



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

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**SUMMARY OF TUNA FISHERY E-REPORTING AND E-MONITORING DATA  
SUBMITTED TO SPC BY MEMBER COUNTRIES**

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**WCPFC-2018-ERandEMWG3-IP-03  
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Prepared by the

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## **Background information**

The Pacific Community (SPC) has been assisting with trials of Electronic Reporting (ER) and Electronic Monitoring (EM) systems undertaken by its member countries, which involve fisheries observers, fisher and service provider through the development of software and reception of electronic data into its database systems.

### Electronic logsheets

Trials of Electronic Reporting (ER) software for fishers to report their effort and catch data (e-logsheets) began in 2013. E-logsheets have been received at SPC's regional database system TUFMAN2. This report focuses on the electronically reported logsheet data for the Pacific Islands Countries and Territories (PICTs). Other countries in the region have also undertaken e-logsheets trials and some of the data was received at SPC but are not presented in this report.

Three main e-logsheet software have been trialled between 2013 and 2017:

- eTUNALOG: this software is PC based and can be used by Longline fishers (now replaced by OnBoard)
- OnBoard: this software is Android based and be used by Longline fishers
- iFIMS eLog: this software is PC and Android based and can be used by Longline and Purse Seine fishers

### Electronic Observer Data

Trials of ER software for fisheries observers to report on their monitoring activities onboard Purse Seine vessels began in 2014. Electronic observer data have yet to be received at SPC and so are not presented in this report, at this stage.

There is only one electronic observer software that has been trialled between 2013 and 2017:

- iFIMS eObs: this software is Android based and can be used for Purse Seine fisheries observers to report on their monitoring activities

### Electronic Monitoring Data

Trials of Electronic Monitoring (EM) systems for monitoring the activities of Longline fishing vessels licenced to operate in the PICTs began in 2014. Electronic Monitoring data have been received at SPC and imported into its regional database systems TUBS and TUFMAN2. All EM data produced by PICTs have been sent to SPC and are reported here. The majority of EM systems are installed on Longline vessels. 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.

There is only one electronic monitoring system used in the PICTs at this stage:

- The Satlink Sea Tube Lite (system installed on the vessels) and the Satlink View Manager (EM records analysis software).

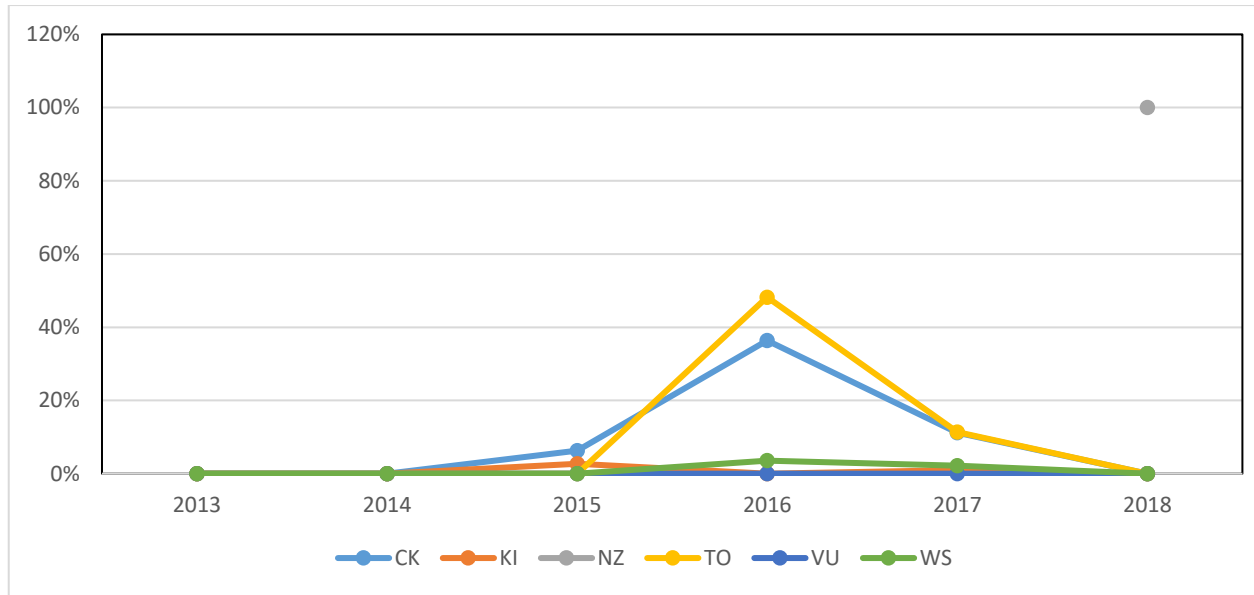
## Longline Electronic Logsheet Data

Table 1. Annual trends in Longline Logsheet E-Reported data by Pacific Island (PI) fleet, 2013–2018

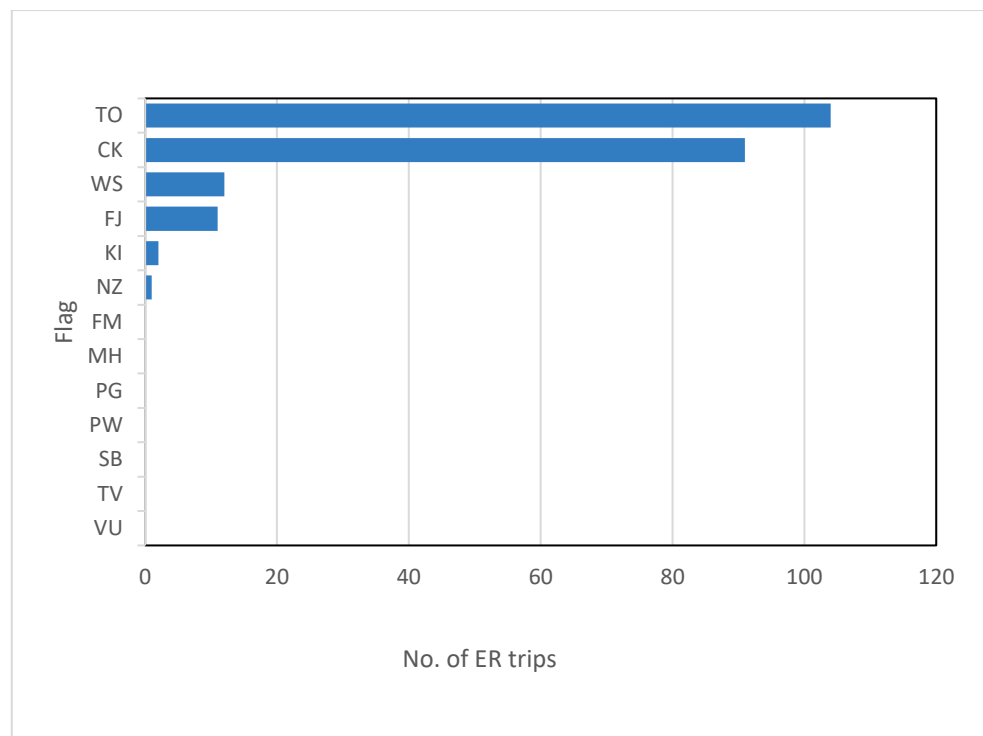
	2013			2014			2015			2016			2017			2018		
	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%
CK	0	109	0.00	0	155	0.00	9	144	6.25	60	165	36.36	22	197	11.17	0	48	0.00
FJ	0	774	0.00	0	706	0.00	2	775	0.26	1	816	0.12	7	891	0.79	1	342	0.29
FM	0	288	0.00	0	308	0.00	0	363	0.00	0	272	0.00	0	229	0.00	0	105	0.00
KI	0	8	0.00	0	11	0.00	1	37	2.70	0	100	0.00	1	108	0.93	0	7	0.00
MH	0	17	0.00				0	3	0.00	0	280	0.00	0	548	0.00	0	206	0.00
PG	0	74	0.00	0	100	0.00	0	87	0.00	0	36	0.00	0	70	0.00			
PW										0	7	0.00	0	35	0.00	0	2	0.00
SB	0	350	0.00	0	390	0.00	0	506	0.00	0	15	0.00	0	7	0.00	0	35	0.00
TO	0	26	0.00	0	99	0.00	0	134	0.00	81	168	48.21	23	202	11.39	0	58	0.00
TV	0	12	0.00	0	10	0.00	0	11	0.00	0	10	0.00	0	10	0.00			
VU	0	368	0.00	0	396	0.00	0	833	0.00	0	443	0.00	0	284	0.00	0	68	0.00
WS	0	300	0.00	0	190	0.00	0	174	0.00	7	197	3.55	5	226	2.21	0	56	0.00
<b>Total</b>	<b>0</b>	<b>2,326</b>	<b>0.00</b>	<b>0</b>	<b>2,367</b>	<b>0.00</b>	<b>12</b>	<b>3,067</b>	<b>0.39</b>	<b>149</b>	<b>2,509</b>	<b>5.94</b>	<b>58</b>	<b>2,807</b>	<b>2.07</b>	<b>2</b>	<b>928</b>	<b>0.22</b>

