



A Comparative Analysis of Reported Carrier Vessel Activity
and Transshipments in the Commission for the
Conservation of Southern Bluefin Tuna (CCSBT) Statistical
Areas in 2017 using AIS Data

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Contents

List of Acronyms	4
Executive Summary	5
1 Introduction	9
1.1 Commission for the Conservation of Southern Bluefin Tuna	10
1.2 CCSBT Transshipment Program	11
1.3 CCSBT Catch Documentation Scheme	12
2 Study Objective	13
3 AIS Analysis Methods	14
4 Overview of CCSBT-Related Carrier Vessel Activity	16
4.1 CCSBT and Vessel Monitoring System Data	17
4.2 Reporting of Transshipments involving Transfers of SBT	18
4.3 AIS Detection of Encounters Between Carrier Vessels and LSTLVs	20
4.4 AIS Detection of Loitering Events by Carrier Vessels	24
4.5 Carrier Vessel Encounters and Loitering Related to Authorization	26
4.6 Seasonal Carrier Vessel Activity	28
Section Key Findings	30
5 Anomalous Activity	31
5.1 Reported and Observed Activity of Taiwanese-flagged Carrier Vessels	31
5.2 Encounters following Potential Fishing Effort in Statistical Areas	31
5.3 Vessel Authorizations and Monitoring Gaps in Statistical Areas	34
5.4 Reported Activity Matched with AIS Data for ICCAT and IOTC ROP	38
Section Key Findings	40
6 Port Activity	41
6.1 CCSBT Port Inspection Resolution	41
6.2 AIS Analysis of Port Visits by Carrier Vessels	42
Section Key Findings	44
7 Data Caveats	44
8 Key Findings and Recommendations	44
9 Conclusion	48
References	51
Annex 2: Detailed Methodology	53

List of Acronyms

AIS – Automatic Identification System

CCSBT – Commission for the Conservation of Southern Bluefin Tuna

CDS – Catch Documentation Scheme

CPC - RFMO Contracting Party (Member) and Cooperating Non-Contracting Party

CVP – Carrier Vessel Portal

FFA – Pacific Islands Forum Fisheries Agency

GFW - Global Fishing Watch

ICCAT – International Commission for the Conservation of Atlantic Tuna

IOTC – Indian Ocean Tuna Commission

LSTLV - Large Scale Tuna Longline Vessel

MCS – Monitoring Control and Surveillance

PSMA – Port State Measures Agreement

RFMO – Regional Fisheries Management Organization

ROP – Regional Observer Program

SBT – Southern Bluefin Tuna

UNFSA – United Nations Fish Stocks Agreement

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 of Southern Bluefin Tuna (SBT) under the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is regulated by CCSBT *Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels* (LSTLVs). The Resolution includes reporting requirements for both LSTLVs and carrier vessels authorized to transship SBT, which include mandatory submission of transshipment declarations for every at-sea transfer. Publicly available information on these at-sea transfers of SBT is provided in CCSBT Secretariat annual reports as well as annual reports from Members that participate in the CCSBT transshipment program and the Regional Observer Programs (ROPs) of both the Indian Ocean Tuna Commission (IOTC) and the International Commission for the Conservation of Atlantic Tunas (ICCAT) from which CCSBT ROP observers are sourced. While an ROP under CCSBT exists, Members whose LSTLVs transshipped SBT in 2017 relied exclusively on ICCAT and IOTC ROP observers to document and report on the at-sea transfers. However, despite the use of CCSBT transshipment declarations, CCSBT Catch Documentation Scheme (CDS) documents and IOTC/ICCAT ROP reports, CCSBT cannot fully ensure that all potential catches and at-sea transfers of SBT are documented and reported. This is especially true as CCSBT has no established means to verify that non-CCSBT authorized vessels operating inside CCSBT Statistical Areas are not catching or transferring SBT. These factors, exacerbated by the Secretariat's lack of access to Vessel Monitoring System (VMS) data that could be used to effectively cross-validate reported information, leaves CCSBT in a position where they are unable to fully address their own expressed *"...grave concern that organized tuna laundering operations have been conducted and a significant amount of catches by IUU vessels have been transshipped under the names of duly licensed fishing vessels..."* (CCSBT Transshipment Resolution 2017).

In an effort to provide insight into carrier vessel movement and transshipment activity within CCSBT, Global Fishing Watch (GFW) used commercially available Automatic Identification System (AIS) data and machine learning technology to analyze movement patterns of carrier vessels operating in CCSBT Statistical Areas during calendar year 2017. A comparative analysis of this AIS data was then done with publicly available CCSBT information relevant to the reporting of at-sea transfers of SBT. This analysis was conducted to gain a better understanding of carrier vessel activity occurring in Statistical Area waters and detect vessels potentially involved in unreported or unauthorized catches and at-sea transfers of SBT. The analysis included a review of AIS-detected encounters between carrier vessels and those LSTLVs that exhibited movements inside the Statistical Areas consistent with fishing effort. Attempts were made to categorize these encounters based on vessel authorization status by referencing both the CCSBT Record of Carrier Vessels and authorized vessel list. The analysis clearly raises the possibility that at-sea transshipments involving transfers of SBT in 2017 went unreported.

The review of public data indicates CCSBT relies on self-reporting by Members and second-source ROP information obtained through other RFMOs. These reporting protocols reduce the effectiveness of CCSBT's management of SBT by providing few

opportunities for the Secretariat to verify and cross-validate reported data. As a result, there is increased risk that some authorized at-sea transfers of SBT go unreported as well as catch and transshipments of SBT by unauthorized vessels goes unchecked.

The analysis and subsequent findings indicate:

- While a CCSBT ROP exists, Members rely heavily on the ROPs of other RFMOs. Observer reports from both ICCAT and IOTC indicate 90 transshipments occurred between carrier vessels and LSTLVs in 2017 that involved SBT; a number matched by the Secretariat in their annual reports. This represents the highest number of reported at-sea transfers of SBT since 2014.
 - *Recommendation: **Strengthen ROP data sharing agreements*** with both ICCAT and IOTC to ensure full accounting of every at-sea transfer involving SBT.
 - Require carrier observers sourced from ICCAT and IOTC to submit independent reports of all at-sea transfers of SBT to all relevant authorities including the CCSBT Secretariat, flag States and port States.
 - Transshipment reporting should be consistent with the data provided by the ICCAT ROP, to include geolocation data and estimated quantities of SBT for every at-sea transfer.
 - *Recommendation: **Require near real-time reporting*** (within 24 hours) of all at-sea transfers of SBT by both vessels involved not only to the relevant flag, coastal, and port State authorities, but the CCSBT Secretariat as well.
 - *Recommendation: Require carrier vessels to **transmit transshipment declarations*** for all landings of SBT directly to the CCSBT Secretariat in addition to the flag State and competent authorities of the port State.
- The 90 reported transfers of SBT in 2017 were conducted by 10 carrier vessels, only three of which were flagged to CCSBT Members. Nearly 78 percent of all reported at-sea transfers of SBT were reported to have been received by carrier vessels not flagged to CCSBT Members, with nearly 36 percent conducted by a single carrier vessel flagged to Singapore, which is neither a Member nor Cooperating Non-Member of both CCSBT and IOTC. Non-Member flag States carry no obligations to cooperate with CCSBT or ensure their vessels comply with CCSBT management measures, meaning that there is no mechanism to ensure accountability of the vessels actions.
 - *Recommendation: Prohibit Members from authorizing non-Member flagged carrier vessels to be involved with at-sea transfers of SBT to regulate that only CCSBT (or IOTC and ICCAT) member's vessels can be involved in transshipment events involving the transfer of SBT.*

Analysis of AIS data also indicated:

- A significant level of carrier vessel and LSTLV activity occurred within CCSBT Statistical Areas¹ in 2017. A total of 240 encounters involving 22 distinct carrier vessels and 130 LSTLVs were detected within these Areas, as well as over 1,600 loitering events exhibited by carrier vessels themselves.
 - *Recommendation:* Require Members to submit annual reports on the transshipment activities of all carrier vessels they authorize to transship catches of SBT.
 - *Recommendation:* Members annual transshipment reports should be extended to include an accounting for the activities of all Members' flagged carrier vessels determined to have operated in CCSBT Statistical Areas during the previous year, regardless of CCSBT authorization. Ensuring member States not only report transshipments that include SBT but also transshipments that do not include SBT will greatly assist in closing current data gaps.
- 20 percent of all AIS-detected encounters were conducted by carrier vessels that did not appear on CCSBT's vessel authorization lists. Similarly, nearly 12 percent of the loitering events that occurred in the main CCSBT Statistical Areas¹ (excluding area 10) were conducted by carrier vessels that did not appear on the CCSBT Record of Carrier Vessels.
 - *Recommendation:* CCSBT Members should consider mandating use of AIS, along with VMS, for all their LSTLV fleets. This would assist in identifying anomalous fishing effort in SBT fishing grounds by LSTLVs not authorized by CCSBT.
- 35 AIS-detected encounters in 2017 occurred between carrier vessels and LSTLVs in locations outside the main CCSBT Statistical Areas¹ where LSTLVs had previously exhibited vessel movements consistent with fishing effort inside CCSBT Statistical Areas. Given the location of previous fishing effort, it is important to ensure these catches and transfers of SBT are reported.
 - *Recommendation:* Strengthen existing VMS arrangements through the implementation of a centralized VMS to allow the Secretariat to cross-check and validate reported information and provide CCSBT and Members a powerful tool to identify incidents of unreported fishing and transshipment of SBT.
 - *Recommendation:* In the absence of member State VMS sharing or a centralized VMS, consider facilitating the ability of the Secretariat to analyze AIS data to assist in determining locations of LSLTV fishing effort to provide independent cross-checking and validation of reported information.
- Carrier vessels visited, and presumably offloaded quantities of SBT, in a limited number of ports; primarily - Port Louis, Singapore, Cape Town and Kaohsiung City.

