



**THIRD E-REPORTING AND E-MONITORING WORKING GROUP MEETING
(ERandEMWG3)
Busan, Republic of Korea
6 - 7 August 2018**

PROGRESS ON ER AND EM IMPLEMENTATION IN THE REGION

WCPFC-2018-ERandEMWG3-IP-01

23 July 2018

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Oceanic Fisheries Programme
Pacific Community (SPC)

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 emergence of artificial intelligence software is discussed. EM data reporting is presented. An outlook on developing standards for EM data processes and for EM Analysts is provided. Ongoing work about an ER and EM metadata database development is presented.

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: An overview of the current status of ER and EM projects and implementation in the Western and Central Pacific Ocean.

Country	EM	Description	ER	Description	Coordination
Australia	Yes	EM programme implemented on 75 vessels (three types of gear)	Yes	Two private e-log software certified by AFMA are available for use by vessel operators	Dedicated staff
New Zealand	Yes	Integrated ER and EM programme to be implemented in 2018	Yes	Integrated ER and EM programme to be implemented in 2018	Dedicated staff
Papua New Guinea	No	EM programme to be implemented primarily towards observer safety	Yes	<i>iFIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL vessels.	Three dedicated staff
New Caledonia	No	EM trial in 2015-2016	Yes	Two longline vessel using <i>OnBoard</i> . One vessel using <i>eTUNALOG</i>	Observer coordinator and SPC Regional ER and EM co-coordinator
Solomon Islands	Yes	EM trial in 2014. EM trial in 2015-2016. Seven longline vessels equipped with EMS.	Yes	<i>iFIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL fishers.	ER and EM coordinator in post since April 2016 and SPC Regional ER and EM coordinator
Vanuatu	Yes	Two longline vessels and one carrier vessel equipped with EMS	Yes	Two longline vessels using <i>OnBoard</i> . TAILS application used for monitoring artisanal fisheries.	One dedicated staff
Fiji	Yes	45 longline vessels equipped with EMS. 50 vessels to be equipped by end of 2018	Yes	Four longline vessels in 2017.	One dedicated manager and team of 12 EM Analysts
Tonga	No		Yes	Three longline vessels using <i>eTUNALOG</i> .	One dedicated staff
Niue	No		Yes	<i>TAILS</i> application used for monitoring artisanal fisheries	
Samoa	No		Yes	Three longline vessels using <i>eTUNALOG</i> . One vessel using <i>OnBoard</i> . Plan to increase ER.	Dedicated Data Manager
American Samoa	No		No		

Country	EM	Description	ER	Description	Coordination
Cook Islands	Yes	Two PS vessels equipped with EMS.	Yes	Three longline vessels using <i>eTUNALOG</i> .	One dedicated staff
Tokelau	No		Yes	<i>TAILS</i> application used for monitoring artisanal fisheries. <i>iFIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL fishers	
Tuvalu	No		Yes	<i>TAILS</i> application used for monitoring artisanal fisheries. <i>iFIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL fishers	One dedicated staff
Kiribati	No		Yes	1 Longline vessel using <i>eTUNALOG</i> .	
Nauru	No		Yes	<i>TAILS</i> application used for monitoring artisanal fisheries	
FSM	Yes	Five longline vessels equipped with EM	Yes	<i>FIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL fishers. One PS vessel using <i>eTUNALOG</i>	ER and EM coordinator and two EM Analysts
RMI	Yes	Six longline vessels equipped with EMS	Yes	<i>iFIMS e-obs</i> for fisheries observers and <i>iFIMS e-logs</i> for PS and LL fishers	ER and EM coordinator and a team of rotating EM Analysts
Palau	Yes	Seven longline vessels equipped with EM	No		One coordinating staff and two EM Analysts
FP	No		Yes	25 longline vessels using <i>OnBoard</i>	Four dedicated staff

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 (**eLog**) 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. 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 of, 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 four WCPFC member countries and 30 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. A few longline vessels continue to use the PC application *eTUNALOG*. Although the *OnBoard* application will quickly replace *eTUNALOG*.

iFIMS includes an Android application (**eForms**) which allows longline vessel operators to report their effort and catch data electronically on a daily basis. Approximately 150 longline vessels are currently using the *iFIMS* E-Reporting system. E-logs are securely lodged to the PNAO's *iFIMS* database system and are then 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 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.