### Notes

1. Based on E-reported data imported into the TUFMAN 2 system from eTunaLog, OnBoard and iFIMS eLog
2. Acknowledges that there may be other E-Reported data not yet provided to SPC and so not included in this table.
3. Unit used is TRIP. "Total" represents VMS trips. "ER" represents ER trips. "%" represents percentage of ER to Total
4. Acknowledges that other effort metrics for determining coverage may be used by member countries, including fishing days, days at sea and hooks.



**Figure 1. Trends in Longline Logsheet E-Reporting coverage by PI fleet, 2013-2018**



**Figure 2. Total longline logsheet E-Reporting trips by PI fleet over the period 2013-2018**

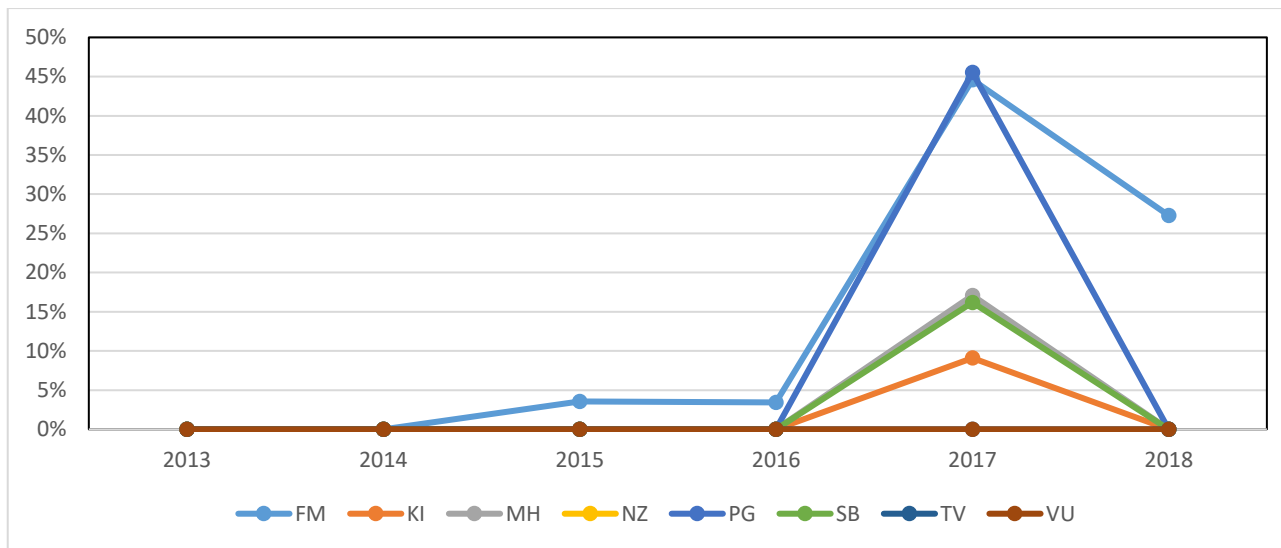
## Purse-seine Electronic Logsheet Data

Table 2. Annual trends in Purse-seine Logsheet E-Reported data by Pacific Island (PI) fleets, 2013–2018

	2013			2014			2015			2016			2017			2018		
	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%	ER	Total	%
FM	0	74	0.00	0	63	0.00	3	84	3.57	4	117	3.42	33	74	44.59	3	11	27.27
KI	0	94	0.00	0	154	0.00	0	209	0.00	0	210	0.00	18	198	9.09	0	32	0.00
MH	0	101	0.00	0	109	0.00	0	106	0.00	0	86	0.00	14	82	17.07	0	27	0.00
PG	0	364	0.00	0	316	0.00	0	323	0.00	0	271	0.00	194	426	45.54	0	4	0.00
SB	0	73	0.00	0	72	0.00	0	80	0.00	0	101	0.00	17	105	16.19	0	4	0.00
TV	0	10	0.00	0	9	0.00	0	5	0.00	0	7	0.00	0	6	0.00	0	4	0.00
VU	0	29	0.00	0	25	0.00	0	10	0.00	0	6	0.00	0	11	0.00	0	5	0.00
<b>Total</b>	<b>0</b>	<b>757</b>	<b>0.00</b>	<b>0</b>	<b>753</b>	<b>0.00</b>	<b>3</b>	<b>822</b>	<b>0.36</b>	<b>4</b>	<b>802</b>	<b>0.50</b>	<b>276</b>	<b>902</b>	<b>30.60</b>	<b>3</b>	<b>87</b>	<b>3.45</b>

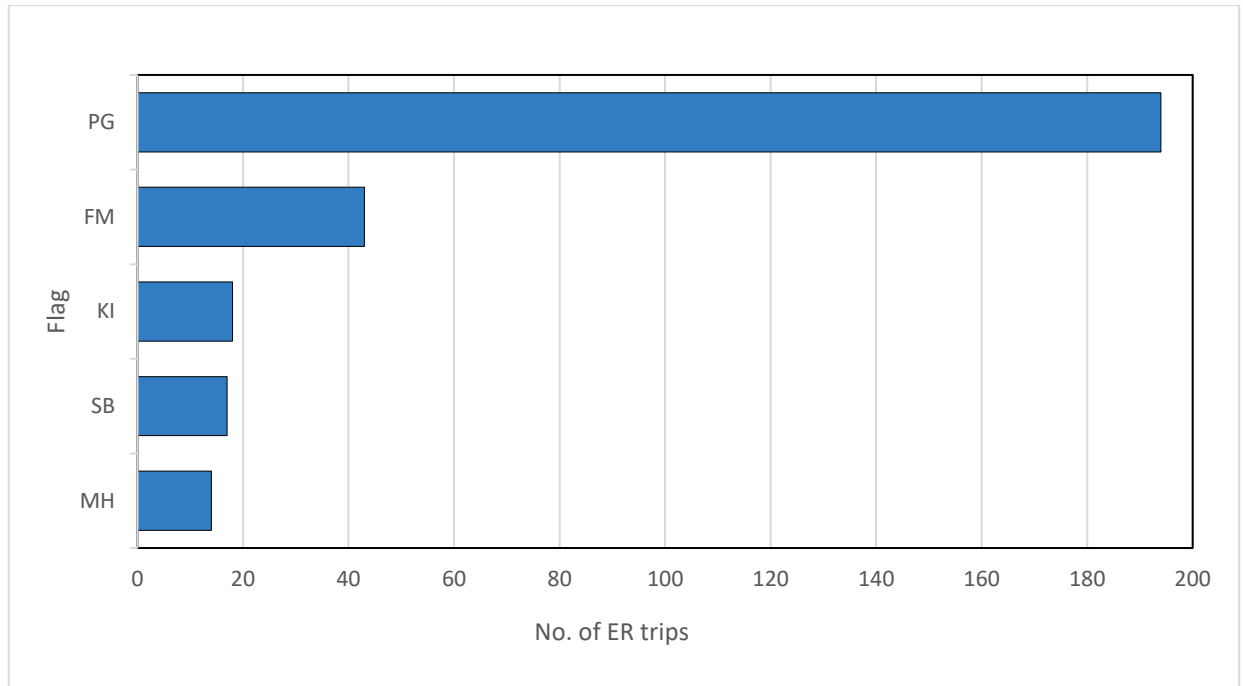
### Notes

1. Based on E-reported data imported into the TUFMAN 2 system from PNA iFIMS eLog data provisions
2. Acknowledges that there may be some E-Reported data not yet provided or with data quality issues, and so not included in this table.
3. Unit used is TRIP. “Total” represents VMS trips. “ER” represents ER trips. “%” represents percentage of ER to Total
4. Acknowledges that other effort metrics for determining coverage may be used by member countries, including fishing days, days at seas.
5. The VMS trips (“Total”) may not represent chartering arrangements.