¹ CCSBT Statistical Areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15 – see figure 1. These areas are considered the main Statistical Areas, in addition to the other Areas of 11, 12, and 13 (see CCSBT 2014 and CCSBT-ESC/1809/04).

- *Recommendation:* Analysis of AIS data can be used effectively to identify port visit trends by carrier vessels that could be used to help prioritize port inspection protocols specific to landed quantities of SBT.
- *Recommendation:* CCSBT should align port control protocols to PSMA as much as possible, identifying which countries are party to the PSMA and request landings data from those countries to identify potential inconsistencies with reported landings.

This study provides a conservative estimate of potential at-sea transshipment activity that occurred in CCSBT Statistical Areas in 2017. While most at-sea transshipments reported by the ICCAT and IOTC ROPs did not involve transfers of SBT, current reporting protocols, especially those specifically associated with carrier vessels, provide CCSBT few opportunities for independent verification of this fact. Although only 10 carrier vessels were reported to have been involved with at-sea transfers of SBT in 2017, analysis of AIS data clearly indicated a much higher level of carrier vessel activity occurred in CCSBT Statistical Areas. At least 78 distinct carrier vessels were observed to have operated in the Areas in a manner other than direct and continuous transit. Lack of effective oversight over the collective activities of **all** carrier vessels operating in the Areas, regardless of CCSBT authorization, increases the risk that harvests and subsequent transfers of SBT can go unreported, especially by those vessels that have no CCSBT authorization.

Conclusion

The report raises the possibility that at-sea transfers involving SBT in 2017 went unreported. This may be a result not only of ineffective reporting protocols and processes, but also of CCSBT's reliance on self-reporting by Members without the proper tools or independent means of verification and validation of the transshipped quantities, especially shared VMS data. CCSBT should consider amending their transshipment Resolution to enable more effective transshipment monitoring and reporting. Doing so would enhance transparency of carrier vessel and LSTLV activities, including harvests and subsequent at-sea transfers of SBT. Improving CCSBT's ability to cross-verify and validate reported information, regardless of source, will increase opportunities to detect anomalous activity and for relevant authorities to respond and investigate potential instances of unreported or unauthorized transshipments of SBT. Verification and validation of transshipments of SBT will strengthen the Commission's SBT rebuilding plan as it reduces the uncertainty associated with catch and effort data.

1 Introduction

Global Fishing Watch (GFW), in partnership with The Pew Charitable Trusts (Pew), is undertaking an assessment of at-sea transshipment activity occurring in the waters of the Convention Areas of the global tuna Regional Fisheries Management Organizations (RFMOs). The purpose is to help expand greater understanding of transshipment and inform policy development directed at strengthening transshipment management and control in the global tuna fisheries. This work includes a series of annual reports covering transshipment-related activity that is observable from comparative analyses of vessels Automatic Identification System (AIS) data combined with reviews of publicly available information specific to transshipment. These reports are designed to be RFMO-specific and cover calendar years 2017 through 2019. This is the first such report specific to the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and covers calendar year 2017.

A second element of work complementing these reports is the development of a publicly accessible web-based Carrier Vessel Portal (CVP) specifically focused on information and activities of carrier vessels authorized by the five tuna RFMOs. The purpose of the CVP is to provide users an easy, single-access data platform for information related to carrier vessels and at-sea transshipments. Initially, the CVP is envisaged to display AIS data linked with RFMO vessel authorization information, with the intention to display additional information as it becomes publicly available such as Secretariat annual reports, RFMO transshipment declarations, observer reports, and other related data.

Carrier vessels registered over 300 gross tons and on international voyages are already required to broadcast on AIS, as mandated by the International Maritime Organization (IMO) (IMO 2002). AIS used in fishing fleets is increasing with a growing number of flag and coastal States, as well as the Pacific Islands Forum Fisheries Agency (FFA), mandating its use through their own national or regional fisheries regulations. For example, the European Commission and the United States of America require AIS on fishing vessels over a certain size. The FFA requires fishing vessels to be equipped with AIS as a prerequisite to be included on the FFA Regional Vessel Register. 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.

To help overcome these data gaps, CVP will provide a central repository where users have access to a range of publicly available information to support greater understanding of transshipment activities and assist in investigations or development of risk assessments. Intended users of the CVP include RFMO Secretariats and flag, coastal, and port State authorities. However, the open nature of the portal and easily accessible publicly available database will allow other fishery stakeholders to better understand fleet dynamics and

conduct greater due diligence in recognizing potential risks of anomalous activity directly associated with their supply chains.

1.1 Commission for the Conservation of Southern Bluefin Tuna

The CCSBT is an intergovernmental organization made up of member governments that share mutual interests in managing and conserving southern bluefin tuna stocks throughout its distribution (Figure 1). The CCSBT was established through the Convention for the Conservation of Southern Bluefin Tuna, an agreement signed by Australia, Japan and New Zealand in May 1993. In addition to the Convention’s three original members, there are five other members which make up the Extended Commission (collectively termed “Members”). These include the Republic of Korea, Indonesia, the European Union, South Africa and Taiwan, Province of China (referred to as The Fishing Entity of Taiwan by CCSBT and in this report hereafter referred to as “Taiwan”). Currently, no countries are considered formal Cooperating Non-Members (CNM) of CCSBT although the Philippines was previously considered a CNM with its CNM status ceasing as of 12 October 2017².

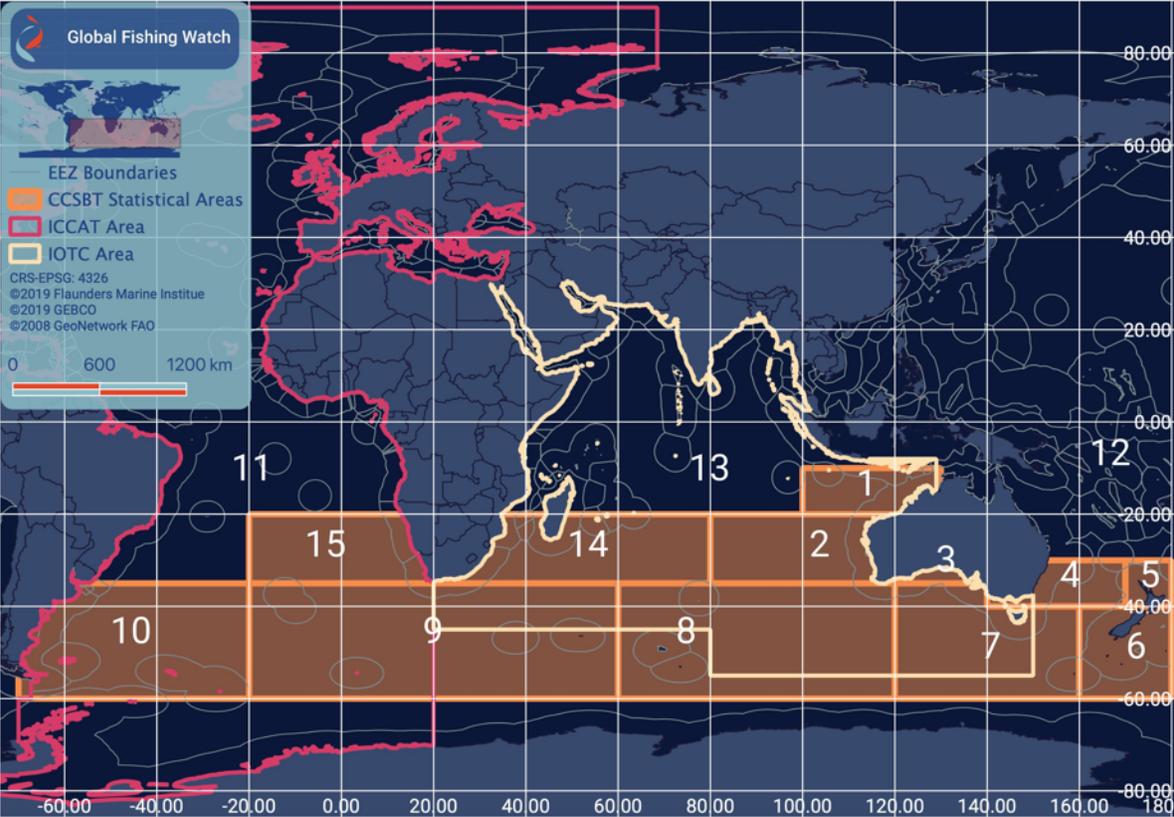


Figure 1: CCSBT Statistical Areas and Convention Area Boundaries of ICCAT and IOTC

