Transhipment observers – a tool for understanding seabird bycatch mitigation measures use on high seas tuna longline vessels

Philip H Augustyn[1,2] and Ross M Wanless[2,3]

[1]*Food and Agriculture Organisation of the United Nations, Rome, Italy*
[2] *Seabird Conservation Programme, BirdLife South Africa, South Africa*
[3] *FitzPatrick Institute, DST/NRF Centre of Excellence, University of Cape Town, South Africa*

Abstract
Understanding the extent of use of the various combinations of seabird bycatch mitigation measures required in IOTC Resolution 12/06 is an important part of meeting the challenge to reduce seabird bycatch to negligible levels. Self-reporting of use of seabird bycatch mitigation measure by fleets is variable across countries, and carries no burden of evidence. Therefore, BirdLife International through its partner BirdLife South Africa, under the FAO's Common Ocean tuna project, undertook an assessment of two readily-available sources of data to indicate use of bird scaring lines (BSL) and night setting by vessels that transhipped tuna in the IOTC area. Images from transhipment observers were evaluated for presence and likely suitability of 'tori poles' to indicate whether a Best Practice BSL, or a line that could meet the performance specifications for aerial extent in Res 12/06, could be deployed. We also evaluated likely use of night setting requirements based on logbook entries for setting times. Only vessels actively fishing in waters south of 25°S were evaluated. We estimate that of 119 high seas vessels assessed, *ca* a third had tori poles that could support an effective BSL. Of 117 vessels assessed for night setting, the data indicated that only 11% of vessels had consistent use of night setting. While these results point to very low levels of use of effective seabird bycatch mitigation measures, they should be interpreted with caution due to the challenges in analysing images that were not originally intended to be used for the purposes that we report here. However, despite the fact that it was not possible to determine use of line weighting in this study, our most optimistic evaluation is that at best one third of high seas vessels fishing south of 25°S consistently use two seabird bycatch mitigation measures. However, while we do not report on use of these measures by fishing entity, there are large differences, with vessels of certain fishing entities showing very high levels of both likely effective BSL use and night setting, and others showing very low levels. Despite some limitations, this pilot has identified there are clear opportunities for RFMOs to use transhipment observers, including through photographs, to check compliance with conservation measures for seabird bycatch mitigation. A draft report on this work will be presented to IOTC following discussion at WPEB 2018.

Introduction

The Food and Agriculture Organisation of the United Nations (FAO) is overseeing the implementation of the Common Oceans (ABNJ) Tuna Project (see http://www.fao.org/in-action/commonoceans/en/). The project seeks to support Regional Fisheries Management Organisations (RFMOs) and fleets to improve the management and sustainability of high seas tuna fishing. One aspect of the project is to improve the uptake of Best Practice seabird bycatch mitigation measures, in line with RFMO requirements. That work is implemented by BirdLife International, through its partner BirdLife South Africa.

The Indian Ocean Tuna Commission (IOTC) agreed to a binding resolution in 2012 (Res 12/06) that requires mandatory use of two out of three measures to mitigate risks of seabird bycatch during longline fishing in waters south of 25°S. In broad terms, those measures are: setting between nautical dusk and nautical dawn, using a bird scaring line (BSL), and adding weight to branchlines.

BSLs are deployed off the stern of a longline vessel during setting, to create a physical barrier and visual deterrent to seabirds scavenging baited hooks (ACAP 2011), with a required aerial extent of

75-100 m (depending on vessel size). It is this aerial extent that protects the baited hooks from scavenging seabirds until the hooks have sunk beyond their reach (Wanless and Waugh 2010). Res 12/06 recommends a pole ('tori pole') be fitted to achieve the required height above water level. To withstand the forces acting on a BSL aloft for up to 100 m astern, such a pole requires appreciable strength, including of reinforcing points. Various tori pole designs exist and some are permanent structures welded to the deck, others are temporary configurations, and may include a rotating section to swing the pole wide of the vessel. All functional tori poles have a BSL attachment point at the distal end, usually consisting of a welded eye. These features make detecting the presence or absence of a tori pole from photographs a tractable possibility.

IOTC Res 12/06 came into force in July 2014. To date, evaluating the extent of use of mitigation measures in the IOTC area has relied on self-reporting by countries in their annual reports to Commissions (Angel et al. 2015). In addition, few countries have reported in detail on which two of the three possible seabird bycatch measures are used (*Op cit.*). Finding independent, reliable information on use of seabird bycatch mitigation measures with efficient resource use is a non-trivial challenge. Under the Regional Observer Scheme of the IOTC, 100% of at-sea transhipments of tuna within the IOTC area of competence are observed by independent observers (Res 18/06). During their regular duties, transhipment observers take photograph of the stern of the fishing vessel, and, if the observer boards the fishing vessel, they take photographs of a subset of logbook pages.

