A Crew-based Observer protocol alternate for on-board data collection in compliance with Resolution 24/04 On A regional observer scheme effectively deployed on artisanal and semi-industrial multiday fisheries boats in the Indian Ocean by Sri Lanka

N.D.P. Gunawardane*, S.P. Creech†, G.G.E.M. Gunasekera† and M.M. Ariyaratne*

*Department of Fisheries and Aquatic Resources, New Secretariat, Maligawatte, Colombo 10.
†Pelagikos private limited, 16, Welikadawatte Road, Rajagiriya, 10107, Sri Lanka

Introduction

The Indian Ocean Tuna Commission (IOTC) adopted a Resolution (11/04) on a Regional Observer Scheme (ROS) in 2011. Resolution 11/04 set out the minimum recording requirements for fisheries for tuna and tuna-like species in the IOTC area. The Department of Fisheries and Aquatic Resources (DFAR[1]) initiated a ROS in compliance with Resolution 11/04 in 2013, with financial support from the Seafood Exporters' Association of Sri Lanka (SEASL[2]) through Sri Lanka Longline Fisheries Improvement Project (SLL FIP). However, the small size and absence of facilities on-board Sri Lanka's semi-industrial longline vessels was immediately highlighted by the Observer as a constraint that precludes the safe deployment of ROS on artisanal and semi-industrial Sri Lankan vessels registered to fish with and beyond Sri Lanka's exclusive economic zone.

The DFAR initiated trials of on-board electronic monitoring schemes (EMS) in compliance with Resolution 23/08 in 2018, with financial support from the European Union (EU). Four longline and two gillnet vessels were selected to install EMS equipment. Four sets of EMS equipment and three Desktop computers were received by DFAR in 2019. Marine Instrument Pvt Ltd and SG Holdings Pvt (Ltd) installed EMS onboard of the four fishing longline vessels. Data cassettes were sent to the Marine Instruments for evaluation, however the data recording was incomplete. The basic construction of Sri Lanka's multi-day vessels and the rudimentary electrical systems installed in these vessels hindered the successful completion of these trails.

Most of the of Sri Lanka's artisanal and semi-industrial multi-day boat vessels currently measure less than 24 m length overall. Sri Lanka's fleet of small-scale vessels represented 44% of total number of IOTC registered vessels (4,490) in 2023[3]. The average length of Sri Lanka's IOTC registered vessels is 17.81m (58.43ft.). Thirteen years on from Resolution 11/04 Sri Lanka's artisanal and semi-industrial multi-day boat vessels are still too small to comply with Resolution 22/04 and insufficiently equipped to comply with 23/08. An alternative protocol is essential if the largest fishing fleet in the Indian Ocean is to comply with ITOC resolutions on a ROS and the collection of on-board catch data and other scientific data related to the fisheries for tuna and tuna-like species in the future. Resolution 24/04 On a regional observer scheme acknowledges this urgent need, by encouraging Contracting and Cooperating Non-Contracting Parties to

[1] www.fisheriesdept.gov.lk
[2] www.seals.lk
[3] www.iotc.org/vessels/current

formulate and report alterative data collection methods to the ROS to IOTC to increase ROS coverage.

A Crew-based Observer Protocol

In 2018 the new SLL FIP initiated a sub project to investigate whether skippers and crew operating less than 24 m longline fishing vessels could be trained as Crew-based Observed (CbO), to collect independently verifiable fisheries information and scientific data in compliance with IOTC's Resolution 15/01 *On the recording of catch and effort data by fishing vessels in the IOTC area of competence* and 16/04 On a regional observer scheme. The sub-project was based on a presentation on a crew-based observer programme made to the DFAR by Worldwide Fund for Nature's Pakistan office in 201, co-financed by SEAPACT[4] and the SEASL.

The success of the sub-project strongly suggested that Sri Lankan skippers and crew could be trained to collect fisheries information and scientific data. Serial improvements were made to the CbO protocol during each of the subsequent interactions of the CbO programme between 2018 and 2023. Subsequent deployments of CbO between 20219 and 2023 were co-financed by New England Seafood International (NESI[5]) and the SEASL under the new SLL FIP and by Oceans5, under the Blue Resources Trust / Oceans5 project (Table 1).

43 CbO have been deployed 94 times on-board semi-industrial fishing vessels operating longline (three sets per trip) and gillnets (Protected Species Only) between 2018 and 2023. Trip, gear, set and catch data has been record from 174 trips. 1,658 trip, 1,620 gear, 1,065 set and 54,938 catch data have been recorded by CbO using the CbO protocol (Table 1). Each CbO deployment was implemented in collaboration with officers in the respective District Fisheries and Harbour offices at the local level. CbO deployment and the analysis of data was coordinated and completed in association with senior officers of the DFAR's Operations and Information Technology division in Colombo. Technical assistance in the design, development, deployment, data analysis, reporting and programme management and administration of the CbO programme over the past six years was provided by `pelagikos`.

