



Global Fishing Watch

**A Comparative Analysis of AIS Data with the
Inter-American Tropical Tuna Commission Reported
Transshipment Activity in 2019**

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 RFMO's, including 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.

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List of Acronyms

AIS – Automatic Identification System
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
IATTC – Inter-American Tropical Tuna Commission
ICCAT – International Commission for the Conservation of Atlantic Tunas
IOTC – Indian Ocean Tuna Commission
IUU – Illegal, Unreported, Unregulated
LSTLV – Large-Scale Tuna Longline Vessels
MCS – Monitoring, Control and Surveillance
MoU – Memorandum of Understanding
NPFC – North Pacific Fisheries Commission
PSMA – Port State Measures Agreement
RFMO – Regional Fisheries Management Organization
ROP – Regional Observer Program
SPRFMO – South Pacific Regional Fisheries Management Organization
WCPFC – Western and Central Pacific Fisheries Commission
VMS – Vessel Monitoring System

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

The Inter-American Tropical Tuna Commission (IATTC) oversees the capture, transfer, and landing of tuna and tuna-like species in the eastern Pacific Ocean. IATTC [Resolution C-12-07 On Establishing a Program for Transshipments by Large-Scale Fishing Vessels](#) manages transshipment activity within the IATTC Convention Area. Under this resolution, at-sea transshipments of IATTC-managed catch can only be conducted by large-scale tuna longline fishing vessels (LSTLVs) and carrier vessels.

Global Fishing Watch (GFW) reviewed the annual transshipment report from the Regional Observer Program and AIS data from 2019 to compare reported information against observed activity on the high seas. For the past two years, GFW has also used information from the MRAG Americas report to compare against AIS-detected data, but the 2019 MRAG ROP report was unavailable on the IATTC website.

As with other tuna Regional Fisheries Management Organizations (RFMOs) – IATTC saw a decrease in observed activity by carrier vessels in 2019 compared to 2018. Interestingly, the IATTC-WCPFC overlap area appeared to maintain a stable level of transshipment activity, suggesting the reduction in transshipment activity likely occurred almost entirely outside the overlap area. Additionally, 2019 saw a shift in the most active carrier fleets in the IATTC Convention Area – while Panamanian carriers remained among the most active fleets in 2019, Chinese-flagged carriers were nearly twice as active in 2019 compared to 2018. Notably, encounter events by Chinese-flagged carriers increased, while loitering events by Chinese-flagged carriers decreased from 2018 to 2019, suggesting a possible increase in uptake of AIS by LSTLVs interacting with Chinese carrier vessels. This is a positive step forward in transshipment transparency, and IATTC should encourage other member States to increase the use of AIS by their fishing fleets in the Convention Area. Without consistently available ROP reports and in the absence of a centralized VMS program where tracks from fishing vessels and carrier vessels are in the same system, AIS data can be used by members and the Secretariat to indicate compliance with IATTC measures.

Nearly all of the carrier vessel deployments recorded in the IATTC Secretariat report on the implementation of the Regional Observer Program (ROP) for 2019 (see [CAF-07-03](#) and [Document IATTC-95-07](#)) were matched to GFW's Carrier Vessel Portal (CVP) data. Of the 44 deployments included in the ROP report, GFW detected transshipment activity on AIS during 43 of them and matched 38 of them to transshipment activity in the IATTC Convention Area in 2019. There were five deployments visible in the CVP with AIS-detected transshipment events during the reported deployment, but outside the report scope – either transshipping in the WCPFC Area or in the IATTC Convention Area, but not in the 2019 portion of the deployment. One carrier linked to seven ROP deployments was not visible in the CVP as the carrier vessel conducting the deployment transmitted on AIS under a previous name, not matched to the name included in the ROP Report. The carrier was identified in internal GFW databases using its historical vessel name, and an analysis of the carrier's AIS activity during the deployment dates found the carrier was active in the IATTC Convention Area during all deployments. AIS-detected loitering events were identified on six of the seven deployments and one deployment

did not appear on AIS to have detected transshipment activity. IATTC should ensure vessels transmit and register consistent vessel identify information, historic registry records are public, and reporting requirements for the ROP are strengthened to capture discrepancies in vessel identity records to ensure effective oversight of transshipment on the high-seas, and to ensure no unreported catch of IATTC-managed species enters the supply chain.

IATTC's Convention Area overlaps with that of two other RFMOs: the South Pacific Regional Fisheries Management Organization (SPRFMO) and the Western and Central Pacific Fisheries Commission (WCPFC). SPRFMO manages squid, among other fisheries, such as jack mackerel and hake, in the south Pacific Ocean, while WCPFC manages migratory fish stocks, including tuna and tuna-like species, in the western and central Pacific Ocean. As with previously studied years, AIS data showed a significant level of activity conducted by carriers engaging with LSTLVs in the WCPFC overlap, and with squid jiggers in squid fishing areas in the SPRFMO overlap. IATTC currently has an MoU with SPRFMO, [COMM 8 - Prop 20](#), though it does not have any provisions regarding transshipment. Additionally, IATTC and WCPFC have an [MoU](#), though given the level of activity in the overlap between both RFMOs' Convention Areas, IATTC and WCPFC should consider strengthening the MoU to allow for cross certification of observers onboard carrier vessels (in addition to catching vessels). Updating both MoUs would improve transshipment management efforts in the Pacific and help ensure compliance with each organization's management measures.

Lastly, IATTC is the only tuna RFMO which has yet to adopt a comprehensive port State measure to define minimum inspection requirements by port States landing IATTC-managed catch. It is especially important that IATTC work to adopt and implement a port State Measure as six of the ten ports visited after encounters in the IATTC Convention Area were in States which are not party to the Food and Agriculture Organization of the United Nations (FAO) [Port State Measures Agreement](#) (PSMA). Furthermore, the two most frequently visited ports after detected transshipment activity in the Convention Area are known to be heavily trafficked ports that may act as transition stops (transitory ports): Kaohsiung and Papeete. While Papeete, and French Polynesia more broadly, has relatively strong port inspection standards set through the PSMA, all visits made to this port were by foreign-flagged vessels, which are not held to the same inspection standard as domestic carriers. Conversely, Kaohsiung is located in Chinese Taipei, which is unable to ratify the PSMA as it is not a UN member country, although it must adhere to any RFMO measure related to PSMA where they are recognized as a party to the treaty. IATTC should implement a port State measure that is well aligned with the FAO PSMA to ensure effective port controls when carriers land IATTC-managed catch.