² <https://www.ccsbt.org/en/content/origins-convention>

1.2 CCSBT Transshipment Program

Transshipment of Southern Bluefin Tuna (SBT) under the CCSBT is regulated by the CCSBT *Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels* (LSTLVs) (CCSBT Transshipment Resolution 2017). Within this Resolution, CCSBT uses the term “carrier vessel” to refer to any vessel, except a container vessel, that receives SBT transshipped from an LSTLV. According to the Resolution, the Secretariat maintains a Record of Carrier Vessels which are duly authorized to receive SBT from LSTLVs at sea or in port. Carrier vessels not entered on the record are deemed not authorized to receive SBT in transshipment operations. Each Member must submit to the Executive Secretary a list of carrier vessels they authorize to receive transshipments of SBT. Members must also notify the Secretariat of any addition to, deletion from, and/or any modification to their own list of carrier vessels when changes occur. The Resolution does not specify that carrier vessels must be flagged to a CCSBT Member to be included on the CCSBT Record of Carrier Vessels.

Per Section 1 and 3 of the Resolution, all LSTLV transshipments of SBT are required to take place in port except for transshipments which take place under the CCSBT program to monitor transshipments at sea (CCSBT Transshipment Resolution 2017). Under this program, LSTLVs are not authorized to transship at sea unless they have prior authorization from their respective flag State. Vessels conducting transshipments of SBT in waters under the national jurisdiction must be authorized to do so by the relevant coastal State. LSTLVs that conduct at-sea transshipments must be included on the CCSBT Authorized Vessel List and operate under the jurisdiction of a Member which participates in the transshipment program.

Each Member is responsible for ensuring that all carrier vessels they authorize have onboard a CCSBT observer in accordance with the CCSBT Regional Observer Program (ROP) (CCSBT Transshipment Resolution 2017). To not duplicate efforts, IOTC and ICCAT observers who are embarked on CCSBT-authorized carrier vessels can participate in the CCSBT transshipment program provided these observers meet the standards set out by CCSBT and the Secretariat is informed. Unlike IOTC and ICCAT, which use service providers to run and manage their respective carrier ROP, the CCSBT Secretariat manages the CCSBT ROP. If a Member wishes to utilize an observer from the CCSBT ROP, they must submit an observer deployment request to the Secretariat approximately 15 days to two months before an authorized carrier vessel makes a trip that will include SBT transshipments. The Executive Secretary then appoints an observer and ensures they are placed on the authorized carrier vessel. The cost of implementing the CCSBT ROP is financed by flag Members of LSTLV fleets which engage in at-sea transshipment of SBT.

Prior to transshipping any SBT at sea, authorized LSTLVs must first notify their respective flag State authority at least 24 hours in advance of the intended transshipment. Additionally, each LSTLV must complete and provide to their flag State authority (as well as coastal State authority where applicable) a CCSBT transshipment declaration no later than 15 days after the transshipment. Before each transshipment, the authorized carrier vessel involved must confirm the LSTLV with which they intend to transship is party to

the CCSBT transshipment program and has obtained prior authorization from their respective flag State. The receiving carrier vessel must complete their own CCSBT transshipment declaration and transmit this to both the CCSBT Secretariat and the flag State of the LSTLV within 24 hours after the transfer. The receiving carrier vessel must also, no later than 48 hours before landing, complete a CCSBT transshipment declaration and transmit this to the competent authorities of the port State where the carrier vessel intends to land SBT.

As part of the CCSBT transshipment program (see CCSBT Transshipment Resolution 2017), Members must provide to the Secretariat an annual report that details:

1. The quantity and percentage of SBT transshipped at sea and in port during the previous fishing season;
2. The list of their authorized LSTLVs that transshipped SBT at sea and in port during the previous fishing season; and
3. A comprehensive report assessing the content and conclusions of the reports of observers assigned to carrier vessels which received at-sea transshipments of SBT from their LSTLV fleets during the previous fishing season.

This annual report allows Members to provide information on SBT on a “quota year” basis. Those Members that have not specified a “quota year” to CCSBT provide the information on a calendar year basis. The quota year is referred to as the “fishing season”. Information is provided by Members for the most recently completed fishing season, although they are encouraged to also provide preliminary information for the current fishing season where the fishing for that season is complete or close to complete. Quota year – or fishing season – is used by the CCSBT Members of Japan, Korea and Taiwan³. The 2017/18 fishing season for these three Members ran from 01 April 2017 to 31 March 2018 (*CCSBT-ESC/1809/04 2018*).

1.3 CCSBT Catch Documentation Scheme

In 2005, CCSBT developed principles to guide development of a Catch Documentation Scheme (CDS) for SBT which led to the 2006 adoption of a Resolution on the Implementation of a CCSBT CDS. As a component of the CDS, CCSBT established a Statistical Document Program to collect SBT data from its Members that included information on total catch, catch and effort, and catch at size data⁴. For transshipments, landings of domestic product, exports, imports and re-exports under the jurisdiction of a Member cooperating in the CDS, all SBT must be accompanied, in part, by a Catch Monitoring Form. This Form records information on the catch, landing, transshipment, export and import of all SBT regardless of whether farmed or not, including unexpected catch. The Catch Harvest Section of this Form contains a data field that requires the vessel master to outline the area in which SBT were harvested using specific main CCSBT

³ <https://www.ccsbt.org/en/content/data-submission-requirements>

⁴ <https://www.ccsbt.org/en/content/sbt-data>

Statistical Areas (numbered 1 to 10 and 14 to 15) or other CCSBT Statistical Areas (numbered 11 to 13) where there is no corresponding main area (Figure 2).

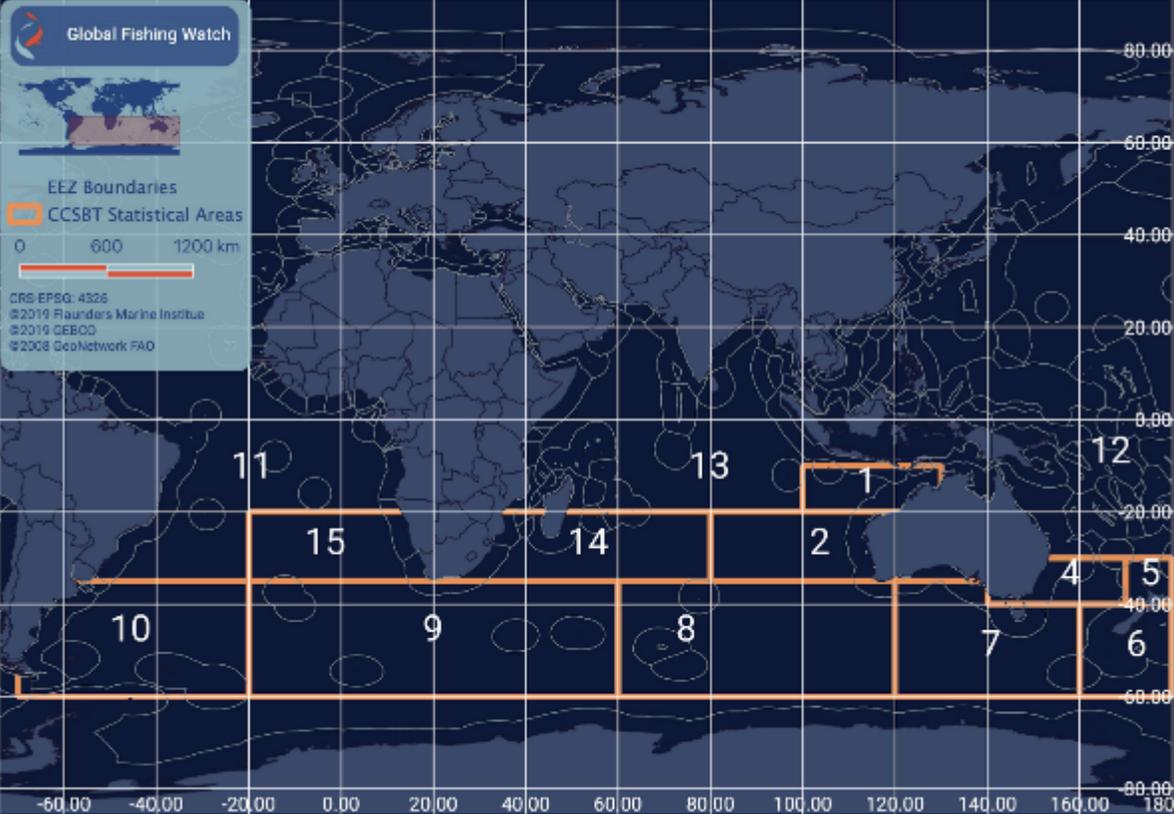


Figure 2: CCSBT Statistical Areas

2 Study Objective

This study used commercially available satellite AIS data combined with the application of machine learning technology and analysis of publicly available information to analyze track histories of carrier vessels and LSTLVs operating in CCSBT Statistical Areas in 2017. This was done with the overall objective to strengthen understanding of transshipment activity in CCSBT to help inform future policy decisions, specifically, to:

1. Enable CCSBT policy makers to make better informed decisions regarding the management of transshipment of SBT involving CCSBT-authorized carrier vessels and LSTLVs to strengthen the current CCSBT transshipment program where needed to address potential management gaps or loopholes related to reporting, vessel monitoring, and data-sharing; and
2. Better inform CCSBT policy makers by providing them with greater transparency regarding activities of non-CCSBT authorized carrier vessels and LSTLVs

operating in CCSBT Statistical Areas via information on vessel movement patterns including spatial dynamics, encounters, loitering events, and frequented ports.

Additionally, this analysis provides usable data on vessel activity consistent with transshipping which:

1. Demonstrates how AIS analysis can be used as a monitoring and analysis tool to complement existing CCSBT MCS structures using VMS, flag State authorizations, observer reporting and catch documentation;
2. Provides data that can be used by the Secretariat or national authorities to initiate follow-on investigations of activities of carrier vessels and LSTLVs where data appears to show anomalous behavior, or potentially unauthorized or unreported transshipment activity specifically related to CCSBT Statistical Areas; and
3. Complements the development of the CVP that is intended to give RFMO fisheries stakeholders access to AIS data and relevant publicly available information on carrier vessels and transshipment within a single platform.

Note: Any incident identified in this study as possibly anomalous or non-compliant should not be seen as definitive. This report acknowledges that AIS data represents only one dataset and additional information available to the Secretariat and Member flag States would be needed to provide a complete understanding of any potential non-compliant or unauthorized fishing activity. Further investigation by the Secretariat, relevant flag and/or coastal State authorities who have access to this additional non-public information would be needed to make that determination and take appropriate enforcement or regulatory action.

3 AIS Analysis Methods

GFW uses AIS data to provide insight into vessel movements and fishing activity throughout the world, including possible transshipment behavior (i.e., Miller et al. 2018; Boerder et al. 2018; Sala et al. 2018). The GFW database was used in conjunction with public registry data from CCSBT, IATTC, IOTC, and ICCAT to analyze potential fishing activity in CCSBT Statistical Areas by LSTLVs and ensuing transshipment activity occurring between those LSTLVs (i.e., 'donor' vessels) and carrier vessels that may have involved the transfer of SBT during calendar year 2017. A full description of data methods is described in Annex 2 and explained in detail in Kroodsma et al. 2018 and Miller et al. 2018. The GFW database contains a table of AIS-detected 'encounters' between two vessels and 'loitering' events by carrier vessels. Encounters, where two vessels meet at sea, may indicate possible transshipment activity between two vessels. Encounters are estimated using AIS data, including distance between the two vessels, vessel speeds, and duration in a given area. SBT catch from within the CCSBT Statistical Areas prior to

transshipment events is estimated by using the GFW machine learning of apparent fishing⁵ activity by longline fishing vessels.

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 3). Loitering was also estimated using AIS data, including vessel speed, duration in a given location and distance from shore. Given that the CCSBT transshipment program was established for carrier vessels and LSTLVs, only encounters between these types of vessels were examined for this report (see Annex 2).

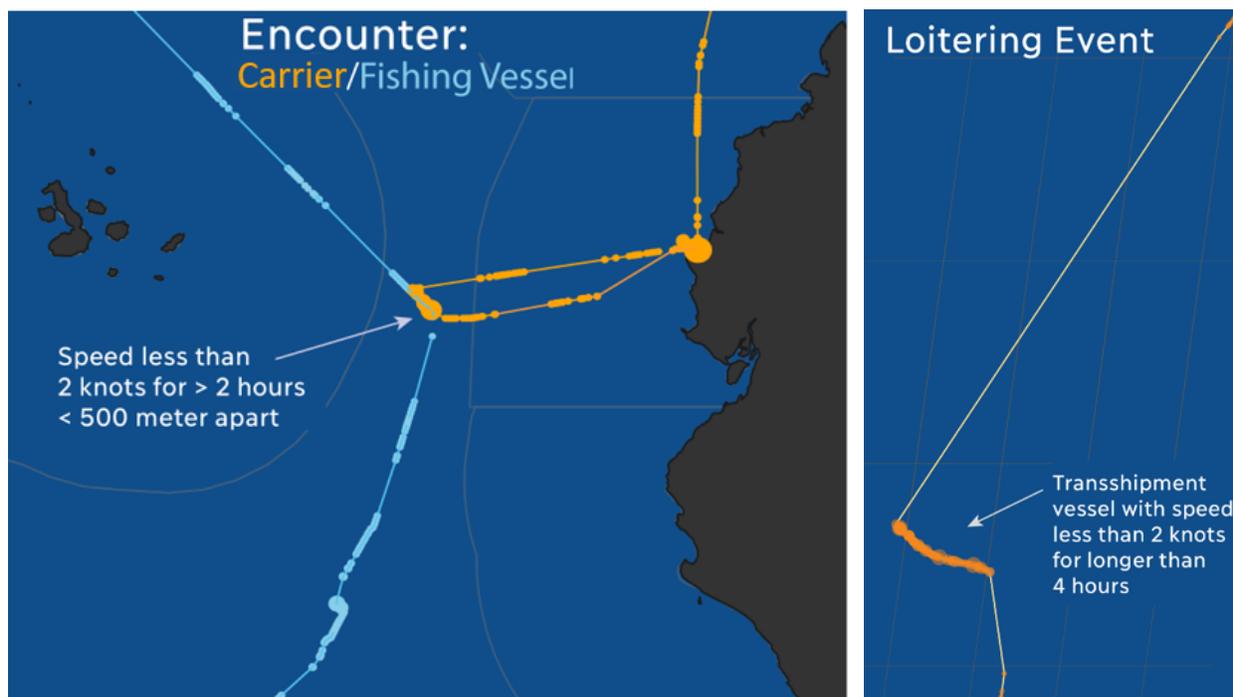


Figure 3 - Examples of vessel tracks during typical 'Encounter' where two vessels meet at sea and 'Loitering' events where a carrier vessel (referred to as transshipment vessel) has behavior consistent with encountering an LSTLV at sea but no LSTLV is visible on AIS

The GFW database also contains an estimate of port visits conducted by carrier vessels (see Annex 2). The ports visits are estimated using AIS data, including vessel speed,

⁵ 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

location, and duration in a given anchorage. This information was used to establish port to port carrier trip information to compare against reported carrier trips identified in the ICCAT ROP.

Vessel authorization was established by using the publicly available vessel registry produced by CCSBT⁶, ICCAT⁷, and IOTC⁸. Periods of authorization were only considered for vessel authorizations under CCSBT, while vessel authorization related to the other RFMOs were only considered insofar as calendar year 2017. As such, if a carrier vessel or LSTLV was authorized under IOTC or ICCAT at some point during calendar year 2017, that was used as the basis for authorization should the vessel not hold authorization under CCSBT. If a carrier vessel or LSTLV was authorized under CCSBT, the specific authorization period, to include the month, date, and year of the beginning and end of that vessel's authorization, was considered as the basis of the vessel's authorization during the time of encounters or loitering activity. It should be noted that the publicly available historical ICCAT vessel registry database is in the process of being updated by ICCAT. The carrier vessels listed in carrier deployments during 2017 by the ROP were assumed as authorized during 2017, even though not all were identified on the ICCAT public registry.

The full version of the data analyzed, including event and vessel information details, is included in Annex 1 of this report.