Table 1 Deployment of Crew-based Observers between 2018 and 2023

Year	CbO Deployed	No. Trips	Gear Type	Harbours	Trip Data	Gear Data	Set Data	Catch Data
2018/2019	17	17	LL	2	193	136	258	9,682
2019	13	17	LL	3	149	88	59	4,139
2019/2020	22	44	LL	4	311	183	98	7,732
2020/2021	11	15	LL & GN	3	204	292	144	12,247
2021/2022	11	20	LL & GN	4	270	310	166	5,666
2022/2023	11	36	LL & GN	4	324	342	182	7,149
2023	9	25	LL & GN	4	207	269	158	8,323
	94	**174**	**LL & GN**	**4**	**1,658**	**1,620**	**1,065**	**54,938**

[4] www.seapact.org
[5] www.neseafood.com

The CbO protocol

Sri Lanka's CbO protocol comprises two data collection stages (see Annex 1 and Annex 2). During the pre-departure briefing (**Stage 1**) vessel information, cruise information and other required information are collected from the Harbour Office, vessel log-book, IOTC web site and an Interview Sheet by a Harbour Officer and validated by the Officer in Charge or the Assistant Director, District Fisheries Office. CbO are then provided with a waterproof digital camera with an in-built geographic positioning system (GPS) and scale on which to record the weight of each fish or other capture species caught. During the post-arrival de-briefing (**Stage 2**) report information, cruise information, other required information, operation, catch, species and remarks are collected from the catch certificate, logbook, interview sheet, digital camera by the Harbour Officer and validated by the Officer in Charge or Assistant Director or Data analyst.

Compliance with Resolution 15/01

IOTC Resolution 15/01 sets out the reporting requirements for vessels per trip (Annex A) and per set/shot/operation (Annex B). Vessels operating longline gear configurations are required to provide 14 variables under four reporting requirements once per trip, with a maximum of 41 variables (8 optional) once per shot (Table 2). Vessels operating gillnets are required to provide 13 variables under four reporting requirements once per trip, with a maximum of 41 variables (5 optional) once per set (Table 2).

Table 2 Reporting requirements and variables under Annex A and Annex B

Reporting Requirements *once per trip*	**Variables**	**CbO Protocol**	
1.1 Report Information	2	2	100%
1.2 Vessel Information	5	5	100%
1.3 Cruise Information	2	2	100%
1.4 Other required information			
Longline (Gear configuration)	5	5	100%
Gillnet (Gear configuration)	4	4	100%

Reporting Requirements *once per set/shot*	**Variables**	**CbO Protocol**	
2.1 Operation			
For longline	08	08	100%
For gillnet	05	05	100%
2.2 Catch	01	01	100%
2.3 Species			
For Longline			
Primary Species	10	10	100%
Other Species	13	13	100%
Optional	06	06	100%
For Gillnet			
Primary Species	14	14	*100%*
Other Species	13	13	*100%*
Optional	05	05	*100%*
2.4 Remarks	03	03	*100%*

The CbO protocol developed by the DFAR for less than 24m artisanal and semi-industrial multiday fishing vessels is capable of collecting 100% of the IOTC's reporting requirements for vessels operating longline and or gillnets set out in Annex 1 using hard copy and or electronic data, once per trip (Table 2). 100% of the IOTC's reporting requirements for vessels operating longline and or gillnets set out in Annex 2 can be also be collected using the CbO, for a sub sample of longline shots and gillnet sets per trip (Table 2). The CbO protocol cannot be applied to every shot or set made by a vessel during a fishing trip due to the time constraints imposed on CbO to take images of each and very fish caught per set or shot. The sex of a fish caught also cannot be recorded.

Results and Reporting

Data collected using the CbO protocol can be used by analysts to map the fishing grounds of individual or collections of fishing vessels (Figure 1), validate these fishing grounds using target (Figure 2) and other capture species catch (Figure 3), as well as map the bycatch of protected species (Figure 4). The CbO protocol enables analysts to evaluate the composition of the catch including the target species, other capture species and protected species by number and often weight (Table 3), as well as calculate catch per unit effort (*e.g.* catch per 1,000 hooks).

Table 3 Example of catch composition and CPUE analysis using the CbO data

Species	No.	%	CPUE	kg	%	CPUE
Target Species - Yellowfin tuna	518	76.7%	5.7	21,179	88.7%	231.4
Other capture species	**151**	**22.4%**	**1.6**			
Skipjack tuna	54	8.0%	0.6	177	0.7%	1.9
Bigeye tuna	23	3.4%	0.3	1,127	4.7%	12.3
Swordfish	18	2.7%	0.2	245	1.0%	2.7
Lancet fish	14	2.1%	0.2	44	0.2%	0.5
Indo-Pacific sailfish	13	1.9%	0.1	213	0.9%	2.3
Black marlin	6	0.9%	0.1	350	1.5%	3.8
Silky shark	6	0.9%	0.1	187	0.8%	2.0
Sunfish	3	0.4%	0.0		0.0%	0.0
Devilfish	4	0.6%	0.0	269	1.1%	2.9
Escolar	2	0.3%	0.0	6	0.0%	0.1
Pelagic stingray	2	0.3%	0.0	13	0.1%	0.1
Wahoo	2	0.3%	0.0	30	0.1%	0.3
Blue shark	1	0.1%	0.0	30	0.1%	0.3
Common dolphinfish	1	0.1%	0.0	2	0.0%	0.0
Puffer fish	1	0.1%	0.0	1	0.0%	0.0
Protected species	**6**	**0.9%**	**0.07**			
Common bottlenose dolphin	3	0.4%	0.0		0.0%	0.0
Leatherback sea turtle	1	0.1%	0.0		0.0%	0.0
Oceanic whitetip shark	1	0.1%	0.0		0.0%	0.0
Olive ridley turtle	1	0.1%	0.0	10	0.0%	0.1

