Global Fishing Watch

A Comparative Analysis of AIS Data with the International Commission for the Conservation of Atlantic Tunas Reported Transshipment Activity in 2019

Acknowledgements

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Prepared by: Global Fishing Watch

Contents

2019 AIS-Detected Transshipment Activity in Tuna Regional Fisheries Management Organizations

Transshipment of catch at-sea is a major part of the global fishing industry, particularly the tuna sector. However, existing monitoring and regulatory controls over transshipment at-sea are widely considered insufficient, with no guarantee that all transfers are being reported or observed in accordance with Regional Fisheries Management Organizations (RFMOs) Conservation and Management Measures (CMMs). Ineffective and/or incomplete monitoring, control and surveillance of at-sea transshipment creates opportunities for illegally caught seafood to enter the supply chain, and may perpetuate human rights abuses aboard vessels and provide an enabling environment for other illicit activities.

To help increase the transparency and understanding of at-sea transshipment activities, Global Fishing Watch (GFW), in partnership with The Pew Charitable Trusts (Pew), is undertaking an assessment of at-sea transshipment activities occurring inside the Convention Areas of the five global tuna RFMOs. Together, GFW and Pew also launched the Carrier Vessel Portal (CVP) in 2020. The first of its kind, the CVP is a publicly facing tool focused on at-sea transshipment, that seeks to provide policymakers, authorities, fleet operators, and other fisheries stakeholders information on when and where at-sea transshipment activities are taking place. The CVP uses commercially available satellite Automatic Identification System (AIS) data, combined with machine learning technology and publicly available information provided by RFMOs, including vessel registry data, to identify and display information on potential transshipment activity.

Utilizing the CVP, Pew and GFW are producing a series of annual reports that compare at-sea transshipment-related activities observable through AIS data with publicly available information generated from RFMO member implementation of the relevant at-sea transshipment CMM. These reports are designed to be RFMO-specific and cover calendar years 2017-2019 inclusive.

These reports assess the activity of carrier vessels and provide indication of possible transshipment events by comparing AIS data of vessels and determining possible “encounters” and “loitering” events. ‘Encounter Events’ are identified when AIS data indicates that two vessels may have conducted a transshipment, based on the distance between the two vessels and vessel speeds. ‘Loitering Events’ are identified when a single carrier vessel exhibits behavior consistent with encountering another vessel at-sea, but no second vessel is visible on AIS, also known as a ‘dark vessel’. Loitering events are estimated using AIS data to determine vessel speed, duration at a slow speed and distance from shore.

***Note: AIS data is only one dataset and additional information available to RFMO Secretariats, RFMO members, and flag States is needed to provide a complete understanding of any apparent non-compliant or unauthorized fishing activity identified within this report. Only after investigation by the Secretariat or relevant flag and coastal State authorities should that determination be made and appropriate enforcement or regulatory action taken*.**

For more information on the data used in this study, or to request the data annex, please contact carrier-vessel-portal-support@globalfishingwatch.org.

List of Acronyms

AIS – Automatic Identification System
CCSBT – Commission for the Conservation of Southern Bluefin Tuna
CMM – Conservation and Management Measure
CPC – Contracting and Cooperating Non-Contracting Parties
CVP – Carrier Vessel Portal
DPE – Designated Port for Entry
EEZ – Exclusive Economic Zone
GFW – Global Fishing Watch
ICCAT – International Commission for the Conservation of Atlantic Tunas
IUU – Illegal, Unreported, Unregulated
LSTLV – Large-Scale Tuna Longline Vessels
MCS – Monitoring, Control and Surveillance
PSMA – Port State Measures Agreement
RFMO – Regional Fisheries Management Organization
ROP – Regional Observer Program
VMS – Vessel Monitoring System
WCPFC – Western and Central Pacific Fisheries Commission

This report also refers to UN ISO 3166-1 alpha-3 country codes which can be found here for reference https://unstats.un.org/unsd/tradekb/knowledgebase/country-code.

Executive Summary

Transshipment in waters of the International Commission for the Conservation of Atlantic Tunas (hereinafter referred to as the "ICCAT Convention Area") is currently regulated by the Recommendation 16-15, *Recommendation by ICCAT on Transhipment*. The Recommendation includes reporting requirements for both fishing and carrier vessels to help deter Illegal, Unreported, and Unregulated (IUU) fishing activities and better manage the fishery. Additionally, this Recommendation requires that all carriers transshipping ICCAT-managed species are authorized by ICCAT and must carry an ICCAT observer from the Regional Observer Programme (ROP) at all times. The Recommendation acknowledges the need for greater monitoring, control and surveillance (MCS) of vessel activity and transshipments due to '*…grave concern that... a significant amount of catches by IUU fishing vessels have been transshipped under the names of duly licensed fishing vessels…*'.

In 2019, Global Fishing Watch (GFW) submitted a report to the 26th Regular Meeting of the Commission that used commercially available Automatic Identification System (AIS) data to analyze the track histories of carriers operating within the ICCAT Convention Area during the calendar year 2017. In 2020, a follow up analysis of data covering the calendar year of 2018 was completed and the resulting report was submitted during the ICCAT Compliance Committee[1]. This year, GFW analyzed 2019 trends in potential transshipments and port visits over time by fleet, and provided an enhanced comparison of AIS activity with ROP data.

The ICCAT Regional Observer Programme (ROP) for carriers is one of the most transparent observer programs amongst the tuna RFMOs. Included in the ROP observer reports are geolocations and dates of each observed at-sea transshipment conducted by carriers and longliners within the Convention Area. This level of transparency of at sea transshipment activities allows members to conduct due diligence and validate that reported information on their flagged vessels is consistent with what is reported by the ROP. However, even with the high levels of transparency, there were still discrepancies between the ROP Observer Reports (ICCAT Observer Report 2018, ICCAT Observer Report 2019, and ICCAT Observer Report 2020) and the ICCAT ROP summary documents (Doc. No. PWG 402/2019 and Doc. No. PWG 402/2020-rev). The ROP could be further improved by the standardization of reporting requirements and by requesting additional metadata in the submitted reports which would clarify details on when and where transshipments are being observed, thus reducing the likelihood of ambiguities between the ROP observer reports and the ICCAT ROP summary documents.

Activity was detected by AIS that was not reported to the ICCAT ROP. 61 loitering events were detected that were not reported on ROP deployments, 21 of these events by non-CPC Carrier vessels. In addition, not all ports visited by carriers after encounters with longliners were located within ICCAT member States, meaning they were not designated as ports of entry under the ICCAT Port State Measures Recommendation 18-09.

[1] The 2020 ICCAT Commission meeting was canceled due to the COVID-19 pandemic, but some Commission business - including the Compliance Committee - occurred by correspondence.

This potential unobserved activity at-sea and unmonitored activity in-port increases the risk of non-compliance with ICCAT transshipment management measures. ICCAT should consider the following recommendations to improve the Recommendation on Transhipment, and further reduce the risk of IUU fishing activities within the Convention Area.

Finding	Recommendations for ICCAT
AIS data captured trends reported by ICCAT ROP and captured additional information on transshipment hotspots in overlapping RFMOs	Implement a centralized VMS to ensure ability to audit and validate reported information provided by CPCs. In the absence of a centralized VMS program, use AIS as a supplemental tool to help monitor implementation of the ROP and validate transshipment activity. AIS use could be implemented through a CMM that encourages members to mandate AIS use for distant water vessels and have minimum standards on the implementation of SOLAS Chapter V Regulation 19[2].
ICCAT has one of the most transparent carrier vessel ROPs of all tuna RFMOs, though reported information can be inconsistent. 61 loitering events were detected that were not reported on ROP deployments, 21 of these events by non-CPC Carrier vessels	Standardize the amount and type of information required from the ROP to a detailed spatial and temporal resolution, and ensure consistency in reported information and metadata. The Secretariat and Member States are encouraged to investigate potential transshipment activity which was not reported on by the ROP. Amend the CMM to only permit transshipment by carriers flagged to CPCs.
All port visits after encounters were to Porto Grande, Cape Verde, and Cape Town, South Africa. However, seven port States were visited after loitering events that were not designated ports by ICCAT 15 non-ROP detected loitering events occurred prior to eight visits to five non-designated ports	Ensure compliance with General Recommendation 18-09 on Port State Measures requiring use of ICCAT designated ports by carriers when carrying transshipped catch that originated in the ICCAT Convention Area. Encourage port authorities in non-CPC port States to share landing declarations at ports used by carriers when landing ICCAT caught species. Require the next port of entry to be identified after transshipments.