In 2016, we identified an opportunity through the work of the transhipment observers to gather data on likely use, and likely effectiveness of use of, bird scaring lines (Wanless and Small 2016). The purpose was not to verify compliance or to report on individual vessels or fishing entities, but to ascertain the utility of this data source, as well as to gain a scientific understanding of the likely current use, and likely effectiveness/conformity with Best Practice guidelines of bird scaring lines, which amongst relevant CPCs is reported as the most commonly used measure by longliners.

The IOTC WPEB recommended that FAO Common Oceans personnel, working through BirdLife South Africa and under the auspices of the WPEB, be granted access to relevant images, and the IOTC Secretariat secured permissions from relevant fishing entities for such a scientific exercise to be undertaken. Here we report on the findings of the analysis of photographs taken by transhipment observers under the auspices of the WPEB. The driving question that we sought to answer through this work is: can information from High Seas transhipment observers be used as an independent data source to determine levels of use/likely effectiveness of seabird bycatch mitigation measure regulations? While this work was conducted as a scientific exercise, it clearly has considerable potential for monitoring compliance with CMMs.

Methods

Transhipment photographs were received in batches for each transhipment voyage. The process of relating images to vessel identification, tori pole presence/placement/nature and logbook information (for night setting south of 25°S) is shown in Fig 1. Photographs of logbook entries were not comprehensive, and generally included positions of the last few days fished before the vessel transhipped, but occasionally included up to seven weeks' fishing history. If fishing had not been recorded south of 25°S, images were discarded. If the vessel had fished south of 25°S, images were analysed further according to the schedule in Table 1.