4 Overview of CCSBT-Related Carrier Vessel Activity

CCSBT established and maintains a publicly available Record of Carrier Vessels⁶. The carrier vessels on this list represent the only carrier vessels authorized to receive SBT from LSTLVs at sea or in port. The Record is populated by Members who submit to the Secretariat a list of carrier vessels that they authorize to receive transfers of SBT from their own flagged LSTLVs. Carrier vessels submitted by Members are not required to be flagged to a CCSBT Member. GFW used this Record, along with publicly available CCSBT, IOTC and ICCAT documents related to transshipment involving SBT, to assess carrier vessel activity associated with CCSBT Statistical Areas during 2017. In addition to the CCSBT Record of Carrier Vessels and Authorized Vessel List, the following specific publicly available documents were referenced:

- *Secretariat Review of Catches (CCSBT-ESC/1809/04)*
- *Operation of CCSBT MCS Measures (CCSBT-CC/1810/06)*
- *Resolution for a CCSBT Scheme for Minimum Standards for Inspection in Port (CCSBT MSIP 2018)*

⁶ <https://www.ccsbt.org/en/content/ccsbt-record-authorized-vessels>

⁷ <https://www.iccat.int/en/vesselsrecord.asp>

⁸ <https://www.iotc.org/vessels/date>

- *Review of CCSBT's Minimum Standards for Inspection in Port Resolution (CCSBT-CC/1810/10)*
- *Report of the Thirteenth Meeting of the Compliance Committee (CCSBT CC 2018)*
- *Report of the Twenty Fifth Annual Meeting of the Commission (CCSBT 2018)*
- *IOTC Report on Establishing a Programme for Transshipment by Large-Scale Fishing Vessels (IOTC-2018-CoC15-04a [E])*
- *IOTC 2018 ROP Contractor Report (IOTC-2018-CoC15-04b [E])*
- *ICCAT (ROP) Observer Reports - Current (commencing with Trip 188-16)*
- *ICCAT (ROP) Observer Reports - Previous (commencing with Trip 203-17)*
- *Annual Report to the Compliance Committee and the Extended Committee – Japan (CCSBT-CC/1810/SBT Fisheries – Japan)*
- *Annual Report to the Compliance Committee and the Extended Committee – Korea (CCSBT-CC/1810/SBT Fisheries – Korea)*
- *Annual Report to the Compliance Committee and the Extended Committee – Taiwan (CCSBT-CC/1810/SBT Fisheries – Taiwan)*
- *Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels (CCSBT Transshipment Resolution 2017)*
- *Resolution on the Implementation of a CCSBT Catch Documentation System (CCSBT CDS 2014)*
- *Resolution on the CCSBT Vessel Monitoring System (VMS) (CCSBT VMS 2017)*

4.1 CCSBT and Vessel Monitoring System Data

CCSBT has no centralized VMS, although it did establish a Resolution regarding VMS. VMS data is collected and retained by Member flag States but is not shared with other States or the CCSBT Secretariat. Therefore, the Commission has no ability to independently cross-check and verify carrier vessel or LSTLV location information to validate catch and effort data and transshipment reporting for discrepancies or other possible anomalies.

The Secretariat also does not receive reports on carrier vessel implementation of CCSBT's VMS measure and is unable to assess whether carrier vessels are complying with VMS obligations. This is a notable gap as two thirds of carrier vessels authorized by CCSBT Members to conduct at-sea transfers of SBT are flagged to non-Member flag States. Authorities of these non-Member flag States are under no obligation to apply with CCSBT's VMS resolution, nor is there any way to monitor the flag States compliance with any CCSBT resolution. In addition, they, like other members, are not required to provide CCSBT any VMS data regarding the movements of their carrier vessels, even though their vessels may be authorized by CCSBT to transship SBT. While CCSBT Members are required to report annually on the VMS operations of their flagged LSTLVs, this obligation does not extend to those carrier vessels they specifically authorize to transship SBT with their flagged LSTLVs. This represents another notable data gap, especially given the

number of non-Member flagged carrier vessels that Members authorize to transship SBT at-sea.

The CCSBT Secretariat has only two primary data sources it utilizes to report on the implementation of the CCSBT VMS Resolution (see CCSBT VMS 2017). These are:

1. Member self-reporting in annual summary information that details whether all LSTLVs involved in SBT fishing activity have complied with the requirements of the CCSBT's VMS Resolution; and
2. IOTC ROP observer reports in those cases where LSTLVs transship SBT at sea with carrier vessels with an embarked IOTC observer.

ICCAT observers also conduct checks of VMS units on LSTLVs, but this check consists only of an observation whether a VMS unit is installed on the vessel and is powered on.

4.2 Reporting of Transshipments involving Transfers of SBT

Attachment A of the Secretariat's document *Operation of CCSBT MCS Measures* includes a summary of reported SBT transshipments which occurred at sea during calendar year 2017 (CCSBT-CC/1810/06). According to this report, 90 transshipments of SBT totaling 2,273,740 kilograms of SBT were reported to have occurred via transshipment declarations and observer reports involving LSTLVs flagged to Japan, Korea and Taiwan (Table 1). Japan, Korea and Taiwan were the only CCSBT Members which authorized carrier vessels to transship SBT at-sea in 2017 and whose LSTLVs were reported to be involved with these at-sea transfers. A total of 38 carrier vessels were authorized by CCSBT in 2017⁶. However, the count of distinct carrier vessels was 37, as one authorized carrier vessel changed flags from Seychelles to Korea during the year. Of the 38 vessels, only 26 carrier vessels were flagged to CCSBT non-Members.

CCSBT reports indicated no CCSBT observers were utilized by Members in 2017 to embark carrier vessels and provide reporting of SBT transshipments. Instead, observers sourced from the ICCAT and IOTC ROPs provided all reporting of SBT at-sea transfers (see ICCAT Observer Reports – Current/Previous, IOTC-2018-CoC15-04a [E], and IOTC-2018-CoC15-04b [E]). According to these documents, 27 transfers of SBT were reported by ICCAT observers embarked on four different carrier vessels. The IOTC observers reported 63 transfers of SBT were reported by IOTC observers embarked on ten different carrier vessels (inclusive of the four carriers with embarked ICCAT observers). The total weight of all SBT transshipped at-sea could not be cross-verified between the transshipment declarations, CCSBT CDS documents and the ICCAT/IOTC observer reports as the embarked observer did not provide weight figures of SBT transferred on 54 of the 90 transshipments.

The ROP documents also indicated the 10 distinct carrier vessels that reported the 90 at-sea transfers of SBT in 2017 were flagged to the six flag States of Japan, Korea, Panama, Liberia, Seychelles, and Singapore and these at-sea transfers took place during 14

different carrier vessel trips (Table 2). IOTC ROP reporting indicated transshipments of SBT did not involve any Taiwanese-flagged carrier vessels, although IOTC observers were deployed on Taiwanese-flagged carrier vessels for 18 separate trips during 2017 (IOTC-2018-CoC15-04b [E]). Self-reporting by Taiwan indicated 32 Taiwanese-flagged LSTLVs were involved in 49 at-sea transfers of SBT (Taiwan CCSBT Member 2018). The 49 transfers appear to involve the 10 carrier vessels with embarked ICCAT or IOTC observers that had reported the 90 transshipments of SBT during 2017. However, none of the 90 transfers reported by these two ROPs involved Taiwanese-flagged carrier vessels. While AIS data indicated Taiwanese-flagged carrier vessels were active in CCSBT Statistical Areas during 2017, ROP reporting indicates none of these carrier vessels conducted at-sea transfers with LSTLVs that involved SBT.

The 10 carrier vessels reported to have been involved with at-sea transfers of SBT were all authorized by CCSBT in 2017; however, only 3 of the 10 were flagged to CCSBT Members. The other seven carrier vessels were flagged to non-Members. This included two carriers flagged to Non-Contracting Parties (NCP) of IOTC; Panama and Singapore. Only eight of the 90 reported transfers of SBT involved carrier vessels flagged to CCSBT Members. By contrast, the two carrier vessels flagged to Panama and Singapore were responsible for reporting almost 36 percent of all transfers of SBT in 2017.

Table 1: Summary of Reported SBT Transshipments at sea during the 2017 Calendar Year (table from CCSBT-CC/1810/06 – Attachment A)

Table 1: Summary of Transshipments at sea during the 2017 Calendar Year

Fishing Vessel Flag	From Transshipment Declarations			From Observer Reports	
	Number of Transshipments	Total Net Weight (kg) of SBT	Product Type	Number of Transshipments	Total Net Weight (kg) of SBT
Japan	34	1,319,928	GG	34	1,002,312
	2	77,034	GGT	2	73,840
Korea	5	361,614	GG	5	257,108
Taiwan	49	515,164	GG	49	65,546
TOTAL	90	2,273,740		90	1,398,806

According to paragraph 31 of the CCSBT *Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels*, CCSBT Members are required to provide an annual report to the Commission which details, in part, a comprehensive report assessing the content and conclusions of the reports of observers assigned to carrier vessels which received at-sea transfers of SBT from their LSTLVs during the previous fishing season (CCSBT Transshipment Resolution 2017). Despite this reporting obligation, the CCSBT Compliance Committee meeting in 2018 noted that “...Members had not provided the ‘comprehensive report assessing the content and conclusions of the reports of the observers assigned to carrier vessels which have received at-sea transshipments from their LSTLVs’ that is required in Members’ annual reports to the Compliance Committee and Extended Commission...” (CCSBT CC 2018).