[2] https://www.liscr.com/sites/default/files/SOLAS%20V_Reg19.pdf

Activity Overview

The ICCAT Convention Area covers a vast area in which a number of different fisheries operate. AIS analysis identified four hotspots of transshipment activity in three overlapping RFMO Convention Areas (Figure 1). In these areas ICCAT shares management responsibilities of the waters with other RFMOs. These include in the north Atlantic an overlap with North East Atlantic Fisheries Commission (NEAFC) where a small number of AIS-detected encounters are linked to NEAFC managed species (Figure 1 Area A). In the south an overlap with the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) where 8 encounters in 2019 likely included southern bluefin tuna (Figure 1 Area B). In the South West Atlantic an overlap with the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) with 48 encounters likely linked to CCAMLR managed species (Figure 1 Area C). Additionally, in the South West Atlantic there is a transshipment hotspot linked to an unregulated squid fishery (Figure 1 Area D). Of these overlapping management responsibilities, CCSBT (Figure 1 Area B) has the most likely risk of including ICCAT managed species given the common distribution of tuna and longline fishing.

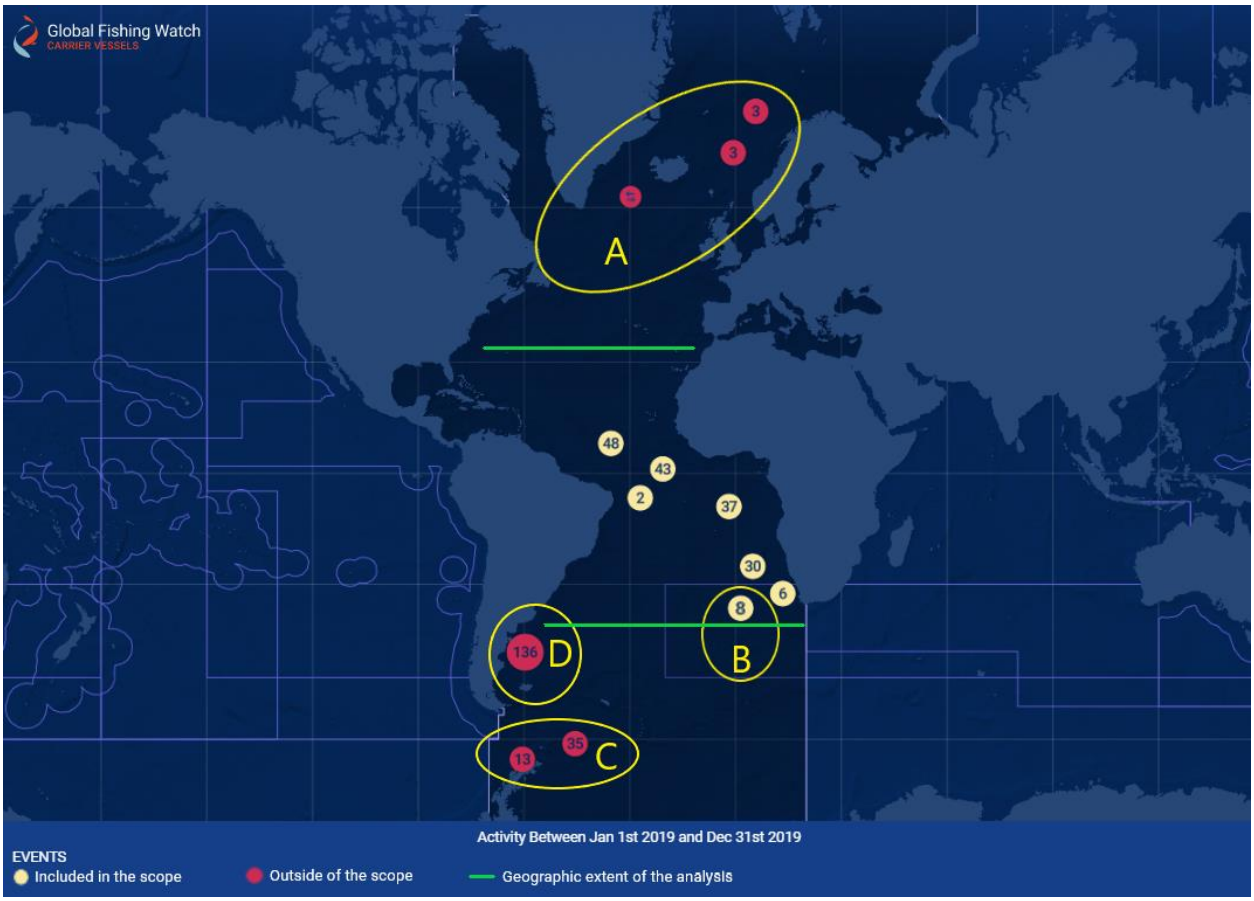

Figure 1. AIS detected transshipment events in the ICCAT Convention Area with transshipment hotspots identified; area A is linked to NEAFC managed species, area B is linked to CCSBT

managed species and are included in the scope of this analysis report, area C represents CCAMLR managed species, and area D is associated with an unregulated squid fishery.

To ensure effective management of its stocks, it is essential that ICCAT has a robust and transparent information exchange program with the other RFMOs and ideally with the key flag States of the unregulated squid fishery in the South West Atlantic (such as China, an ICCAT CPC, that comprises a large portion of the squid fishing fleet).

Report Scope

GFW's analysis is restricted to AIS-detected encounter events with large-scale tuna longline vessels (LSTLVs) and AIS-detected loitering events within the latitudinal range of reported transshipments and detected encounters with LSTLVs in the ICCAT Convention Area. In 2019 analysis was defined to be between the latitudes of 16 and -34 degrees using the above criteria, and in 2018, between the latitudes of 26 and -38 degrees. The geographic extents of ROP reported transshipments were similar between 2018 and 2019. However, in 2018 GFW analyzed a larger geographic area driven by a LSTLV encounter detected on AIS not matched to the ROP in the northern portion of the Convention Area away from most other AIS-detected and ROP reported longline activity. Subsequently, the reduction in loitering events recorded between 2018 and 2019 is, in part, a result of the narrower geographic area of analysis in 2019.