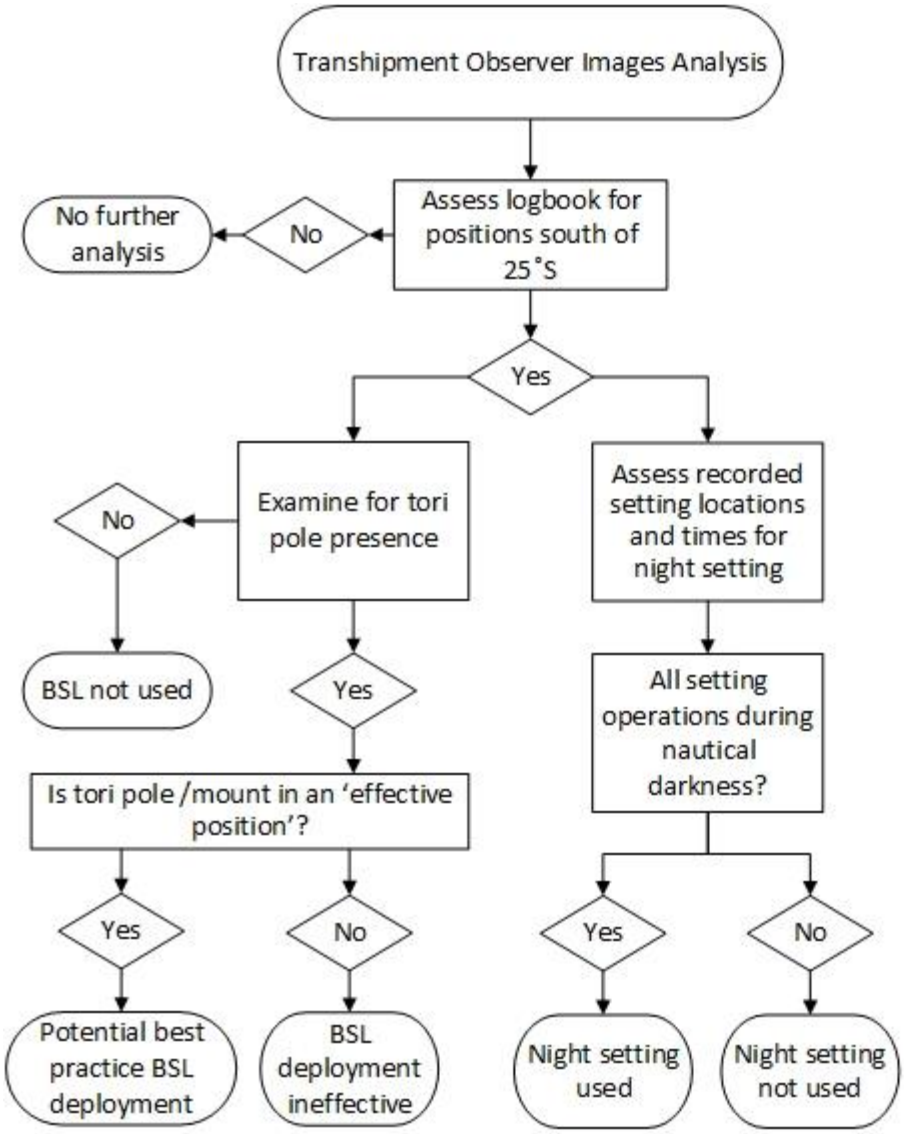

Figure 1. Process flow for analysing IOTC transhipment observers' photographs for tuna longline vessels use of bird scaring lines and night setting.

Tori pole

A tori pole was identifiable as a sturdy pole, at or near the stern of the vessel, raised above the height of the deck with the potential of attaching a BSL (Figs 2-3 and Annex). We defined an 'effective position' as a pole that could hold a BSL and achieve the performance specifications according to Res 12/06, i.e. 100 m and 75 m aerial extent for vessels with LOA of >35 m and ≤35 m, respectively. Effective position was evaluated against the following criteria:

1. Height: top of pole is estimated to be at ≥7 m or ≥6 m above the waterline for vessels of >35 m and ≤35 m total length, respectively
2. Structurally sound: pole appearing to be of sufficient strength to support the towing of a BSL (including apparently solid construction and/or supported by back stays or other strengthening systems)

For this analysis, determination of effective positions required judgement of an experienced scientific observer (PHA) and estimates of various aspects. The BSL attachment point height above the waterline was estimated by comparing known vessel top-deck heights (PHA pers obs). Smaller vessels (<35 m) generally have fibreglass hulls and a railing height of ~4.5 m whereas larger, steelhulled vessels of approximately 50 m typically have railings 5–5.5 m above the waterline. Whenever possible, other reference points in images, such as people and objects (e.g. fishing buoys) were also used to estimate tori pole height.

Figure 2. Image from a transhipment observer of a tuna longliner >35 m length, showing a tori pole that was assessed in this study as being below 7 m above the waterline, and therefore an ineffective position.

Figure 3. Image from a transhipment observer of a tuna longliner showing a tori pole that was not considered structurally sound. It lacks back stays or other strengthening systems

Night setting

From logbook entries (where setting times were recorded) we estimated likely night setting, defined according to Res 12/06 as during nautical darkness (the entire setting operation taking place between nautical dusk and nautical dawn). Logbook setting times were assumed to be recorded in the vessel's local time zone unless stated otherwise. Nautical darkness was determined through reference to an online geospatial resource located at http://suncalc.net. Typically only setting start times (SST) were available, so we assumed (conservatively, based on personal experience of PHA) that setting operations lasted no more than five hours. If the recorded SST or the time five hours thereafter (i.e. our estimated end of setting) was outside nautical darkness, the set was scored as not using night setting as a mitigation measure. From this we recorded a single, binary value for each vessel – either the vessel used night setting, or it didn't (i.e. any sets outside nautical darkness were taken to indicate that the vessel was not systematically using night setting as a mitigation measure). When setting time was missing/absent, the data field was recorded as data deficient and the set/vessel was excluded from this analysis.

Table 1. Types of images taken by transhipment observers in the IOTC area that were reviewed, and intended use of information recorded from those photographs

Image type	Desired Information	Purpose
Side profile	Vessel name (bow), call sign (beam)	Identification of vessel fishing entity
Side profile	Tori poles	Potential use of BSLs
Stern	Tori poles	Potential use of BSLs
Logbook	Fishing positions and setting times	Use of night setting

Results
In total, we analysed images from 30 transhipment voyages, accessing images from 627 fishing vessels from seven entities (either fishing entities or discrete fleets): China (and separately the Taiwanese Longline Fleet), Korea, Japan, Malaysia, and Seychelles and a single vessel from Oman. Oman was excluded from all analyses here due to it being a single vessel. All fishing entities were assigned a letter between A-F at random to anonymise the information. We analysed 3634 images which resulted in 119 vessels that had fishing positions south of 25°S and for which images were of sufficient quality for evaluating tori poles. For vessels with fishing positions south of 25°S, we obtained an average of 7.9 set start times (range = 1-44, SD 8.2) per logbook.