The analysis of 2019 carrier vessel activity indicates that the IATTC transshipment Resolution could be improved in the following ways:

Finding	Recommendation for IATTC
<p>There were discrepancies in transshipment information provided by IATTC ROP and vessel information transmitted on AIS, complicating efforts to analyze or validate reported transshipments. In addition, providing the IATTC report publicly before compliance meetings, consistent with previous years, would ensure accuracy in cross-verifying data.</p>	<p>Develop a CMM that is specific to the use of AIS. Implement through encouraging member States' flagged vessels to enforce SOLAS (Safety of Life at Sea) Chapter V, Regulation 19¹ regarding AIS on vessels of at least 300 gross tonnage and consider requiring it for all distant water vessels</p> <p>Include minimum standards for the implementation of regulations related to AIS that ensures the correct vessel identity is being broadcast by vessels</p> <p>Make historical and current registry records, individual observer reports, and annual transshipment reports from CPCs publicly available to improve transparency of transshipment activity in the Convention Area</p>
<p>A significant amount of the detected carrier activity occurred in the overlap areas with WCPFC and SPRFMO.</p>	<p>Update the MoU with SPRFMO to include a provision specific to transshipments</p> <p>Strengthen the MoU with WCPFC to improve information sharing regarding transshipment activity</p> <p>Ensure training and certification, including cross certification of carrier observers, in both RFMOs</p>
<p>The majority of ports visited after potential transshipment activity are located in IATTC member States, however 6 of the 10 ports visited by carriers after potential transshipments were in countries which are not party to the PSMA.</p> <p>Four ports visited after potential transshipment activity were within non-member States.</p>	<p>Adopt a measure on minimum port inspection standards, in line with the minimum standards for port inspections included within the FAO PSMA</p> <p>Ensure effective information sharing with non-member States to ensure port landing information is shared with the Secretariat</p>

¹ https://www.lisr.com/sites/default/files/SOLAS%20V_Reg19.pdf

Activity Overview

Global Fishing Watch analyzed AIS data from calendar year 2019 and detected 941 encounters in the IATTC Convention Area between carrier vessels and fishing vessels on the high seas (Figure 1). Additionally, 1,514 loitering events by carrier vessels not matched to encounter events² were detected.

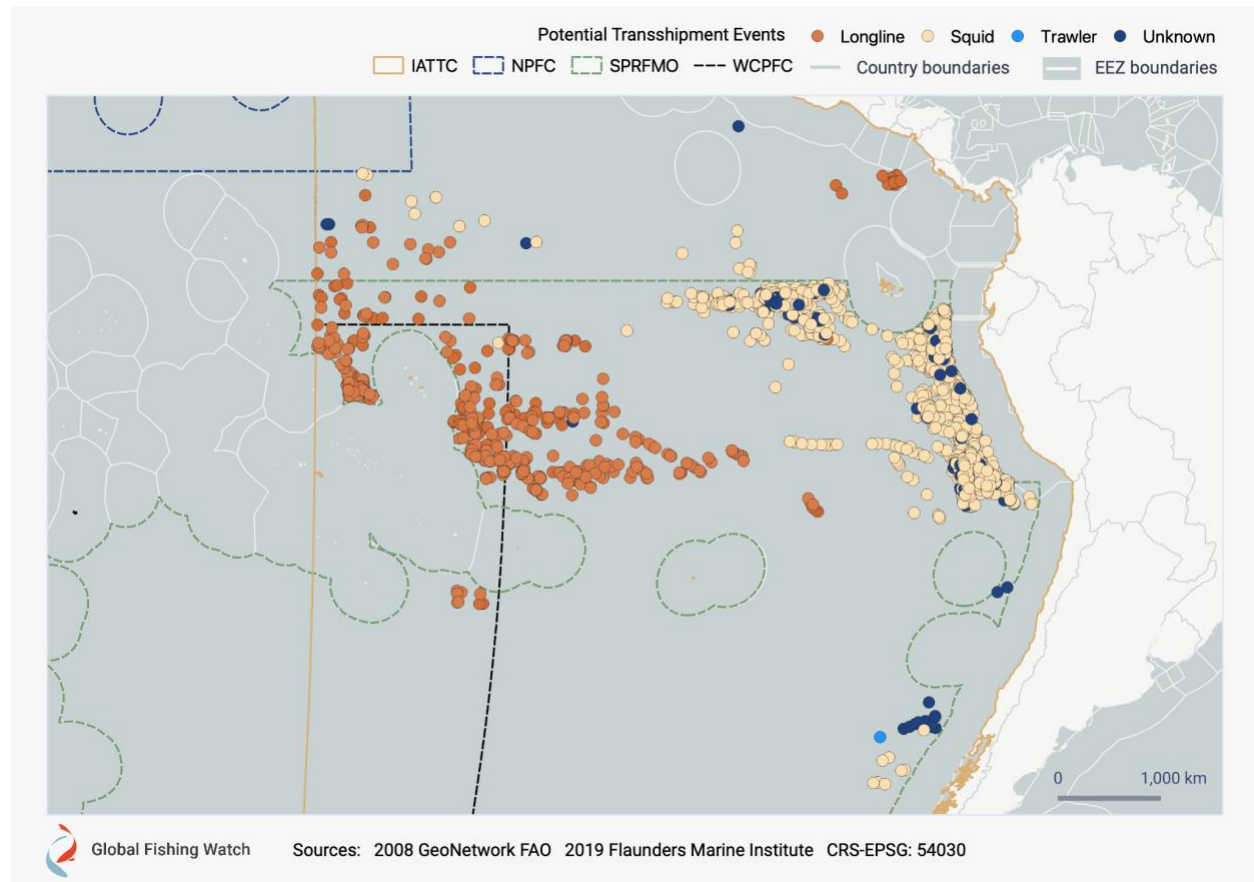


Figure 1. AIS-detected potential transshipment events (encounter and loitering events) in the IATTC high seas by likely fishery³.

² Due to the definition of encounter and loitering events, loitering events can overlap with encounter events. To determine the total number of possible transshipment events, the two event type totals were not simply summed. Any loitering event that overlapped in time with an encounter event by the same vessel, or was within 4 hours of an encounter event, was removed from the total count (see Annex 1).

