



Global Fishing Watch

**A 2018 Comparative Analysis of AIS Data with Reported
Transshipments in the Commission for the Conservation of
Southern Bluefin Tuna Statistical Areas**

Acknowledgements

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Prepared by: Global Fishing Watch

2018 AIS-Detected Transshipment Activity in the Commission for the Conservation of Southern Bluefin Tunas Statistical Areas

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 have also launched the Carrier Vessel Portal (CVP). 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 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 through 2019.

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.

Contents

List of Acronyms	5
Executive Summary	6
Activity Overview	8
Overlap with IOTC/ICCAT ROPs	11
<i>Reported activity</i>	11
<i>ICCAT ROP</i>	12
<i>IOTC ROP</i>	13
<i>Detected encounters not matched to reported SBT transshipments</i>	15
<i>Case Study: Possible SBT transshipments in the Indian Ocean</i>	17
Port Visits	19
Conclusions and recommendations	22
Sources	24
Annex 1. Detailed Methodology	26
<i>AIS-based data methods</i>	26
<i>Data caveats</i>	28
Annex 2. Japan CCSBT response	29
Annex 3. Data for report	Available Upon Request

List of Acronyms

AIS – Automatic Identification System
CCSBT – Commission for the Conservation of Southern Bluefin Tuna
IOTC – Indian Ocean Tuna Commission
ICCAT – International Commission for the Conservation of Atlantic Tunas
CVP – Carrier Vessel Portal
EEZ – Exclusive Economic Zone
GFW – Global Fishing Watch
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

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 the Commission for the Conservation of Southern Bluefin Tuna Statistical Areas (hereinafter referred to as the “CCSBT Statistical Areas”) is currently regulated by the [Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels](#). This Resolution includes reporting requirements for both carrier and fishing vessels to help deter Illegal, Unreported, and Unregulated (IUU) fishing activities and better manage the Southern Bluefin Tuna (SBT) fishery. It also requires that all carriers receiving SBT transshipments at sea be authorized to do so by CCSBT, and that an observer be on board the carrier vessel during the transshipment. The Resolution acknowledges the need for greater monitoring, control, and surveillance of vessel activity, transshipments, and landings relating to SBT due to “...grave concern that...a significant amount of catches by IUU fishing vessels have been transhipped under the names of duly licensed fishing vessels.”

Last year, GFW submitted a [report](#) to the 26th Annual Meeting of the CCSBT, in which commercially available Automatic Identification System (AIS) data was used to analyze the track histories of carrier vessels operating within the CCSBT Statistical Areas during calendar year 2017. Building on the feedback from that report, this year, GFW analyzed carrier vessel activity in the Statistical Areas during calendar year 2018 to further investigate potential risks of non-compliance with reporting requirements and trends in carrier vessel activity over time. This report analyzes trends in carrier vessel activity and behavior using AIS data and identifies potential improvements to the CCSBT Resolution on Transshipment.

GFW shared the findings of this report with CCSBT Member States for comment prior to final submission to the Commission. The Fishing Entity of Taiwan reiterated their comment on the report submitted in 2019 (CCSBT-CC/1910/Info01) that: *since all the at sea transshipment made by Taiwanese-flagged LSTLVs were covered by the IOTC Regional Observer Program, and every Taiwanese-flagged carrier operating in the Indian Ocean are required to have an IOTC ROP observer onboard. Yet, based on our investigation, those potential encounters may be caused by transferring baits or general supply.* Japan conducted a review of the report’s findings, analyzed reported activity by Japanese-flagged vessels and those operated by Japanese private companies in 2018, and found no inconsistencies in this report. Japan found that in 92 of the 98 identified encounters an observer on board, and in the six other cases the carrier met fishing vessels for activities other than the transshipment of fish. In addition, Japan found that there was not transshipment of SBT by Japanese vessels that was not declared to ICCAT or IOTC. The full review conducted by Japan can be found at the end of this report, in Annex 2. Additionally, GFW sent a request to the IOTC Compliance Committee for time and location of 2018 carrier trips with an IOTC observer. While this data was provided by the Committee, it was not shared in time for the submission of this report.

The CCSBT Statistical Areas overlap with the Convention Areas of other tuna RFMOs, including the Indian Ocean Tuna Commission (IOTC) and the International Commission

for the Conservation of Atlantic Tunas (ICCAT). CCSBT has a Memorandum of Understanding (MoU) with both ICCAT and IOTC requiring the Secretariats of each RFMO share information relevant to the transfer of their managed species. Over 72% of SBT transshipments reported through the ICCAT ROP were matched to AIS-detected events, highlighting the benefits of AIS as a complementary tool for validating reported information. However, due to lack of available reported data it was difficult to match AIS detected events in IOTC waters specifically to SBT transshipments. This highlights the need for more detailed information in ROP reports and underscores the potential benefits of centralized VMS programs when attempting to detect unreported activities.

From the analysis, there is clearly a risk that transshipments of SBT may be unobserved and unreported. AIS data provides evidence that in 2018, 20 carrier vessels interacted with fishing vessels identified as longliners by GFW 190 times after they were fishing in SBT habitats, and that 95 of those interactions were with carriers that did not report transshipments of any SBT to either the IOTC or the ICCAT ROPs. As CCSBT relies on these ROPs as a primary tool in monitoring the SBT fishery, the Commission should consider strengthening the MoUs with these RFMOs. Additionally, the Commission should consider implementing its own centralized VMS program, to assist in verifying reported data and detecting unreported activities, and to strengthen oversight of transshipments involving SBT.

Landings and transshipments in port of SBT are regulated through the [*Resolution for a CCSBT Scheme for Minimum Standards for Inspections in Port*](#), which requires Members to designate a port of entry for foreign flagged vessels landing SBT and to inspect at least five percent of all landings. However, AIS analysis of carrier activity related to the transfer of SBT in 2018 indicates that only three of the seven ports visited by carriers after encounters with fishing vessels were located within CCSBT Member States. Therefore, the majority of ports used by carriers which may be carrying SBT are not required to comply with this Resolution. While non-Member port States have been invited to attend annual meetings of CCSBT in the past, and have worked with CCSBT on a case by case basis, this Resolution may be improved by expanding the requirement to include the inspection of foreign flagged vessels entering ports for reasons other than landing and/or transshipment to help ensure that no transfers of SBT go unreported.

The analysis of 2018 carrier vessel activity indicates that these Resolutions could be improved in the following ways:

Finding	Recommendation
<ul style="list-style-type: none"> Using publicly available data, over 72% of ICCAT ROP reported SBT transshipments were matched to AIS detected events. Suggesting that in the absence of a centralized VMS program, AIS data can be used to validate reported activity at sea, as long as sufficient data is included in the ROP. 	<ul style="list-style-type: none"> Implement a centralized VMS program to help validate reported transshipments of SBT and detect unreported activity. Ensure ROP reports contain precise details of transshipment activity, including date and geo-location of each event. Supplemental tools like AIS can help verify reported activity.
<ul style="list-style-type: none"> Using AIS, the number of potential detected encounters for SBT transshipment was greater than that reported by the IOTC ROP. 	<ul style="list-style-type: none"> Strengthen the MoU with IOTC to require date and location information to be included in SBT transshipment reports.
<ul style="list-style-type: none"> While not necessarily for the purpose of landing and/or transshipment of fish, the majority of the port States visited by carriers directly after encounters, are not members of CCSBT and are therefore not required to comply with the CCSBT Resolution on Minimum Port Inspections. 	<ul style="list-style-type: none"> The CCSBT Resolution on Minimum Port Inspections should be expanded to include inspections of foreign carrier vessels carrying SBT while they are in port but not landing and/or transshipping catch. Maintain active engagement and information exchange with non-member port States to obtain details of inspections and landing of carriers vessels potentially containing SBT.