This lapse in Member reporting obligations is a notable data gap and adversely impacts the ability of the Secretariat, or any other organization, to cross-reference and verify reporting of at-sea transfers of SBT. Additionally, the incomplete reporting could be linked to Members’ reliance on the use of non-CCSBT observers sourced through ICCAT or IOTC as well as the ability to authorize non-Member flagged carrier vessels to conduct at-sea transfers of SBT. Current reporting protocols may prevent CCSBT Members from receiving timely receipt of full observer reports from ICCAT or IOTC for which they are to provide comment; therefore, further clarification on these reporting processes may be warranted to ensure Members have access to the full reports necessary to provide an assessment on their contents and conclusions. Likewise, use of non-Member flagged carrier vessels may also impact Member reporting obligations. Although a carrier vessel master is required to pledge compliance with CCSBT measures, Flag State authorities of these carrier vessels are under no obligation to report to, or otherwise cooperate with, CCSBT Members who authorize the carrier vessels to transship SBT – although one must consider Articles 17 and 18 of the United Nations Fish Stocks Agreement (UNFSA) indicate a responsibility for them to cooperate. However, this is only if the non-Member has ratified or acceded to the UNFSA. The risk of this same potential lack of cooperation extends as well to the Secretariat regarding the CCSBT-related activities of those non-Member flagged carrier vessels. A vessel master pledging compliance is not the same as the flag State being bound by CCSBT membership to ensure its carrier vessels are compliant. These factors have the potential to lessen the overall effectiveness of CCSBT’s transshipment program and undermine SBT management arrangements.

Table 2: Carrier Vessel Flag breakdown retrieved from ICCAT and IOTC ROP Reports

CCSBT Status	Flag State	ICCAT		IOTC	
		No. of TS	Carriers	No. of TS	Carriers
CCSBT Members	JPN	12	2	4	2
	KOR	0	0	4	1
Non-Members & NCPs	LIB	15	2	21	4
	SYC	0	0	2	1
	SGP	0	0	31	1
	PAN	0	0	1	1
Total		27	4	63	10

4.3 AIS Detection of Encounters Between Carrier Vessels and LSTLVs

A review of satellite AIS data identified 373 distinct carrier vessels that transited through one or more of the CCSBT Statistical Areas at some point during 2017. For this study, vessel identification was based on a uniquely identified Maritime Mobile Service Identity (MMSI) number and vessel name associated with an AIS transponder. Of the 37 distinct carrier vessels authorized by CCSBT in 2017, 31 were observed on AIS. Of the 31 carrier

vessels, 25 were detected to have had encounter and/or loitering activity in CCSBT Statistical Areas.

A total of 78 of the 373 carrier vessels were identified as either having AIS-detected encounters with LSTLVs or were observed loitering in a manner other than direct and continuous transit while in one or more CCSBT Statistical Area. 130 distinct LSTLVs were observed to have been involved in 240 separate AIS-detected encounters with 22 distinct carrier vessels (Figure 4). Only 16 of the 22 carrier vessels were authorized by CCSBT (Figure 5). By far, the most active CCSBT Statistical Area for encounters was Statistical Area 14. The highest number of distinct carrier vessels operated inside Statistical Areas 14 and 9. See Annex 1-0001-0240 for the full version of the AIS-detected encounter data.

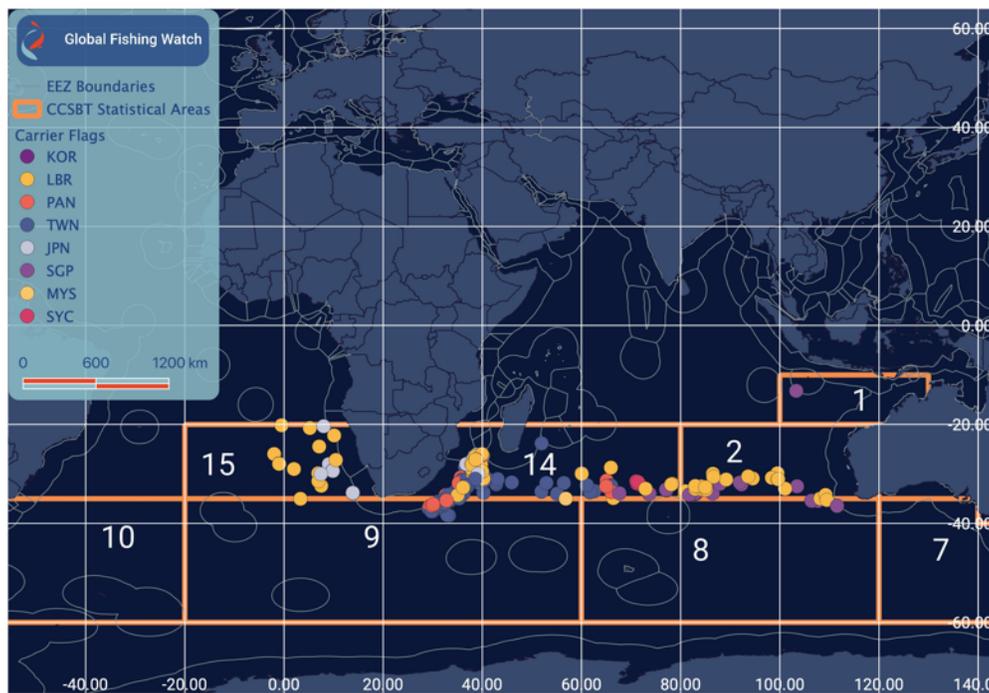
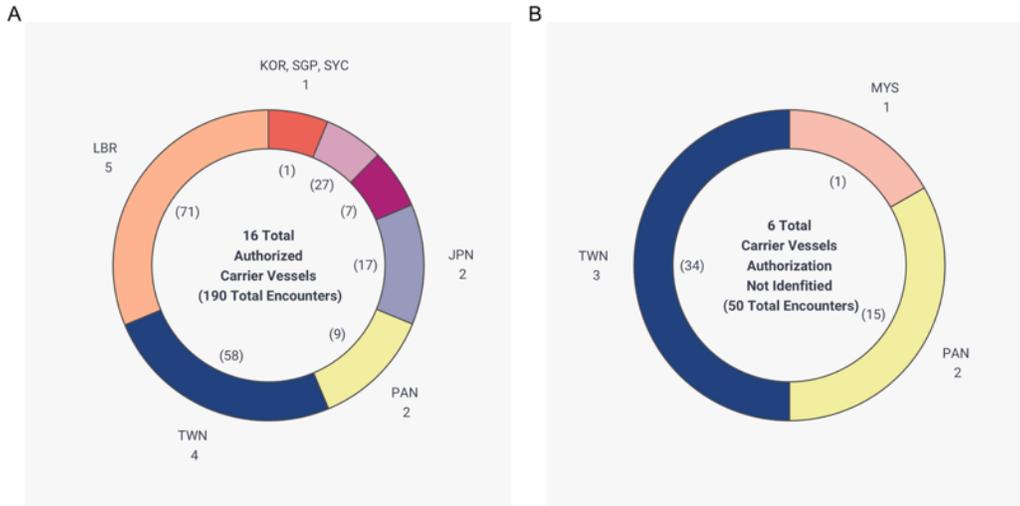


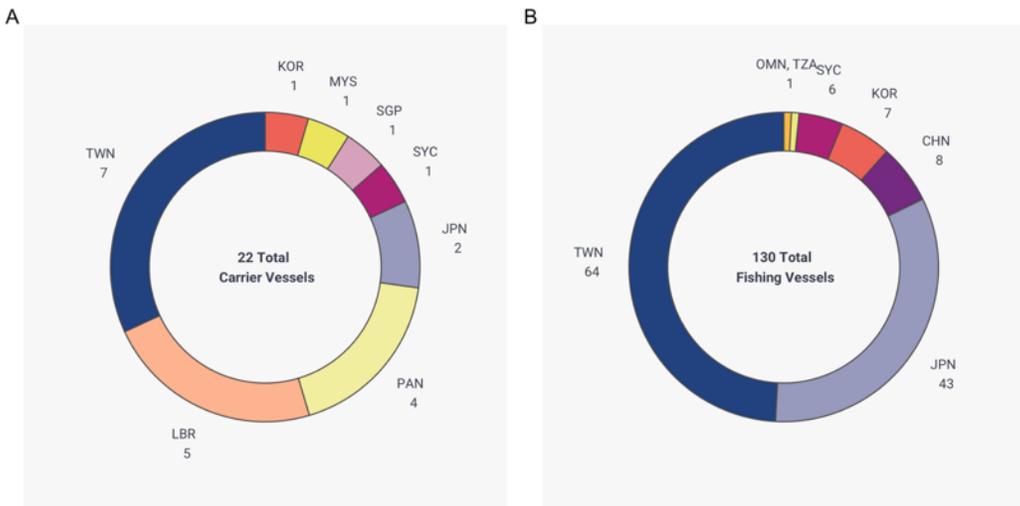
Figure 4: Encounters by Carrier Vessel flag State within CCSBT Statistical Areas



Source: Global Fishing Watch

Figure 5: 22 Distinct Carrier Vessels Detected on AIS having Encounters with LSTLVs (Note: Inner Ring Numbers Represent Count of Encounters)

Flag States of the 130 LSTLVs identified to have encounters with the 22 carrier vessels included the CCSBT Members of Japan, Korea and Taiwan as well as LSTLVs flagged to China, Seychelles, Tanzania and Oman (Figure 6). Most encounters involved carrier vessels flagged to Taiwan, Liberia and Panama and LSTLVs flagged to Taiwan and Japan.