³ Unknown events occur if registry information is unavailable or inconsistent with vessel activity identified by the neural net fishing classification algorithm (See methods annex). In encounters this occurs when (1) there is a discrepancy between fishing vessel registry information and gear type as identified by the neural net OR (2) there is no registry information on the fishing vessel and the neural net does not detect a predominant gear type behavior and thus cannot assign a vessel type. In loitering events, unknown events occur when the carrier is not on the IATTC carrier registry and the carrier vessel does not have a history of encounters with known fishing vessel types.

A third of all detected encounters in the IATTC Convention Area occurred between 19 carrier vessels and 178 LSTLVs, while the remaining encounters were conducted primarily with squid jiggers. For the purposes of this study, GFW focused on the 318 encounters with LSTLVs.

Collectively, GFW detected 465 potential transshipments, both encounters and loitering events, likely related to the transfer of IATTC-managed species in 2019, a 22% decline in AIS-detected activity from 2018⁴. Comparably, the IATTC Regional Observer Programme (ROP) reported 593 transshipments in 2019, a 17.3% decline in reported activity from 2018⁵. Notably, the Indian Ocean Tuna Commission (IOTC) and ICCAT also saw a similar decrease in AIS-detected and ROP-reported transshipment activity on the high seas between 2018 and 2019. An analysis of transshipment activity in CCSBT and WCPFC in 2019 is forthcoming but has yet to be completed. 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 same carrier flag States were active in encounters with LSTLVs between 2018 and 2019, with the majority of encounters being conducted by carriers flagged to China and Panama, which represented 29% and 37% of carrier activity with LSTLVs in 2019, respectively (Figure 2). Carriers flagged to Vanuatu and Korea were substantially less active in 2019. Vanuatu-flagged carriers were detected in 71 encounters in 2018 and 9 encounters in 2019, while Korean-flagged carriers were detected in 62 encounters in 2018 and 31 encounters in 2019. The two Chinese-flagged carriers with transshipment activity in 2019 were observed in over twice as many encounters in 2019 as compared to 2018.

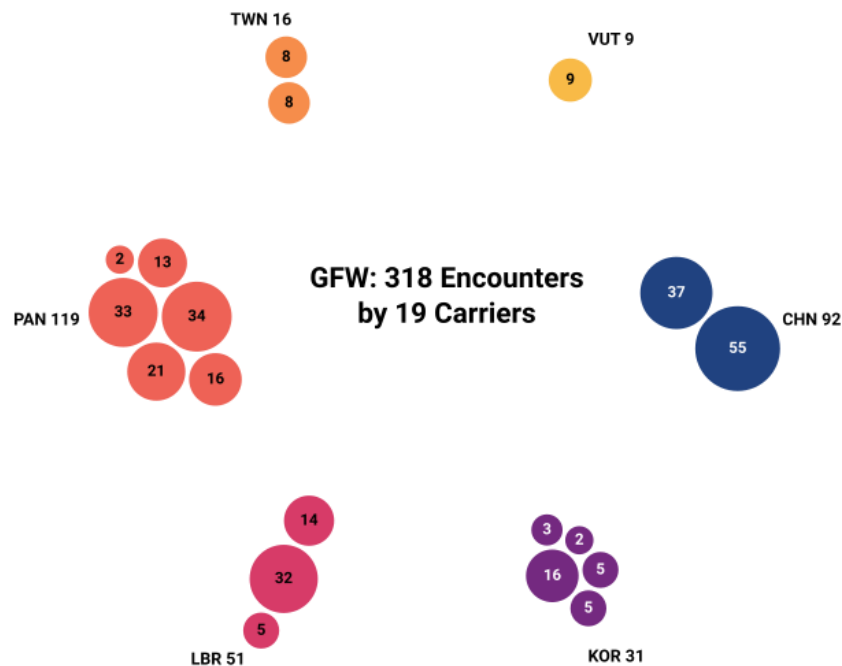


Figure 2. Encounter events by carrier flag State. *Note: Bubbles indicate unique carrier vessels*

⁴ 596 potential transshipments with LSTLVs were detected on AIS in 2018 by GFW. See report, [here](#).

⁵ The ROP reported 717 transshipments in 2018. See figure 2 in [CAF-07-03](#).

GFW detected a significant amount of carrier activity in the eastern portion of the IATTC Convention Area overlapping with the South Pacific Regional Fisheries Management Organization (SPRFMO), likely unrelated to IATTC-managed species and instead linked to squid fishing, which is managed by SPRFMO. Therefore, GFW focused analysis on loitering events that were conducted by carriers that either had encounters with LSTLVs or were listed on the IATTC carrier vessel registry and were not detected on AIS in encounters with squid jiggers in the Convention Area. These events were considered most likely related to the transfer of IATTC-managed catch. In total, GFW analyzed 147 loitering events conducted by 18 carrier vessels (Figure 3).

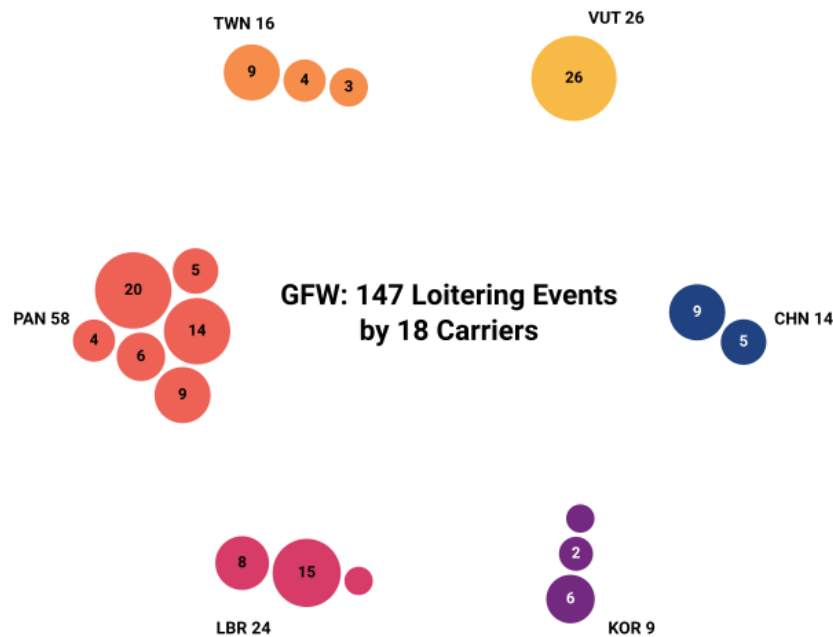


Figure 3. Loitering events by carrier flag State. *Note: Bubbles indicate unique carrier vessels*