Activity Overview

GFW identified 202 AIS-detected encounters in 2018 between carrier vessels and fishing vessels after the fishing vessel was observed potentially fishing¹ within CCSBT Statistical Areas. This report primarily focuses on the 190 encounters that occurred in

¹ Any and all references to “fishing” should be understood in the context of Global Fishing Watch’s fishing detection algorithm, which is a best effort to determine “apparent fishing effort” based on data from the Automatic Identification System (AIS) collected via satellites and terrestrial receivers. As AIS data varies in completeness, accuracy and quality, it is possible that some fishing effort is not identified and conversely, that some fishing effort identified is not fishing. For these reasons, Global Fishing Watch qualifies all designations of vessel fishing effort, including synonyms of the term “fishing effort,” such as “fishing” or “fishing activity,” as “apparent,” rather than certain. Any/all Global Fishing Watch information about “apparent fishing effort” should be considered an estimate and must be relied upon solely at your own risk. Global Fishing Watch is taking steps to make sure fishing effort designations are as accurate as possible.

CCSBT Statistical Areas between 20 West and 120 East longitude (Figure 1). Feedback on last year's report indicated that fishing activity between 20 West to 120 East was most likely to involve capture of SBT, and therefore this analysis does not include those encounters where fishing occurred beyond these coordinates.

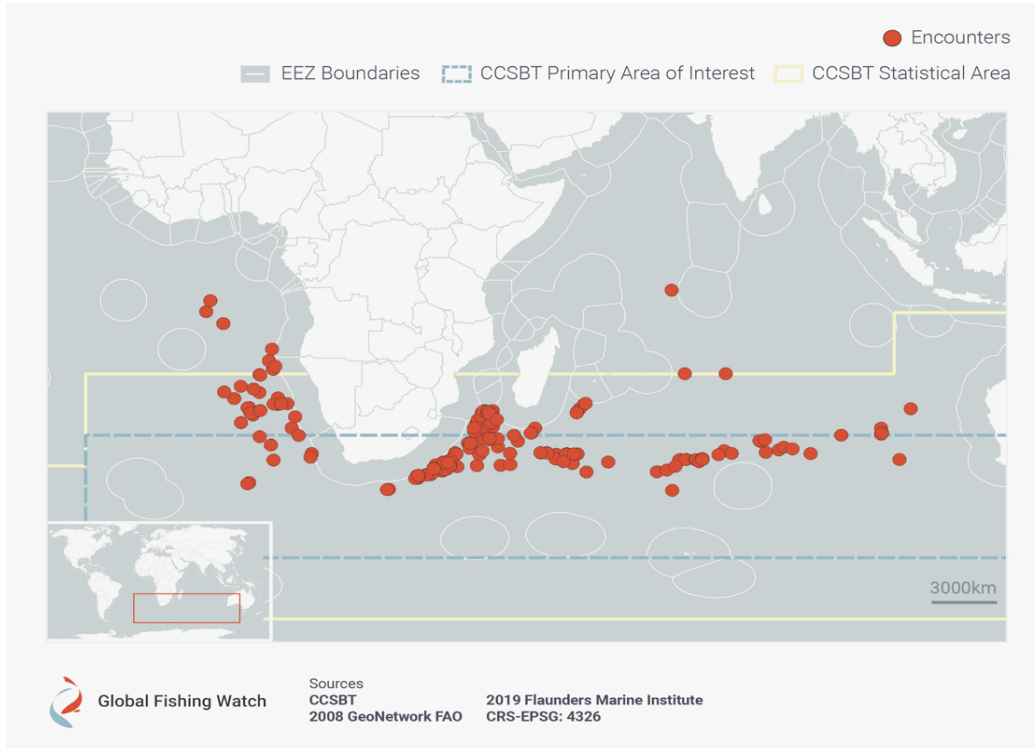


Figure 1. Encounters that occurred between a carrier and fishing vessel after fishing events occurred within the CCSBT Statistical Areas.

The 190 encounters were conducted by 20 carrier vessels flagged to seven flag States and 100 fishing vessels flagged to five flag States (Figure 2).

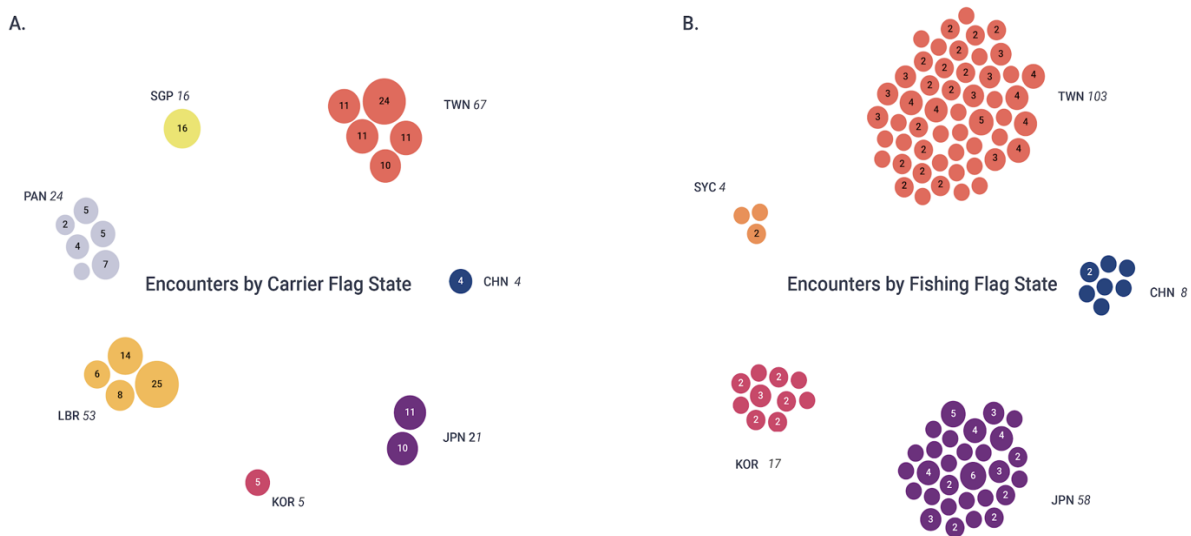


Figure 2. A. GFW-detected Encounter Events by Carrier Flag State and B. Fishing vessel Flag State. *Note: bubbles indicate unique carriers*

The majority of encounters occurred between carriers and LSTLVs flagged to the Fishing Entity of Taiwan (hereafter referred to as “Taiwan”), followed by encounters between Liberian carrier vessels and Japanese LSTLVs, and encounters involving both Japanese carriers and LSTLVs (Figure 3).