Tori pole
Of the 119 vessels for which photographs allowed us to evaluate tori poles, 54% had a tori pole present, and of those that had a pole, two thirds were likely to support an effective BSL (Table 2). This means that overall only 36% of vessels (42 of 119) were considered likely to be able to deploy an effective BSL that follows Best Practice design and performance specifications (Fig 4). There were also clear differences in likely effectiveness of BSL usage amongst the fishing entities in this study. Of those for which we had >5 vessels to analyse, two (D and E) had very high proportions of vessels with effective tori pole positions, whereas entities B and F had a comparatively low numbers of vessels with effective tori poles.

Table 2. Evaluation of likely use of effective bird scaring line and night setting by tuna longliners in the Indian Ocean, using transhipment observers' photographs. Percentages in parentheses.

	Tori pole present			Effective position when present			Setting time recorded		
Fishing entity	Yes	No	Total	Yes	No	Total	Yes	No	Total
A	3 (19)	13	16	0 (0)	3	3	25 (100)	0	25
B	7 (78)	2	9	3 (43)	4	7	9 (100)	0	9
C	2 (40)	3	5	2 (100)	0	2	0 (0)	5	5
D	17 (85)	3	20	16 (94)	1	17	18 (90)	2	20
E	6 (86)	1	7	6 (100)	0	6	9 (100)	0	7
F	29 (47)	33	62	15 (52)	14	30	57 (86)	9	66
Total	64 (54)	55	119	42 (65)	22	64	118 (88)	16	132

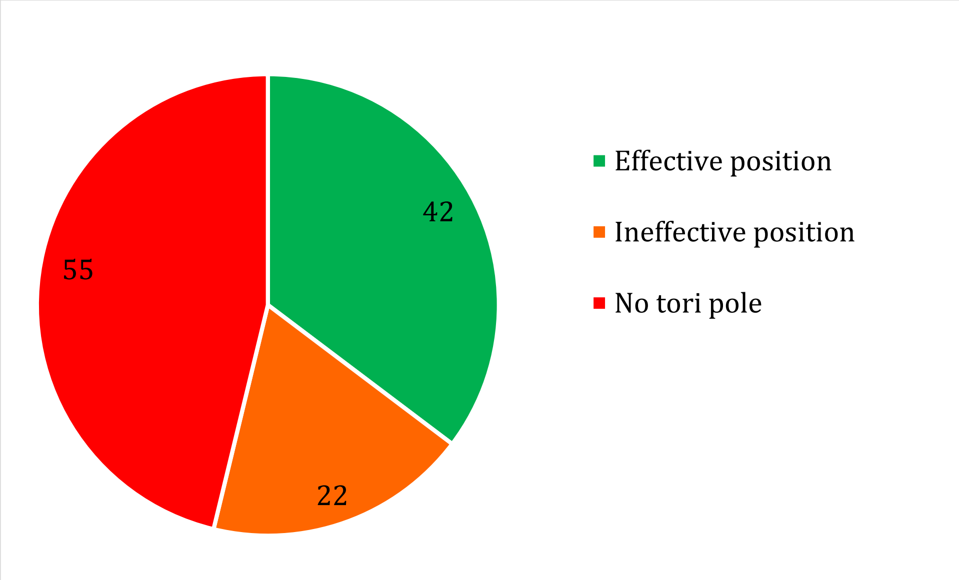

Figure 4. Proportions of presence and likely effectiveness of tori poles for bird scaring line attachments on tuna longliners in the Indian Ocean, assessed using transhipment observers' photographs.

Night setting
Of the 132 vessels assessed, 118 had setting times recorded (Table 2). Of those, setting time information could be extracted from images from 117 vessels. Of those, only 13 (11%) used night setting correctly (i.e. setting operations did not occur during nautical daylight) in all operations that we could interrogate. Our ability to assess setting times was very good for the majority of vessels from the majority of fishing entities. The clear exception was fishing entity D, for which the logbooks had no fields for times of any setting operations to be recorded.

Table 3. Numbers of tuna longliners in the Indian Ocean that had no tori pole and which did not consistently set at night, by fishing entity, assessed using transhipment observers' photographs.

Fishing entity	Day setting	Total
A	13 (81%)	16
B	2 (22%)	9
C	1 (33%)	3
D	2 (11%)	18
E	1 (17%)	6
F	22 (50%)	44
Total	41 (43%)	96

Forty-one vessels assessed had neither a tori pole present nor used night setting consistently (Table 3). None of the vessels of fishing entity A had effective positions for tori poles (Table 2), and thus none of the vessels flagged to this CPC in this study met the requirements of Res 12/06.