Panamanian carriers were detected on AIS with the most loitering activity in 2019, as was the case in 2018, while Chinese, Korean and Liberian carriers were detected with substantially less loitering in 2019 compared to 2018. Korean and Liberian carrier activity appeared to reflect a reduced operational presence whereas Chinese-flagged carriers were observed in nearly twice as many encounters in 2019 compared to 2018. One Chinese carrier in particular was observed in 14 fewer loitering events and 34 additional encounter events between 2018 and 2019. This carrier was linked to the most detected encounter events of any single carrier in 2019 (55 encounters) and the most detected loitering events of any single carrier in 2018 (23 loitering events in 2018). Increased encounter events coupled with the significant decrease in loitering events by Chinese carriers suggests a welcome increase in AIS transmission by the fishing fleet transshipping with the Chinese carriers.

IATTC should continue to encourage member States to ensure that all LSTLVs are reporting on AIS when operating on the high seas. In the absence of a centralized VMS program, AIS data can be used by the Secretariat to help validate transshipment activity reported by the vessels and identify potential transshipments occurring outside of the ROP.

Observer Reported Deployments vs AIS Data

Transshipments in IATTC are managed by [Resolution C-12-07](#), on *Establishing a Program for Transshipments by Large-Scale Fishing Vessels*. Additionally, the IATTC Regional Observer Program (ROP) for Transshipments at Sea manages the observer reporting of high seas transshipments of IATTC-managed catch. The IATTC Secretariat report on the implementation of the ROP recorded 44 carrier vessel deployments that spanned part or all of 2019⁶, during which an observer was on board for an IATTC transshipment. GFW detected transshipment activity on AIS during 43 of these deployments and matched 38 of them to transshipment activity in the IATTC Convention Area in 2019. Matching was done by comparing the carrier identity information and reported deployment departure and arrival data to AIS-detected loitering and encounter events (Table 1).

Table 1. AIS Carrier Trips that Matched⁷ IATTC ROP Deployments in 2019

Carrier Flag	Detected Carriers	Encounters	Loitering Events
CHN	2	92	14
KOR	6	31	9
LBR	3	51	24
PAN	10	119	58
TWN	3	16	16
VUT	1	9	26

ROP Activity Unmatched to GFW AIS Data in 2019

Five of the reported deployments were not matched to AIS-detected encounters or loitering events in the IATTC Convention Area in 2019 but can be seen in the Carrier Vessel Portal (CVP). It appears that these five trips were related to AIS-detected potential transshipment activity which occurred either in 2020 or within the WCPFC Convention Area and so outside of the scope of this report (see data annex for more details). For example, GFW was able to detect one of the five carrier vessels, during the reported deployment dates transshipping in the WCPFC Convention Area; the vessel can be seen in the CVP [here](#). While the CVP helps provide context illuminating why not all of the authorized ROP deployments were reflected in GFW's IATTC analysis, it is still not clear if there was transshipment activity by these carriers of IATTC managed species or in the IATTC Convention Area in 2019.

⁶ See CAF-07-03 and DOCUMENT IATTC-95-07 CORR. in sources for info on ROP deployments in 2019

⁷ To compare carrier activity, flag States for four carriers in the ROP deployment data were adjusted to match GFW flag State data based information available from the WCPFC and the IMO registry.

Information on location and date of reported transshipments during ROP deployments would be necessary to actually corroborate the ROP data. At a minimum, it would be beneficial to know the RFMO and dates which reported transshipments occurred. It is therefore important for IATTC to improve reporting requirements set out in [Resolution C-12-07](#) to ensure that ROP reports match activity at sea. Additionally, the importance of a robust information exchange MoU with WCPFC is clear.

The final unmatched deployment was associated with a carrier vessel which, at the time of the reported deployment, was broadcasting historical identity information on AIS. The vessel was not automatically included in the CVP as the historical identity information was also connected to conflicting registry records that indicated the vessel had been both a longliner and carrier. Therefore, the potential transshipment data from the GFW database was manually reviewed. The GFW data identified loitering activity during six of the seven IATTC ROP deployments by this carrier (Figure 4), however there was one unmatched deployment during which no transshipment activity was detected on AIS.