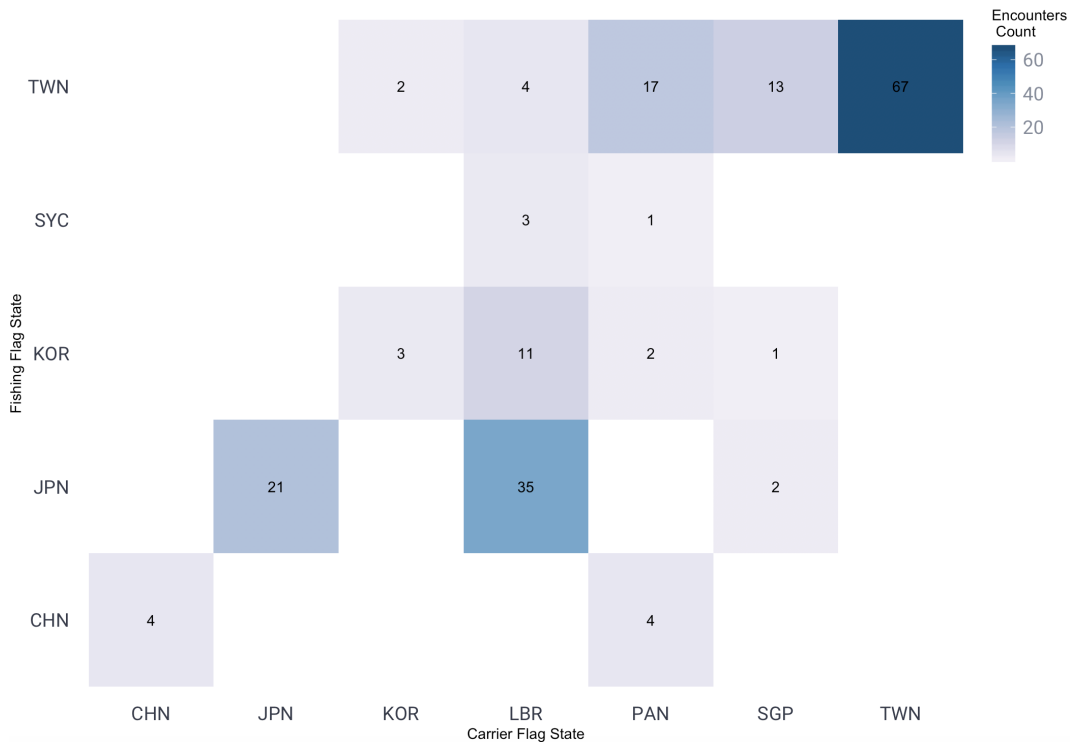


Figure 3. Number of encounters between carrier and fishing vessels by Flag State

Overlaps with IOTC/ICCAT ROPs

The CCSBT *Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels* outlines the monitoring and reporting requirements for carrier vessels and LSTLVs which transship SBT at sea and in port. While the program requires a CCSBT observer to be on board the carrier vessel during the transshipment, the “*CCSBT transshipment program is harmonised and operated in conjunction with those of ICCAT and IOTC to avoid duplication of the same measures. ICCAT or IOTC observers on a transshipment vessel that is authorised to receive SBT are deemed to be CCSBT observers provided that CCSBT standards are met.*”²

GFW analyzed SBT transshipments which were reported through both the ICCAT and IOTC ROPs in 2018 and compared these reports to the AIS-detected encounters. ICCAT observer reports, found at <https://www.iccat.int/en/ROP.html>, were used to identify reported transshipments involving SBT. Table 1 in the IOTC document IOTC-2019-CoC16-04b, found at: <https://www.iotc.org/IOTC-2019-CoC16-04b>, was used to identify information on transshipments of SBT within IOTC waters during 2018. However, no position or temporal data on these SBT transshipments were provided in the reports.

Reported Activity

In the figure below, the AIS-detected encounters by carriers that reported SBT transshipments to ICCAT and IOTC ROPs in 2018 are plotted (Figure 4). In addition, the AIS-detected loitering events that matched ICCAT reported SBT transshipments, along with the ROP recorded incidents of SBT transshipments are overlaid on the map. This data could not be shown for IOTC as the exact locations and time of SBT transshipments were not available.

² <https://www.ccsbt.org/en/content/monitoring-control-and-surveillance>

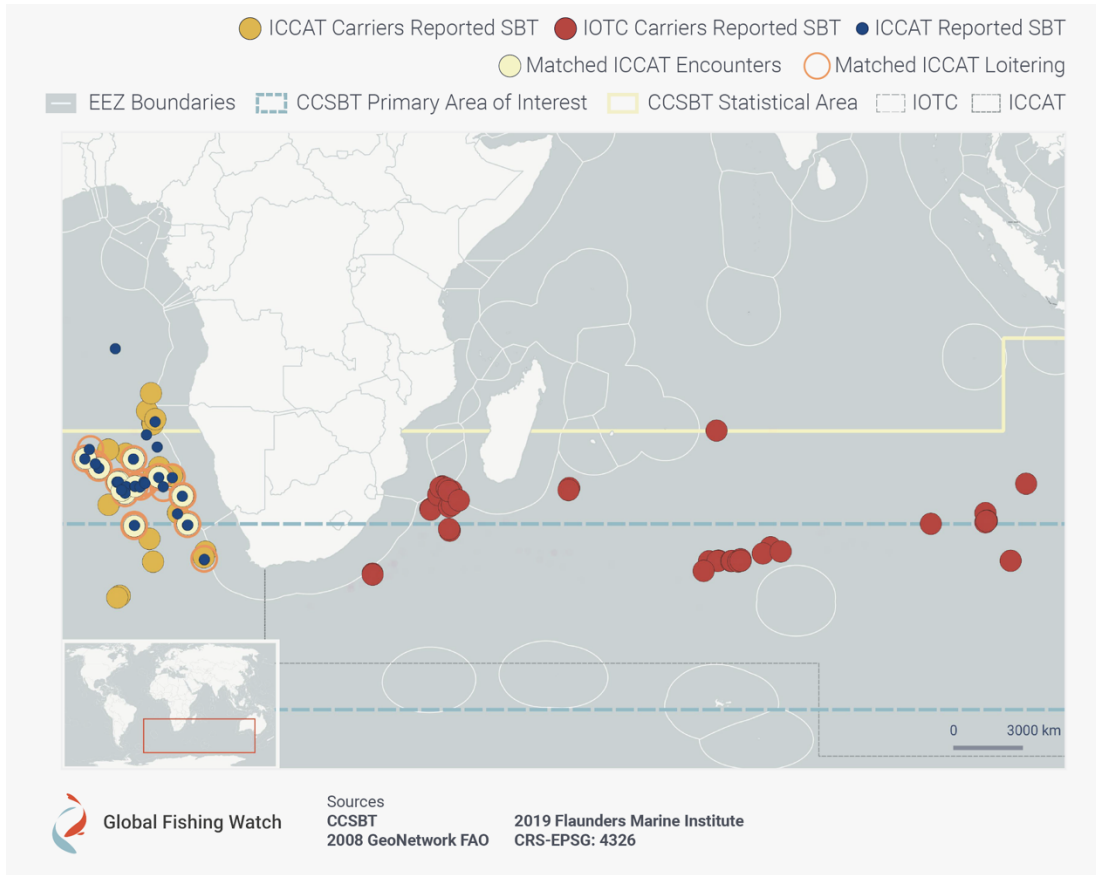


Figure 4. Possible transshipment activity conducted by carriers the reported SBT transshipments to IOTC and ICCAT ROPs

ICCAT ROP

The ICCAT ROP transshipment reports include geolocations and timestamps for all reported transshipments (see reports here: <https://www.iccat.int/en/ROP.html>), which allowed GFW to match AIS detected encounters with the majority of reported transshipments. For the ICCAT reported transshipments GFW estimated matches for both encounter and loitering events. 'Loitering Events' are identified when a single carrier vessel exhibits vessel movements consistent with encountering another vessel at sea, but no second vessel is visible on AIS. Since there is no defined CCSBT Convention Area as the RFMO focuses on the management of a particular species, this report focuses on encounters with carrier vessels where the fishing vessel exhibited behavior consistent with fishing activity detected within the CCSBT Statistical Areas, increasing the likelihood that the encounter was related to transshipment of SBT. Loitering events were only examined in the context of events that match an ICCAT reported SBT transshipment.