Source: Global Fishing Watch

Figure 6: Count of Distinct Vessels in Encounters in CCSBT Statistical Areas by Flag State

There was no publicly available data which identified specific carrier vessel and LSTLV interactions within CCSBT Statistical Areas; however, supplementary use and analysis of AIS data helped provide greater transparency of these interactions. For instance, Taiwanese-flagged carrier vessels almost exclusively had encounters with Taiwanese-flagged LSTLVs. Similarly, Japanese-flagged carrier vessels almost exclusively had encounters with Japanese-flagged LSTLVs. Virtually all the encounters the single

Singaporean-flagged carrier vessel had were with Taiwanese-flagged LSTLVs, and Liberian-flagged carriers primarily encountered Japanese-flagged LSTLVs (Figure 7).

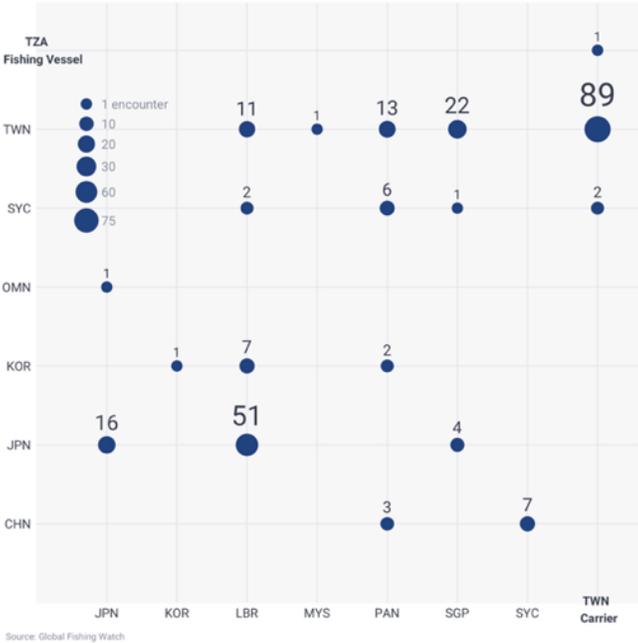


Figure 7: Flag State of Carrier Vessels and LSTLVs Involved in AIS-Detected Encounters in CCSBT Statistical Areas

Of the 240 encounters, 86 percent involved 64 distinct Taiwanese-flagged LSTLVs and 43 distinct Japanese-flagged LSTLVs (Figure 6). This breakdown appears consistent with reported transshipment activity where, of the 90 reported transfers of SBT, all but 5 were reported to have been conducted by LSTLVs flagged to Taiwan and Japan. 16 carrier vessels flagged to Panama, Liberia, and Taiwan were responsible for 78 percent of all encounters detected on AIS. CCSBT authorization was only identified for 11 of these 16 carriers (Figure 5). The single Singaporean-flagged carrier vessel which conducted nearly half of the 63 at-sea transfers of SBT as reported by the IOTC ROP (31 events) was involved in only 11 percent of the encounters. 50 of the 240 encounters involved carrier vessels that were not authorized by CCSBT to transship SBT (Figure 5). These encounters involved carrier vessels flagged to Panama, Taiwan and Malaysia. Three Taiwanese-flagged carriers without CCSBT authorization were involved in 34 encounters, while 2 Panamanian-flagged carrier vessels also not authorized by CCSBT were involved in 15 of the remaining 16 encounters.

It is important to note that AIS data alone cannot be used to make assumptions on the type and quantity of fish product being transshipped if an actual at-sea transfer of catch occurs. It is recognized that encounters, especially those that occurred in CCSBT Statistical Areas 14, 15, and 2, may not have involved transfers of SBT and could very well have only involved transfers of other pelagic species such as bigeye, yellowfin, and skipjack tuna or other tuna-like species. These fish stocks all have distributions that include waters covered by CCSBT Statistical Areas but are managed by other RFMOs such as ICCAT or IOTC.

4.4 AIS Detection of Loitering Events by Carrier Vessels

In addition to the 240 AIS-detected encounters, a total of 1,616 AIS-detected loitering events were exhibited by 78 distinct carrier vessels (Figure 8) (See Annex 1-0241-1856). 318 of these loitering events occurred within the Exclusive Economic Zones (EEZs) of several African coastal States. The 78 carrier vessels are inclusive of the 22 carrier vessels observed to have AIS-detected encounters with LSTLVs. For this study, loitering events were defined as those events in which a carrier vessel’s movements of AIS were consistent with behavior indicative of transshipment at sea (see Annex 2), but for which no other vessel was observed on AIS in the immediate vicinity of the carrier vessel during the loitering timeframe. These loitering events provide an indication that transshipment may have occurred. Loitering events only detail the activity of a carrier vessel; therefore, it is important to note that these events may also indicate activities other than transshipment, such as carrier vessels experiencing mechanical issues, possibly awaiting orders from owners, or even transfers of crew, bait, or supplies other than catch. Additionally, loitering events may involve carrier vessel interactions with fishing vessels that have no AIS or have their AIS turned off or with other fishing vessels not related to CCSBT management and transfers of SBT. The location of a loitering event and the duration and specific behavior of the carrier vessel in relation to sea currents and wind can all help in determining the level of confidence that loitering events may involve transshipment of catch. As such, analyses of loitering events observed by a carrier vessel can be used to help prioritize efforts of inspection authorities, should the carrier vessel be subject to a compliance inspection at sea or in port.

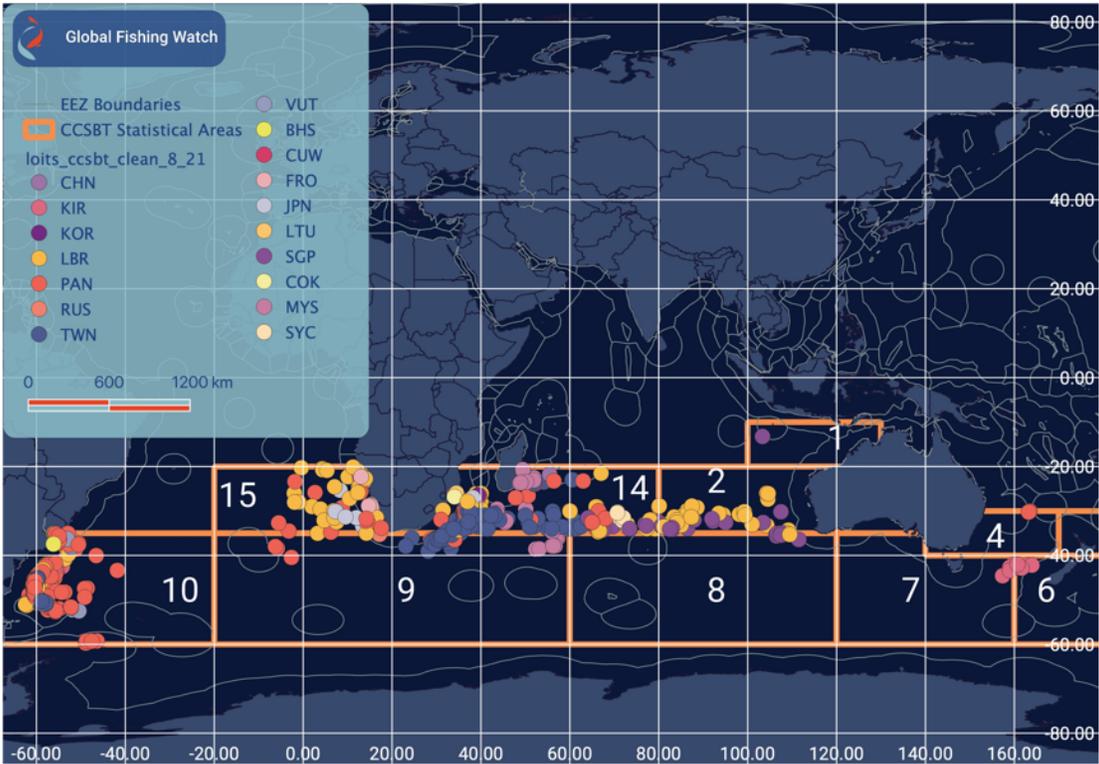
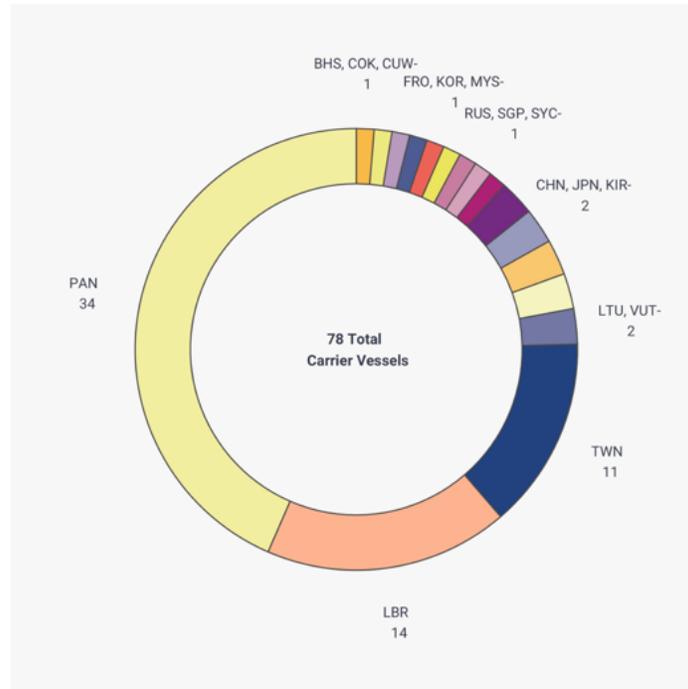