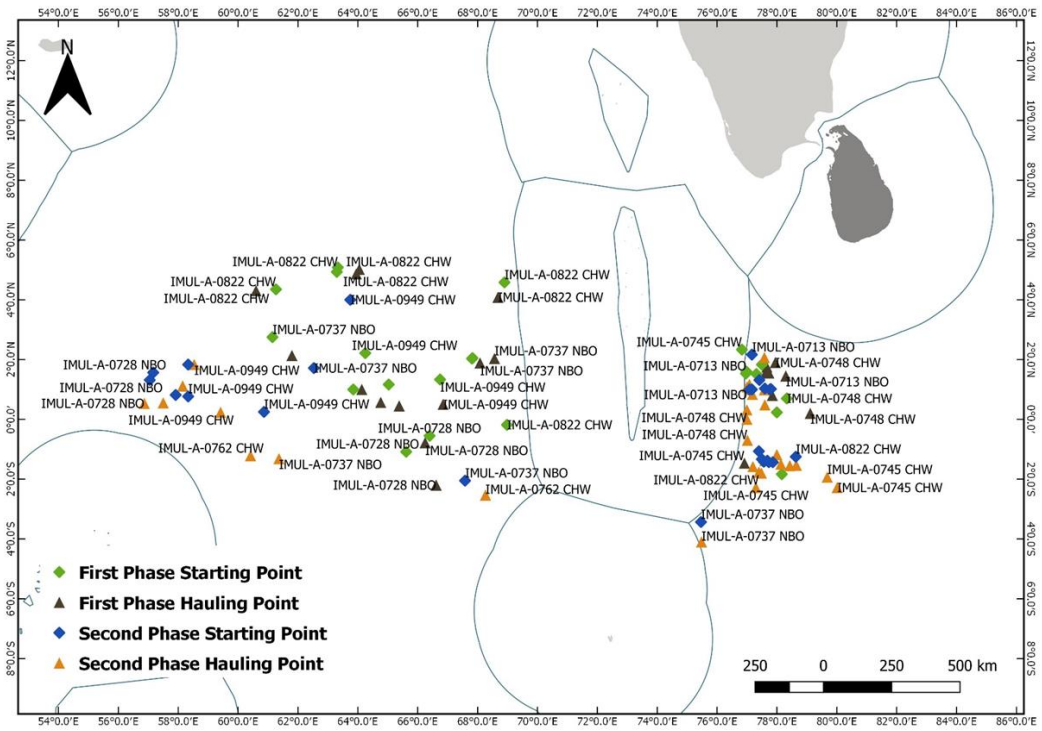

Figure 1: Location of the 25 longline sets, based on CbO data

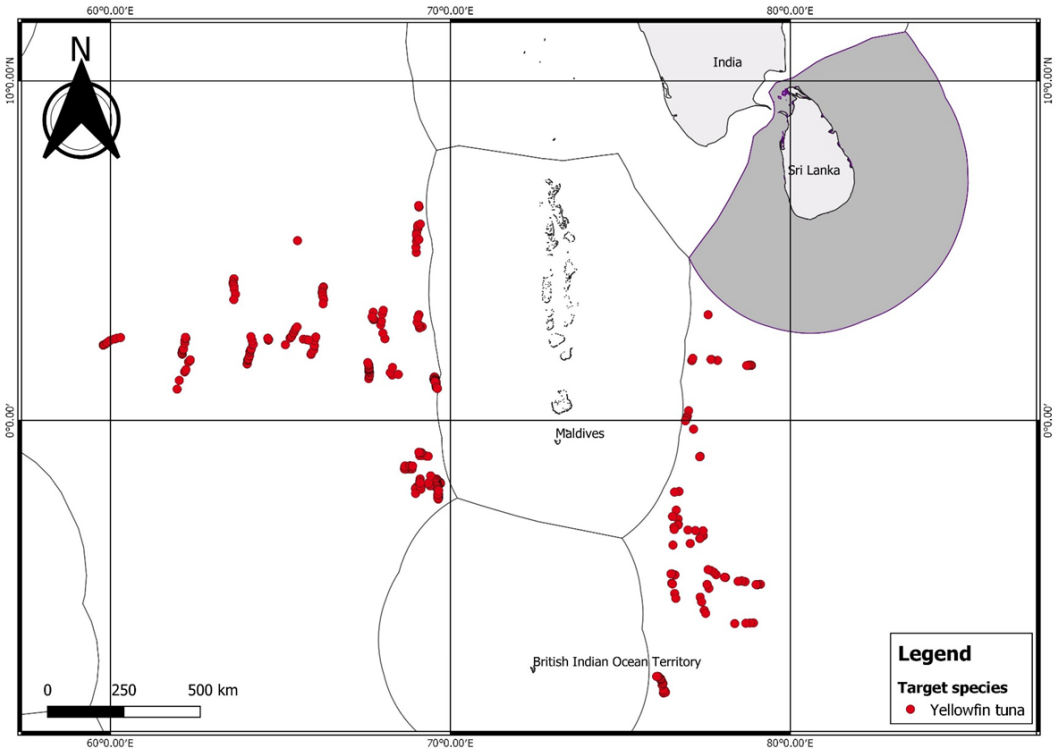

Figure 2: Location of the yellowfin tuna (*Thunnus albacares)* caught, based on CbO data