Of the 29 ICCAT ROP reported SBT transshipments in 2018, GFW matched³ 12 to encounter events and 21 to loitering events (13 of these loitering events overlapped with encounter events). Due to the definitions of encounter and loitering events, it is possible for overlap between the two types of events (see annex). Therefore, a total of 21 distinct reported SBT transshipments, or 72.4% of the reported events, were detected via AIS (Table 1). Discrepancies between the number of reported transshipments and the events detected via AIS may be due to the limits of AIS, constraints of the GFW encounter and loitering event definitions, and the level of precision provided in the ICCAT observer reports. However, the match rate highlights that AIS can be used as a supplementary tool in supporting the efforts of fisheries management authorities. CCSBT should consider implementing a centralized VMS program to help the Secretariat further audit and validate reported transshipments of SBT and to help ensure unreported activity can be detected.

Table 1. AIS-detected Carrier Activity Compared to ICCAT Reported SBT Transshipments

Carrier Flag	Reported Carriers	AIS-Detected Carriers	Reported Transshipments	AIS Matched Encounters	AIS Matched Loitering
JPN	2	2	18	8	15
LBR	2	1	11	4	6

IOTC ROP

Unlike ICCAT, IOTC's ROP transshipment report referencing carriers that reported SBT transshipments do not include timestamps or geolocation data (See here: <https://www.iotc.org/IOTC-2019-CoC16-04b>). GFW requested the time and location of the 2018 ROP reported transshipments from the IOTC Compliance Committee, however, that information was not made available in time for this report.

GFW was able to use the vessel name of the carriers that reported SBT transshipments during 2018 to identify encounters between these specific carriers and LSTLVs that fished in CCSBT Statistical Areas prior to the encounter (Table 2). Each of these vessels are authorized under both IOTC and CCSBT to transship SBT.

³ 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.

Table 2. AIS-Detected Carrier Activity Compared to IOTC Reported SBT Transshipments

Carrier Flag	Reported Carriers	AIS-Detected Carriers	Reported Transshipments	AIS-Detected Encounters
JPN	1	1	1	1
KOR	2	1	23	5
LBR	2	2	10	19
PAN	3	1	21	5
SGP	1	1	17	16

For some flag States, such as Japan and Singapore, GFW identified a very close correlation with events and numbers of active carriers undertaking SBT transshipments reported in the IOTC ROP compared with AIS data. Japan is a member of both CCSBT and IOTC, while Singapore is a member of neither RFMO, nor is it a cooperating non-member. While for Liberia more encounter events were detected than those reported, which may indicate that potential transshipment events relevant to CCSBT were conducted but not reported. However, for Korea and Panama, GFW detected many fewer encounters conducted by fewer carriers. The discrepancy in values is likely because encounter estimates using AIS data are dependent on fishing vessels broadcasting AIS within the CCSBT Statistical Areas and GFW identifying the AIS data as potential fishing activity. As the comparison of ICCAT reported data highlights, increasing data transparency by the IOTC ROP would make it possible to better compare findings and ensure all transshipments of SBT are being reported. As observed above, a centralized VMS program would support the Secretariat’s efforts to validate the reported activity of these vessels and potentially detect unreported activity. Such a program would also lessen the Commission’s reliance on data from other RFMO ROPs, which may have reporting requirements that are insufficient for CCSBT’s needs.

The MoU between CCSBT and IOTC applies to transshipments at sea conducted by carriers flagged to members of both IOTC and CCSBT, as well as transshipments at sea conducted by States which participate in both CCSBT and IOTC. However, in the absence of a centralized VMS program, CCSBT may consider strengthening the MoU with IOTC to require date and location information be included in SBT transshipment reports provided by IOTC to help validate activity.

Detected encounters not matched to reported SBT Transshipments

Of the 190 encounters, 95 were conducted by 11 carrier vessels which were not listed as reporting SBT transshipments in either the ICCAT or IOTC ROPs (Figure 5).

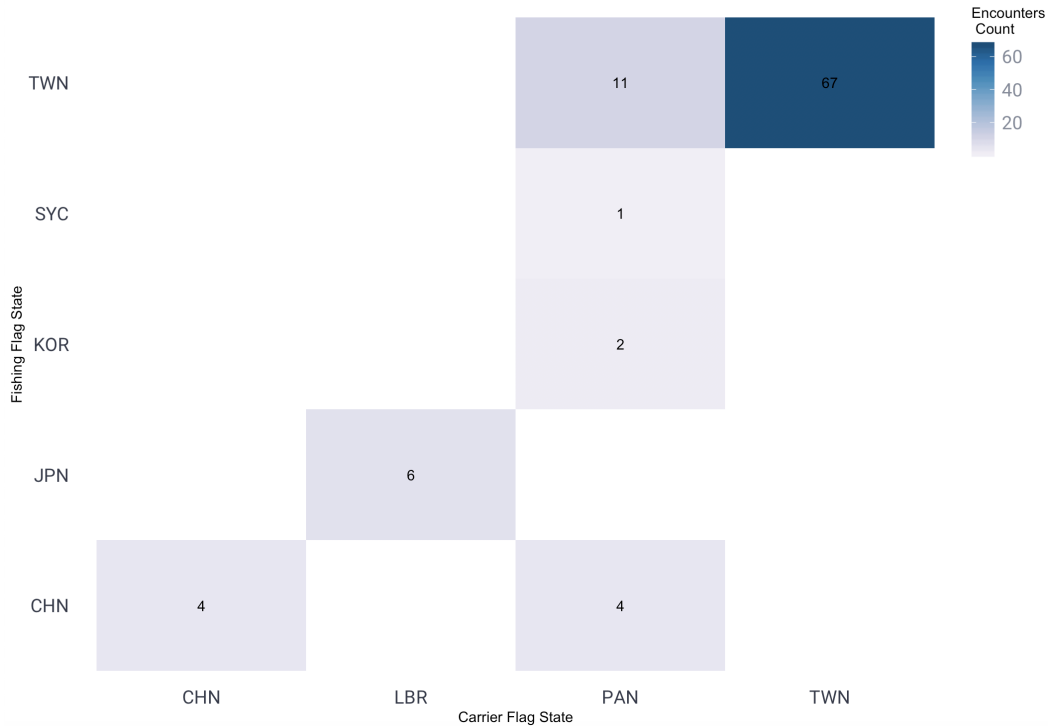


Figure 5. Number of encounters between carriers that did not report SBT and fishing vessels by Flag State

Of the 95 encounters, 54 were conducted by five carrier vessels which were registered by CCSBT to transship SBT. The remaining 41 encounters were conducted by six carriers which were registered to IOTC but not by CCSBT (Table 3).

While it is possible these encounters were related to transfers of catch which did not include SBT, the levels and location of fishing activity within CCSBT Statistical Areas where the water is known to be highly productive for SBT, before the encounter suggests further investigation is merited to confirm that.

