1. Introduction

This information paper provides a brief summary of Electronic Reporting (ER) and Electronic Monitoring (EM) projects currently being implemented in the WCPO oceanic fisheries. ER and EM data flow are presented. The number of analysed EM fishing sets is presented. The development of an application for the collection and transmission of port sampling data is presented. The importance of feeding data towards improving artificial intelligence software is discussed. EM data reporting is presented. An outlook on advancing policy and technical matters for EM is provided.

2. Summary of regional ER and EM projects and coordination resources

The current status of ER and EM projects in the region, as currently understood by OFP-SPC, are described in Table 1.

Table 1: Current status of ER and EM projects and implementation in the Western and Central Pacific Ocean.

Country	EM	Description	ER	Description
Australia	Yes	EM programme implemented on 75 vessels (three types of gear)	Yes	One private e-log software certified by AFMA is available for use by vessel operators for 5 fisheries.
New Zealand	Yes	Integrated ER and EM programme to be implemented in 2018	Yes	Integrated ER and EM programme to be implemented in 2018
Papua New Guinea	No	EM programme to be implemented primarily towards observer safety	Yes	*iFIMS e-obs* for fisheries observers and *iFIMS e-logs* for PS and LL vessels.
New Caledonia	No	EM trial in 2015-2016	Yes	Three longline vessel using *OnBoard.*
Solomon Islands	Yes	EM trial in 2014. EM trial in 2015-2016. Seven longline vessels equipped with EMS. Another 9 LL vessels expected to be equipped in 2019	Yes	*iFIMS e-obs* for fisheries observers and iFIMS e-logs for PS and LL fishers.
Vanuatu	Yes	Two longline vessels and one carrier vessel equipped with EMS	Yes	Third party ER provider working on ER trials. TAILS application used for monitoring artisanal fisheries.
Fiji	Yes	50 longline vessels equipped with EMS.	Yes	Five longline vessels using OnBoard since June 2019.
Tonga	No		Yes	Three domestic longline vessels using OnBoard.
Niue	No		Yes	*TAILS* application used for monitoring artisanal fisheries
Samoa	No		Yes	Three longline vessels using OnBoard. Plan to roll out to rest of fleet domestic and foreign flag fleet.
American	No		No	

Samoa				

Country	EM	Description	ER	Description
Cook Islands	Yes	Two PS vessels equipped with EMS.	Yes	Five vessels using OnBoard. ER trials of third party application.
Tokelau	No		Yes	*TAILS* application used for monitoring artisanal fisheries. i*FIMS e-obs* for fisheries observers and *iFIMS e-logs* for PS and LL fishers
Tuvalu	No		Yes	TAILS application used for monitoring artisanal fisheries. *iFIMS e-obs* for fisheries observers and *iFIMS e-logs* for PS and LL fishers
Kiribati	No		Yes	1 Longline vessel using *eTUNALOG.*
Nauru	No		Yes	TAILS application used for monitoring artisanal fisheries
FSM	Yes	Five longline vessels equipped with EM	Yes	*FIMS e-obs* for fisheries observers and *iFIMS e-logs* for PS and LL fishers. One PS vessel using eTUNALOG
RMI	Yes	Six longline vessels equipped with EMS	Yes	*iFIMS e-obs* for fisheries observers and *iFIMS e-logs* for PS and LL fishers
Palau	Yes	Seven longline vessels equipped with EM	No	
FP	No		Yes	25 longline vessels using *OnBoard*

3. E-Reporting

3.1 Vessel Logsheet E-Reporting (e-logs)

3.1.1 Purse Seine vessels

The Parties to the Narau Agreement (PNA) in collaboration with member countries and purse seine vessel owners continues to implement the *integrated Fisheries Information Management System (iFIMS). iFIMS* includes an Android application *(eForms)* which allows purse seine vessels operators to report their effort and catch data electronically on a daily basis. A total of 250 purse seine vessels are currently reported as using the *iFIMS* E-Reporting system. E-logs are securely lodged to the PNAO's *iFIMS* database system and to meet reporting requirements are then forwarded to SPC's TUFMAN2 database system (with an average two weeks lag time). Currently, 870 electronic logsheets from 154 purse seine vessels have been received in TUFMAN2. Some of these vessels currently continue to also report their effort and catch data using the SPC/FFA Regional Purse Seine Logsheet paper form.