**Figure 3. Trends in Purse-seine logsheet E-Reporting coverage by PI fleet, 2013-2018**





**Figure 4. Total Purse-seine Logsheet E-Reporting trips by PI fleet over the period 2013-2018**

## Longline Observer Data Coverage

Table 3. Annual trends in longline observer data coverage by Pacific Islands (PI) fleet, 2013–2018

	2013			2014			2015			2016			2017			2018
	OBS Hks	Est. Hks	%	OBS Hks	Est. Hks	%	OBS Hks	Est. Hks	%	OBS Hks	Est. Hks	%	OBS Hks	Est. Hks	%	OBS Hks
CK	3,712	68,828	5.39	4,775	61,547	7.76	3,969	62,764	6.32	1,185	115,549	1.03	1,088	127,773	0.85	
FJ	20,749	648,201	3.20	32,508	518,568	6.27	46,350	474,834	9.76	57,673	555,853	10.38	28,464	531,771	5.35	10,043
FM	2,347	110,066	2.13	6,673	80,481	8.29	6,692	178,358	3.75	10,770	223,182	4.83	354	201,143	0.18	64
KI	1,517	33,251	4.56		25,572		1,837	49,307	3.73	765	76,444	1.00	195	47,180	0.41	
MH										4,093	63,218	6.47	6,810	139,737	4.87	
PG	3,117	41,004	7.60	2,938	49,634	5.92		26,584		335	36,261	0.92		28,778		
SB	5,349	339,295	1.58	8,175	1,207,718	0.68	3,092	1,183,851	0.26	169	213,237	0.08				
TO				255	11,755	2.17	539	12,544	4.30	374	12,380	3.02	473	16,408	2.88	
TV		18,009			17,305			20,847		2,252	15,303	14.72		20,095		
VU	16,738	654,108	2.56	2,921	475,885	0.61	5,951	709,499	0.84	4,858	398,309	1.22	1,586	462,049	0.34	
WS	325	57,844	0.56		31,983		312	36,895	0.85		45,231		625	121,227	0.52	
<b>Total</b>	<b>53,854</b>	<b>1,970,607</b>	<b>2.73</b>	<b>58,245</b>	<b>2,480,447</b>	<b>2.35</b>	<b>68,742</b>	<b>2,755,481</b>	<b>2.49</b>	<b>82,474</b>	<b>1,754,967</b>	<b>4.70</b>	<b>39,595</b>	<b>1,696,160</b>	<b>2.33</b>	<b>10,107</b>

### Notes

6. Based on observer data entered into the TUFMAN 2 system
7. Unit of effort used is 100s of Hooks
8. Acknowledges that there may be other observer data not yet provided to SPC and so not included in this table.
9. Acknowledges that other effort metrics for determining coverage may be used by member countries, including fishing days, days at sea and hooks.
10. Acronyms:
  - i. OBS Hks = Number of hooks observed (by onboard observers)
  - ii. Est. Hks=Raised hooks from Logbook data representing 100% coverage
  - iii. %=Percentage of OBS Hks to Est. Hks

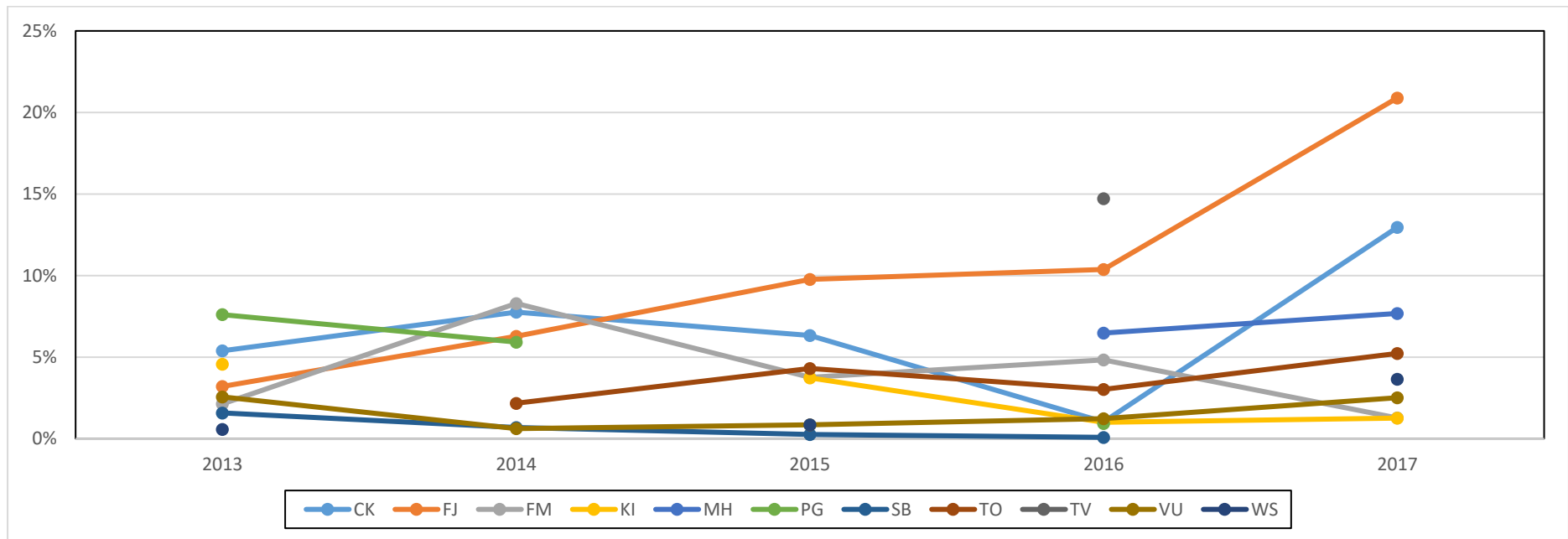
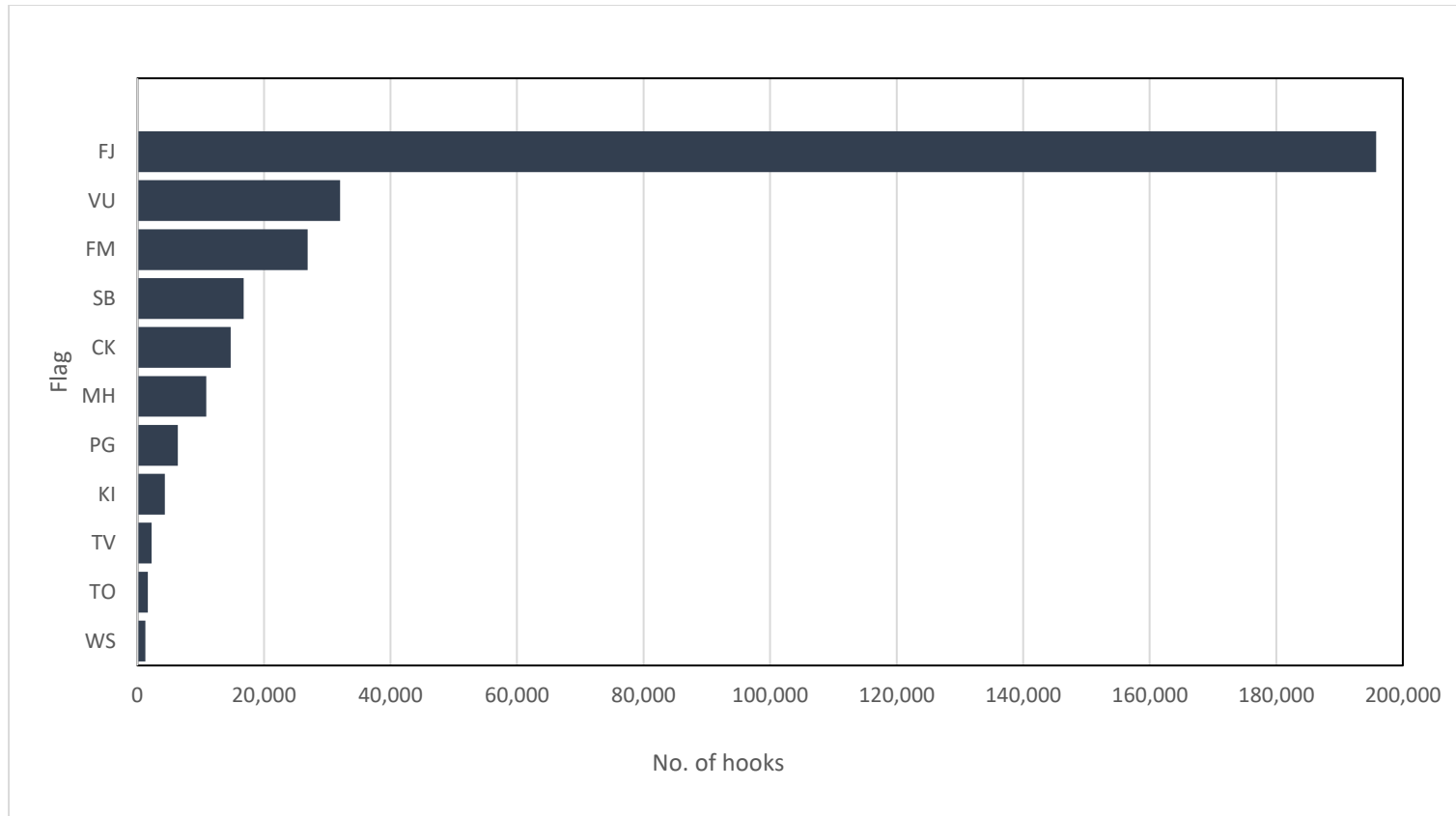