Table 3. AIS-Detected Activity of Carriers that did not report SBT Transshipments to ROPs

Carrier Flag	Carrier Registry	Detected Carriers	Encounters
TWN	CCSBT	2	35
LBR	CCSBT,ICCAT,IOTC	1	3
PAN	CCSBT,ICCAT,IOTC	1	2
LBR	CCSBT,IOTC ⁴	1	3
TWN	CCSBT,IOTC	1	11
CHN	IOTC	1	4
PAN	IOTC	3	16
TWN	IOTC	2	21

The encounters shown in the figure below occurred between June and August, 2018. The main fishing season for SBT historically peaks in July, as reported by CCSBT⁵. The fishing activity between May and August that was conducted before the encounters is reflected in a heat map where the darker blue pixels indicate greater fishing effort. As can be seen, the potential fishing activity that occurred prior to these 63 events were largely in the CCSBT Primary Area of Interest⁶. Of these events, 36 occurred when the carrier was registered with CCSBT (blue and light blue), while 27 occurred when the carrier was only registered with IOTC (red) (Figure 6).

⁴ This carrier is included twice as it is registered for three encounters with CCSBT, ICCAT, and IOTC and for three other encounters it appeared to only be registered by CCSBT and IOTC

⁵ <https://www.ccsbt.org/userfiles/file/data/CatchByYMGOLoLa.xlsx>

⁶ Primary Area of Interest is a subset of the CCSBT Statistical Areas as defined by the CCSBT Secretariat.

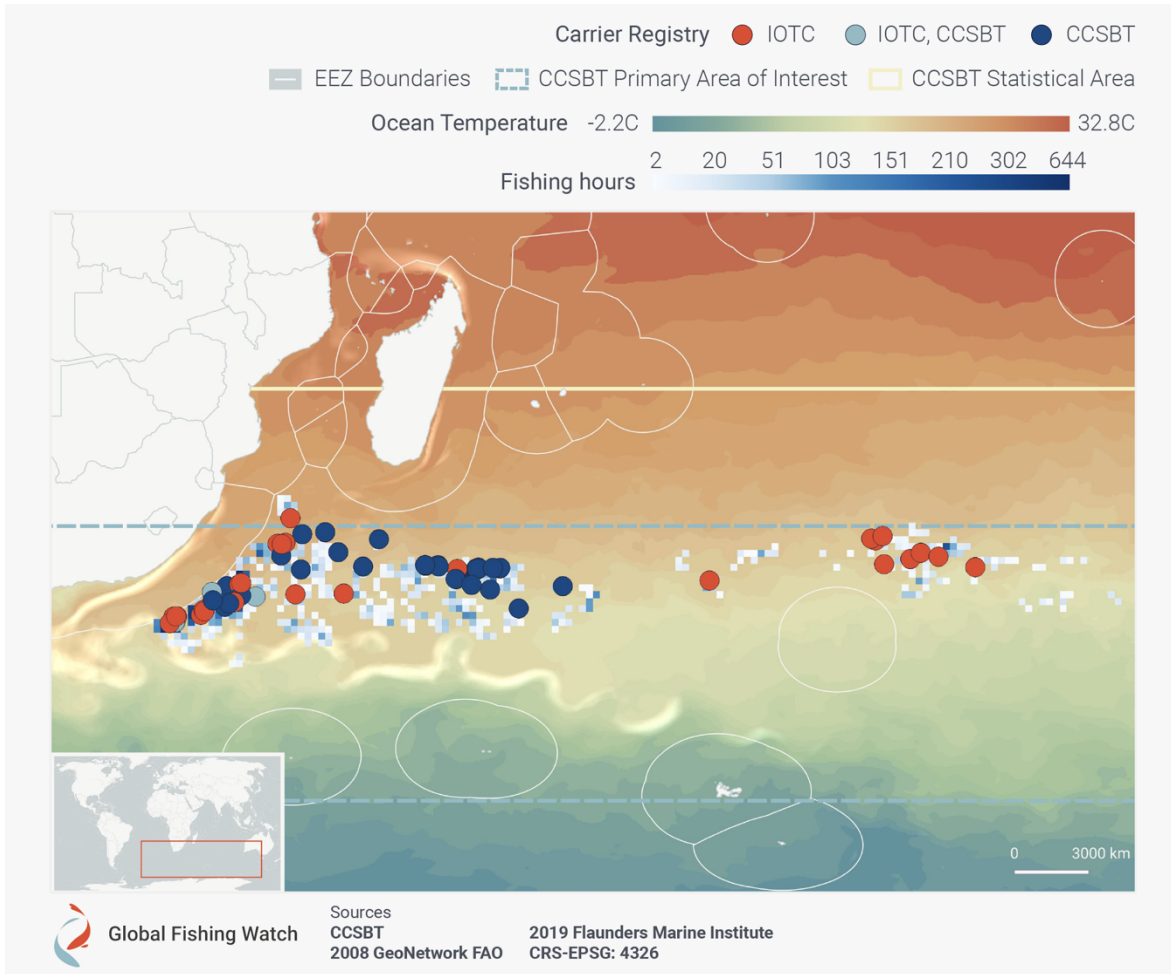


Figure 6. Encounter events that occurred from June through August 2018 differentiated by carrier authorization and the associated fishing hours conducted by fishing vessel prior to encounter

Case Study: Possible SBT Transshipments in the Indian Ocean

Nearly 10 percent of the 41 encounters not associated with an IOTC ROP reported SBT transshipment during June to August 2018 were conducted by a single carrier, flagged to China. The fishing activity prior to the encounters occurred in the SBT Primary Area of Interest (Figure 7).