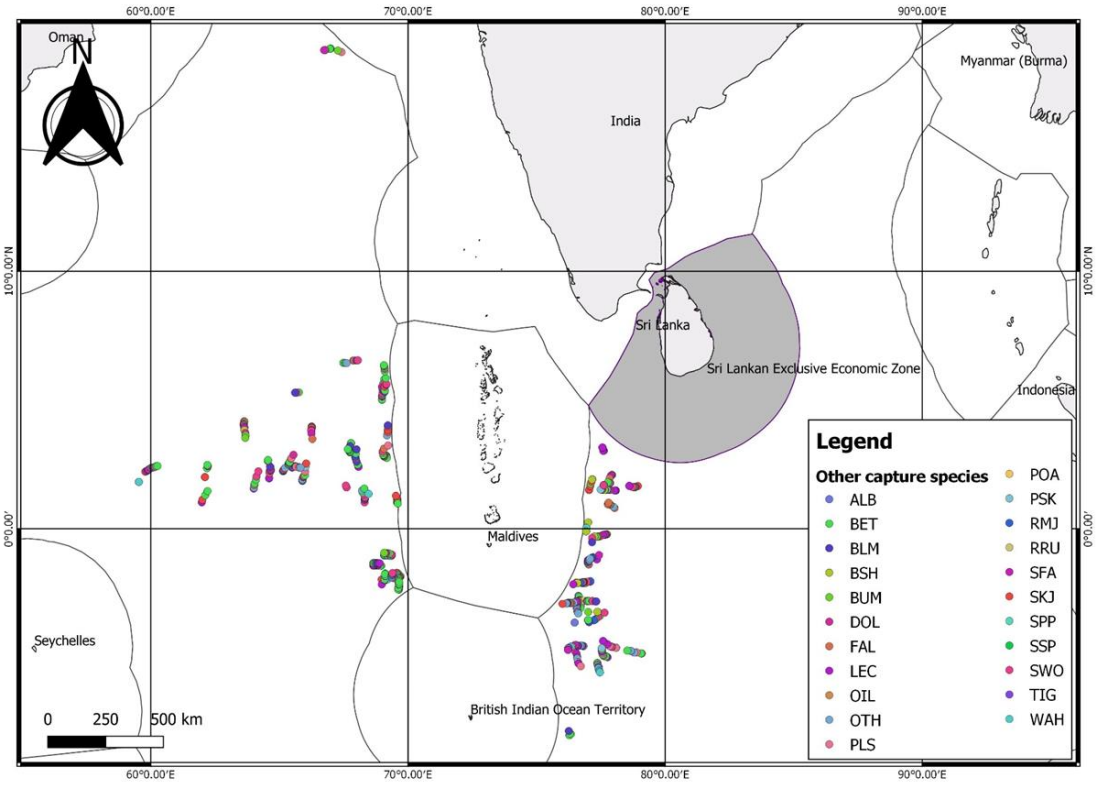

Figure 3: Locations of the other capture species based on CbO data

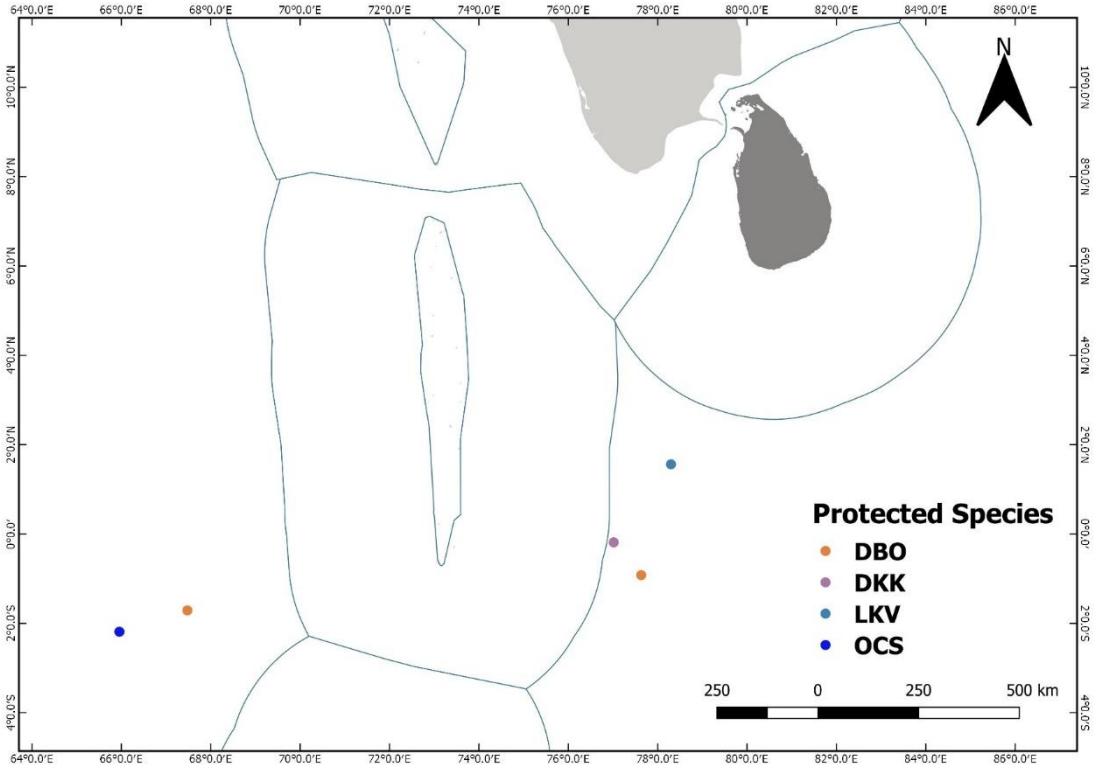

Figure 4: Locations of the Protected species caught, based on CbO data

Analysts can also assess the outcome (*i.e.* retained, discarded dead or discarded alive) for other catch species and protected species accidentally caught in the catch (Table 4).

Table 4 Example of outcome analysis using CbO data

Species	Total	Retained		Discarded Alive		Discarded Dead	
Other capture species							
Skipjack tuna	54	54	100.0%	0	0.0%	0	0.0%
Bigeye tuna	23	23	100.0%	0	0.0%	0	0.0%
Sword fish	18	18	100.0%	0	0.0%	0	0.0%
Indo-pacific sailfish	13	13	100.0%	0	0.0%	0	0.0%
Black marlin	6	6	100.0%	0	0.0%	0	0.0%
Silky shark	6	6	100.0%	0	0.0%	0	0.0%
Devilfish	4	4	100.0%	0	0.0%	0	0.0%
Escolar	2	2	100.0%	0	0.0%	0	0.0%
Wahoo	2	2	100.0%	0	0.0%	0	0.0%
Blue shark	1	1	100.0%	0	0.0%	0	0.0%
Common dolphinfish	1	1	100.0%	0	0.0%	0	0.0%
Rainbow runner	1	1	100.0%	0	0.0%	0	0.0%
Lancet fish	14	1	7.1%	0	0.0%	13	92.9%
Sunfish	3	0	0.0%	3	100.0%	0	0.0%
Pelagic stingray	2	0	0.0%	1	50.0%	1	50.0%
Puffer fish	1	0	0.0%	0	0.0%	1	100.0%
Protected species							
Common Bottlenose Dolphin	3	0	0.0%	3	100.0%	0	0.0%
Leatherback sea turtle	1	0	0.0%	1	100.0%	0	0.0%
Oceanic whitetip shark	1	0	0.0%	1	100.0%	0	0.0%
Olive ridley	1	0	0.0%	1	100.0%	0	0.0%

Length and weight data extracted from digital images can be used to generate length and weight frequencies by species (Figure 5 and Figure 6). Combined with biological information about the species this data can be used by analysts to calculate the percentage of the fish caught at Optimum Length (Figure 5).