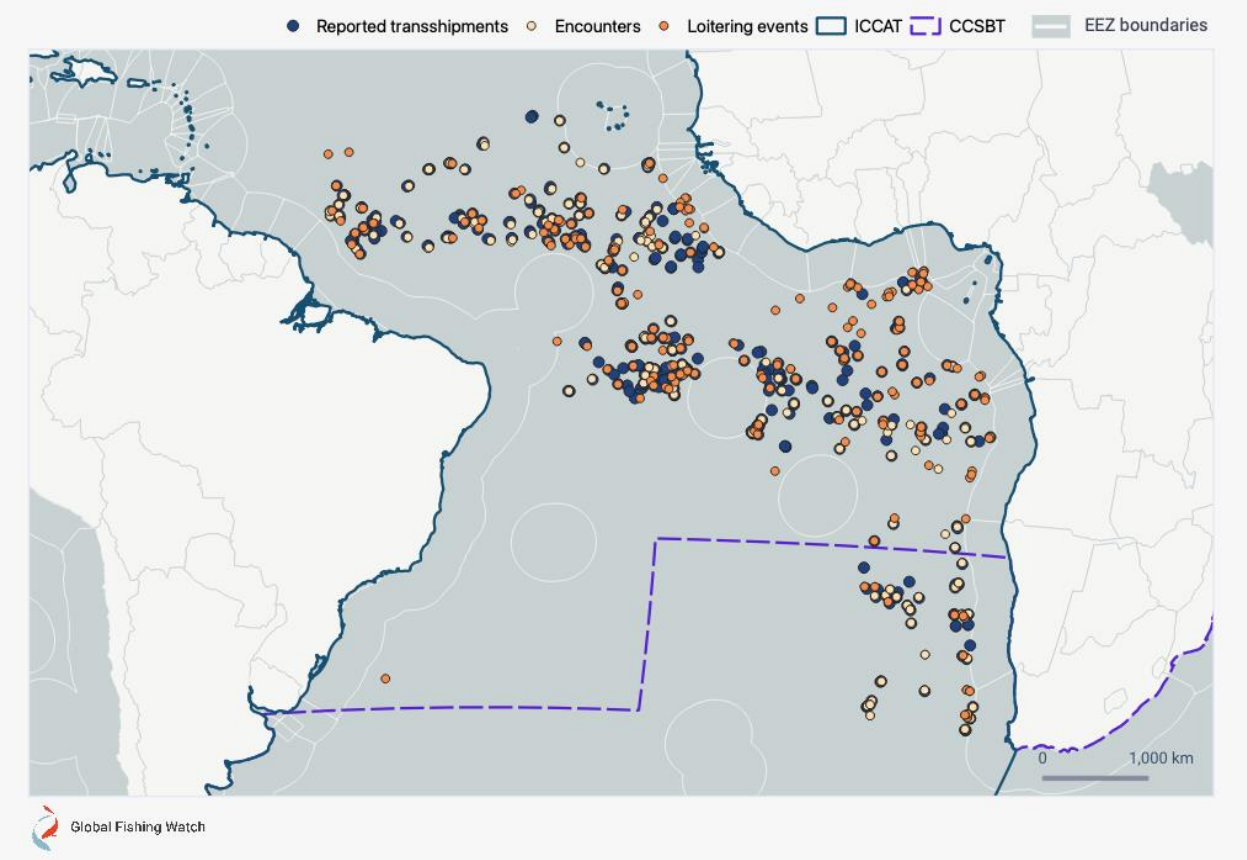

Figure 2. Reported transshipments overlaid with GFW AIS-detected potential transshipments

In general, both ROP data and GFW analysis saw a similar decline of a little over 21% in activity compared to 2018. Across ROP observer reports and GFW AIS analysis, more broadly, there is a trend, showing similar levels of reduced transshipment activity in the IOTC and IATTC between 2018 and 2019. An analysis of transshipment activity in CCSBT and WCPFC in 2019 is forthcoming[3]. The exact reason for the decline is not currently known but may be linked to catches or a shift in fishing operations towards port landings for 2019.

The ICCAT ROP observer reports provided data on 434[4] total fish-related transshipments between carrier vessels and LSTLVs in 2019. These transshipments occurred during 15 monitored ROP deployments within the ICCAT Convention Area[5]. Based on AIS data, GFW identified approximately 370 potential transshipment events, made up of 166 encounters and 204 separate loitering events (Figure 2), of which 83.5% (309) occurred during the 15 ROP authorized deployments (Figure 4). Of those, 193 AIS detected transshipment events were matched with reported transshipments using geolocation data (Figure 3). Overall, the AIS events matched closely with ROP reported transshipment data (see Figure 2).

ICCAT's ROP transshipment data, which allowed for a comparison of AIS-detected transshipment activity to ROP reported transshipments, demonstrate the utility of AIS as a supplemental tool to investigate and corroborate reported transshipment activity, especially in the ICCAT Convention Area. Improved standardization of reported location and time of transshipments by ICCAT, including more clarity on when geolocation information is collected during transshipment events, and information on all vessels involved in transshipment activity, including fishing vessels, would improve GFW's capacity to match ROP transshipment data to AIS. A centralized VMS measure within ICCAT for all authorized vessels, including carriers, would further ensure that all vessels are transmitting their location to the relevant authorities, and all reported activity can be validated.

Comparison of ROP Reported Transshipments to AIS Data

Comparing the ROP reported information on transshipments with the possible AIS-detected transshipment events creates three categories:

1. Transshipments reported by the ROP but not detected on AIS
2. Transshipment events that match between the AIS-detected and ROP reported data
3. Potential transshipment activity detected on AIS but not reported by the ROP.

This report focuses on categories 1 and 3. Category 1 can result from a lack of AIS data at the time, differences in data resolution and reporting between GFW and the ICCAT ROP, or in certain cases a possible misreporting of a transshipment location and time by the ROP.

[3] All five 2019 RFMO Transshipment Reports, once completed, will be available at https://globalfishingwatch.org/rfmo-transshipment/

[4] Reported transshipment data is taken from the ICCAT Observer Report (found here https://www.iccat.int/en/ROP.html) which provides geolocation data and specifies which reported transshipments are fish related.

[5] https://www.iccat.int/com2020/FRA/PWG_402_FRA_rev.pdf

Category 3 can indicate possible non-reporting of a transshipment if the vessel's behavior is consistent with that of a vessel engaged in transshipment activity at sea.

Transshipments reported by the ROP but not detected by AIS analysis

All 15 ROP reported deployments were reflected in activity detected by the AIS analysis, meaning the carrier vessel was observable on AIS with encounter events with a LSTLV or a loitering event longer than 4 hours inside the ICCAT Convention Area. All AIS-detected encounters with LSTLVs were conducted during carrier vessel trips which were reported by the ICCAT ROP in 2019. The ROP reported six voyages by Liberian flagged vessels in 2019, three by Japanese flagged vessels, and six by Panamanian flagged vessels (Figure 4A). These carriers represent the same flag States with reported transshipments in 2018.

The detailed observed transshipment data provided in the 2019 ROP report allows for a closer comparison between the two data sources, down to individual ROP observed events. Using vessel ship name, geolocation, and transshipment data from the ROP reports, 62.5% of the total GFW detected encounters and loitering events were matched to ROP events (Figure 3).

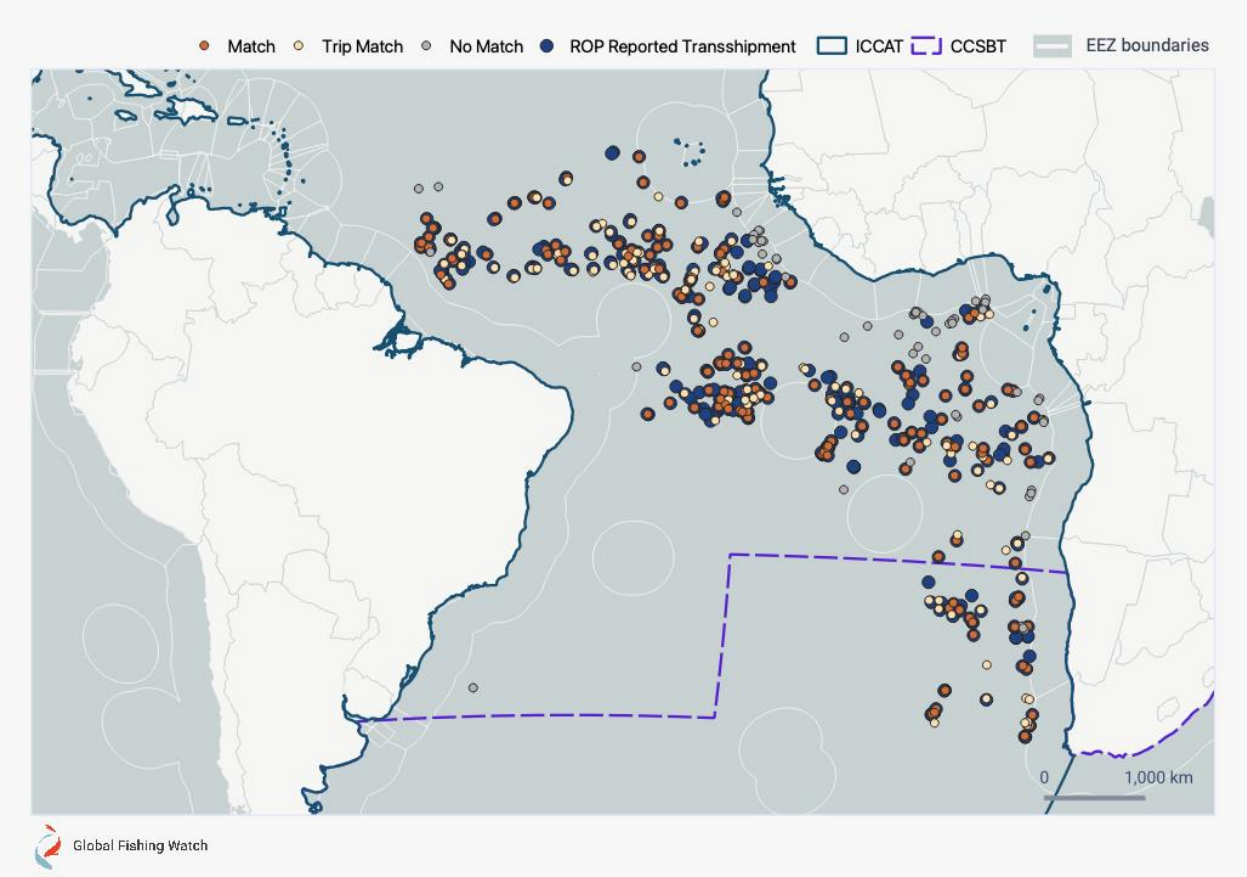

Figure 3. Reported transshipments overlaid with AIS-detected encounter and loitering events.