3.1.2 Longline vessels

The Pacific Community (SPC), at the request, and in collaboration with member countries and longline vessel owners has started to implement the Android application **OnBoard**. This application allows longline vessel operators to report their effort and catch data at any time when internet connectivity is available (either on-board the vessel or on shore). The e-logs are securely lodged to the TUFMAN2 database system where they can be verified and validated by the respective member countries' fisheries authorities. Currently six WCPFC member countries and 54 longline vessels are using *OnBoard*. The logsheet can also be exported and printed into the SPC/FFA paper format. The majority of vessels using OnBoard no longer submit paper log sheets.

OnBoard is now also available for computer (PC) platforms operating Windows 10.

SPC, one member country and a third party ER service provider have been collaborating for longline vessels to submit electronic logsheets to TUFMAN2 according to the agreed WCPFC Standards, Specifications and Procedures for Electronic Reporting in the WCPFC - operational catch and effort data. Currently 20 longline vessels are reporting on a daily basis to TUFMAN2.

iFIMS includes an Android application **(eForms)** which allows longline vessel operators to report their effort and catch data electronically on a daily basis. 91 longline vessels are currently using the *iFIMS* E-Reporting system. E-logs are securely lodged to the PNAO's *iFIMS* database system, however no data have forwarded to SPC's TUFMAN2 database system. These vessels continue to also report their effort and catch data using the SPC/FFA Regional Longline Logsheet paper form.

3.1.3 Port sampling electronic reporting

SPC, at the request, and in collaboration with member countries has begun the implementation of the Android application **OnShore.** This application allows fisheries staff to record species and size composition data of longline caught specimens landed in port. The application was specifically designed to cope with the fast pace of unloadings. The electronic data is securely uploaded to the TUFMAN2 database. Currently four member countries are using OnShore (64 port sampling events have been submitted) and are providing regular feedback for continued development.

3.1.4 E-Logs data flow

Figure 1 below illustrates the current data flow for e-logs (from *OnBoard and iFIMS).* The dotted arrows represent data flow processes that have yet to be fully implemented.
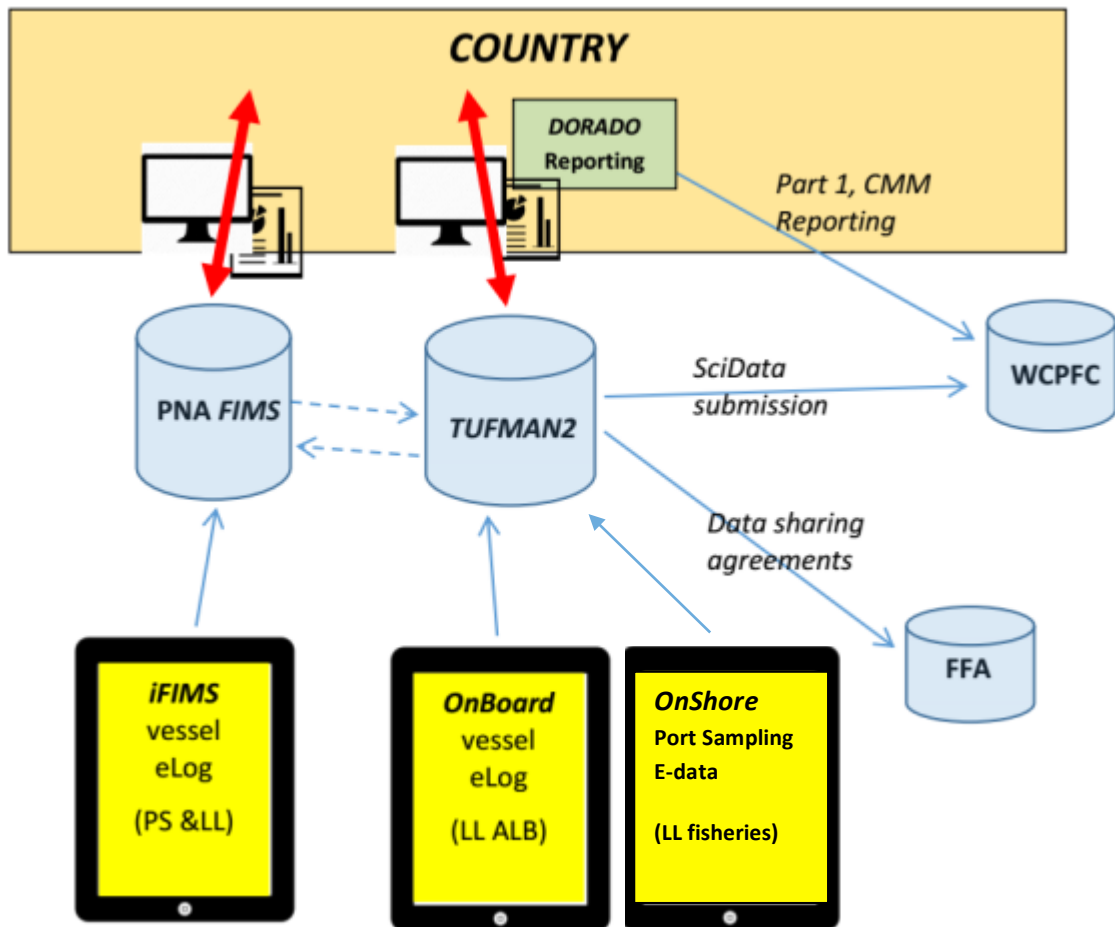