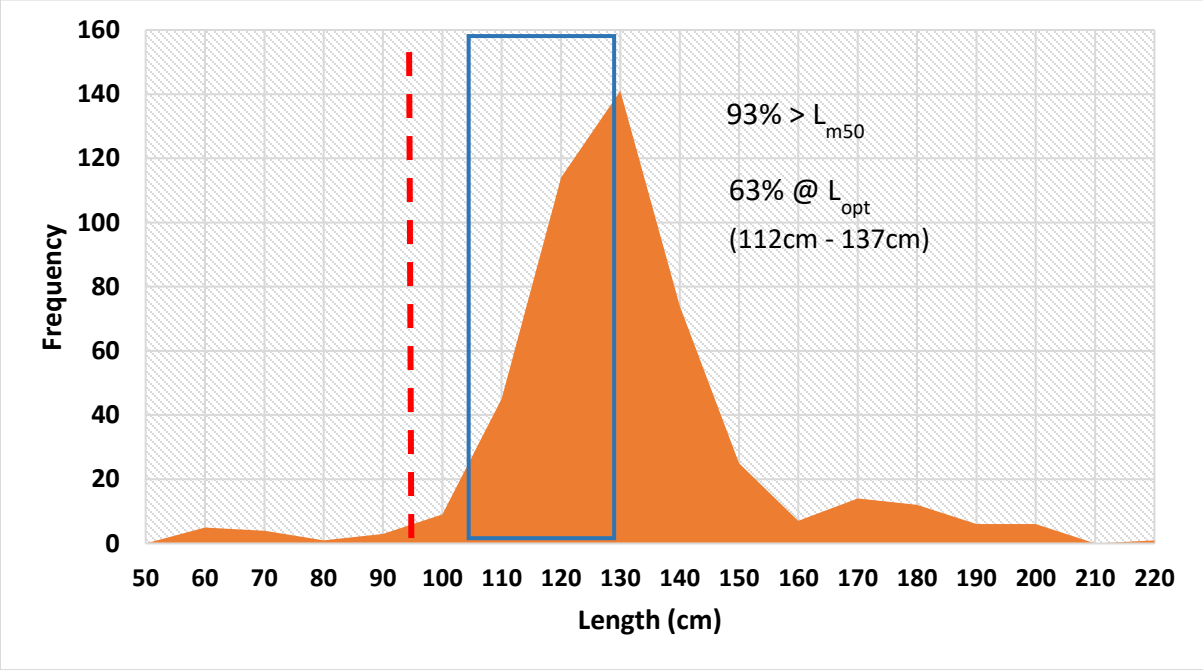

Figure 5 Length frequency for yellowfin tuna (*T. albacares*), based on CbO data

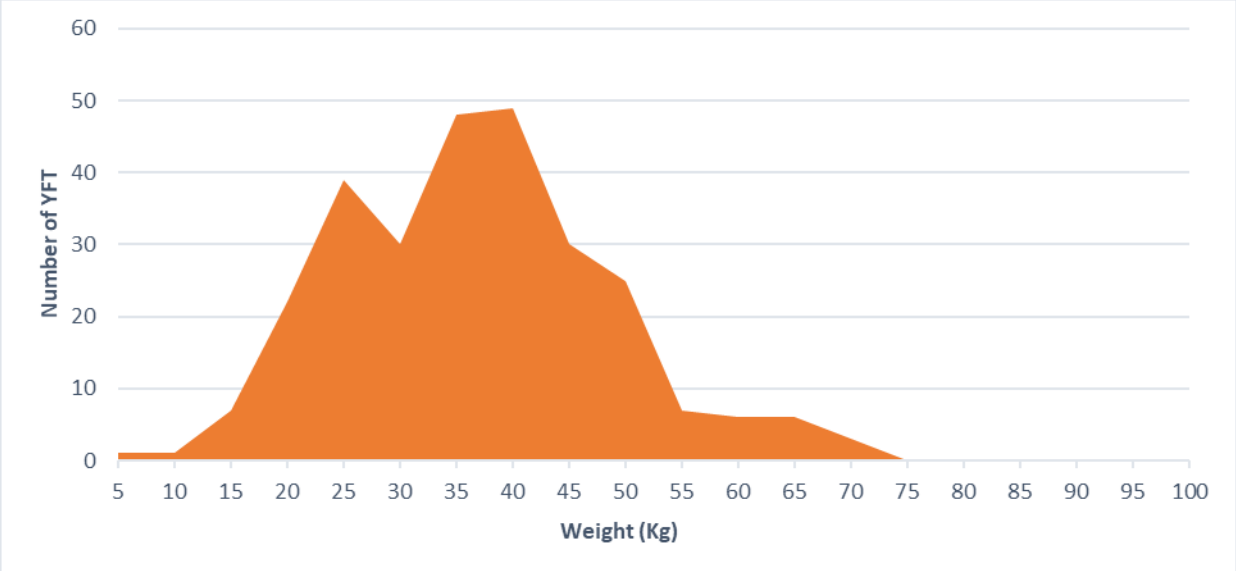

Figure 5 Weight frequency for yellowfin tuna (*T. albacares*), based on CbO data

Conclusion

The inability of artisanal and semi-industrial Sri Lankan fishing vessels to provide safe and secure working conditions and the basic design and electrical configurations of such vessels have proven to be an insurmountable obstacles in the way of deploying of Scientific Observers and or the installation of electronic monitoring systems, since the introduction of IOTC Resolution 11/04 and 22/04, despite the best efforts of the government and the seafood export industry to deploy observers and install EMS on Sri Lankan multiday fishing vessels.

The very large number of such vessels operating within the IOTC's area of jurisdiction and the over-riding importance of Resolution 15/01 necessitates the exploration of alternates for on-board data collection, in accordance with Section 7 of Resolution 24/04. Since 2018 the DFAR has been deploying crew-based observes to collect fisheries, catch and effort data from on-board Sri Lankan fishing vessels operating in the IOTC area of competence, supported by the Sri Lankan multiday boat owners, the seafood export industry, international seafood importers' organisations, a local non-government organization, a northern American philanthropic organisation and pelagikos pvt ltd.

The CbO protocol currently in operation is simple to explain and use. The protocol requires only two pieces of equipment. The deployment of a CbO costs less than 25% of a national observer. The CbO is capable of collecting 100% of the IOTC's fisheries information requirements per trip and 100% of the catch and effort data requirements on a sub-sampling basis.