An AIS-detected event is considered “matched” when the time and location of the event is overlapping or occurring spatially and temporally close enough[6] to an ROP reported transshipment to be considered a likely match. A “trip match” occurs when a GFW detected transshipment occurs during an ROP authorized deployment but is not spatially or temporally close enough to an ROP transshipment event to be matched to a specific ROP reported transshipment. “No Match” indicates the AIS-detected event did not occur during an ROP authorized deployment.

The trip matching rate between the two data sources varied between carrier flag States (see Figure 4). For Liberia and Panama, the trip matching rate was 85% and 69% respectively, however for Japan the trip match rate was just over half matched (Figure 4). GFWs experience with other RFMOs suggests that detailed geolocation data which are included in the ROP reports facilitate compliance checks using vessel tracking data sources; timely reporting of these data would support more robust monitoring by flag States and port States.

Figure 4. A. Reported Transshipments by Carrier Flag State. B. GFW AIS-Detected Potential Transshipments by Carrier Flag State Overlapping with ROP Deployment[7]. *Note: bubbles represent unique carrier vessels while numbers inside the bubble indicate the number of detected transshipments*

[6] A matched encounter is defined as an encounter event within 12 hours and 10 kilometers of a reported transshipment event. A matched loitering event is defined as within 12 hours and 5 kilometers of a reported transshipment event. The matching algorithm is stricter as loitering events are less well defined than encounter events. For the purposes of this report only reported ROP at-sea transshipments of fish were matched to AIS-detected data.

[7] The 309 potential transshipment events detected on AIS which occurred during ROP reported deployments. The 61 potential transshipment events (all loitering) which were detected on AIS but did not occur during ROP reported deployments are not included in Figure 5B.

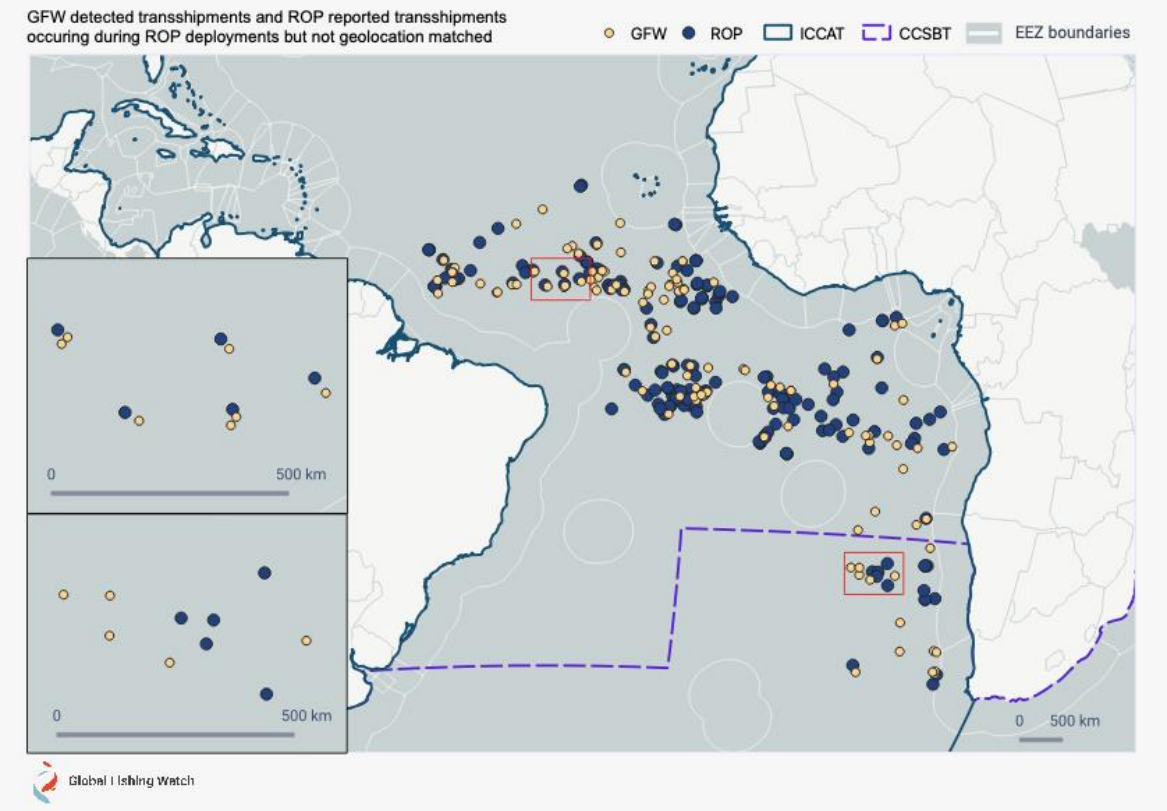

Figure 5. Reported transshipments overlaid with GFW AIS-Detected encounter and loitering events occurring during ROP authorized deployment but not geolocation matched.

AIS-detected events and reported transshipments may not match for a number of reasons. ROP reported transshipments provide geolocation data and the transshipment date at a lower resolution as compared to GFW data (for example, see Figure 5). It is also unclear if geolocation data provided by the ROP is for the beginning or end of a transshipment, and there is no specification of what time during the date of the transshipment the activity occurs. A gap in AIS positions caused by a system being switched off or a satellite reception issue can also cause a transshipment to be missed by the AIS analysis (see Annex 1). To ensure the most accurate cross validation of reported information, it is critical to provide a detailed spatial and temporal resolution of transshipment location information and to standardize the transshipment and vessel identity metadata required from the ROP.

Potential transshipment activity observable on AIS but not reported by the ROP

GFW found 100% of the AIS-detected encounters and 70% of the AIS-detected loitering events occurred by carriers during ROP authorized deployments. Within the geographic extent of the analysis, there were 61 AIS-detected events (all loitering events) associated with 29 different carrier vessels which were not matched to ROP authorized deployments (Figure 6; Figure 7). These events highlight the risk of potential transshipment activity going unreported to the Commission and should be investigated further by the carriers' flag States and the Secretariat.

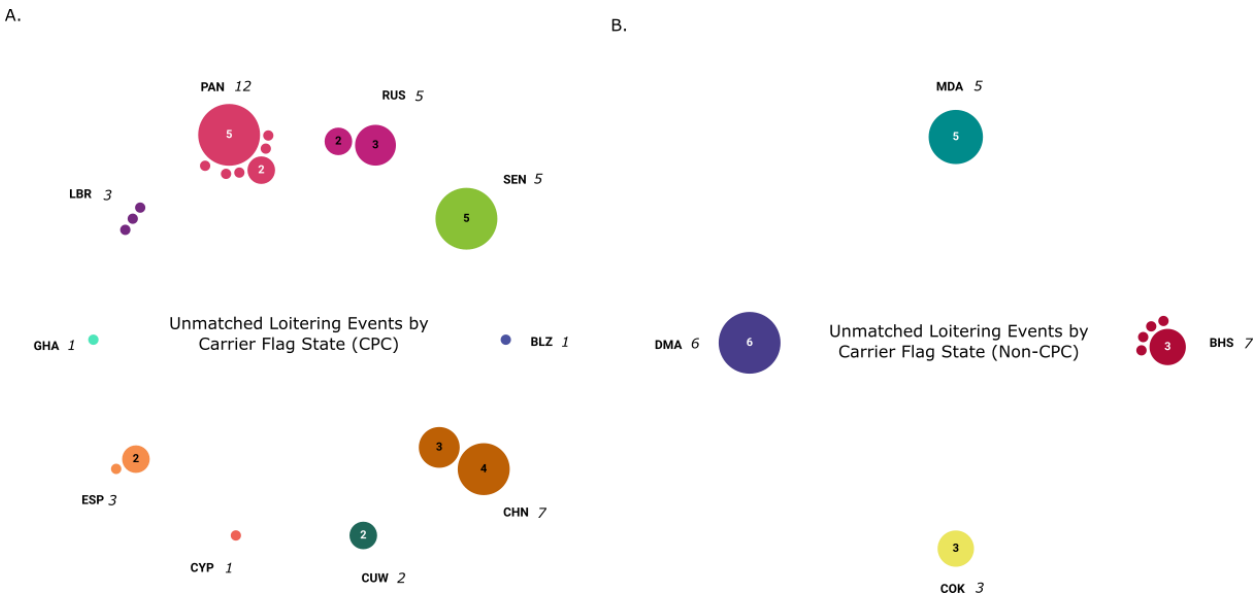

Figure 6. A. GFW AIS-Detected Loitering Events by CPC Carrier Flag State Not Overlapping with ROP Deployment. B. GFW AIS-Detected Loitering Events by non-CPC Carrier Flag State Not Overlapping with ROP Deployment. *Note: bubbles represent unique carrier vessels while numbers inside the bubble indicate the number of detected transshipments.*