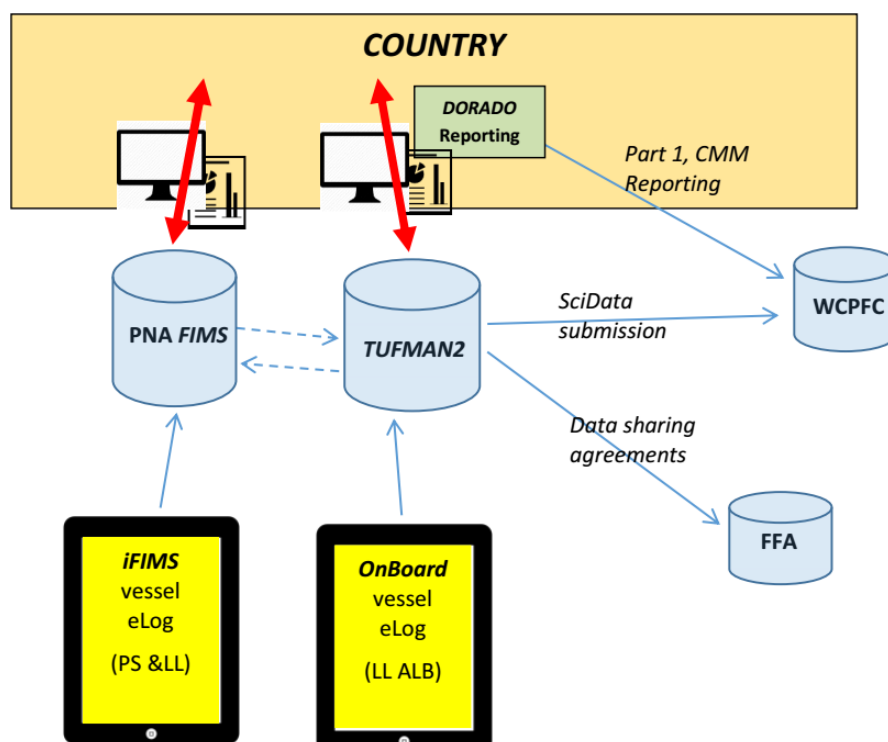


Figure 1: Current e-reported logsheet data flow from *iFIMS* and *OnBoard*.

3.2 Observer E-Reporting – Purse Seine (eObs) and Longline

The *iFIMS* 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 in the longer term, will then be transmitted to the regional observer database (currently managed through SPC's Tufman 2 Observer system). Fisheries observers are still required to complete their SPC/FFA Regional Purse Seine Fisheries Observer Workbook (paper) in the short-medium term.

In responding to a request from several member countries, SPC is developing an Android and PC-based application for observers on longline vessels to directly enter and then transmit their data. The data will then be lodged directly to the Tufman 2 database. Initial field trials are envisaged to begin during the first quarter in 2019.

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 are yet to be established.