Annex A – Assessment of Sri Lanka's CbO protocol's capability to collect reporting requirements *once per trip*

Requirement	CbOP	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
1.1 Report Information						
1. Date of the submission of logbook	Yes	De-briefing	Harbour Office	Hard Copy	Harbor Officer	AD[6] / HOIC[7]
2. Name of reporting person	Yes	De-briefing	Harbour Office	Hard Copy	Harbor Officer	AD / HOIC
1.2 Vessel information						
1. Vessel name and / or registration number	Yes	Briefing	Logbook	Hard Copy	Harbor Officer	AD / HOIC
2. IMO Number, where available	Yes	Briefing	IOTC website / Logbook	Electronic Data / Hard Copy	Harbor Officer	AD / HOIC
3. IOTC number	Yes	Briefing	IOTC website / Logbook	Electronic Data / Hard Copy	Harbor Officer	AD / HOIC
4. Call sign/ if not available other unique identifying code (fishing license number)	Yes	Briefing	IOTC website / Logbook	Electronic Data / Hard Copy	Harbor Officer	AD / HOIC
5. Vessel size (GT and vessel length- m)	Yes	Briefing	IOTC website / Logbook	Electronic Data / Hard Copy	Harbor Officer	AD / HOIC
1.3 Cruise information						
1. Departure date (at your location) and port	Yes	Briefing / De-briefing	Interview Sheet / Catch Certificate	Hard Copy	Harbor Officer	HOIC
2. Arrival date (at your location) and port	Yes	De- briefing	Interview Sheet / Catch Certificate	Hard Copy	Harbor Officer	HOIC
1.4 Other required information						
Longline (Gear Configuration)						
1. Average branch line length (m) -	Yes	Briefing / De-briefing	Logbook / Interview Sheets	Hard Copy	Harbor Officer	HOIC
2. Average float line length (m)	Yes	Briefing / De-briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC
3. Average length between branch (m)	YES	Briefing / De-briefing	interview sheet	Hard Copy	Harbor Officer	HOIC

[6] Assistant Director
[7] Harbour Officer in Charge

Requirement	CbOP	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
4. Main line material • Thick rope (Cremona rope) • Thin rope (Polyethylene or other material • Nylon braided • Nylon monofilament	Yes	Briefing / De-briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC
5. Material of the terminal tackle of the branch line (leader/trace) • Nylon monofilament • Other (such as wire)	Yes	Briefing / De-briefing	Interview sheet	Hard Copy	Harbor Officer	HOIC
Gillnet (Gear Configuration)						
1. Overall length of net (m): record the total overall length of the net onboard	Yes	Briefing / De-briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC
2. Mesh size of net (mm): record the mesh size (measured between opposite knots when fully stretched) used during the trip	Yes	Briefing / De-briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC
3. Depth of assembled net (meters): height of assembled net in meters	Yes	De- briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC
4. Netting material: e.g. nylon braid, nylon monofilament, etc.	Yes	Briefing / De-briefing	Logbook / Interview Sheet	Hard Copy	Harbor Officer	HOIC

Annex B Assessment of Sri Lanka's CbO protocol's capability to collect reporting requirements *once per shot/set*

Requirement	CbO P	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
2.1 Operation						
For longline						
1. Date of set	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
2. Position in latitude and longitude: either position at noon or position of start of gear or area code of operation (e.g. Seychelles EEZ, High seas, etc.) may be optionally used	Yes	De- briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
3. Time of starting setting and, when possible, retrieving the gear	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
4. Number of hooks between floats: if there are different hooks counts between floats in a single set then record the most representative (average) number	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
5. Total number of hooks used in the set	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
6. Number of light–sticks used in the set	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
7. Type of bait used in the set: e.g. fish, squid, etc.	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
8. Optionally, sea surface temperature at noon with one decimal point	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
For gillnet						
1. Date of set: record the date for each set or day at sea (for days without sets)	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
2. Total length of net (meters): float line length used for each set-in meter	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
3. Start fishing time: record the time when starting each set and, when possible, gear retrieving	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
4. Start and end position in latitude and longitude: record start and end latitude and longitude that represent the area that your gear is set between or, if no set, record the latitude and longitude at noon for days without set	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
5. Depth at which net is set (meters): approximate depth at which the gillnet is set	Yes	De-briefing	Interview Sheet	Hard Copy	Harbor Officer	Data Analyst
2.2 Catch						