Discussion
The literature documenting the negative impact of bycatch in tuna longline fishing on the conservation status of albatrosses and petrels is legion. Determining the scale of impact of tuna longline fishing on threatened seabird species/populations is an ongoing effort in various RFMOs and the Common Oceans project (Abraham et al. 2018). A critical tool for reducing the impact of tuna

fishing on seabirds is the IOTC's Res 12/06, which included a mandatory requirement for CPCs to report on how they are implementing the measure. To date, however, the level of information available to, and reported by, CPCs is inadequate to evaluate which measures are used in what proportions. The study we report on here provides new insights into the levels of use of bird scaring lines and night setting. Currently, both these measures appear to be poorly implemented in high seas fleets. About half of all vessels evaluated and known to have fished south of 25°S had no tori pole, and therefore cannot be implementing BSLs according to Res 12/06. Similarly, a very low percentage of vessels used night setting consistently.

Presence of a robust tori pole is not a mandatory requirement for vessels using the BSL as one of their two mitigation measures. However, Res 12/06 requires that BSLs achieve performance measures in terms of minimum aerial extent when deployed. We consider it improbable that those performance specifications can be achieved under ordinary fishing conditions with BSLs that meet the requirements of Res 12/06, without raising the height of the attachment point to a minimum of 6-7 m above waterlevel (Melvin et al. 2004). We therefore have assumed that vessels that deploy BSLs but which have low, weak or no tori pole will fail to meet the mandatory performance specifications of Res 12/06.

In addition to BSL and night setting, Res 12/06 allows that vessels may choose a third measure in addition to either of these, namely line weighting. It was not possible to assess the use of line weighting in this study, however, in this study 41 of 96 (34%) vessels had neither a tori pole nor used night setting consistently and therefore cannot have been using two of three mitigation measures. We assessed one fishing entity (State F) as having a maximum of one third of their using two measures, even assuming all of those vessels also used line weighting.

Through the process of analysing images of tori poles and logbook pages, it became apparent that there are opportunities to improve the utility of both transhipment observers for compliance checking and the kinds of information that logbooks could provide to improve the IOTC's ability to evaluate levels of implementation of CMMs. We recommend that when a transhipment observer boards a tuna longliner for inspections, they should check all possible compliance-related aspects of IOTC CMMs. For compliance checking of Res 12/06, observers should verify that the vessel has fished south of 25°S recently, and if so, then

1. check and photograph tori pole (position, height, structural design)
2. measure (approximately) the total length of a BSL (if present)
3. check for night setting/photograph logbook pages
4. check terminal sections of branchline gear for line weighting

Recommendations for improving Res 13/03 (logbook minimum requirements)

- Setting time should always be filled out and indicated clearly. All fishing entities must include setting time field within their logbooks. The logbooks of one fishing entity in this study did not following Res 13/03.
- Ideally both start and end setting times should be included in logbook; Res 13/03 currently does not include a requirement for logbooks to record 'end setting time'. This makes verification of night setting considerably more difficult or impossible
- The time zone in which the time of setting is recorded must be indicated clearly; Res 13/03 states clearly that it must be done, but many logbook templates we reviewed don't meet this condition of Res 13/03. Indicate local time zone at position if local time used. When using local time, daylight saving should be indicated if applicable.

- The time zone of the logbook hardcopy should match the time zone of the digital copy (sometimes these do not, PHA unpublished data).
- Setting position should be recorded at the start of line setting (not midday or other, to avoid confusion with VMS data. (Amend Resolution 13/03, Annex II)
- Logbooks should indicate which mitigation measures were used to prevent seabird bycatch (tick box or similar: include line weighting, BSL, night setting)

Following from comments on this paper from scientists at the WPEB14 meeting, a draft report will be submitted to the IOTC Secretariat for circulation to and comment by relevant CPCs.

Acknowledgements

Jan Wissema and the CapMarine observers collected and made available the photographic data at sea. Peter Watt-Pringle made contributions to the initial stages of this work and Cleo Small provided insightful comments and guidance.

References

Abraham ER, Carneiro A, Fahmi Z, Inoue Y, Kathena JN, Kim DN, et al. 2018. Update on the seabird component of the common oceans tuna project seabird bycatch assessment workshop. (Report to the Indian Ocean Tuna Commission's Working Party on Ecosystems and Bycatch meeting, Cape Town, South Africa, 10-14 September).

ACAP. 2011. Summary best practice advice for reducing the impact of pelagic longline gear on seabirds. Maldives, 2011:Paper presented to the Indian Ocean Tuna Commission, Working Party on Ecosystems and Bycatch, IOTC-2011-WPEB-07-44.