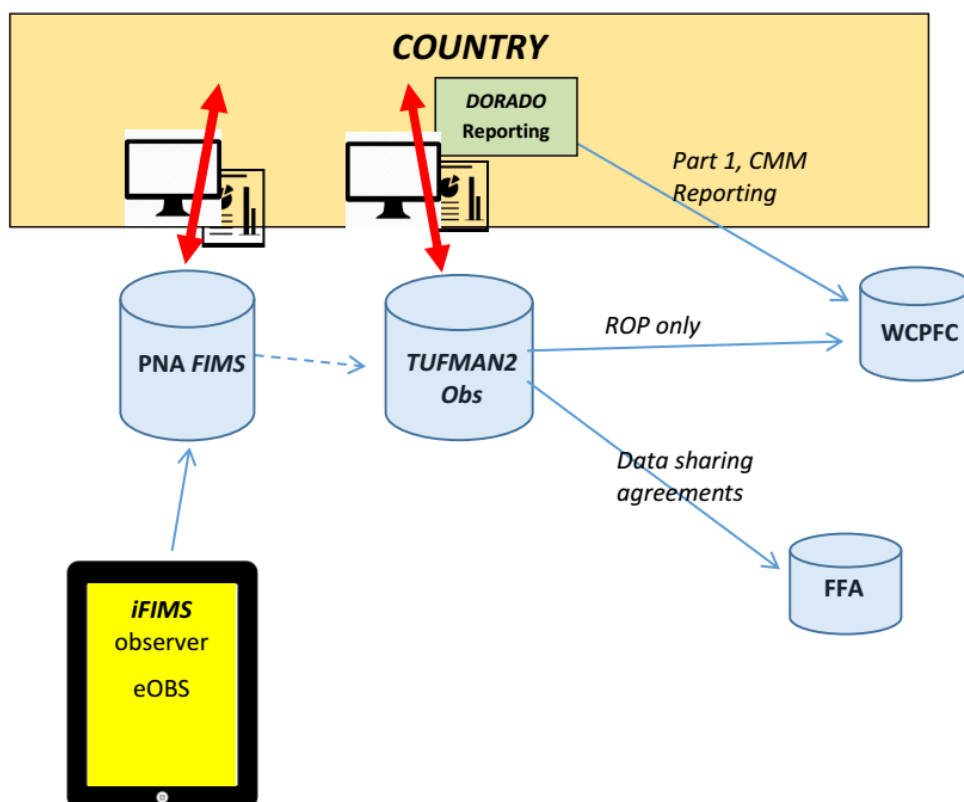


Figure 2: Current e-reported observer data flow from *iFIMS*.

4. E-Monitoring

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

Table 2 below summarises the number of vessels per country equipped with an E-Monitoring System, the number of EM analysts trained, working and the number of review computers available.

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
Palau	7 ¹	LL	4	2	2
FSM	5	LL	5	2 ²	2
RMI	6	LL	6	2 ³	2
Fiji	45	LL	33	12 ⁴	12
Cook Is.	2	PS	2	1	1
Solomon Is.	7	LL	8	0	3
Vanuatu	3	2 LL + 1 carrier	2	1	1

¹ Four Koror based vessels + 3 Okinawa based vessels

² One permanent EM analyst. Other EM analysts working when available

³ Rotation system with two analysts working at the same time

⁴ Rotation system

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 the system to lodge EM data directly to the PNA iFIMS database is in the development phase.

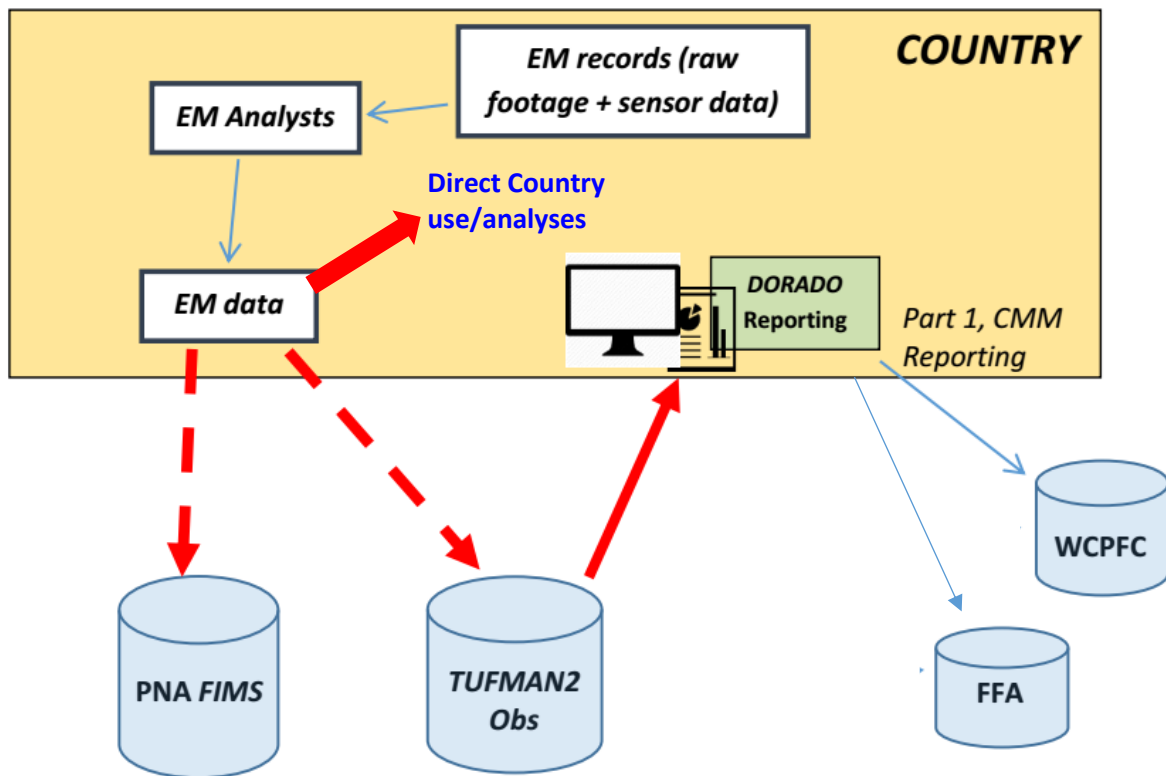


Figure 3: Current EM data flow

4.3 Enhancing EM records analyses using Artificial Intelligence (AI)

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 the relevant technical service providers with a subset of the records (video) and data that they can then pursue AI developments (which will result in proprietary software); in this regard, consideration will need to include a clear understanding of data ownership and confidentiality, and a clear elaboration on how countries will benefit.