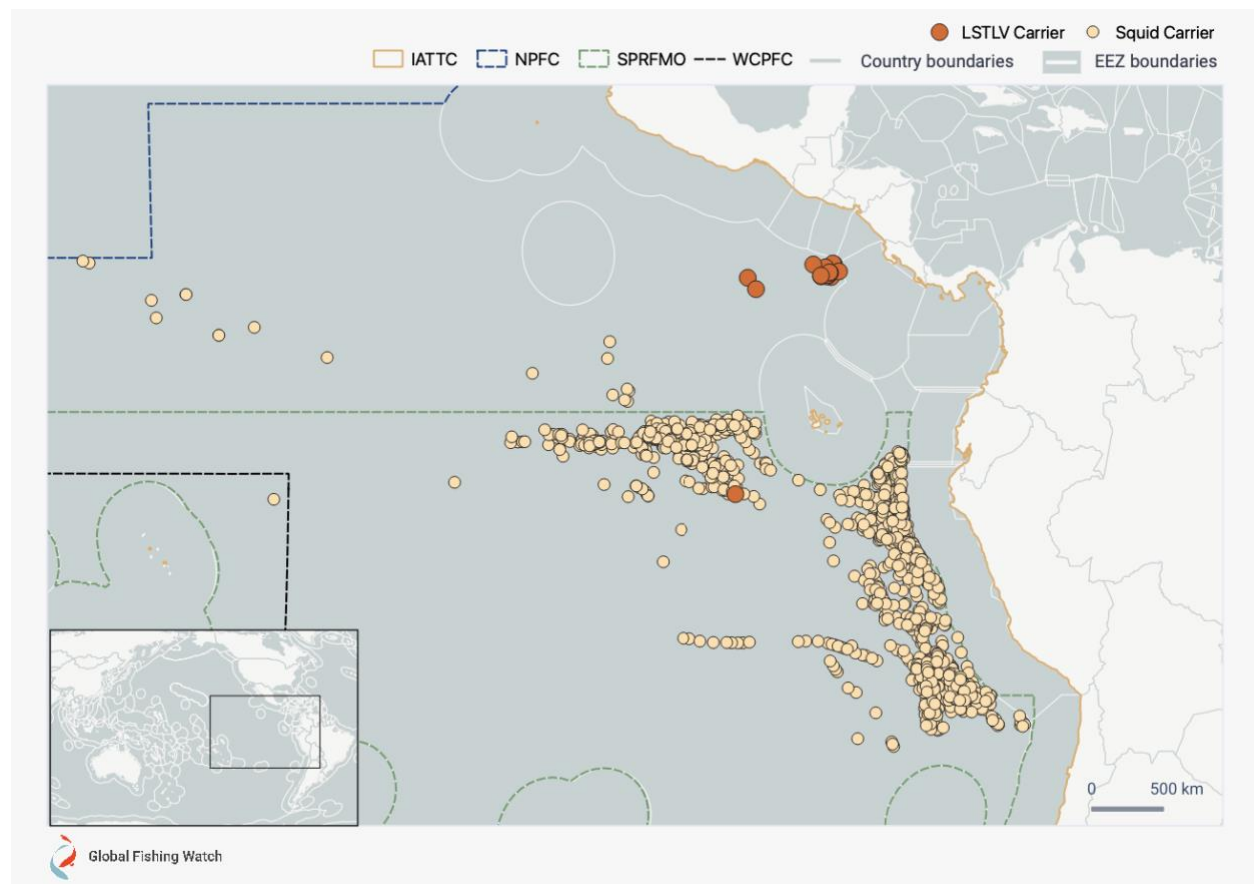


Figure 4. AIS detected transshipment activity by a carrier with outdated identification information in IATTC overlaid with detected squid related loitering and encounters from 2019.

The AIS-detected activity by this vessel (all loitering) appeared to overlap with squid fishing hotspots on at least one occasion (Figure 4). Furthermore, this vessel has been authorized by both IATTC and the SPRFMO, which means the carrier is authorized to transship both IATTC-managed and SPRFMO-managed species.

It represents a significant MCS risk that this vessel is broadcasting historical vessel information on AIS impacting the ability to link the vessel's AIS data to reported information. Further, this vessel is active in the overlap between IATTC and SPRFMO where squid transshipments occur and is able to operate for the species of both RFMOs. IATTC should encourage member States' flagged vessels to enforce SOLAS (Safety of Life at Sea) Chapter V, Regulation 19⁸ on AIS use for qualified vessels⁹ which mandates qualified vessels accurately broadcast on AIS to ensure compliance with IATTC transshipment guidelines.

Overlaps

SPRFMO Overlap

In addition to the carrier vessel mentioned above (Figure 4), GFW identified 10 other carrier vessels involved in AIS encounters in the IATTC Convention Area which held authorizations from both IATTC and SPRFMO in 2019, a continued trend from the previous two years studied. Moreover, of the 941 AIS-detected carrier vessel encounters in IATTC's Convention Area, 511 were conducted with squid jiggers. Therefore, more than half of all observed encounters (54%), as well as nearly all observed loitering events (87.6%) in IATTC in 2019 were likely not related to the transfer of IATTC-managed species, but rather the transfer of SPRFMO-managed squid (refer back to Figure 1 to see distribution of squid activity).

While the two organizations have an MoU, [COMM 8 - Prop 20](#), there is no mention or provisions regarding transshipment. The lack of formal information sharing mechanisms related to transshipment between the two organizations and minimal oversight over squid transshipments is an area of risk for IATTC. More information on this fishery and the transshipments occurring within IATTC's Convention Area, regardless of target species, will reduce this risk and strengthen governance efforts within IATTC's waters. Therefore, SPRFMO and IATTC should consider updating the MoU to reflect the overlap of carrier vessel activity in their respective Convention Areas by addressing transshipment in the agreement.

⁸ https://www.lisrc.com/sites/default/files/SOLAS%20V_Reg19.pdf

⁹ For details on vessels mandated to use AIS under SOLAS Chapter V, Regulation 19, see regulation here: https://www.lisrc.com/sites/default/files/SOLAS%20V_Reg19.pdf

WCPFC Overlap

Nearly half of all observed encounters (45%) and loitering events (48%) detected on AIS occurred in the overlap with WCPFC's Convention Area.