Angel A, Wanless RM, Small C. 2015. A need for improved reporting on seabird bycatch in the longline fishery. Indian Ocean Tuna Commission's Working Party on Ecosystems and Bycatch meeting, Olhão, Portugal 7-11 September.

Melvin E, Sullivan B, Robertson G, Wienecke B. 2004. A review of the effectiveness of streamer lines as a seabird by-catch mitigation technique in longline fisheries and ccamlr streamer line requirements. CCAMLR Science 11:189-201.

Wanless RM, Waugh SM. 2010. Technical description of hookline sink rates and protection offered by streamer lines. ICCAT Collected Volume of Scientific Papers 65:2297-2304.

Wanless RM, Small C. 2016. Data collection opportunities for assessing the use and effectiveness of seabird conservation measures. (Indian Ocean Tuna Commission's Working Party on Ecosystems and Bycatch meeting). Seychelles, 12-16 September 2016.

Annex

Examples of tori pole and other masts or similar structures

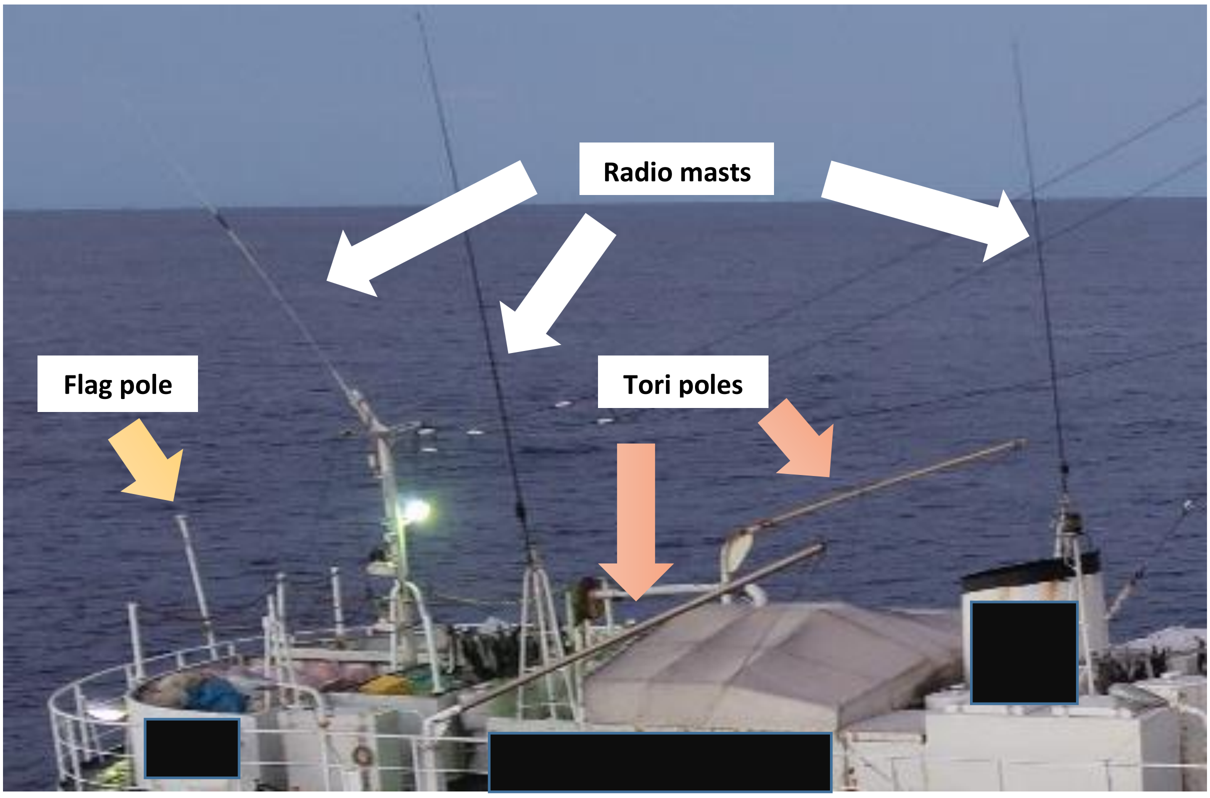

Figure A1. General overview of different poles and masts onboard a pelagic longline vessel.