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 73 longline vessels equipped with EM systems. The majority of EM data produced by PICTs have been sent to SPC for storage in the regional observer database, which *inter alia*, facilitates the relevant member countries generating a wide range of summary reports of their EM data using the online tool DORADO reporting tool. Only two Purse Seine vessels have been equipped with EM systems to date, but no EM data have been sent to SPC from these trials, at this stage. One carrier vessel has recently been equipped with an EM system. (Another Information Paper produced for the WCPFC ERandEMWG-3 provides summaries of EM data generated to date).

4.5 EM data process standards

The second Regional Electronic Monitoring Process Standards Workshop (REMPS-2) was held in Noumea 20–24 November 2017. That workshop brought together 47 participants from member countries, EM service providers, NGOs, observer agency, and sub-regional and regional agencies. This strong range of expertise resulted in tangible outcomes which are listed in the report. The full report is available here: <http://oceanfish.spc.int/en/meetingsworkshops/e-reporting-a-e-monitoring/474-second-em-workshop-11-2017>

The workshop's main aims were to enhance the draft longline EM process standards for observer data developed in 2016, and to develop draft purse seine EM process standards for observer data. This work is focused on the detailed data standards for EM by defining the data fields and describing the business requirements in relation to those data fields (increasingly sought by EM service providers). The workshop reviewed the full range of observer data fields in the SPC/FFA Data Collection Committee (DCC) standards, recognising that the WCPFC Regional Observer Programme (ROP) minimum data field standards are directly aligned to the DCC observer data fields, but do not cover all DCC data fields. The purpose of establishing the process standards for E-Monitoring is to provide guidance on **how** the agreed standard observer data fields could be collected using EM.

The outcomes of REMPS-2 outlined subsequent work including the tabling of the draft EM Process standards at the WCPFC EREM WG3 and at the DCC11 meeting in late August 2018. Delegates rated the event's organisation, content and relevance very highly (see http://oceanfish.spc.int/en/publications/doc_download/1728-workshop-survey-answers). SPC and other agencies are considering holding a third Electronic Monitoring Process Standards Workshop (REMPS-3) in Noumea in November 2018.

4.6 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 will commence in 2019.

5. Metadata database

There are a range of standards for the provision of fisheries data to regional (WCPFC) and sub-regional (SPC, FFA and PNA) agencies. These standards are mostly contained in documents and outline the data sources and data fields that are required to be collected and provided to these agencies for regional scientific and compliance coordination purposes. There is overlap in the information collected between agencies, for example, the WCPFC requirements for collecting and providing observer data overlap with the standard for collecting and providing observer data set by SPC and FFA through their Data Collection Committee (DCC).

With the evolution of E-Reporting and E-Monitoring, SPC has developed a Metadata Database to better organise the range of information describing scientific data fields used in the regional (WCPFC) fisheries. For example, observer data field requirements are described in the WCPFC ROP minimum standard data fields document, the SPC/FFA DCC reports, the WCPFC ER Observer data field standards and the Draft EM Process standards. The purpose of the metadata database is to link these different sources at the data field level to facilitate future review and the standardisation of metadata amongst these document sources.

While the focus on constructing a metadata database is to store information on the data fields acquired from E-Reporting and E-Monitoring, this database can also extend to providing information on the data fields collected through other mechanisms (e.g. simply recording onto hard-copy forms), since the required data fields are essentially the same.

This project comprises the following components:

1. A structured relational database that will be the repository for all data standards
2. A tool to manage the metadata database
3. A web-based reporting tool to disseminate information from the metadata database to all interested users

The metadata database structure has been developed to store information in the following elements:

1. Keyfields
2. Source document
3. Entity
4. Modifications

Figure 4 shows a conceptual diagram of inputs and outputs of the metadata database. The objective over time is to achieve consistency in defining fields and how that data are acquired amongst all relevant source documents/materials using the metadata database. It would mean that the documents on the left-hand side could disappear and the information is instead managed within the metadata database and can then be disseminated in a variety of forms depending on the relevant user's requirements.