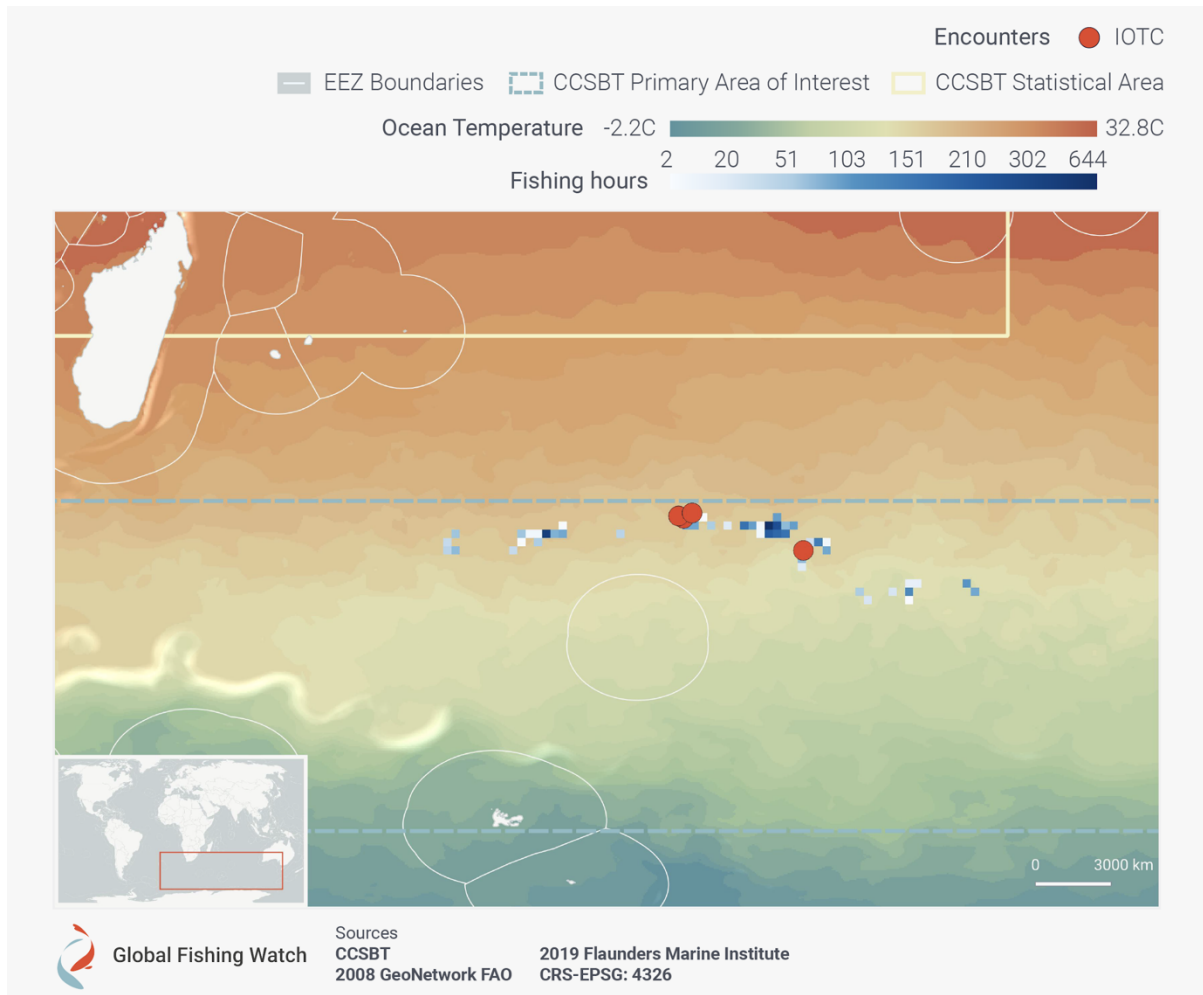


Figure 7. Encounters with China-flagged carrier vessels and fishing hours (blue) prior to encounter events

The fishing activity shown above, in peak SBT fishing season, is located along a temperature front in the southern Indian Ocean, where conditions are ideal for finding SBT, making it highly likely that some SBT would be present in any catch.

This case was also highlighted in this year's GFW 2018 transshipment report for IOTC where it was noted that this incident is documented in an exchange between CCSBT and IOTC⁷. In this instance, the embarked observer thought they had identified SBT transshipped by the vessel, which was misreported as yellowfin. The IOTC Secretariat requested the flag State of the carrier investigate the vessel's activity. The subsequent investigation did not find any proof of SBT transshipment, but the monitoring gap and potential risk is clear.

⁷ The 2018 transshipment report was submitted to IOTC in August 2020 for review by Member States and will be made publicly available here: <https://globalfishingwatch.org/rfmo-transshipment/>

Port Visits

AIS activity indicated seven ports were visited by carriers after encounters with fishing vessels that were potentially catching SBT (Figure 8). The most frequently visited ports after an encounter were Port Louis, Cape Town, and Singapore.

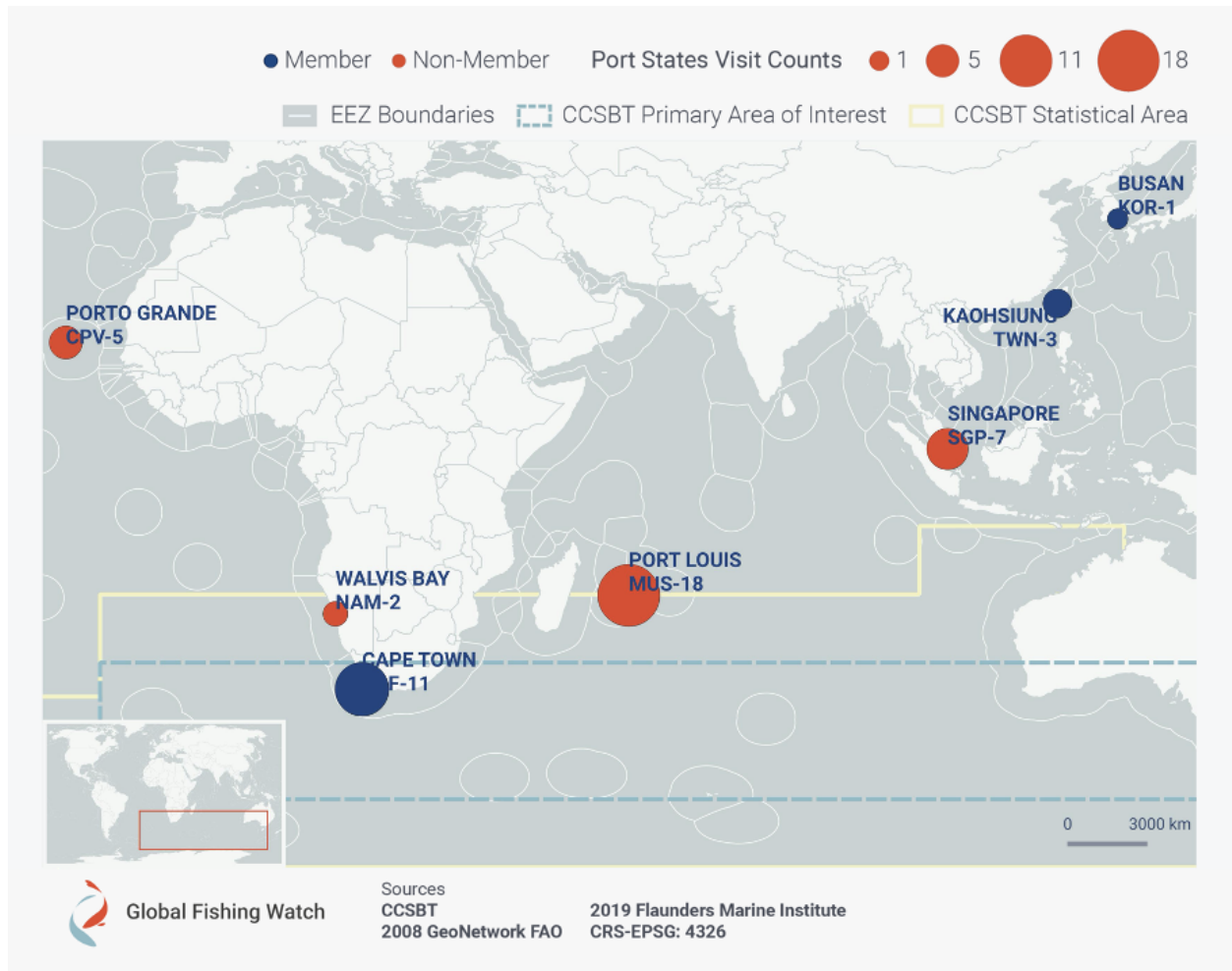


Figure 8. Ports visited by carriers after CCSBT encounter events

Of the seven port States visited by carriers, only three are CCSBT Members (Table 4). Non-Member States such as Mauritius, Namibia, and Singapore have been extended invitations to attend CCSBT annual meetings in the past. In addition, CCSBT works with non-Member port States like Singapore on a case by case basis to exchange relevant SBT landing information.

Table 4. Port visits by carriers after encounter events

Port	Port State	Detected Visits	Encounters Prior to Visit	CCSBT Member
PORT LOUIS	MUS	18	98	No
CAPE TOWN	ZAF	11	32	Yes
SINGAPORE	SGP	7	34	No
PORTO GRANDE	CPV	5	11	No
KAOHSIUNG	TWN	3	7	Yes
WALVIS BAY	NAM	2	7	No
BUSAN	KOR	1	1	Yes

Singapore was used by the widest variety of flag States' carrier fleets, while Liberian flagged carriers visited the widest variety of ports. The most port visits by one Flag's vessels were made in Port Louis by Taiwanese flagged carrier vessels, followed by port visits to Cape Town by Liberian flagged carriers (Figure 9).