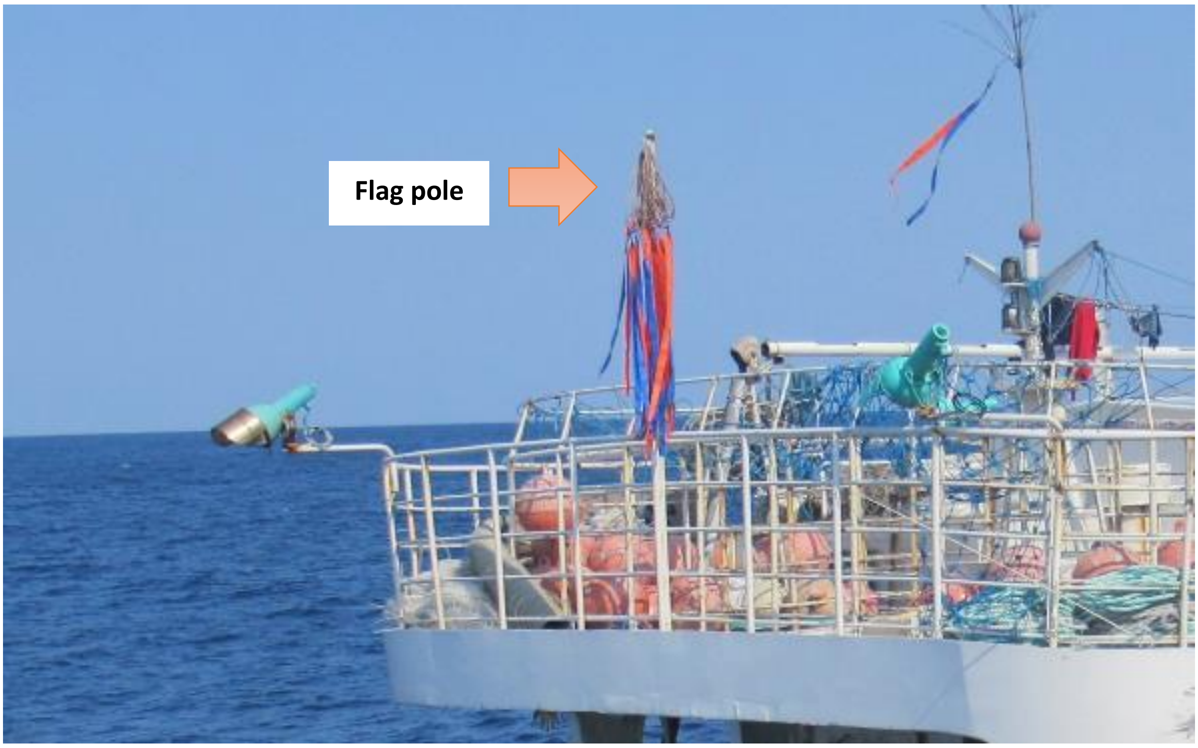

Figure A2. Example of vessel with spiritual decoration attached to the flag pole. There are no tori poles or other forms of BSL attachment points visible within this photo.

Figure A3. Note the flag pole, which is not a tori pole or BSL attachment point.

Figure A4. No tori pole visible anywhere on the top deck.

Figure A5. A good example of a tori pole mounted over the bait casting area. Even though the photo only includes part of the TP, it is clearly higher than 7m above the waterline and would qualify as a best practice (BP) installation.

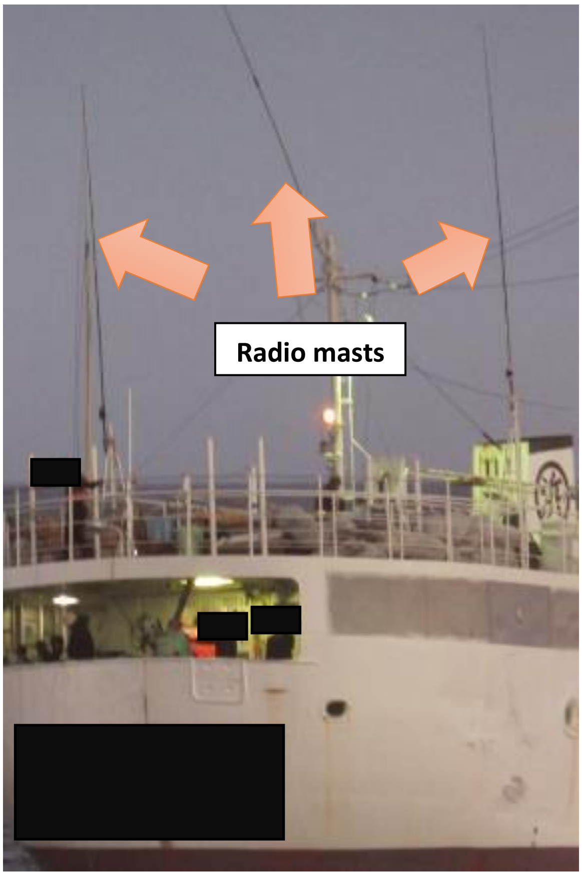

Figure A6. An example of radio masts. These are used for long-distance radio communication only and they are not to be confused with tori poles.