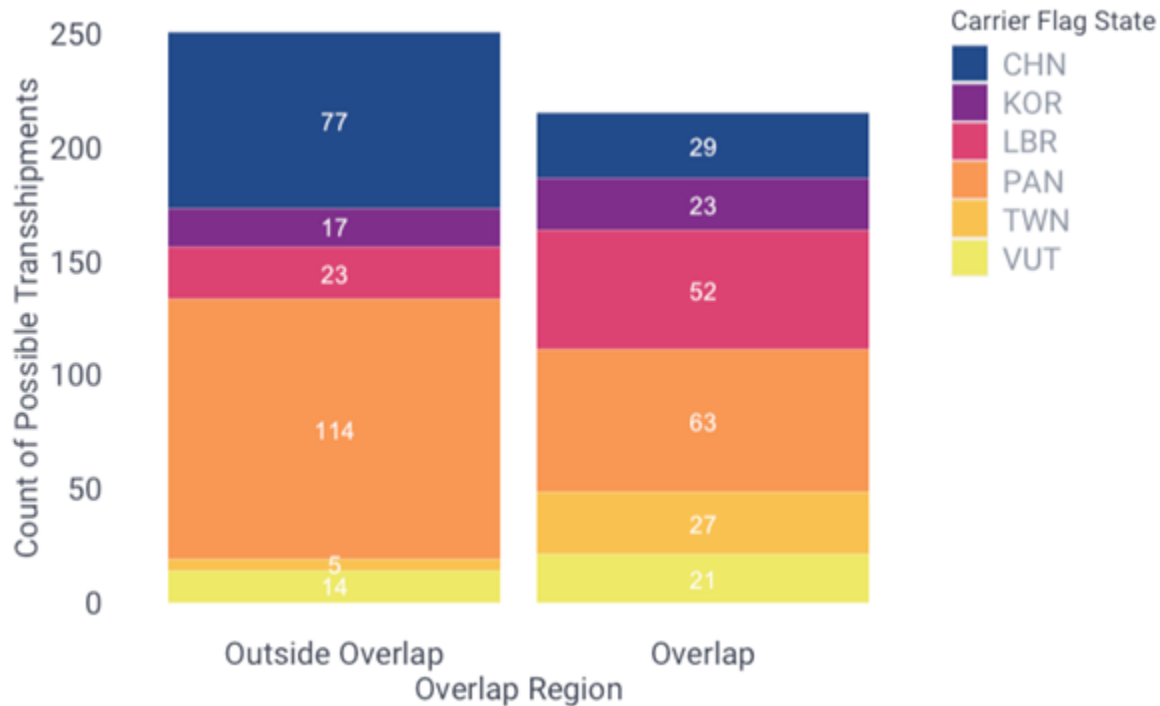


Figure 5. Count of possible transshipments by carrier flag State within and outside the IATTC-WCPFC overlap

When looking at the location of carrier activity, carriers flagged to China and Panama were most active outside the IATTC-WCPFC overlap area (Figure 5). Even though nearly two-thirds of AIS detected transshipments by Panamanian carriers occurred outside the overlap area (114 potential transshipments), Panama also had the largest presence of carrier activity inside the overlap area compared to carriers of other flag States, with 63 potential transshipments detected in the overlap, followed by Liberia, with 52 detected transshipments. Chinese Taipei had the largest ratio of carrier activity inside the overlap by ratio, with 84.4% (27) of its detected transshipments occurring in the overlap and 15.6% (5) of its detected transshipments occurring outside the overlap.

Most fishing activity conducted prior to an AIS-detected encounter occurred in the same region in which the encounter occurred, however there is some fishing just west of the overlap area and north of the overlap area that occurred outside of the overlap while the transshipment occurred inside (Figure 6).

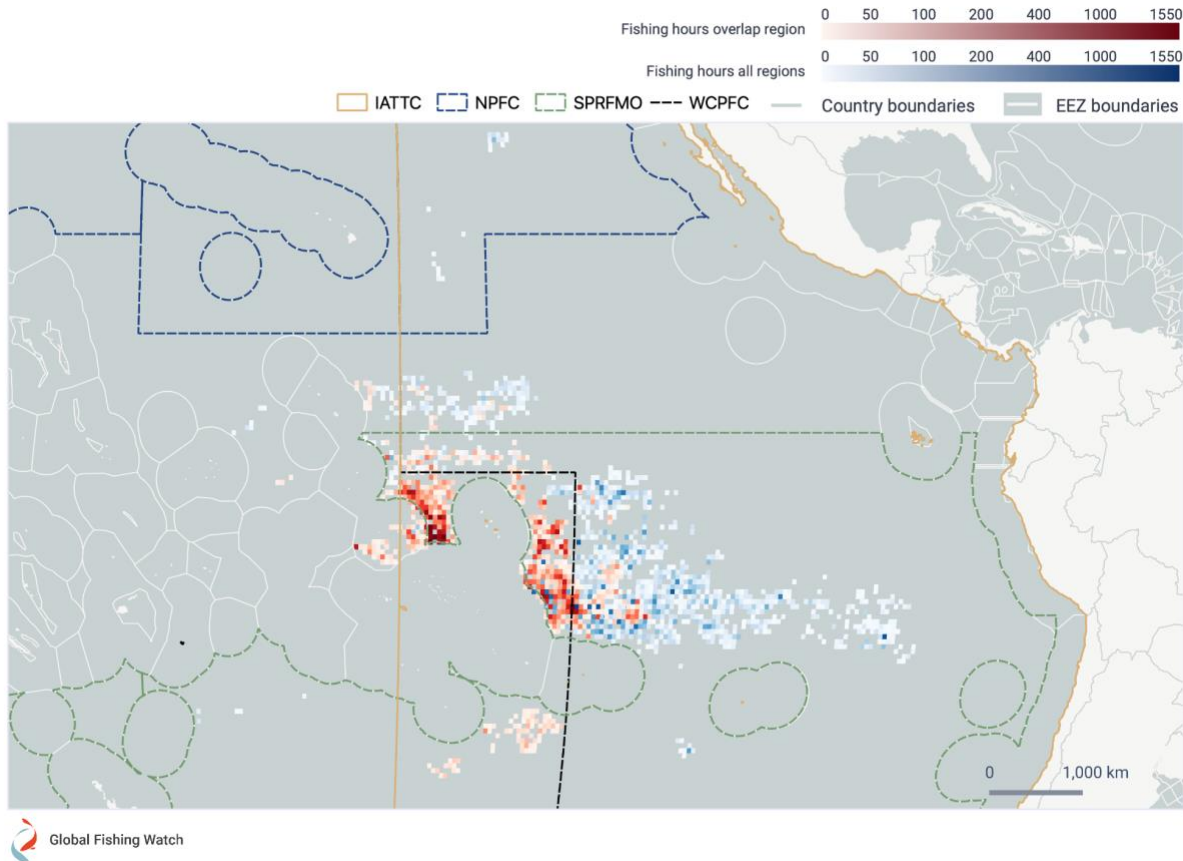


Figure 6. Longline fishing hours prior to encounters within the IATTC-WCPFC overlap (red) and encounters outside the overlap (blue).

Furthermore, while there was a significant decrease in observed encounters in the IATTC Convention Area in 2019 from the previous year, the decrease in activity was observed outside of the WCPFC Overlap. AIS-detected activity within the WCPFC Overlap area remained relatively constant from 2018 to 2019. Given the consistent amount of transshipment activity in the WCPFC Overlap, and that the fish caught inside the overlap are more likely to be transshipped inside the overlap area (Figure 6), IATTC and WCPFC should strengthen their existing [MoU](#). It should seek to ensure all observers from both RFMOs are trained and cross certified and that there is increased information sharing and validation of reported transshipment data between the two organizations.