Figure 1: Current e-reported losgheet data flow from *iFIMS, OnBoard and OnShore.*

3.2 Observer E-Reporting – Longline and Purse Seine

SPC is developing an Android and PC based application for observers on longline vessels to report and transmit their observations. The data will be lodged directly to the TUFMAN2 database. Initial field trials were conducted in New Caledonia in Q4 2018. A second phase of field trials will be conducted in New Caledonia in Q3 2019.

The i*FIMS* system includes an Android application **(eObs)** which allows fisheries observers to report and transmit their observations while at sea onboard purse seine vessels and upon return to port. The data are lodged to PNAO's *FIMS* database and are supposedly then forwarded to SPC's TUFMAN2 database. No electronic observer data from this system have been uploaded to TUFMAN2 yet. Fisheries observers are still required to complete their SPC/FFA Regional Purse Seine Fisheries Observer Workbook (paper).

3.2.1 E-obs data flow
Figure 2 below illustrates the current observer electronic data flow (from *iFIMS eObs).*
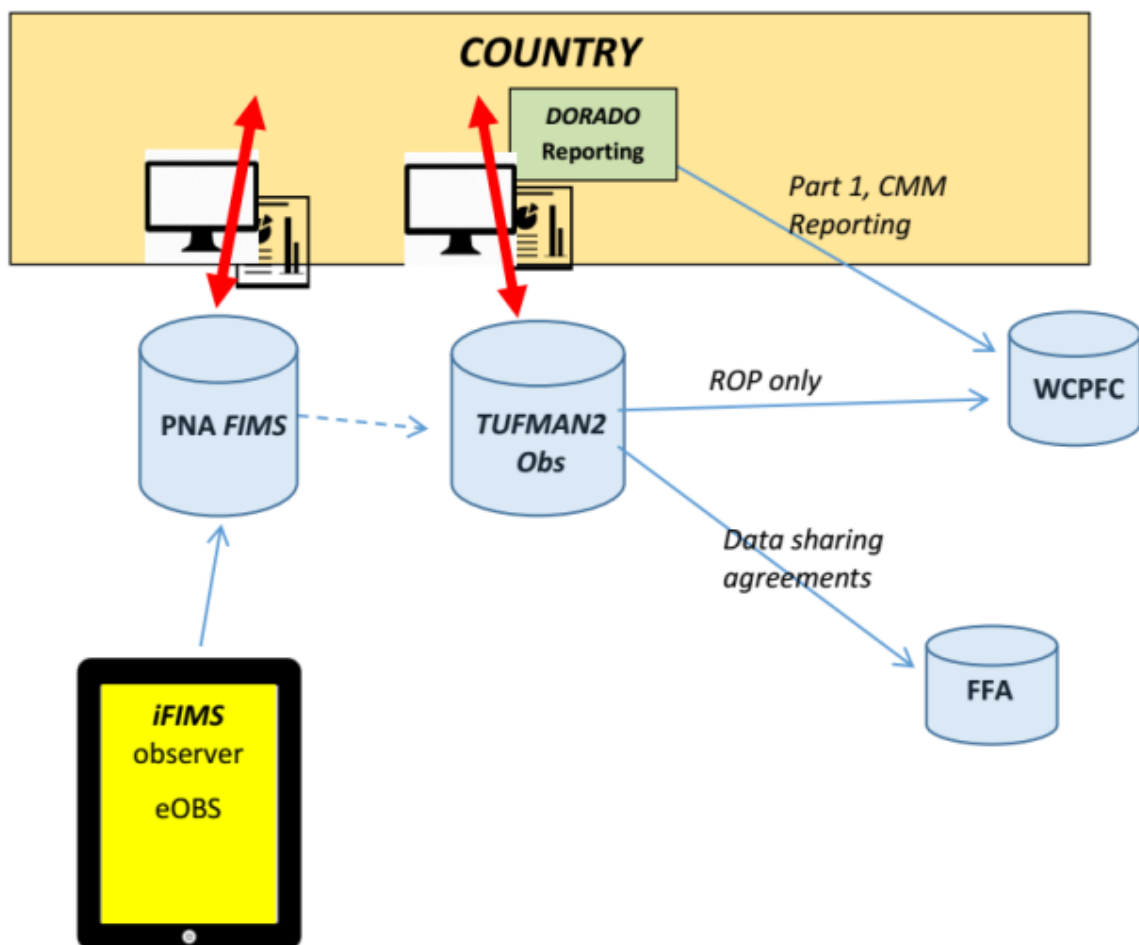Dotted arrows represent data flow processes that need to be completed.

Figure 2: Current e-reported observer data flow from *iFIMS.*

4. E-Monitoring

4.1 Regional update on number of vessels equipped with EMS, number of EM analysts trained and working and number of EM analysed sets

Table 2 below summarises the number of vessels per country equipped with an E-Monitoring System, the number of EM analysts trained and working, the number of review computers available and the number of analysed sets received in the EM database at SPC.

Table 2: Summary of EM operations in seven Pacific Islands Countries and Territories.

Country	Number of vessels equipped with EMS	Vessel gear	Number of EM analysts trained	Number of EM analysts working	Number of review stations	Number of Sets received in the EM database at SPC
Palau	7	LL	4	2	2	311
FSM	5	LL	5	22	2	465
RMI	6	LL	6	23	2	1379
Fiji	50	LL	33	124	12	4481
Cook Is.	2	PS	2	1	1	
Solomon Is.	7	LL	8	0	3	63
Vanuatu	3	2 LL + 1 carrier	2	1	1	43 (from LL)