Figure 5. Trends of % coverage in Longline Observer for PI fleets, 2013-2017



**Figure 6. Total number of hooks for longline Observer by PI Fleet, 2013-2018**

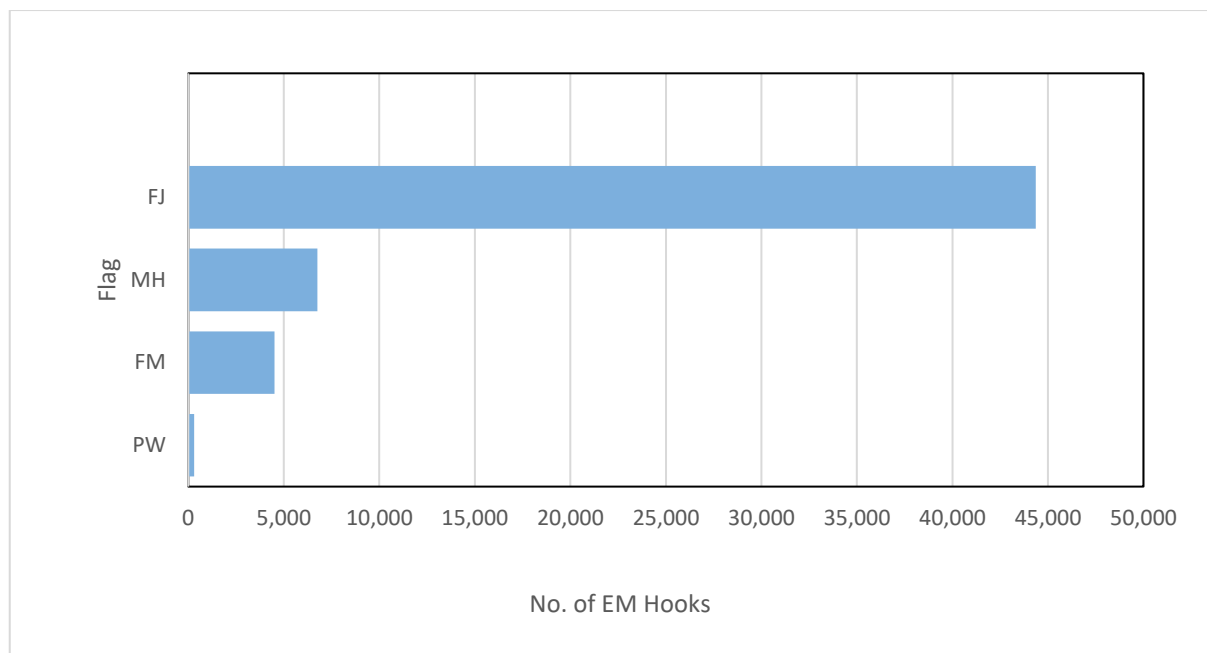
## Electronic Monitoring Data

**Table 4. Annual trends in longline EM activities by Pacific Island (PI) fleet, 2015–2018**

	2015			2016			2017			2018
	EM Hks	Est. Hks	%	EM Hks	Est. Hks	%	EM Hks	Est. Hks	%	EM Hks
FJ	2,351	474,834	0.5	10,397	555,853	1.87	30,701	531,771	5.77	905
MH							6,261	139,737	4.48	494
FM				2,123	224,968	0.94	2,386	201,143	1.19	
PW				299	626	47.8				

### Notes

1. Based on EM data imported into the TUBS database
2. Unit of effort used is 100s of Hooks
3. Acknowledges that there may be other EM data not yet provided to SPC and so not included in this table.
4. Based on EM Data imported in the regional observer database
5. Acknowledges that other effort metrics for determining coverage may be used by member countries, including fishing days, days at sea and trips.
6. Acronyms:
  - a. EM Hks = Number of hooks observed (by E-monitoring Analysts)
  - b. Est. Hks = Raised hooks from Logbook data representing 100% coverage
  - c. % = Percentage of EM Hks to Est. Hks
7. For Palau, Est. Hks in 2016 data Not Available  
For 2017, Est. Hks data Not Available yet.