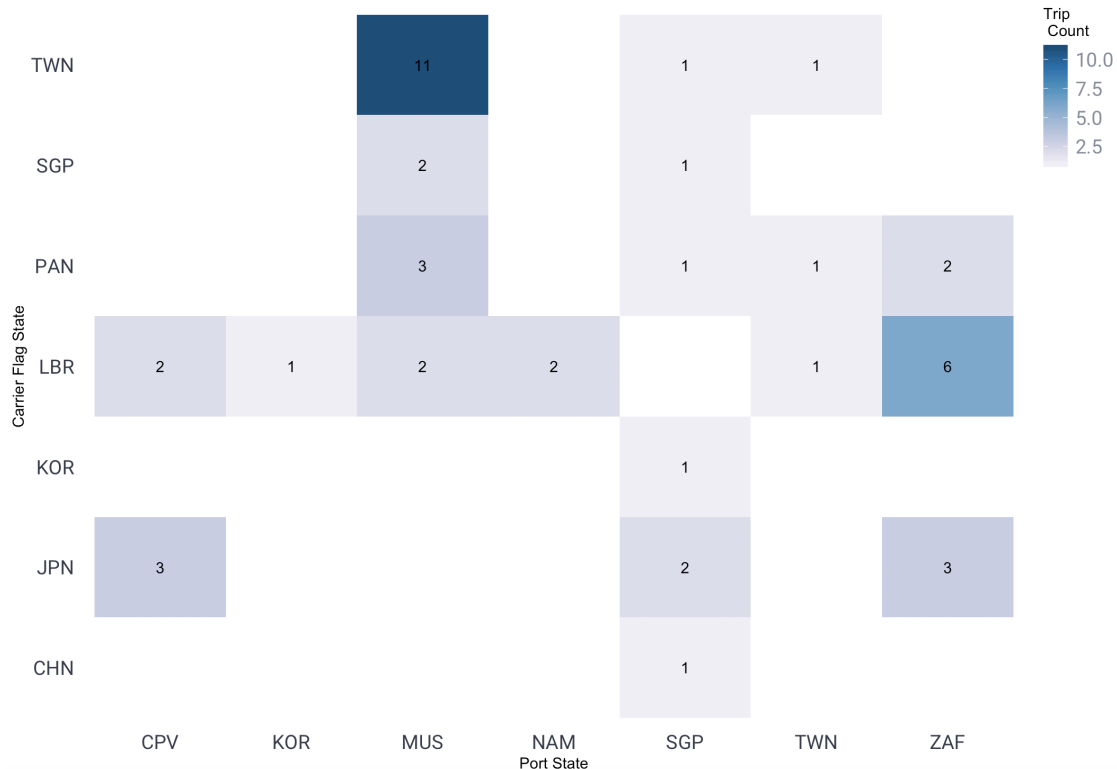


Figure 9. Count of port visits per Port State by Carrier Flag State

Port Louis and Porto Grande, both located in countries that are not members of CCSBT, were the most frequented ports by carriers after AIS detected encounters in IOTC and ICCAT, respectively. Additionally, ICCAT’s ROP transshipment reports from 2018 frequently mention carrier vessels stopping in Porto Grande. Singapore was also used frequently for port visits by carriers after operating in IOTC and CCSBT. It is unclear how often these ports are used for landing catch or for transshipping in port, though it is clear that each plays an important role in fisheries on a global scale, as well as for carriers operating in multiple RFMOs, CCSBT included.

Three of the four port States which are visited by carriers likely carrying SBT on board which are not members of CCSBT are party to the Port State Measures Agreement (PSMA) under the UN FAO. However, only one of the ports visited in these port States is an officially designated port of entry through the PSMA. It is important that ports used by carriers landing or transshipping SBT in port States which are not members of CCSBT be ports States which are party to the PSMA, to ensure that they are applying consistent port State measures across all RFMOs.

CCSBT’s *Resolution on Minimum Port Inspection Standards* requires port States to “designate its ports to which foreign fishing vessels may request entry” and that they must “inspect at least 5% of foreign fishing vessel landing and transshipment operations

*in their designated ports each year.*⁸ To ensure effective monitoring, control and surveillance efforts to prevent illegally caught fish from entering the supply chain, this Resolution should be expanded to include inspections of foreign carrier vessels that enter foreign ports of Member States, even when the purpose of the port call is not landing and/or transshipment. This would align with the FAO PSMA and several other RFMO port State measures, and would ensure broader oversight of SBT catch, especially in the case where the product is landed in ports that do not guarantee reporting or inspection. CCSBT should also encourage non-member port States to provide inspection information for foreign vessels carrying SBT that visit their ports but do not transship or land SBT.

Conclusions and Recommendations

The findings of this report highlight the complicated nature of managing at-sea transshipment of species-specific catch sourced from CCSBT Statistical Areas. Current oversight and reporting mechanisms could be improved to ensure increased transparency and consistency in managing transshipments of SBT. Given the reliance on other RFMOs for a range of measures, improvements to the monitoring of transshipment of SBT by CCSBT would lessen the impacts of misreporting, which can severely impact management measures and stock rebuilding.

There is clearly a risk that transshipments of SBT may go unobserved and unreported. Half of the AIS detected encounters with fishing vessels after they fished in SBT habitats were not reported as SBT transshipments to either the IOTC or ICCAT ROPs. As CCSBT relies on the ROPs of both organizations to help to monitor the SBT fishery, the Commission should consider strengthening the MoUs with these RFMOs and implementing its own centralized VMS program, to assist in verifying reported data and detecting unreported activities.

Finally, ports visited by carrier vessels after encounters with fishing vessels which were observed fishing in CCSBT Statistical Areas were largely located in Non-Member States, highlighting the need to ensure effective port inspection schemes not only during landing and transshipping, but also during visits to ports unrelated to landing. These key findings and corresponding recommendations for the Commission to consider are provided in the table below:

8

https://www.ccsbt.org/sites/ccsbt.org/files/userfiles/file/docs_english/operational_resolutions/Resolution_Minimum_Port_Inspection_Standards.pdf

Finding	Recommendation
<ul style="list-style-type: none"> Using publicly available data, over 72% of ICCAT ROP reported SBT transshipments were matched to AIS detected events. Suggesting that in the absence of a centralized VMS program, AIS data can be used to validate reported activity at sea, as long as sufficient data is included in the ROP. 	<ul style="list-style-type: none"> Implement a centralized VMS program to help validate reported transshipments of SBT and detect unreported activity. Ensure ROP reports contain precise details of transshipment activity, including location. Supplemental tools like AIS can help verify reported activity.
<ul style="list-style-type: none"> Using AIS, the number of potential detected encounters for SBT transshipment was greater than that reported by the IOTC ROP. 	<ul style="list-style-type: none"> Strengthen the MoU with IOTC to require date and location information to be included in SBT transshipment reports.
<ul style="list-style-type: none"> While not necessarily for the purpose of landing and/or transshipment of fish, the majority of the port States visited by carriers directly after encounters, are not members of CCSBT and are therefore not required to comply with the CCSBT Resolution on Minimum Port Inspections. 	<ul style="list-style-type: none"> The CCSBT Resolution on Minimum Port Inspections should be expanded to include inspections of foreign carrier vessels carrying SBT while they are in port but not landing and/or transshipping catch. Maintain active engagement and information exchange with non-member port States to obtain details of inspections and landing of carriers vessels potentially containing SBT.