4.2 EM Data flow

Figure 3 below illustrates the current E-Monitoring data flow. Dotted arrows represent data flow processes that need to be completed. Note that consultations with countries and the PNAO are ongoing in regards to being able to lodge EM data to the PNA iFIMS database.
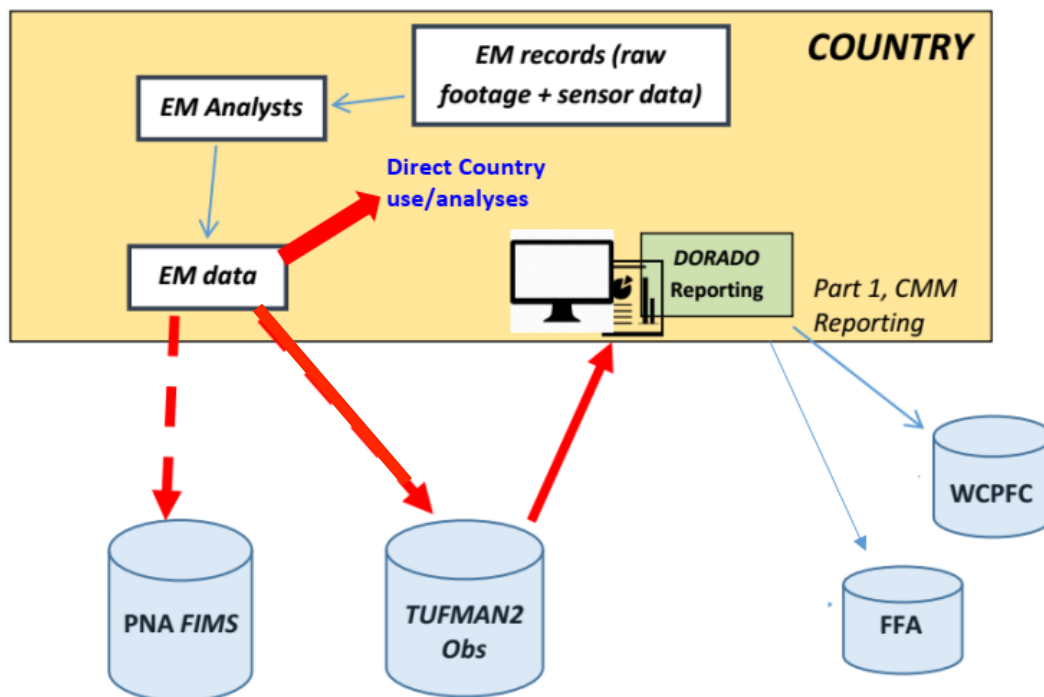

Figure 3: Current EM data flow

4.3 Enhancing EM records analyses using Artificial Intelligence

EM service providers have been researching and developing software to use Artificial Intelligence (AI) solutions to aid in the analysis of EM records. It can be expected that more longline vessels will be equipped with EM systems. For the efficient analysis of a growing volume of EM records, the use of AI software will be essential. However, for EM service providers to develop AI software which meet members' needs, a large volume of EM records and corresponding EM data are needed. For example, if AI is going to be used in aiding the identification of species, at least 5000 images for each species are needed (at minimum).

These EM records and EM data are currently available and belong to the respective members who have produced them. There needs to be a discussion on how, collectively, members can benefit from providing EM service providers the records and data they need to pursue AI developments (which will result in proprietary software).

The Nature Conservancy (TNC) has launched an open library of training data to accelerate the implementation of AI in fisheries. For further details please go to: https://www.fishnet.ai/home

4.4 EM data reporting

Trials of EM systems for monitoring the activities of longline fishing vessels licenced to operate in the Pacific Islands Countries and Territories began in 2014. There are now 77 longline vessels equipped with EM systems. The majority of EM data produced by PICTs have been sent to SPC and are available for countries to query and report on using the online tool DORADO. Only two Purse Seine vessels are equipped with EM systems but no EM data have been sent to SPC from these trials, at this stage. One carrier vessel was equipped with an EM system in 2018 for which no data has been provided yet.

4.5 SPC/FFA/PNA Data Collection Committee (DCC) EM meeting

SPC, FFA and PNA have been collaborating towards holding a DCC EM meeting in Q3 2019.

This meeting will aim to progress towards the adoption of an agreed EM framework and standards at the WCPFC level for the longline fishery on the high seas and in EEZs, that is appropriate and cost-effective to members. This workshop format meeting will focus on E-Monitoring for the Longline fishing operation only, acknowledging that EM has the potential to be used in other operations (e.g. end-of-trip longline transhipment) and other fisheries, which will be addressed at a later date.

5. Standards for the training, assessment and certification of EM Analysts

Members have identified that there is a need to develop standards to guide the training, assessment and certification of EM Analysts (staff responsible for analysing EM records). Building from the success of the Pacific Islands Regional Fisheries Observer (PIRFO) competency development programme, SPC and FFA members support the concept that a training and development programme for EM Analysts should be established within PIRFO programme. This work was not conducted in 2018 as there were policy gaps preventing this technical work. Outcomes from the above mentioned DCC EM meeting will guide this development.