**Figure 7. Total number of hooks for Longline EM, by PI fleet 2015-2018**

## Comparisons of E-Monitoring vs Observer vs Logsheet data

### Tropical Longline Fisheries

**Table 5: Aggregated Catch Summary- EM vs Observer vs Logsheet (tropical longline fisheries)**

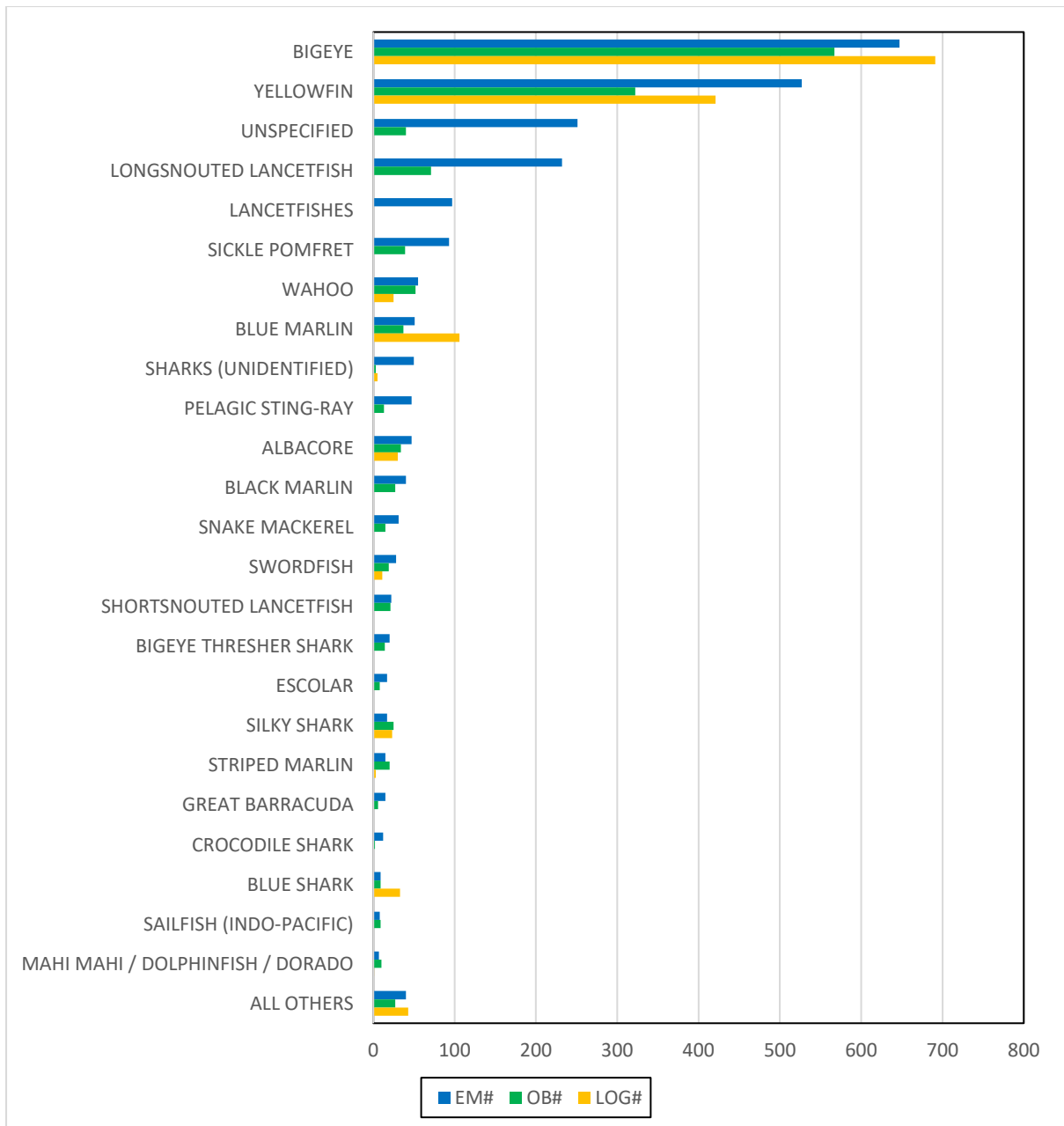
SP_NAME	SP_CODE	EM#	EM%	OB#	OB%	LOG#	LOG%
BIGEYE	BET	647	27.21	567	40.79	691	49.64
YELLOWFIN	YFT	527	22.16	322	23.17	421	30.24
UNSPECIFIED	UNS	251	10.56	40	2.88	0	0.00
LONGSNOUTED LANCETFISH	ALX	232	9.76	71	5.11	0	0.00
LANCETFISHES	ALI	97	4.08	0	0.00	0	0.00
SICKLE POMFRET	TST	93	3.91	39	2.81	0	0.00
WAHOO	WAH	55	2.31	52	3.74	25	1.80
BLUE MARLIN	BUM	51	2.14	37	2.66	106	7.61
SHARKS (UNIDENTIFIED)	SHK	50	2.10	3	0.22	5	0.36
PELAGIC STING-RAY	PLS	47	1.98	13	0.94	0	0.00
ALBACORE	ALB	47	1.98	34	2.45	30	2.16
BLACK MARLIN	BLM	40	1.68	27	1.94	0	0.00
SNAKE MACKEREL	GES	31	1.30	15	1.08	0	0.00
SWORDFISH	SWO	28	1.18	19	1.37	11	0.79
SHORTSNOUTED LANCETFISH	ALO	22	0.93	21	1.51	0	0.00
BIGEYE THRESHER SHARK	BTH	20	0.84	14	1.01	0	0.00
ESCOLAR	LEC	17	0.71	8	0.58	0	0.00
SILKY SHARK	FAL	17	0.71	25	1.80	23	1.65
STRIPED MARLIN	MLS	15	0.63	20	1.44	3	0.22
GREAT BARRACUDA	GBA	15	0.63	6	0.43	0	0.00
CROCODILE SHARK	PSK	12	0.50	2	0.14	0	0.00
BLUE SHARK	BSH	9	0.38	9	0.65	33	2.37
SAILFISH (INDO-PACIFIC)	SFA	8	0.34	9	0.65	0	0.00
MAHI MAHI / DOLPHINFISH / DORADO	DOL	7	0.29	10	0.72	1	0.07
POMFRETS AND OCEAN BREAMS	BRZ	6	0.25	0	0.00	0	0.00
PELAGIC THRESHER SHARK	PTH	6	0.25	12	0.86	0	0.00
SKIPJACK	SKJ	5	0.21	2	0.14	0	0.00
SHORT-BILLED SPEARFISH	SSP	4	0.17	1	0.07	0	0.00
MARLINS, SAILFISHES, SPEARFISHES (UNIDENTIFIED)	BIL	3	0.13	0	0.00	0	0.00
THRESHER SHARK (VULPINAS)	ALV	3	0.13	0	0.00	0	0.00
Devil Manta Ray (Mobula nei)	RMV	2	0.08	0	0.00	0	0.00
OCEANIC WHITE-TIP SHARK	OCS	2	0.08	6	0.43	4	0.29
ATLANTIC POMFRET / RAY'S BREEM	POA	2	0.08	1	0.07	0	0.00
OPAH / MOONFISH	LAG	1	0.04	1	0.07	0	0.00
ROUDI ESCOLAR	PRP	1	0.04	0	0.00	0	0.00
ANGELSHARKS, SAND DEVILS NEI	ASK	1	0.04	0	0.00	0	0.00
GREEN TURTLE	TUG	1	0.04	0	0.00	0	0.00
OLIVE RIDLEY TURTLE (NEW FAO)	LKV	1	0.04	0	0.00	0	0.00

SP_NAME	SP_CODE	EM#	EM%	OB#	OB%	LOG#	LOG%
COOKIE CUTTER SHARK	ISB	1	0.04	0	0.00	0	0.00
BLUEFIN TUNA (ATLANTIC)	BFT	1	0.04	0	0.00	0	0.00
MAKO SHARKS	MAK	0	0.00	0	0.00	7	0.50
OTHER FISH	OTH	0	0.00	0	0.00	11	0.79
OCEAN SUNFISH	MOX	0	0.00	1	0.07	0	0.00
LONG FIN MAKO SHARK	LMA	0	0.00	1	0.07	0	0.00
OILFISH	OIL	0	0.00	1	0.07	0	0.00
SHORT FIN MAKO SHARK	SMA	0	0.00	1	0.07	0	0.00
PORBEAGLE SHARK	POR	0	0.00	0	0.00	21	1.51
	<b>TOTAL</b>	<b>2378</b>		<b>1390</b>		<b>1392</b>	