Port Dynamics

Most RFMOs have adopted port State measures in alignment with the UN Food and Agriculture Organization’s Port State Measures Agreement (PSMA). IATTC, however, has yet to do so. Furthermore, the Commission has not yet implemented any measure focused on minimum port inspections. Given the number of overlapping Convention Areas, wide variety of species managed, and the geographically distant ports where product is landed, IATTC should strongly consider implementing a measure that defines minimum inspection standards for ports landing IATTC-managed catch and information that should be shared in advance of entering ports with IATTC-managed catch on board.

The lack of port State measures puts IATTC’s oversight of its managed species at significant risk, particularly given the number of carriers observed visiting ports in IATTC member States not party to the PSMA after encounters with LSTLVs that had been observed fishing in IATTC managed waters. The AIS-detected port visits by carrier vessels after an encounter and/or loitering event in IATTC are shown in Figure 7.

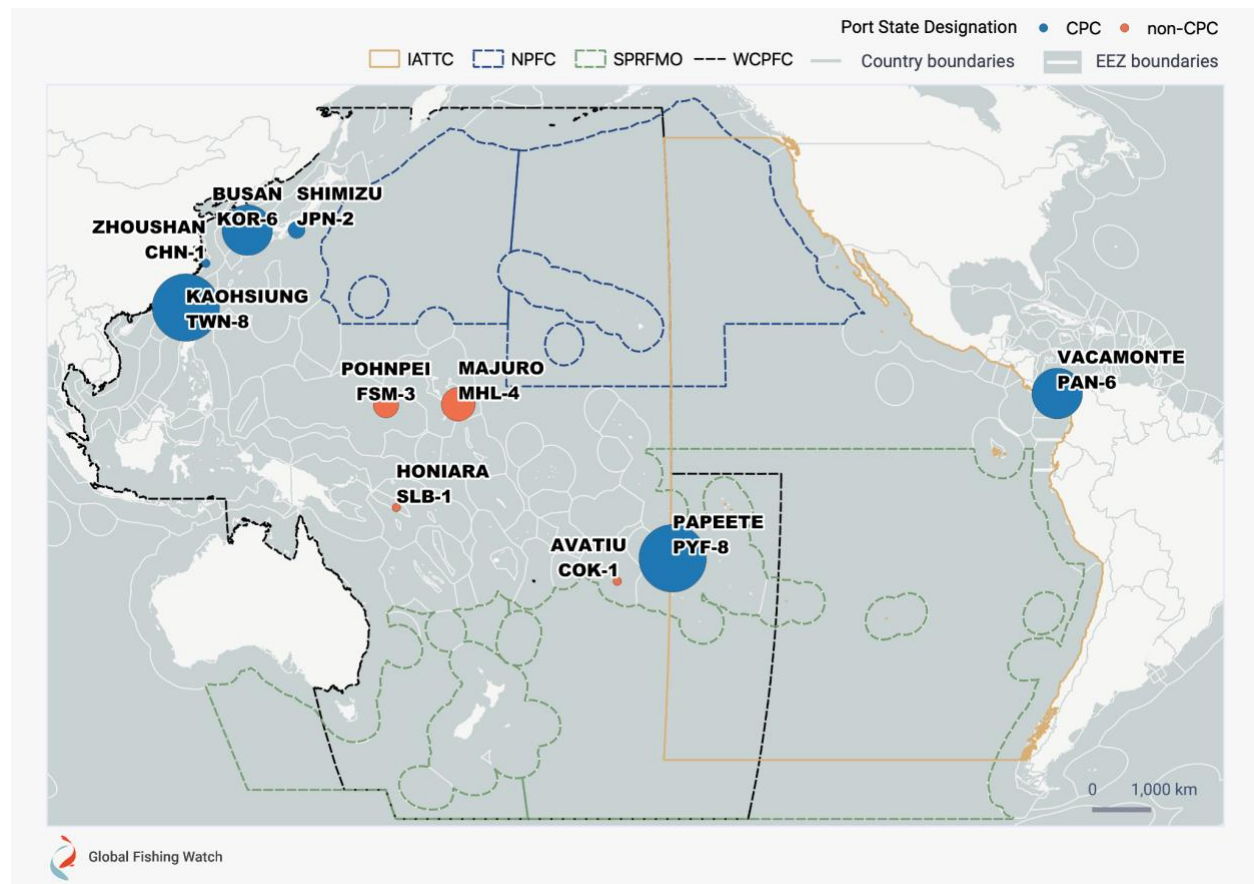


Figure 7. Count of port visits by carriers after potential transshipment events on the high seas within the IATTC Convention Area. *Note: Port symbols are sized proportionately based on the number of port visits.*

Carrier vessels detected in AIS-events likely related to the transshipment of IATTC catch went on to visit 10 different ports (Figure 7; Figure 8). Papeete, French Polynesia; Kaohsiung, Chinese Taipei; Busan, Korea; and Vacamonte, Panama collectively account for 70% of all port visits after AIS-detected events. These four ports, all located in member States, and so liable to be bound by any port State or inspection measure IATTC adopts, were the most frequently visited by carriers after a potential transshipment in 2019, as well as in 2018.

The two most visited ports, Kaohsiung and Papeete, are known to be heavily trafficked transitory hubs but the number of seafood processing operations in both ports make them a likely location for landing fish also. Both ports are in member States of IATTC and French Polynesia is also Party to the PSMA as part of France. While Papeete has relatively strong port inspection standards, all visits made to this port were by foreign-flagged vessels, which are not held to the same inspection standard as domestic carriers. Chinese Taipei conversely is not able to be a Party to the PSMA, nor is it a member of any other RFMO with a binding PSM, and therefore it is unclear whether any port State measures are in place. The level of activity occurring in these ports highlights their importance with regard to information sharing and risk assessment on compliance with IATTC CMMs. IATTC should implement a Commission wide port State measure that ensures minimum standards across all member States landing IATTC-managed catch, that would ensure that the Commission has oversight and relevant information of this activity in the ports of Kaohsiung and Papeete along with other members' ports.