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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 2002). 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 2017 transshipment reports (<https://globalfishingwatch.org/rfmo-transshipment/>), including possible transshipment events defined as encounter and loitering events, port visits by carriers, vessel identity information broadcast from AIS, and publicly available vessel registry data.

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).

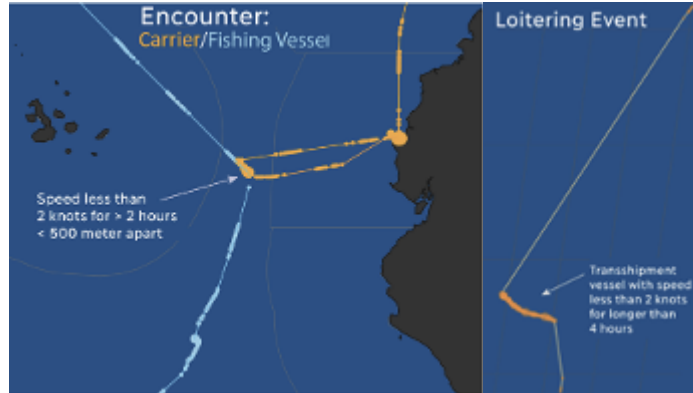


Figure A1 - Examples of vessel tracks during typical 'Encounter' where two vessels meet at sea and 'Loitering' events where a carrier vessel (referred to as transshipment vessel) has behavior consistent with encountering an LSTLV at sea but no LSTLV is visible on AIS

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 carriers 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.

Because CCSBT focuses specifically on Southern Bluefin Tuna, encounter events for this report were identified if the fishing vessel potentially fished inside CCSBT Statistical Areas 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 CCSBT⁹, ICCAT¹⁰, and IOTC¹¹. In addition ICCAT Observer Reports¹² were used to identify spatial-temporal data of reported SBT transshipments to match AIS-detected data. Lastly, the IOTC list of vessels¹³ that transshipped SBT was used to identify carriers that reported SBT transshipments. 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. The CCSBT Statistical Areas have relatively strong Class-A AIS reception, however there may be a limit on AIS data in the CCSBT Statistical Areas due to vessel use of AIS, for instance there tends to be less vessel presence in the Southern 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 Southern 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).

⁹ <https://www.ccsbt.org/en/content/ccsbt-record-authorized-vessels>

¹⁰ <https://www.iccat.int/en/VesselsRecord.asp>

¹¹ <https://www.iotc.org/vessels>

¹² https://www.iccat.int/Documents/Comply/transshipmentreports_current.pdf

¹³ <https://www.iotc.org/IOTC-2019-CoC16-04b>

**RESULTS OF JAPAN’S INVESTIGATION ON THE REPORT OF Global Fishing Watch (GFW)
REGARDING AT-SEA TRANSSHIPMENT**

GFW provided a draft report “A 2018 Comparative Analysis of AIS Data with Reported Transshipments in the Commission for the Conservation of Southern Bluefin Tuna Statistical Areas” which analyzed movements of carrier vessels in the CCSBT statistical areas by using AIS data. According to their report, their AIS-based data and analysis identified 190 cases of “Encounter” by 20 carrier vessels possibly engaged in at-sea transshipment within the CCSBT statistical areas in 2018.

The Fisheries Agency of Japan (FAJ) requested GFW to share the raw AIS-based data used for the report and conducted factual investigation in cooperation with Japanese private companies operating 10 out of 20 carrier vessels (98 cases out of 190). All 59 cases of “Encounter” that Japanese fishing vessels met carrier vessels at-sea were covered by the 98 cases.

Name of Operator	Name of Carrier Vessel	Flag
MRS CORPORATION	CHITOSE	SGP
MRS CORPORATION	IBUKI	PAN
MRS CORPORATION	CHIKUMA	LBR
MRS CORPORATION	LADYTUNA	PAN
MRS CORPORATION	TUNaqueen	PAN
TAISEIMARU KAIUN KAISHA, LTD	TAISEIMARU24	JPN
TAISEIMARU KAIUN KAISHA, LTD	TAISEIMARU15	JPN
TOEI REEFER LINE LTD	SHOTAMARU	LBR
TOEI REEFER LINE LTD	GENTAMARU	LBR
TOEI REEFER LINE LTD	MEITAMARU	LBR

1. Main movements identified by the AIS-based data

GFW mainly identified the following type of movement, judging from AIS data.

Encounter: 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.

In addition, the GFW database also contains possible port visits made by carrier vessels.

2. The results of factual investigation

(1) The FAJ confirmed that these carrier vessels actually met other fishing vessels, flagged to Japan or others at sea in all cases of 98 encounters identified by AIS. Of these, the number of cases involving transshipment of fish was 74 (including SBT: 26, not including SBT: 48), and the remaining 24 cases were meetings solely for other activities such as transshipment of bait and/or parcel and fuel supply, without transshipment of fish. All transshipments of fish were declared to ICCAT or the IOTC in advance, with the information on SBT. ROP observers were onboard in 92 cases. In the remaining 6 cases, carrier vessels met fishing vessels without ROP observer onboard, but all of these 6 cases were solely for other activities than transshipment of fish.

Total Encounters	98 (ROP observers onboard: 92)
Transshipment or fish	74 (including SBT: 26, not including SBT: 48) (ROP observers onboard: 74)
Other activities*	24 (ROP observers onboard: 18) (*transshipment of bait and/or parcel and fuel supply etc.)

Meeting with other vessels at sea without ROP observers onboard was conducted in 6 cases during 3 trips, and all the trips ended by entering port at Cape Town. Perhaps the PEW could contact the port inspectors at Cape Town to know whether there was any problem.

(2) GFW states that there are 95 cases out of 190 that no notification regarding at-sea transshipment of SBT seemed to be made to ICCAT or the IOTC. Carrier vessels operated by Japanese private companies were involved in 8 cases out of 95. Of these, the number of cases involving transshipment of fish was 1. This transshipment was declared to the IOTC in advance but did not include SBT, resulting in the GFW report that this case was not notified of ICCAT or the IOTC as SBT transshipment. The remaining 7 cases were meetings solely for other activities such as transshipment of bait and/or parcel and fuel supply, without transshipment of fish.

3. Conclusion

- ✓ The FAJ cross-checked data provided by GFW with 3 private companies in Japan which operate 10 carrier vessels. Most cases related to 10 carrier vessels were monitored by ROP observers onboard.
- ✓ In total 6 cases during 3 trips, carrier vessels met vessels at sea without ROP observer onboard, but all of these meetings were for other activities than transshipment of fish. All the 3 trips ended at Cape Town. South Africa is a member of the CCSBT and these port visits were subject to port inspection.
- ✓ There was no sign of any illegal practice related to at-sea transshipment.
- ✓ Japan completed investigation for 10 out of the 20 carrier vessels which GFW detected in the CCSBT statistical areas. The other 10 carrier vessels must be reviewed by other flag or relevant members.

Summary Table: The result of Japan's investigation on
AIS-detected activity of carriers operated by Japanese private companies

		transshipment of fish		Other activities (transshipment of bait etc.)
		Including SBT	Not including SBT	
Observer onboard-Yes	IOTC	10	35	18
	ICCAT	16	13	
Observer onboard-No	-	0	0	6
Total		26	48	24