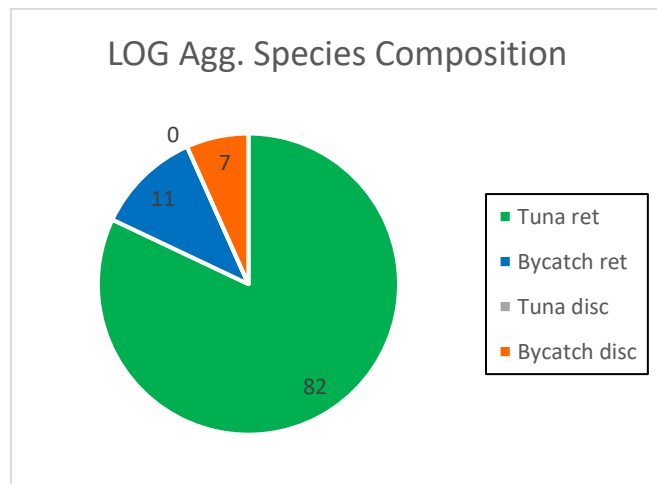
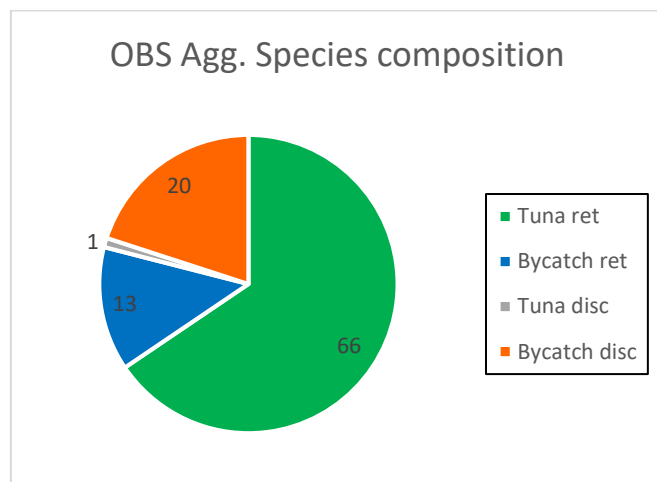
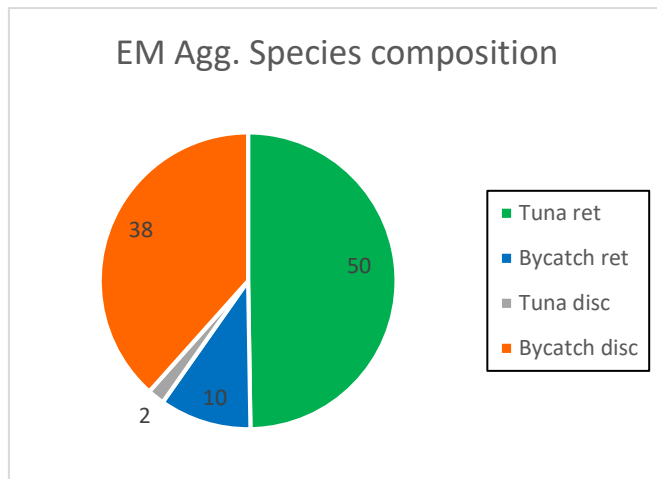
#### Notes

1. The above aggregated data comparisons are based on 9 EM trips conducted in 2017 which have been linked to respective trips by on-board observers and from logbook data.
2. Table Header Definitions:
  - i. EM# - Number of specimens observed (by E-monitoring Analysts)
  - ii. EM% - Percentage of EM# to total number of specimens
  - iii. OB# - Number of specimens observed (by onboard observers)
  - iv. OB% - Percentage of OB# to total number of specimens
  - v. LOG# - Number of specimens caught (as reported on the Logsheets)
  - vi. LOG% - Percentage of LOG# to total number of specimens caught





**Figure 8. Aggregate species composition- EM vs OB vs LOG (tropical longline fisheries)**



**Figure 9. Breakdown of Tuna and bycatch by retain/discard categories, EM vs OB vs LOG (tropical longline fisheries)**

## Southern Albacore Tuna Longline Fisheries

**Table 6: Aggregated Catch Summary- EM vs Observer vs Logsheet (Southern Albacore Tuna Longline Fisheries)**

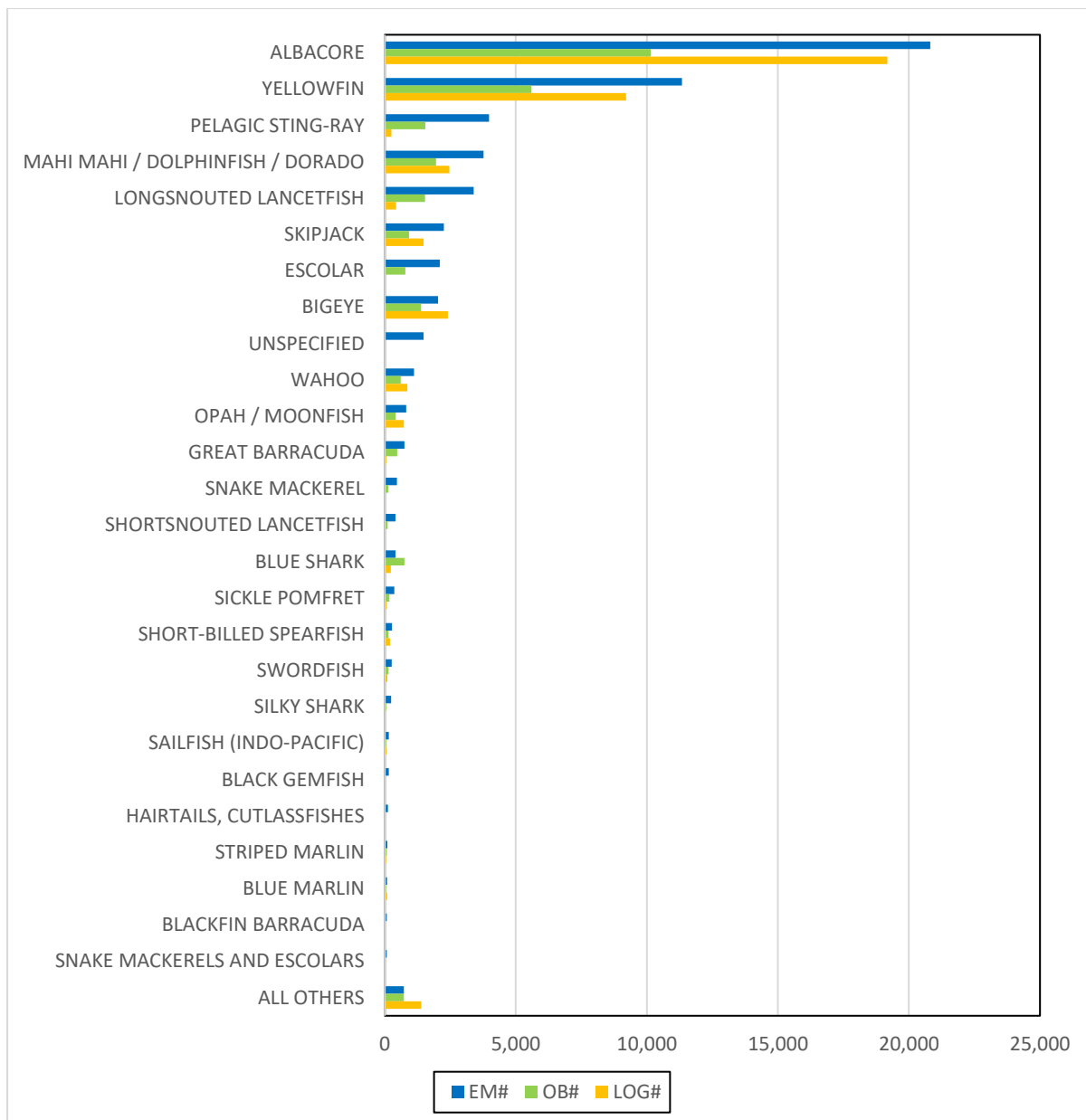
SP_NAME	SP_CODE	EM#	EM%	OB#	OB%	LOG#	LOG%
ALBACORE	ALB	20,811	36.05	10,143	36.48	19,180	48.85
YELLOWFIN	YFT	11,337	19.64	5,589	20.10	9,203	23.44
PELAGIC STING-RAY	PLS	3,978	6.89	1,541	5.54	248	0.63
MAHI MAHI / DOLPHINFISH / DORADO	DOL	3,763	6.52	1,960	7.05	2,467	6.28
LONGSNOUTED LANCETFISH	ALX	3,390	5.87	1,537	5.53	429	1.09
SKIPJACK	SKJ	2,249	3.90	928	3.34	1,481	3.77
ESCOLAR	LEC	2,098	3.63	781	2.81	0	0.00
BIGEYE	BET	2,029	3.51	1,377	4.95	2,408	6.13
UNSPECIFIED	UNS	1,474	2.55	7	0.03	0	0.00
WAHOO	WAH	1,119	1.94	604	2.17	857	2.18
OPAH / MOONFISH	LAG	813	1.41	403	1.45	725	1.85
GREAT BARRACUDA	GBA	754	1.31	478	1.72	61	0.16
SNAKE MACKEREL	GES	467	0.81	136	0.49	0	0.00
SHORTSNOUTED LANCETFISH	ALO	407	0.70	107	0.38	0	0.00
BLUE SHARK	BSH	402	0.70	755	2.72	226	0.58
SICKLE POMFRET	TST	358	0.62	172	0.62	72	0.18
SHORT-BILLED SPEARFISH	SSP	276	0.48	146	0.53	192	0.49
SWORDFISH	SWO	258	0.45	138	0.50	93	0.24
SILKY SHARK	FAL	246	0.43	65	0.23	21	0.05
SAILFISH (INDO-PACIFIC)	SFA	153	0.27	69	0.25	71	0.18
BLACK GEMFISH	NEN	151	0.26	5	0.02	0	0.00
HAIRTAILS, CUTLASSFISHES	CUT	125	0.22	0	0.00	0	0.00
STRIPED MARLIN	MLS	94	0.16	72	0.26	49	0.12
BLUE MARLIN	BUM	92	0.16	51	0.18	89	0.23
BLACKFIN BARRACUDA	BAB	79	0.14	7	0.03	0	0.00
SNAKE MACKERELS AND ESCOLARS	GEP	77	0.13	0	0.00	0	0.00
Slender sunfish	RZV	56	0.10	14	0.05	0	0.00
GEMFISH (SOUTHERN OR SILVER KINGFISH)	GEM	56	0.10	11	0.04	0	0.00
BLACK MARLIN	BLM	53	0.09	11	0.04	66	0.17
SHORT FINNED MAKO SHARK	SMA	51	0.09	79	0.28	14	0.04
OCEANIC WHITE-TIP SHARK	OCS	49	0.08	40	0.14	23	0.06
SOAPFISH	GSE	46	0.08	15	0.05	0	0.00
CRESTFISH/UNICORNFISH	LOP	38	0.07	10	0.04	0	0.00
PELAGIC PUFFER	LGH	32	0.06	9	0.03	0	0.00
ROUDI ESCOLAR	PRP	27	0.05	2	0.01	0	0.00
OILFISH	OIL	25	0.04	73	0.26	925	2.36
RAZORBACK SCABBARDFISH	ASZ	22	0.04	2	0.01	0	0.00
RAINBOW RUNNER	RRU	18	0.03	10	0.04	0	0.00
BIGEYE THRESHER SHARK	BTH	17	0.03	14	0.05	0	0.00
BARRACOUTA (SNOEK)	SNK	16	0.03	217	0.78	0	0.00