Two-thirds of unmatched AIS-detected activity occurred by carriers flagged to CPC member States. Panamanian-flagged carriers represented one-fifth of the unmatched events (Figure 6A). Of unmatched events by non-CPC flagged carriers, the Bahamas was the most active (Figure 6B).

Collectively, unmatched AIS-detected loitering events by non-CPC carriers represented 5.7% of all AIS-detected transshipments (21 of 370 events). Nearly all unmatched loitering events by non-CPC carriers tended to occur in the East Atlantic, close to the boundaries of West African coastal States EEZs (Figure 7).

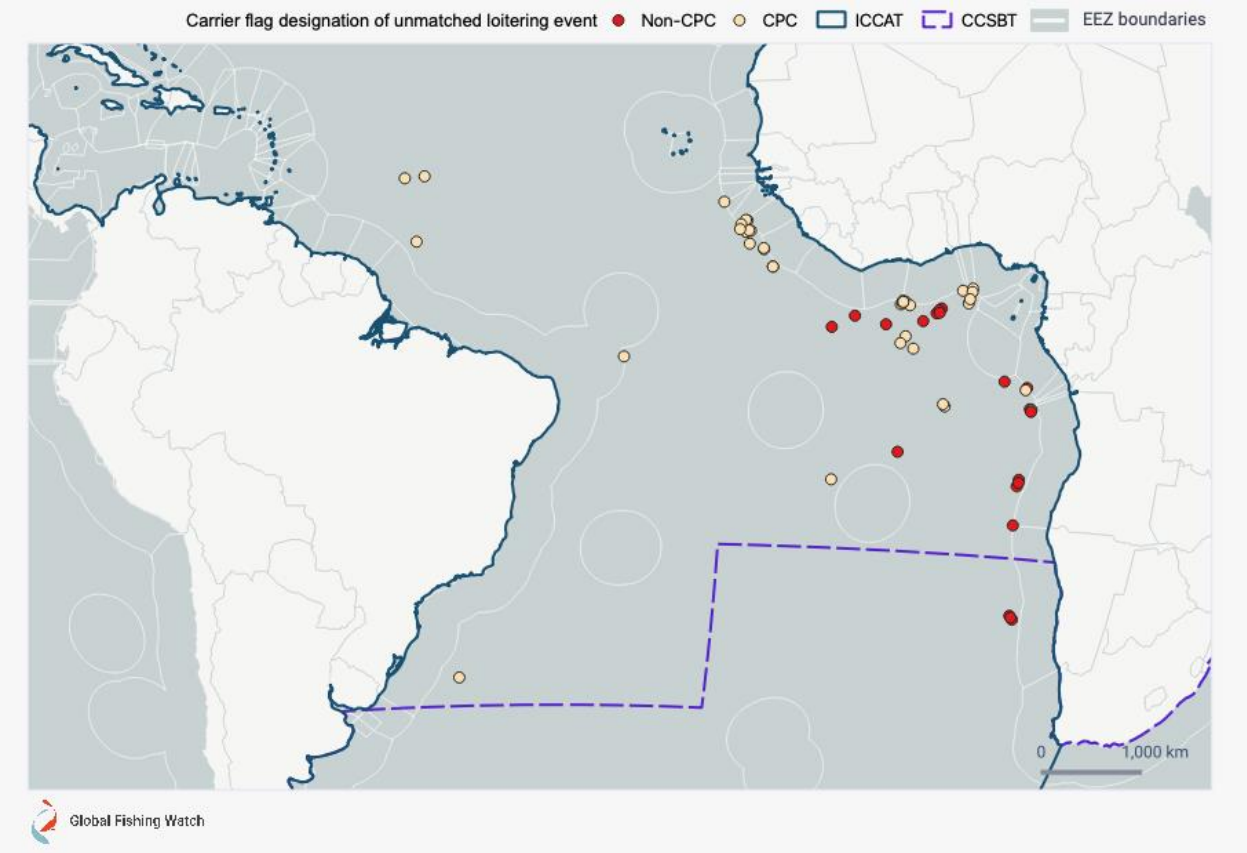

Figure 7. GFW detected loitering events not matched to ROP Deployments in 2019 colored by if carrier flag State is CPC or Non-CPC

Loitering events do not provide information on vessels interacting with carriers[8], and thus there is no way to know what activities potential fishing vessels engaged in before these (and all other) detected loitering events. However, GFW did analyze fishing activity prior to encounters along West African EEZs in 2018[9] and found longline vessels spent time fishing within West African EEZs, and then encountered carriers after, on the high seas. Given the fishing activity observed before encounters in the same area in 2018, it is of concern that non-CPC flagged carriers could be transshipping with fishing vessels that are not transmitting on AIS, and further, based on historic activity, could have likely been fishing in West African coastal waters prior to meeting up on the high seas. If such interactions are occurring, there is a high risk of catch going unmonitored and unreported. **West African member States may wish to consider increased oversight of transshipment activity conducted just outside their national waters through improvements to the current transshipment regulation at ICCAT to ensure that transfers of fish caught within EEZs are being properly monitored and reported to relevant authorities in near real time.**

[8] See Annex 1 for description of 'dark' vessels, or vessels which do not appear on AIS
[9] See page 17, Figure 10 https://globalfishingwatch.org/wp-content/uploads/ICCAT_2018.pdf

It is also possible some of these loitering events may be linked to vessels stopping for reasons other than carrying out transshipments of fish, including waiting to enter piracy high risk areas or awaiting orders from an operator. The vessel's movements can indicate the likely activity, including the potential risk of unauthorized transshipments that warrant further investigation by the flag or coastal State. Figure 8 provides an example of a Moldovan carrier that travels south from Gulf of Guinea ports to the high seas off Angola with multiple loitering events at sea. If this was transshipment activity the donor vessel was not transmitting AIS, and its identity or target species is unknown. It is recommended that in cases like this, investigations are conducted to determine the activity of the vessels and the risk of unauthorized transshipment of ICCAT species. AIS can complement existing monitoring control and surveillance tools to help identify potential cases where further investigation is required.