Figure A7. Flag pole attachment point. These are not tori poles and would not be able to withstand the drag of a BSL. During PBO visits, some captains have tried to sell this as a BSL mounting position.

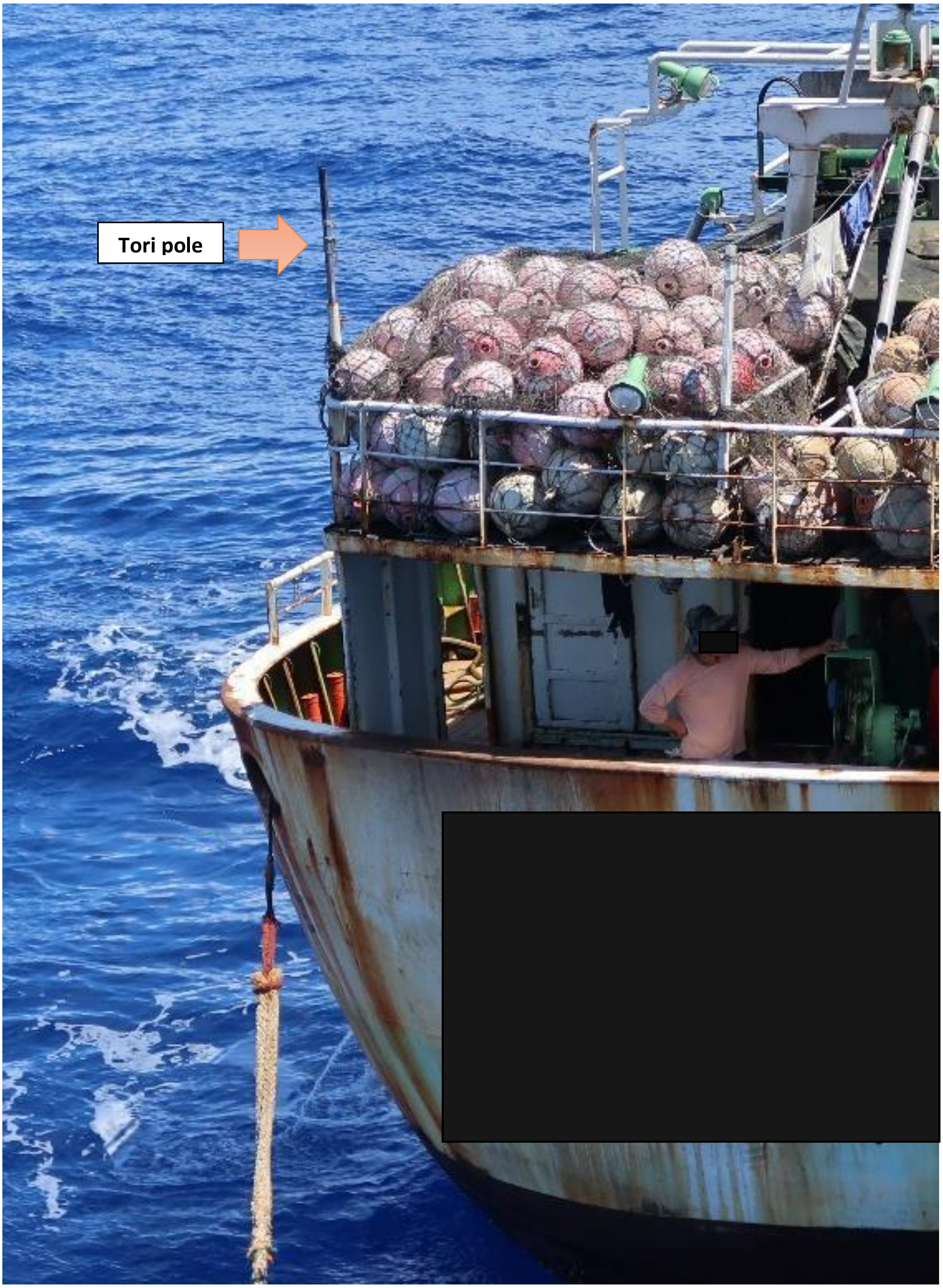

Figure A8. Potential short tori pole at the top-left. If a BSL was attached to this it would most likely be approximately 6 m above the water line and would not be considered to be a best practice installation.

Figure A9. An alternative design for a best practice tori pole.