Requirement	CbOP	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
1. Catch weight (kg) or number by species per set/shot/fishing event for each of the species and form of processing in section 2.3: • For longline by number and weight • For gillnet by weight	Yes	De-briefing	Digital Camera + GPS (Nikon Coolpix)	Digital Images	Harbor Officer	Data Analyst
2.3 Species						
For Longline						
Primary Species						
Southern bluefin tuna (*Thunnus maccoyii* | SBF)	Yes	De-briefing	Digital Camera + GPS (Nikon Coolpix)	Digital Images	Harbor Officer	)Data Analyst
Albacore (*Thunnus alalunga* | ALB)						
Bigeye tuna (*Thunnus obesus* | BET)						
Yellowfin tuna (*Thunnus albacares*) YFT						
Skipjack tuna (*Katsuwonus pelamis* | SKJ)						
Swordfish (*Xiphius gladius* | SWO)						
Striped marlin (*Tetrapturus audax* | MLS)						
Blue marlin (*Makaira nigricans* | BUM)						
Black marlin (*Makaira indica* | BLM)						
Indo–Pacific sailfish (*Istiophorus platypterus* | SFA)						
Other Species						
Short bill spearfish (*Tetrapturus angustirostris* | SSP)	Yes	De-briefing	Digital Camera + GPS (Nikon Coolpix)	Digital Images	Harbor Officer	Data Analyst
Blue shark (*Prionace glauca* | BSH)						
Mako sharks (*Isurus spp*. | MAK)						
Porbeagle shark (*Lamna nasus* | POR)						
Hammerhead sharks (*Sphyrna spp*. | SPN)						
Silky shark (*Carcharhinus falciformis* | FAL)						
Other bony fish (MZZ)						
Other sharks (SKH)						
Seabirds (in number)[8]						
Marine Mammals (in number | MAM						
Marine turtles (in number | TTX)						

[8] When a CPC is fully implementing the observer program the provision of seabird data is optional

Requirement	CbOP	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
Thresher sharks (*Alopias spp*. | THR)						
Oceanic whitetip shark (*Carcharhinus longimanus*) OCS						
Optional species to be recorded						
Tiger shark (*Galeocerdo cuvier* | TIG)	Yes	De-briefing	Digital Camera + GPS (Nikon Coolpix)	Digital Images	Harbor Officer	Data Analyst
Crocodile shark (*Pseudocarcharias kamoharai* | PSK)						
Great white shark (*Carcharodon carcharias* | WSH)						
Mantas and devil rays (*Mobulidae* | MAN						
Pelagic stingray (*Pteroplatytrygon violacea* | PLS)						
Other rays						
For Gillnet						
Albacore (*Thunnus alalunga* | ALB)	Yes	De-briefing	Digital Camera + GPS (Nikon Coolpix)	Digital Images	Harbor Officer	Data Analyst
Bigeye tuna (*Thunnus obesus* | BET)						
Yellowfin tuna (*Thunnus albacares*) YFT						
Skipjack tuna (*Katsuwonus pelamis* | SKJ)						
Longtail tuna (*Thunnus tonggol* | LOT)						
Frigate tuna (*Auxis thazard* | FRI)						
Bullet tuna (*Auxis rochei* | BLT)						
Kawakawa (*Euthynnus affinis* | KAW)						
Narrow barred Spanish mackerel (COM (*Scomberomorus commerson*)						
Indo–Pacific king mackerel (S. guttatus | GUT)						
Swordfish (*Xiphias gladius* | SWO)						
Indo–Pacific sailfish (*Istiophorus platypterus* | SFA)						
Marlins (*Tetrapturus spp, Makaira spp*. | BIL)						
Southern bluefin tuna (*Thunnus maccoyii* | SBF)						
Other species						
Shortbill spearfish (*Tetrapturus angustirostris* | SSP)	Yes	De-briefing	Nikon Coolpix Digital camera	Digital images	Harbor Officer	Data Analyst
Blue shark (*Prionace glauca* | BSH)						
Mako sharks (*Isurus spp.* | MAK)						

Requirement	CbOP	Data Collection Stage	Source of Information	Type of Information	Collected by	Validated by
Porbeagle shark (*Lamna nasus* | POR)						
Hammerhead sharks (*Sphyrna spp*. | SPN)						
Other sharks (SKH)						
Other bony fish (MZZ)						
Marine turtles (in number | TTX)						
Marine mammals (in number | MAM)						
Whale sharks (*Rhincodon typus*) (in number | RHN)						
Seabirds (in number)						
Thresher sharks (*Alopias spp.* | THR)						
Oceanic whitetip shark (*Carcharhinus longimanus* | OCS)						
Optional species to be recorded						
Tiger shark (*Galeocerdo cuvier* | TIG)	Yes	De-briefing	Nikon Coolpix Digital camera	Digital images	Harbor Officer	Data Analyst
Crocodile shark (*Pseudocarcharias kamoharai* | PSK)						
Mantas and devil rays (*Mobulidae* | MAN)						
Pelagic stingray (*Pteroplatytrygon violacea* | PLS)						
Other rays						
2.4 Remarks						
1. Discard of tuna, tuna-like fish and sharks to be recorded by species in weight (kg) or number for all gears should be recorded in the remarks[9]	Yes	De-briefing	Nikon Coolpix Digital camera	Digital images	Harbor Officer	Data Analyst
2. Any interactions with whale sharks (*Rhincodon typus*), marine mammals, and seabirds should be recorded in the remarks	Yes	De- briefing	Nikon Coolpix Digital camera	Digital images	Harbor Officer	Data Analyst
3. Other information is also written in the remarks	Yes	De- briefing	Interview sheets	Hard copy	Harbor Officer	Data Analyst

[9] Recall the Recommendation 10/13 On the implementation of a ban on discards of skipjack tuna, yellowfin tuna, bigeye tuna and non-target species caught by purse seiners [superseded by Resolution 13/11; then by Resolution 15/06