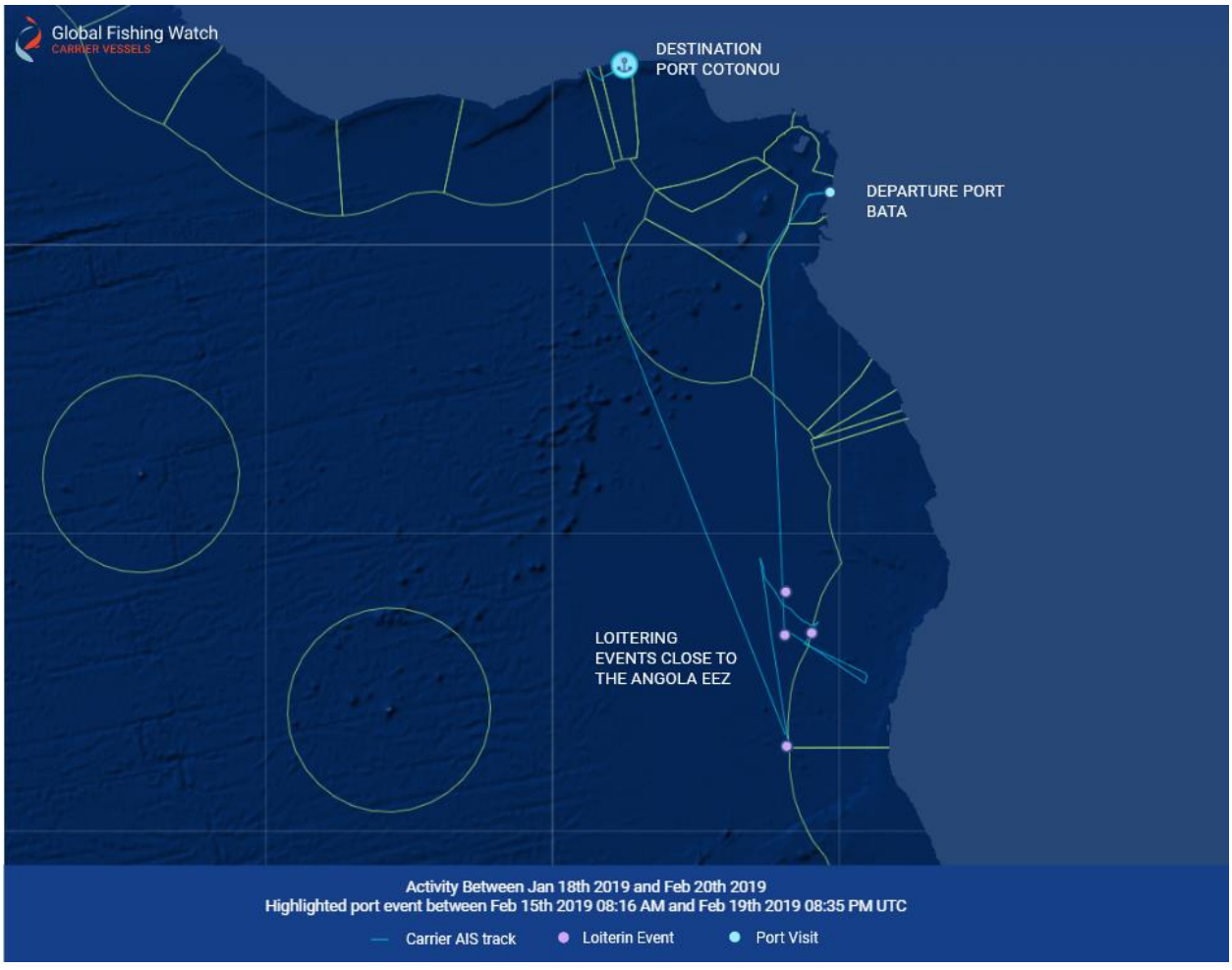

Figure 8. AIS track of a Moldovan carrier in 2019 showing a 1 month voyage with multiple loitering events close to the Angolan EEZ. The voyage started and ended in ports in the Gulf of Guinea (the destination port is unclear due to a gap in the AIS data, the vessel may have first visited Lomé, Togo before Cotonou, Benin).

The algorithms used, to detect potential transshipments based on AIS data and match them to reported data sources, are constantly being improved, as is satellite coverage. Additional steps that could be made by ICCAT CPCs to improve the transparency and validation of reported transshipment information would be providing more information regarding authorized transshipments, including the identity of all vessels involved[10]. ICCAT CPCs could also strengthen AIS requirements for their fishing fleets, either regionally through ICCAT CMMs agreed by the members, as is the case of the Forum Fisheries Agency (FFA) regional vessel register or Vessels in Good Standing List or at the national level as is the case of the European Union members, United States and Canada, who regulate AIS use for their fishing vessels operating beyond national waters.

Port Visits

ICCAT Recommendation 18-09 on Port State Measures outlines minimum inspection requirements for foreign flagged vessels entering CPC ports, including carriers entering port after engaging in transshipments on the high seas. This Recommendation is closely aligned with the UN Food and Agriculture Organization's (FAO) Port State Measures Agreement (PSMA), and requires CPCs to designate ports of entry (DPE) for foreign flagged vessel entry. Although the level of oversight with PSMA port States may be similar, CPCs could lose oversight of ICCAT-managed species when vessels enter ports that are not ICCAT designated ports and not CPC ports after ICCAT related transshipment or fishing activity. However, if Recommendation 18-09 is fully implemented and the port States have capacity to enforce management measures, carriers entering ICCAT DPEs after engaging in transshipments have a lower risk of noncompliant activity going undetected.

Only four ports were visited after carrier trips with AIS-detected encounters– Porto Grande, Cape Town, Colon, and Port Louis. Porto Grande, Cape Town, and Colon are ICCAT DPE's. While Port Louis is not an ICCAT DPE, it is the primary port in Mauritius – a country which is party to the PSMA – and therefore likely to be the focus of any PSMs that take place in this State. As all carriers involved in port visits to Port Louis were flagged to CPCs and these port visits occurred after identified encounters during ROP deployments, this activity is exemplary of low risk activity that is controlled and monitored through these MCS measures.

Similar to 2018, Porto Grande and Cape Town remain the two most frequented ports (Figure 9), with a noticeable increase in visits to Cape Town during 2019. As discussed in both the 2017 and in the 2018 reports, Porto Grande is one of the global ports which serves as a stopover by carriers during longer voyages, similar to Port Louis, Mauritius, Colon in Panama or Cape Town in South Africa. The activity in these ports highlights the importance of information exchange between countries whose ports are frequented by carrier vessels which may or may not be embarking or disembarking fish or fish products. In particular, the importance of advance entry

[10] The quantities transshipped by specific vessels is commercial information and would not be expected in public reports however the identification of vessels with authorized transshipment with geospatial and temporal data would support greater transparency and validation of transshipment activity.

into port reporting requirements for carrier vessels before they offload their cargo for verification and cross-checking by the various port authorities.

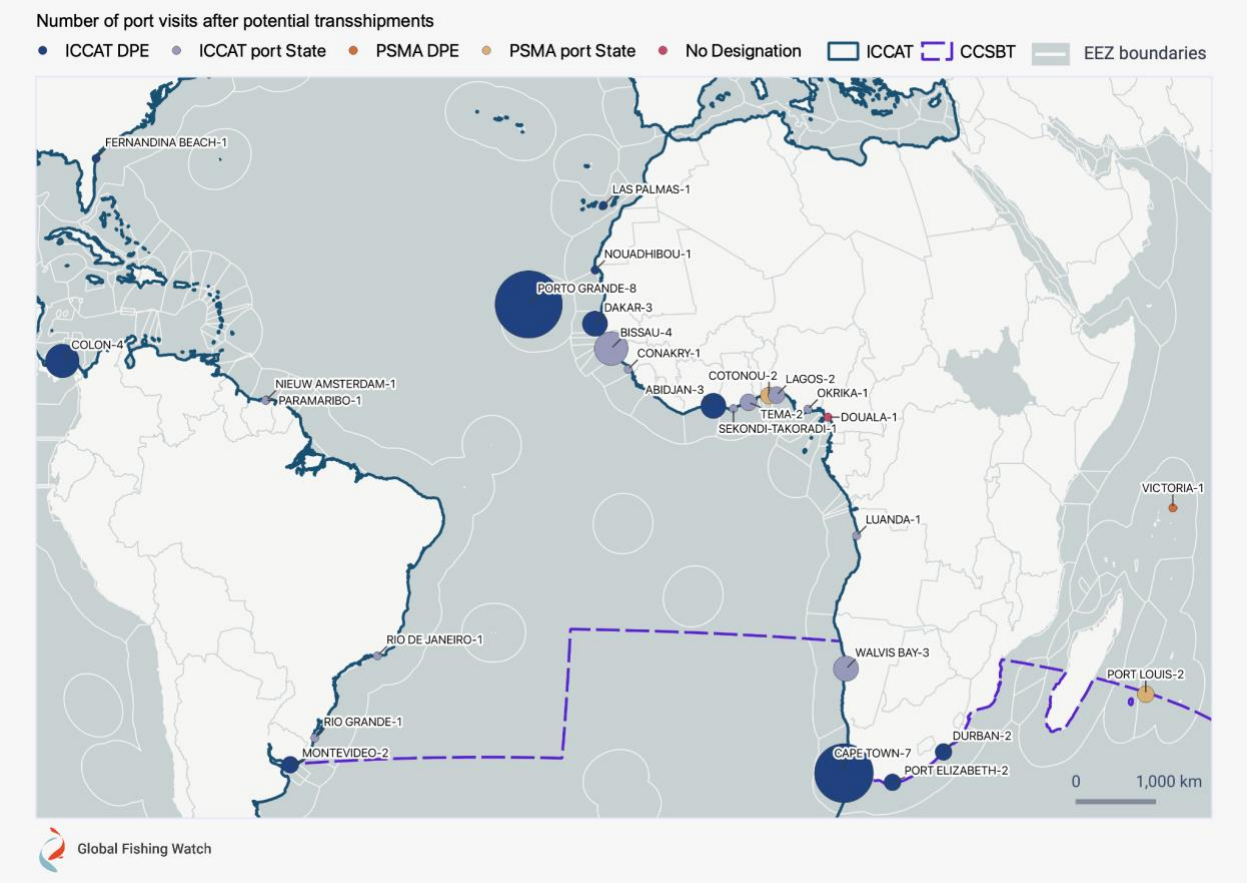

Figure 9. Count of port visits by carriers after potential transshipment events on the high seas in the ICCAT Convention Area.