SP_NAME	SP_CODE	EM#	EM%	OB#	OB%	LOG#	LOG%
DEALFISHES	TRX	16	0.03	0	0.00	0	0.00
LEATHERBACK TURTLE (NEW FAO)	DKK	15	0.03	4	0.01	0	0.00
ATLANTIC POMFRET / RAY'S BREAM	POA	13	0.02	10	0.04	0	0.00
HAWKSBILL TURTLE	TTH	13	0.02	2	0.01	0	0.00
BRILLIANT POMFRET	EBS	11	0.02	0	0.00	0	0.00
BRONZE WHALER SHARK	BRO	9	0.02	45	0.16	0	0.00
SILVER-TIP SHARK	ALS	9	0.02	2	0.01	0	0.00
FLESH-FOOTED SHEARWATER	PFC	9	0.02	0	0.00	0	0.00
LOGGERHEAD TURTLE	TTL	8	0.01	6	0.02	0	0.00
POMFRETS AND OCEAN BREAMS	BRZ	8	0.01	0	0.00	0	0.00
Giant manta	RMB	7	0.01	2	0.01	0	0.00
LONG FINNED MAKO SHARK	LMA	7	0.01	29	0.10	0	0.00
OCEAN SUNFISH	MOX	6	0.01	4	0.01	0	0.00
CRESTFISH	LLL	6	0.01	0	0.00	0	0.00
OARFISHES NEI	RRG	6	0.01	1	0.00	0	0.00
VELVET DOGFISH	SSQ	5	0.01	2	0.01	0	0.00
COOKIE CUTTER SHARK	ISB	5	0.01	1	0.00	0	0.00
PUFFERS (FAMILY)	PUX	5	0.01	0	0.00	0	0.00
FILEFISH (UNICORN LEATHERJACKET)	ALM	5	0.01	0	0.00	0	0.00
PELAGIC THRESHER SHARK	PTH	5	0.01	3	0.01	0	0.00
OCEANIC TRIGGERFISH (UNIDENTIFIED)	TRI	4	0.01	0	0.00	0	0.00
OLIVE RIDLEY TURTLE (NEW FAO)	LKV	4	0.01	2	0.01	0	0.00
BIGEYE SCAD	BIS	3	0.01	0	0.00	0	0.00
SEAL SHARK / BLACK SHARK	SCK	3	0.01	0	0.00	0	0.00
BLUEFIN TUNA (ATLANTIC)	BFT	3	0.01	0	0.00	0	0.00
GREEN TURTLE	TUG	3	0.01	7	0.03	0	0.00
DEEPWATER RED SNAPPER	ETA	3	0.01	1	0.00	0	0.00
THRESHER SHARK (VULPINAS)	ALV	2	0.00	3	0.01	0	0.00
DOGTUOTH TUNA	DOT	2	0.00	0	0.00	0	0.00
DEEPWATER LONGTAIL RED SNAPPER	ETC	2	0.00	0	0.00	0	0.00
SHARPTAIL MOLA	MRW	2	0.00	0	0.00	0	0.00
RAYS (DASYATIDIDAE)	STT	2	0.00	0	0.00	0	0.00
GREAT HAMMERHEAD	SPK	2	0.00	0	0.00	0	0.00
TIGER SHARK	TIG	2	0.00	0	0.00	0	0.00
SLENDER TUNA	SLT	2	0.00	0	0.00	0	0.00
BULL SHARK	CCE	2	0.00	1	0.00	0	0.00
AMBERJACK / GIANT YELLOWTAIL	YTC	1	0.00	1	0.00	0	0.00
BLACK MACKEREL	SXH	1	0.00	4	0.01	0	0.00
FILEFISHES (FAMILY)	FFX	1	0.00	0	0.00	0	0.00
GREAT WHITE SHARK	WSH	1	0.00	0	0.00	0	0.00
DOLPHIN, SPOTTED	DPN	1	0.00	0	0.00	0	0.00
PACIFIC BLUEFIN TUNA	PBF	1	0.00	0	0.00	0	0.00
MAKO SHARKS	MAK	1	0.00	0	0.00	0	0.00