Figure 5 shows the list of entities on the user interface of the management tool. The information displayed includes the name of the Entity, its reference document, gear type, data type and the description of the entity.

Figure 6 shows the user interface where all the key fields can be looked up and queried. Specifically, here the key field displayed is *hk_btflt* (hooks between floats) and the information includes key field details and all references linked to that key field.

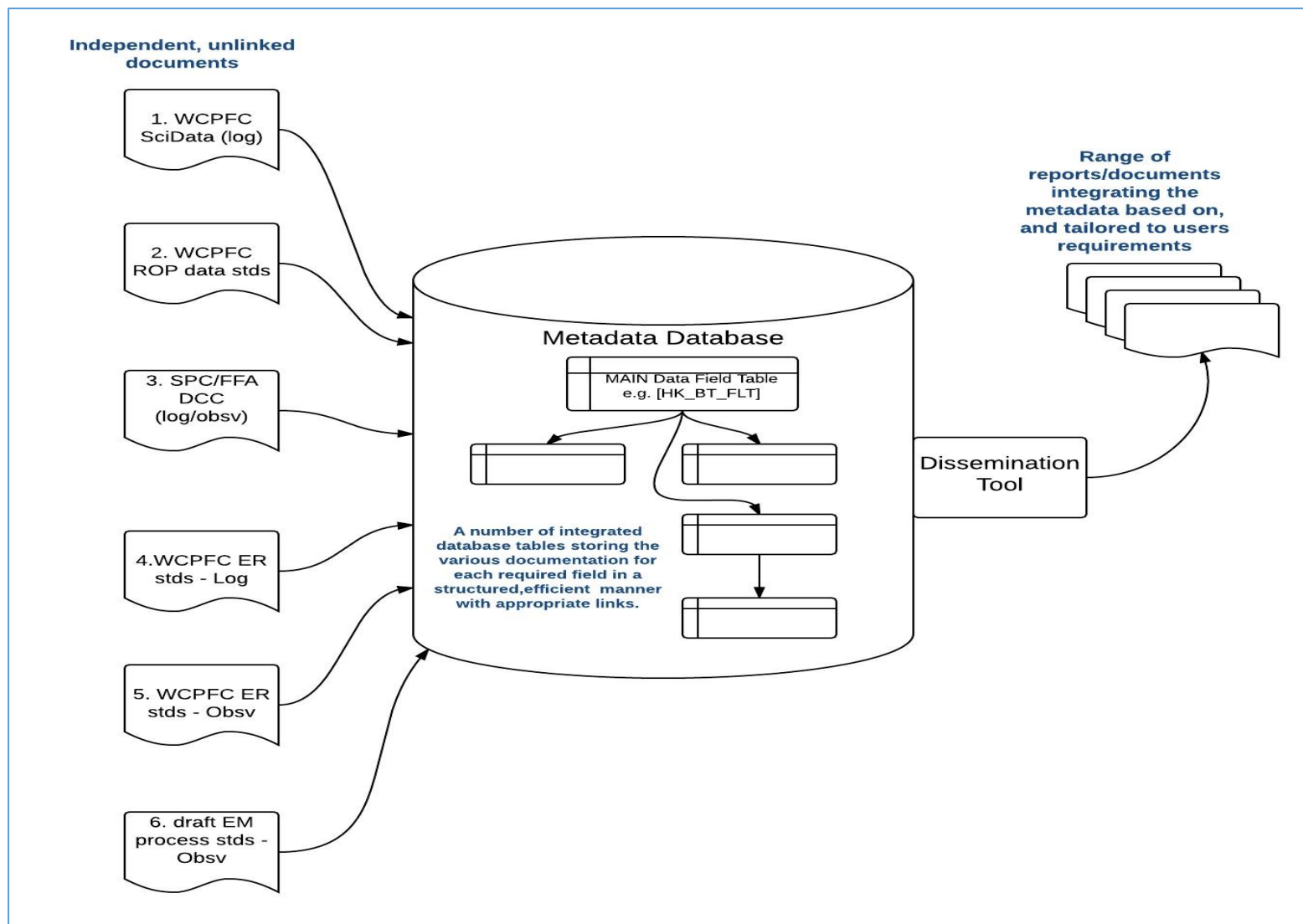


Figure 4: Conceptual diagram of the inputs and outputs of the metadata database.