There were eight CPC port States visited after AIS-detected loitering events which were not designated for entry under ICCAT's Port State Measures; namely Angola, Brazil, Ghana, Guinea, Guinea-Bissau, Nigeria, Namibia, and Suriname (Figure 9). Walvis Bay, Namibia, Sekondi-Takoradi and Tema in Ghana, and Paramaribo and Nieuw Amsterdam in Suriname have now been designated for entry. Like Suriname, neither Guinea-Bissau nor Nigeria are party to the PSMA, and therefore, ensuring no IUU caught fish enters these ports relies on proper implementation of Recommendation 18-09. **Port State CPCs should consider designating their ports for entry for tuna and tuna-like species under both ICCAT regulations and through the PSMA to ensure effective monitoring and control of landing of ICCAT managed species, and to prevent IUU sourced catch from entering the supply chain.**

Port visits after AIS-detected events not matched to ROP deployment data by carriers flagged to non-member States

Transshipments conducted by non-members that may have gone unreported to the ROP pose a double risk to ICCAT and to coastal States, as this activity, if related to the transfer of ICCAT or domestic managed catch, undermines the management of those fish stocks. GFW further investigated the ports visited after the 21 non-ROP detected loitering events by carriers flagged to non-members (Figure 10).

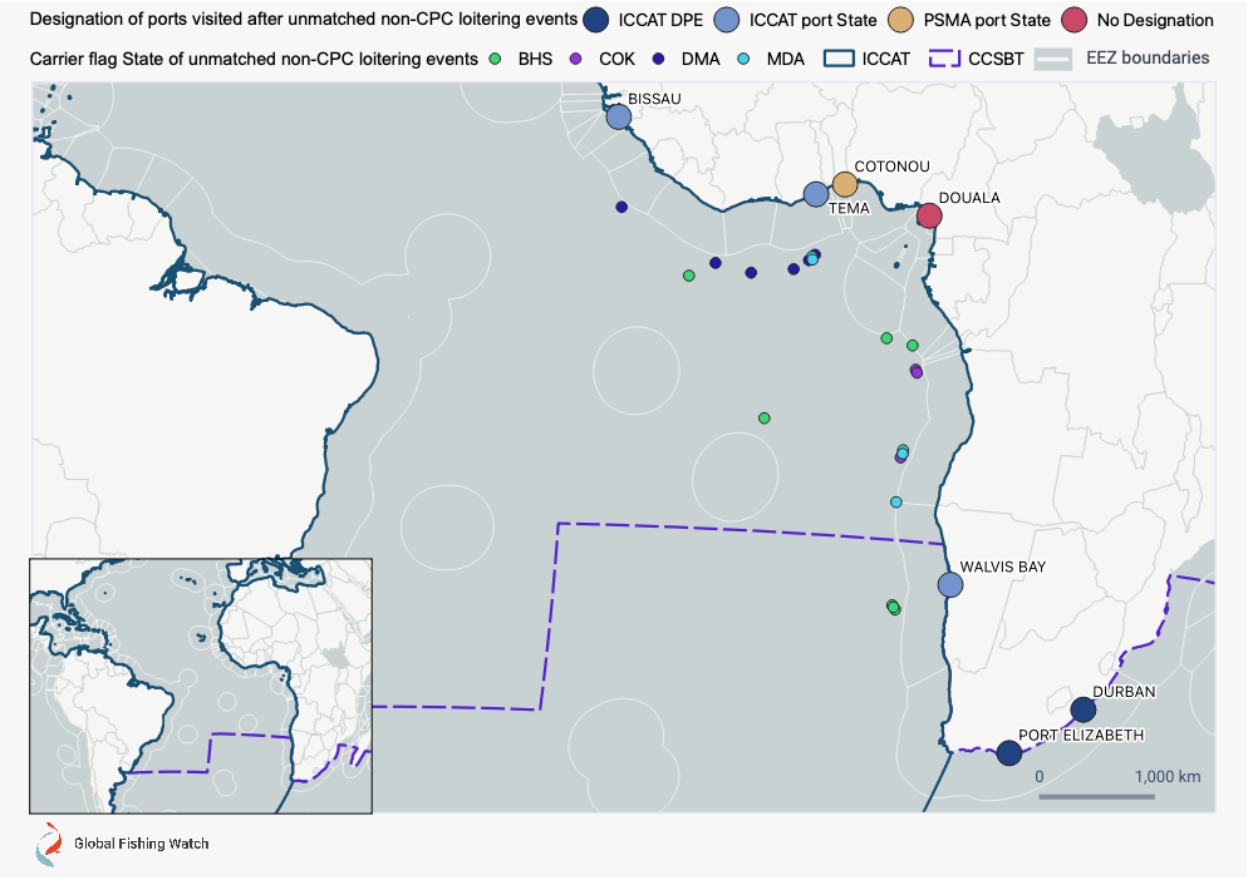

Figure 10. GFW detected loitering events by non-CPC flagged carriers and the ports visited after detected activity in 2019.

For six of these events, the carriers visited ICCAT DPE's thus suggesting a measure of oversight. The remaining 15 non-ROP detected loitering events occurred prior to a total of eight visits to five non-designated[11] ports (Figure 10). Of the port visits to non-CPC DPE's, three ports (Bissau, Tema, and Walvis Bay) were in CPC port States, and one port was in a PSMA port State (Cotonou). Douala, Cameroon was the only port visited in 2019 to a country neither being a member of ICCAT nor being a party to the PSMA (Figure 10).

[11] Visits to ports that are not ICCAT DPE

Conclusion and Recommendations

This analysis highlights the complicated nature of managing transshipment at-sea within the ICCAT Convention Area. Transshipment is a complex practice, though thorough observer reports, and high levels of oversight make management of the practice more effective. Strengthening existing measures and efforts, such as requiring consistent reporting methods by observers, or implementing a centralized VMS, allows management officials to more accurately and consistently verify authorized activity reported by CPCs, and thus effectively govern the activity of carrier vessels in the Convention Area. Additionally, carriers entering ports not designated for entry by foreign fleets increases the risk of ICCAT-managed species entering port without proper port controls or inspection schemes. In response to these findings, ICCAT should consider the following recommendations:

Finding	Recommendations for ICCAT
AIS data captured trends reported by ICCAT ROP and captured additional information on transshipment hotspots in overlapping RFMOs	Implement a centralized VMS to ensure ability to audit and validate reported information provided by CPCs. In the absence of a centralized VMS program, use AIS as a supplemental tool to help monitor implementation of the ROP and validate transshipment activity. AIS use could be implemented through a CMM that encourages members to mandate AIS use for distant water vessels and have minimum standards on the implementation of SOLAS Chapter V Regulation 19[12].
ICCAT has one of the most transparent carrier vessel ROPs of all tuna RFMOs, though reported information can be inconsistent. 61 loitering events were detected that were not reported on ROP deployments, 21 of these events by non-CPC Carrier vessels	Standardize the amount and type of information required from the ROP to a detailed spatial and temporal resolution, and ensure consistency in reported information and metadata. The Secretariat and Member States are encouraged to investigate potential transshipment activity which was not reported on by the ROP. Amend the CMM to only permit transshipment by carriers flagged to CPCs.
All port visits after encounters were to Porto Grande, Cape Verde, and Cape Town, South	Ensure compliance with General Recommendation 18-09 on Port State Measures requiring use of ICCAT

[12] https://www.liscr.com/sites/default/files/SOLAS%20V_Reg19.pdf

Africa. However, seven port States were visited after loitering events that were not designated ports by ICCAT 15 non-ROP detected loitering events occurred prior to eight visits to five non-designated ports	designated ports by carriers when carrying transshipped catch that originated in the ICCAT Convention Area. Encourage port authorities in non-CPC port States to share landing declarations at ports used by carriers when landing ICCAT caught species. Require the next port of entry to be identified after transshipments.