Figure 8. Count of port visits after potential transshipment events by carrier flag State

Nearly a quarter (22.5%) of port visits after an AIS-detected event were to four Pacific Island States – the Cook Islands, the Marshall Islands, the Federated States of Micronesia, and the Solomon Islands – none of which are members of IATTC, nor party to the PSMA. Visits to ports in Pacific Island States may be vulnerable as these ports are also not covered by strong Port State Measures under other RFMOs (WCPFC CMM 2009-06 is non-binding). However, the Pacific Islands Forum Fisheries Agency (FFA) has adopted a robust regional PSM framework¹⁰. For example, the Marshall Islands port of Majuro has very strong port inspection standards, covering 100% of inspections for carriers involved in transshipments¹¹. These Members are strongly encouraged to implement this regional framework if they have not already done so, in order to establish adequate oversight over IATTC managed species, and ideally provide important information to the IATTC and its Members.

Effective implementation of a comprehensive port State management measure, paired with information sharing, and cooperation amongst member States and other RFMOs can help decrease the risk of IUU-caught fish entering the supply chain and increase transparency of transshipment activity at sea and in port. The absence of such a measure is a key gap in the management, governance and oversight of fishing activity in its convention area by IATTC and should be addressed.

Conclusion and Recommendations

This analysis highlights the complicated nature of managing transshipment at-sea within the IATTC Convention Area. Transshipment is a complex practice, made more complicated by the lack of consistent reporting mechanisms, information sharing, and oversight. These issues can impact the ability of enforcement officials to effectively govern the activity of carrier vessels operating on the high seas and assess compliance with management measures. Lack of available information on observer trips, authorizations, and carrier vessel activity in the Convention Area can increase the risk of reduced transparency. Incomplete agreements with overlapping RFMOs weaken the shared management efforts of each organization – not having provisions in an MoU specific to the management of transshipment complicates management efforts and oversight of the practice. The absence of a comprehensive port State measure aligned with the FAO PSMA increases the risk of IUU-caught product, sourced from IATTC, entering the supply chain.

In response to these findings, the following recommendations are made for the consideration of IATTC members:

¹⁰ <https://www.ffa.int/node/2454>

¹¹ See pg 17-18 https://oceansolutions.stanford.edu/sites/g/files/sbiybj13371/f/outlawocean_iuu_eeps.pdf

Finding	Recommendation for IATTC
<p>There were discrepancies in transshipment information provided by IATTC ROP and vessel information transmitted on AIS, complicating efforts to analyze or validate reported transshipments. In addition, providing the IATTC report publicly before compliance meetings, consistent with previous years, would ensure accuracy in cross-verifying data.</p>	<p>Develop a CMM that is specific to the use of AIS. Implement through encouraging member States' flagged vessels to enforce SOLAS (Safety of Life at Sea) Chapter V, Regulation 19¹² regarding AIS on vessels of at least 300 gross tonnage and consider requiring it for all distant water vessels</p> <p>Include minimum standards for the implementation of regulations related to AIS that ensures the correct vessel identity is being broadcast by vessels</p> <p>Make historical and current registry records, individual observer reports, and annual transshipment reports from CPCs publicly available to improve transparency of transshipment activity in the Convention Area</p>
<p>A significant amount of the detected carrier activity occurred in the overlap areas with WCPFC and SPRFMO.</p>	<p>Update the MoU with SPRFMO to include a provision specific to transshipments</p> <p>Strengthen the MoU with WCPFC to improve information sharing regarding transshipment activity</p> <p>Ensure training and certification, including cross certification of carrier observers, in both RFMOs</p>
<p>The majority of ports visited after potential transshipment activity are located in IATTC member States, however 6 of the 10 ports visited by carriers after potential transshipments were in countries which are not party to the PSMA.</p> <p>Four ports visited after potential transshipment activity were within non-member States.</p>	<p>Adopt a measure on minimum port inspection standards, in line with the minimum standards for port inspections included within the FAO PSMA</p> <p>Ensure effective information sharing with non-member States to ensure port landing information is shared with the Secretariat</p>

¹² https://www.lisrc.com/sites/default/files/SOLAS%20V_Reg19.pdf

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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).

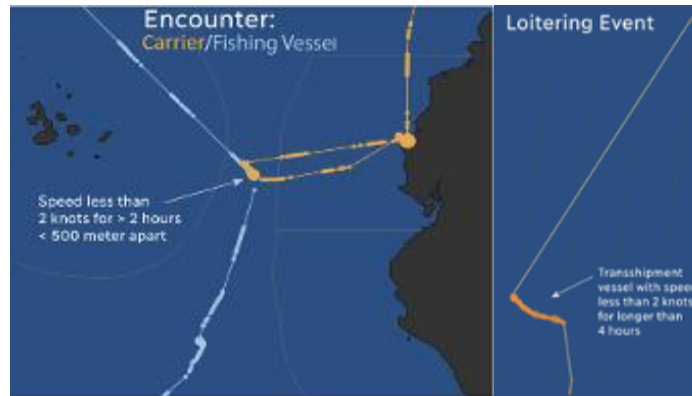


Figure A1 - Examples of vessel tracks during typical 'Encounter' where two vessels meet at-sea and 'Loitering' events where a carrier vessel (referred to as transshipment vessel) has behavior consistent with encountering an LSTLV at-sea but no LSTLV is visible on AIS

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.

The fishing hours by vessels occurring prior to encounter events were identified if the fishing vessel potentially fished within 3 weeks of the encounter and after any previous encounter or port visit. Potential fishing is estimated using a convolutional neural network that uses AIS based data such as vessel speed, direction, and rate of turn to classify if a fishing vessel is likely fishing or transiting (not fishing) (See Kroodsma et al. 2018).

Vessel authorization was established by using the publicly available vessel registry produced by IATTC¹³, NPFC¹⁴, SPRFMO¹⁵, and WCPFC¹⁶. In addition, GFW used the carrier IATTC documents IATTC-95-07 CORR, CAF-07-03, and CAF-07-03 Addendum 1 that list carrier vessel trips to identify carrier authorization. IATTC and other RFMOs should consider improving access to publicly available historical vessel authorization lists to enable a more complete and more accurate picture of authorized vessel patterns and movements to all stakeholders in a fishery and ensure effective monitoring and control of fishing activities occurring inside respective Convention Areas.

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 IATTC Convention Area has relatively strong Class-A AIS reception (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). 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.iattc.org/PDFFiles/VesselDatabase/VesselList/_English/List-of-authorized-carrier-vessels.pdf

¹⁴ <https://www.npfc.int/compliance/vessels>

¹⁵ <https://www.sprfmo.org/web/public/vessel>

¹⁶ <https://www.wcpfc.int/record-fishing-vessel-database>