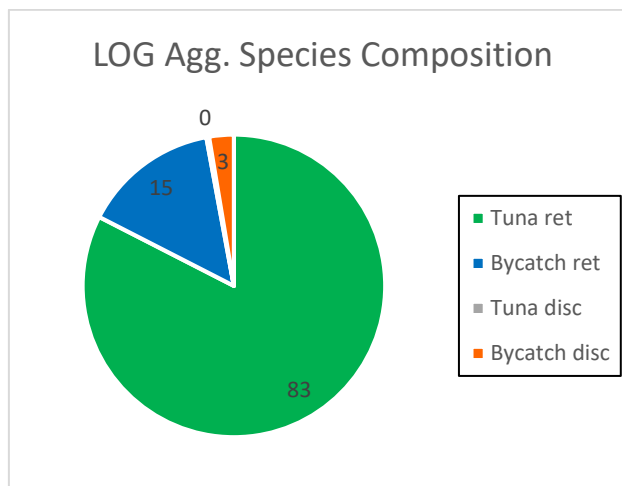
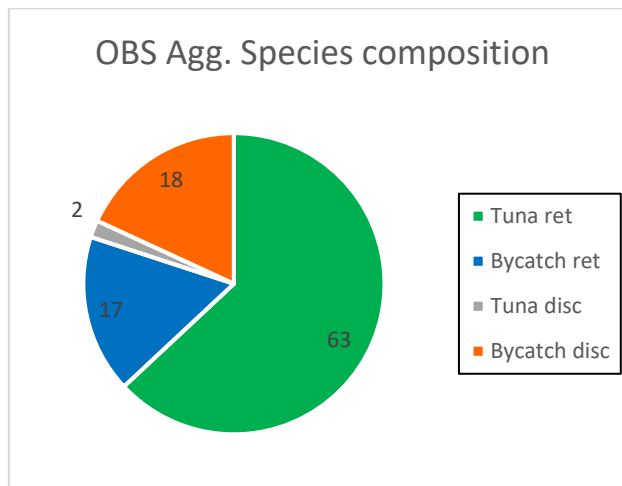
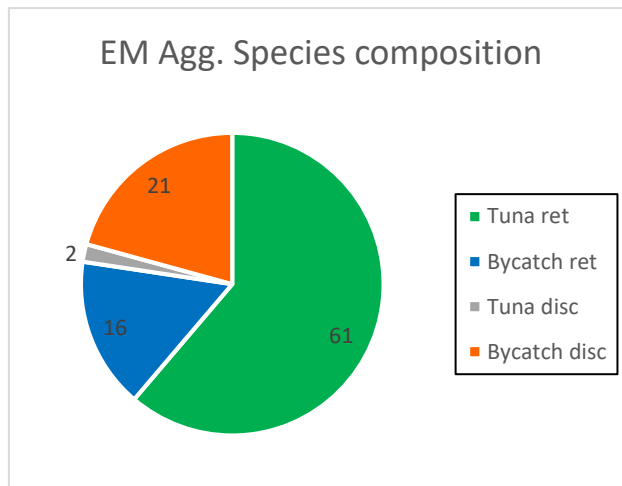
SP_NAME	SP_CODE	EM#	EM%	OB#	OB%	LOG#	LOG%
GAPING NEEDLE FISH	BAF	1	0.00	0	0.00	0	0.00
SQUIDS (OMMASTREPHIDAE)	OMZ	1	0.00	0	0.00	0	0.00
BIGNOSE SHARK	CCA	1	0.00	0	0.00	0	0.00
SOUTHERN BLUEFIN TUNA	SBF	1	0.00	0	0.00	0	0.00
SARGENT MAJOR	ABU	1	0.00	0	0.00	0	0.00
ANGELSHARKS, SAND DEVILS NEI	ASK	1	0.00	0	0.00	0	0.00
MARLINS, SAILFISHES, SPEARFISHES (UNIDENTIFIED)	BIL	1	0.00	0	0.00	0	0.00
OMOSUDID	OMW	1	0.00	73	0.26	0	0.00
RAYS, STINGRAYS, MANTAS NEI	SRX	1	0.00	0	0.00	0	0.00
BLACKTIP SHARK	CCL	0	0.00	1	0.00	0	0.00
ALBATROSS	ALZ	0	0.00	2	0.01	0	0.00
LEATHERBACK TURTLE	LTB	0	0.00	1	0.00	0	0.00
FALSE KILLER WHALE	FAW	0	0.00	1	0.00	0	0.00
SPANISH MACKEREL (NARROW-BARRED)	COM	0	0.00	2	0.01	0	0.00
ARROW SQUID (WELLINGTON FLYING SQUID)	TSQ	0	0.00	1	0.00	0	0.00
SMOOTH HAMMERHEAD	SPZ	0	0.00	1	0.00	0	0.00
MAKO SHARKS	MAK	0	0.00	0	0.00	10	0.03
OTHER FISH	OTH	0	0.00	0	0.00	24	0.06
POMFRETS AND OCEAN BREAMS	BRZ	0	0.00	0	0.00	2	0.01
BOTTLENOSE DOLPHIN	DBO	0	0.00	1	0.00	0	0.00
ALASKA POLLOCK(=WALLEYE POLL.)	ALK	0	0.00	2	0.01	0	0.00
SHARKS (UNIDENTIFIED)	SHK	0	0.00	2	0.01	0	0.00
WHALE SHARK	RHN	0	0.00	1	0.00	0	0.00
LAYSAN ALBATROSS	DIZ	0	0.00	1	0.00	0	0.00
LONG-BEAKED COMMON DOLPHIN	DCZ	0	0.00	1	0.00	0	0.00
RAJA RAYS NEI	SKA	0	0.00	2	0.01	0	0.00
MOBULA (A.K.A. DEVIL RAY)	RMV	0	0.00	1	0.00	0	0.00
CHINA ANCHOVY	ESC	0	0.00	1	0.00	0	0.00
BARRACUDAS (UNIDENTIFIED)	BAR	0	0.00	0	0.00	76	0.19
TUNA (UNIDENTIFIED)	TUN	0	0.00	0	0.00	246	0.63
MARLINS, SAILFISHES, SPEARFISHES (UNIDENTIFIED)	BIL	0	0.00	0	0.00	1	0.00
PORBEAGLE SHARK	POR	0	0.00	0	0.00	7	0.02
	<b>TOTAL</b>	<b>57,731</b>		<b>27,802</b>		<b>39,266</b>	

#### Notes

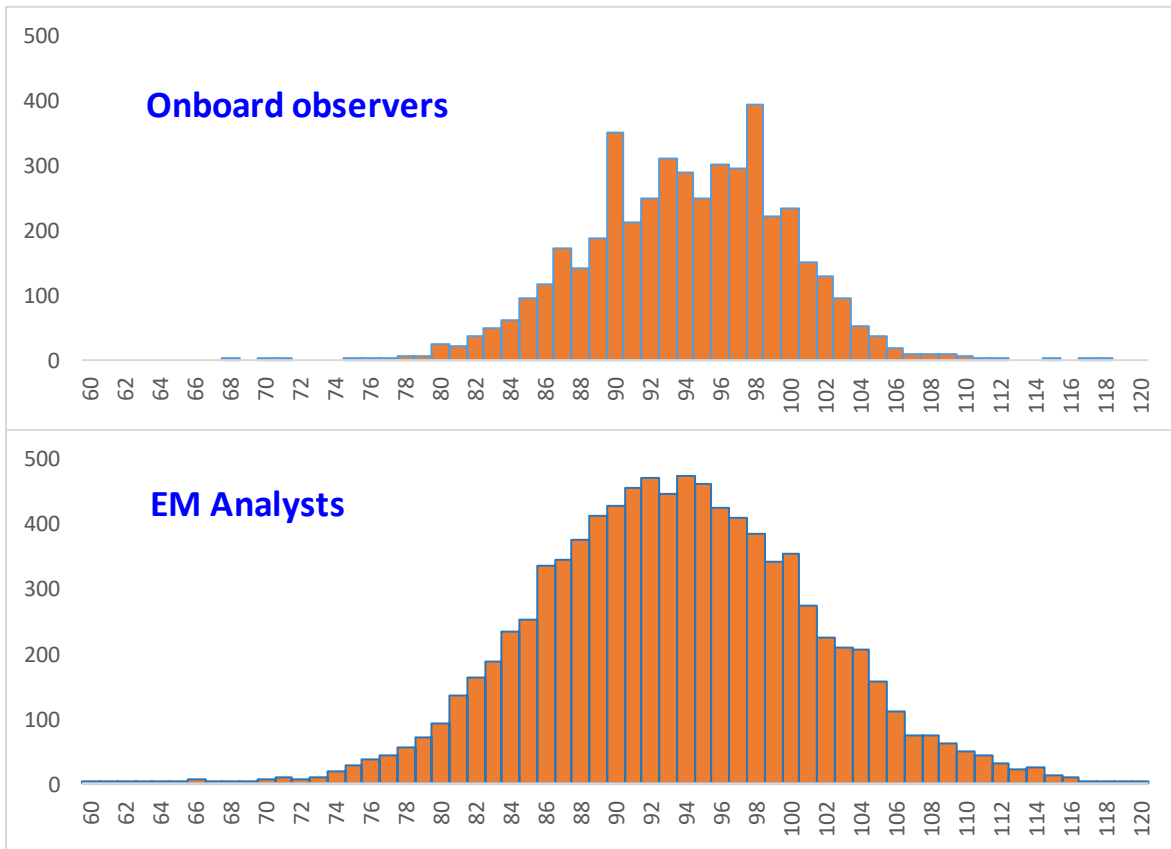
1. The above aggregated data comparisons are based on EM trips conducted in 2015-2017, that have corresponding trips from onboard Observers and from Logsheet data.



**Figure 10. Aggregate species composition- EM vs OB vs LOG (Southern Albacore Tuna Longline Fisheries)**



**Figure 11. Breakdown of Tuna and bycatch by retain/discard categories, EM vs OB vs LOG (Southern Albacore Tuna Longline Fisheries)**



**Figure 12. Comparison of Albacore tuna length frequency obtained from paired onboard observer (top) and EM trips (bottom), 2016–2018 (Southern Albacore Tuna Longline Fisheries)**