MetaData Application Home Admin ▾ Entities Key Fields Reference Fields Keyfield References

Entities

Create New

EntityName: Search

EntityName	Source	Data Type	Gear Type	IntroText
LL_ACTIVITY	WCPFCER Data Standards- Logsheet	Logsheet	Long-Line	PROVIDE the following informatio... more
LL_TRIP_REPORT	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE descriptive information ... more
OBS_JOURNAL	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE a description of the day... more
OBS_POLLUTION_DETAILS	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE information any Pollutio... more
OBS_POLLUTION	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE information any Pollutio... more
LL_GEAR	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE information on the LONGL... more
VES_CREW	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE the summary details of V... more
VES_ELEC	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE information on the stand... more
VES_AIR_SIGHT	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE the details on the GEN-1... more
OBS_TRIPMON_COMMENTS	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE the details of the OBSER... more
OBS_TRIPMON	WCPFCER Data Standards- Observer	Observer	Long-Line	PROVIDE the details of the OBSER... more
OBS_SSI_DETAILS	WCPFCER Data Standards- Observer	Observer	Long-Line	The observer must PROVIDE the fo... more
OBS_SSI	WCPFCER Data Standards- Observer	Observer	Long-Line	The observer must PROVIDE the fo... more
LL_OBS_CATCH	WCPFCER Data Standards- Observer	Observer	Long-Line	The observer must PROVIDE the fo... more
LL_SETHAULLOG	WCPFCER Data Standards- Observer	Observer	Long-Line	Integrated GPS/VMS into the E-Re... more
LL_OBS_SET	WCPFCER Data Standards- Observer	Observer	Long-Line	The observer must PROVIDE the fo... more
OBS_TRIP	WCPFCER Data Standards- Observer	Observer	Long-Line	The start of a trip is defined t... more
PS_TRIP_REPORT	WCPFCER Data Standards- Observer	Observer	Purse-Seine	PROVIDE descriptive information ... more
OBS_JOURNAL	WCPFCER Data Standards- Observer	Observer	Purse-Seine	PROVIDE a description of the day... more
OBS_POLLUTION_DETAILS	WCPFCER Data Standards- Observer	Observer	Purse-Seine	PROVIDE information any Pollutio... more

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1 2 »

Figure 5: Screen shot of the Observer Entities module as displayed on the user interface.

MetaData Application Home Admin ▾ Entities Key Fields Reference Fields Keyfield References Hello eparamal@spc.int! Log off

Search for Key Fields

KeyField: hk_bt_fit

Search Reset

Keyfield Information

Key Field Name: hk_bt_fit
 Short Description: Hooks between floats
 Description: Number of hooks between floats
 Validation Rules: Must be 1-60, or -1 for no information.
 Format: SmallInt
 Values: [View](#)

References

Edit	Reference	Gear Code	Data Type	Entity Name	Field Name	Instructions	Validation Rules	Format
✕	WCPFC ER Data Standards- Logsheet	LL	Logsheet	LL_ACTIVITY	NUMBER OF BRANCHLINES	PROVIDE the NUMBER OF BRANCHLINES (synonymous to HOOKS BETWEEN FLOATS and BRANCHLINES between FLOATS) for this set	The "Number of Branchlines" are also commonly referred to as "Hooks between floats" or "Branchlines between FLOATS" for some fleets. The code must be within the valid range. Only relevant with ACTIVITY = "1 - FISHING SET"	NUMBER(2)
✕	WCPFC ER Data Standards- Observer	LL	Observer	LL_SETHAULLOG	HK_BT_FLT	Hooks between this float retrieved and the next float	Must be 1-60, or -1 for no information. Only used when Float retrieved (STEND_ID = 91) E-Monitoring ONLY	SmallInt
✕	WCPFC ER Data Standards- Observer	LL	Observer	LL_OBS_SET	HK_BT_FLT	Number of hooks between floats	Must be 1-60, or -1 for no information.	SmallInt

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Figure 6: Screen shot of the Keyfield information module as displayed on the user interface.

6. Acknowledgements

Members, regional and sub-regional agencies across the WCPO have played a proactive, cooperative and collaborative role in developing ER and EM systems and processes to date. On behalf of all involved, we would like to acknowledge the funding of the International Seafood Sustainability Foundation (ISSF), The Nature Conservancy (TNC), The World Wildlife Fund (WWF) and The Pew Charitable Trusts for their ongoing support of this work throughout the region.