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Annex 1. Detailed Methodology

AIS-based data methods

Carriers registered over 300 gross tons and on international voyages are already required to broadcast on Automatic Identification System (AIS), as mandated by the International Maritime Organization (IMO) (IMO 2015). Although the use of AIS is not globally mandated for fishing vessels, AIS used in fishing fleets is increasing with a growing number of flag and coastal States mandating its use through their own national or regional fisheries regulations. AIS devices broadcast the location of a vessel along with other information, including identity, course and speed. This makes the use of AIS, and its subsequent analysis, very useful in understanding fishing activity that can be used to support and complement existing national and RFMO Monitoring, Control and Surveillance (MCS) programs. This is especially true as AIS can provide a greater insight of fishing vessel activities, especially when these interactions involve vessels of differing flag States where VMS data is not publicly available or readily shared between authorities.

The Carrier Vessel Portal (CVP) is established using GFW datasets developed from AIS data. The CVP uses the same datasets used in the 2019 transshipment reports (https://globalfishingwatch.org/rfmo-transshipment/), including possible transshipment events defined as encounter and loitering events, port visits by carrier vessels, vessel identity information broadcast from AIS, and publicly available vessel registry data. While datasets used in this report match the CVP, this analysis added a number of additional constraints to the potential transshipment events analyzed (geographic area of interest, minimum and maximum restrictions on loitering events) and thus the CVP data must be filtered to match these constraints.

GFW uses publicly broadcasted AIS data to estimate vessel information and vessel activity, including fishing, encounters and loitering events. Encounters, where two vessels meet at-sea, may indicate possible transshipment activity between two vessels. Vessel encounters are defined when two vessels are within 500 meters of each other for at least 2 hours and traveling at < 2 knots, while at least 10 kilometers from a coastal anchorage (Miller et al. 2018). Whereas, vessel loitering is when a carrier vessel travelled at speeds of < 2 knots for at least 4 hours, while at least 20 nautical miles from shore (see Miller et al. 2018 for original methodology, however the original minimum of 8 hours has been changed to 4 hours for the purposes of this study).

Loitering by a single carrier vessel where the carrier vessel exhibits behavior consistent with encountering another vessel at-sea, but no second vessel is visible on AIS, may also indicate a possible transshipment event but where there is no AIS data for the second vessel, also known as a ‘dark vessel’ (Figure A1). Loitering events may indicate a possible encounter for which data is lacking for the second vessel, possibly due to lack of AIS transmission, poor satellite coverage, or the size of the second vessel (INTERPOL 2014).

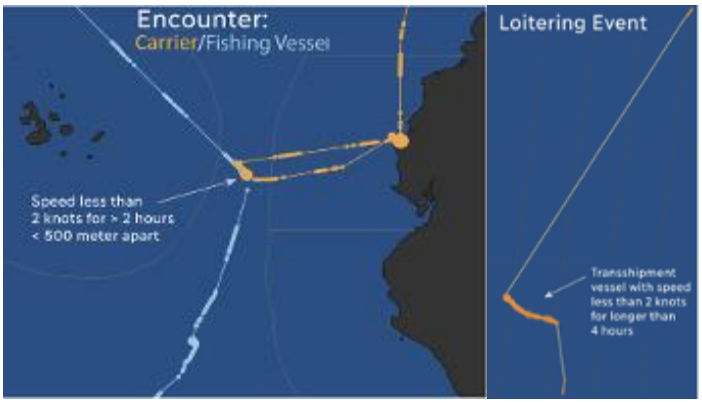

Figure A1 - Examples of vessel tracks during typical 'Encounter' where two vessels meet at-sea and 'Loitering' events where a carrier vessel (referred to as transshipment vessel) has behavior consistent with encountering an LSTLV at-sea but no LSTLV is visible on AIS

The GFW database also contains an estimate of port visits conducted by carriers. GFW defines ports as any 0.5-kilometer grid cell with 20 or more unique vessels stationary for greater than 12 hours. A port visit includes the port entry and exit of a vessel if the vessel stops. A vessel "enters" port when it is within 3 kilometers of a GFW-defined port. A vessel has 'stopped' when it has entered port and slowed to a speed of 0.2 knots and has started movement again when it moves over 0.5 knots. A vessel "exits" port when it is at least 4 kilometers away from the previously entered port. Note, for the purposes of this analysis any port visits that had a duration of less than 3 hours were removed from the data. Port stops can vary in duration from less than an hour to multiple weeks. Generally, very short port stops, as defined by GFW, may be intermediate ports a vessel stops at before entering a port to conduct activities of interest to this report, such as offloading of catch. Therefore, in an attempt to exclude intermediate ports, this analysis excluded port visits of less than 3 hours, so that all voyages ended at ports where the carrier vessels remained for at least 3 hours.

The carrier and fishing vessels analyzed in this report were chosen based on the GFW database of fishing and carriers. The fishing database is defined in Kroodsma et al. (2018) and includes fishing vessels based on registry database information or as defined by a convolutional neural network (Kroodsma et al. 2018). Fishing vessels capable of fishing tuna were defined by the GFW vessel classification using known registry information in combination with a convolutional neural network used to estimate vessel class (network described in Kroodsma et al. 2018). The carrier database is defined in Miller et al. (2018) and was curated using International Telecommunication Union and major RFMOs, vessel movement patterns based on AIS, a convolutional neural network used to estimate vessel class (see Kroodsma et al. 2018) and the International Maritime Organization (IMO) unique identifier.

For the purposes of the ICCAT 2019 transshipment analysis the possible transshipment events were restricted to those most likely to be relevant for the analysis. Because the ICCAT transshipment resolution focuses on LSTLVs, any encounters involving fishing vessels not identified as longlines were removed from the analysis and loitering events that occurred above 16 degrees latitude and below -34 degrees latitude were removed from the analysis as well. In

addition loitering events were restricted to those that are <= 24 hours in duration, due to a finding from the 2017 transshipment reports (for example see section 4.6 in the 2017 ICCAT report) that these loitering events are more likely to indicate possible transshipment activity.

Vessel authorization was established by using the publicly available vessel registry produced by ICCAT[13] and CCSBT[14], along with the ICCAT Observer Reports[15]. If a carrier or fishing vessel was listed as 'authorized' on any of the public registries during an encounter or loitering event the event was considered 'authorized'. However, if a vessel was not authorized on one of the three registries during the time period of an encounter or loitering event the authorization status is unknown. The ability to determine vessel authorization is largely dependent on the accuracy and comprehensiveness of the public registries, as well as the vessel information (name, MMSI, IMO, callsign) transmitted on AIS by the vessel and used by GFW.

Data caveats

The analysis presented in this report relies on commercially available AIS data and publicly available information. Therefore, the AIS data is limited by those vessels that transmit AIS data and do so by providing accurate vessel identity information. Low satellite coverage or high-density areas can also limit AIS data usefulness, although the ICCAT Convention Area has relatively strong Class-A AIS reception with the exception of the Gulf of Mexico, parts of Europe outside the range of terrestrial receivers along the coast, and parts of the southern Atlantic Ocean (see Taconet, Kroodsma, and Fernandes 2019). AIS data tends to be sparser and more limited for vessels equipped with Class-B AIS devices (Kroodsma et al. 2018). For further analysis of GFW AIS data quality in the Atlantic Ocean refer to: Taconet, Kroodsma, and Fernandes 2019. AIS device class often depends on flag State regulations, vessel length, and vessel purpose. Because of the limitations of AIS data, lack of complete and accurate public vessel databases and registries, and limitations of modelling estimations, the AIS detected encounter, and loitering data are represented as accurate as possible but should be considered restrained estimates based on these limitations (see Kroodsma et al. 2018, Miller et al. 2018, and https://globalfishingwatch.org/ for further discussion).

[13] https://www.iccat.int/en/VesselsRecord.asp
[14] https://www.ccsbt.org/en/content/ccsbt-record-authorised-vessels
[15] https://www.iccat.int/en/ROP.html