Figure 8 - Loitering Events within CCSBT Statistical Areas by Carrier Vessel Flag State

Figure 8 indicates the AIS-detected loitering activity of all 78 carrier vessels in CCSBT Statistical Areas during 2017. Loitering activity was dominated by 59 distinct carrier vessels flagged to Panama, Liberia, and Taiwan which accounted for approximately 88 percent of all loitering events (Figure 9).



Source: Global Fishing Watch

Figure 9 - Count of Distinct Carrier Vessels in Loitering Events by Flag State within CCSBT Statistical Areas

The majority of carrier vessel loitering activity occurred in CCSBT Statistical Area 10 (Table 4) where nearly 67 percent of all loitering events took place. This Area also had the highest level of carrier vessel presence, with 45 different carrier vessels observed loitering inside the Area at various times during 2017. This high level of carrier vessel presence and their associated loitering activity is likely related to at-sea transshipment involving species other than SBT, such as squid, which are not managed by CCSBT or covered under the CCSBT transshipment program. Similarly, loitering activity observed in Statistical Areas 14, 15, and 2 could also be related to transfers of tuna and tuna-like species other than SBT. The amount of loitering activity observed in Statistical Area 9 should be of higher interest to CCSBT, as the distribution of tropical tunas, a primary target of LSTLVs, likely do not extend this far into the southern latitudes for these to be the primary target species. As such, carrier vessel loitering in CCSBT Statistical Area 9 has greater potential to involve at-sea transfers that include quantities of SBT and these events may deserve closer scrutiny to ensure whether confirmed transshipments did involve SBT but went unreported to CCSBT. The relatively high level of carrier vessel activity in CCSBT Statistical Areas may indicate that greater monitoring is needed with respect to the activities of **all** carrier vessels, regardless of whether they are authorized by CCSBT or not.

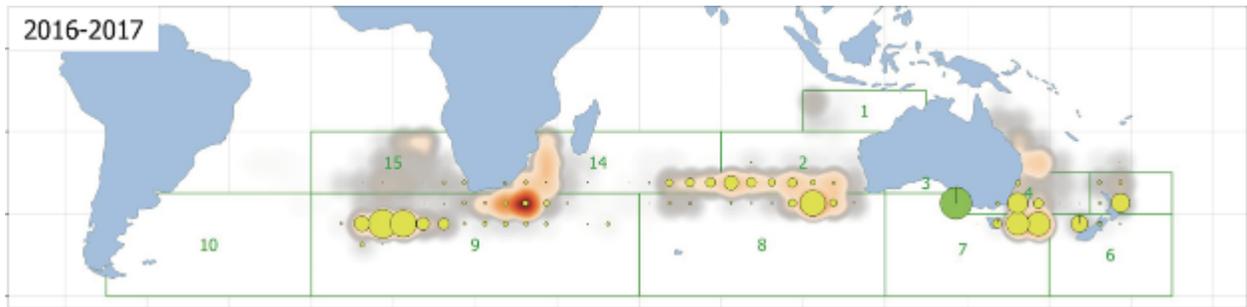
Table 4 - Count of Loitering Events in CCSBT Statistical Areas in 2017

CCSBT Statistical Area	Distinct Vessels	Count of Loitering Events
1	1	1
2	3	58
4	1	2
6	1	6
7	1	4
8	2	11
9	14	70
10	45	1081
14	35	325
15	17	58

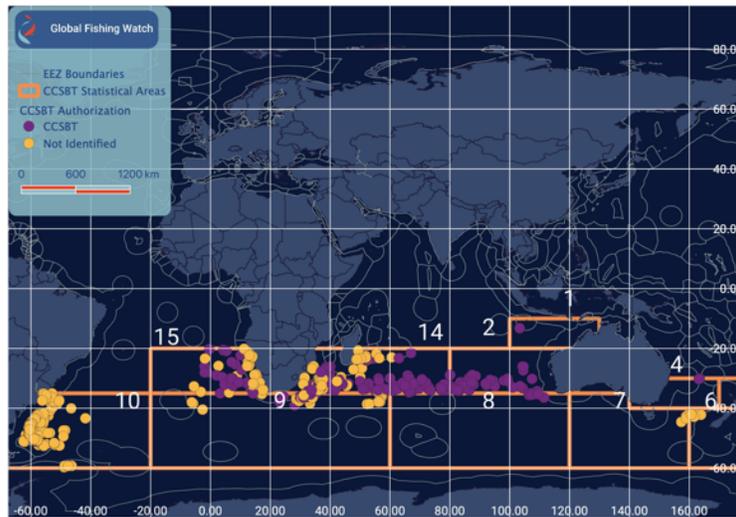
4.5 Carrier Vessel Encounters and Loitering Related to CCSBT Authorization

Comparative analysis of AIS-detected carrier vessel encounters and loitering events with reported areas of SBT catch by LSTLVs in CCSBT Statistical Areas suggest a correlation with geographic location of where SBT was harvested (Figure 10). This analysis also considered whether carrier vessels involved in encounters with LSTLVs or loitering events were authorized by CCSBT in 2017. Many encounters and loitering events by CCSBT-authorized carrier vessels were detected southwest of Australia, along the border of CCSBT Statistical Areas 2 and 8. This activity corresponds with reported catch and effort of SBT by LSTLVs in 2016-2017 (Figure 10). Similarly, CCSBT-authorized carrier vessels were also observed in encounters and loitering events in the South Atlantic and Indian Ocean waters around South Africa that overlap with ICCAT and IOTC Convention Area waters. These waters are inclusive of CCSBT Statistical Areas 9, 14 and 15. None of the carrier vessels observed loitering in CCSBT Statistical Area 10 were authorized by CCSBT. These carrier vessels were all flagged to Panama, Taiwan and Liberia. Given the distribution of SBT catch by LSTLVs in 2016-2017, it appears there is low risk these carriers were involved in at-sea transfers of SBT while operating in Statistical Area 10.

A



B



C

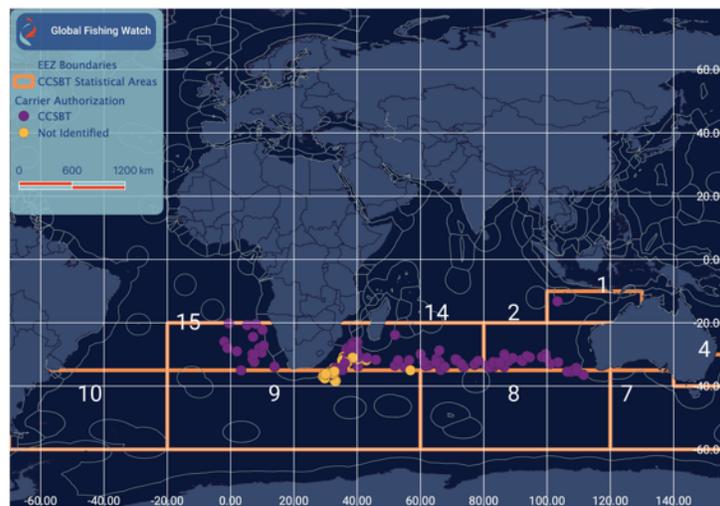
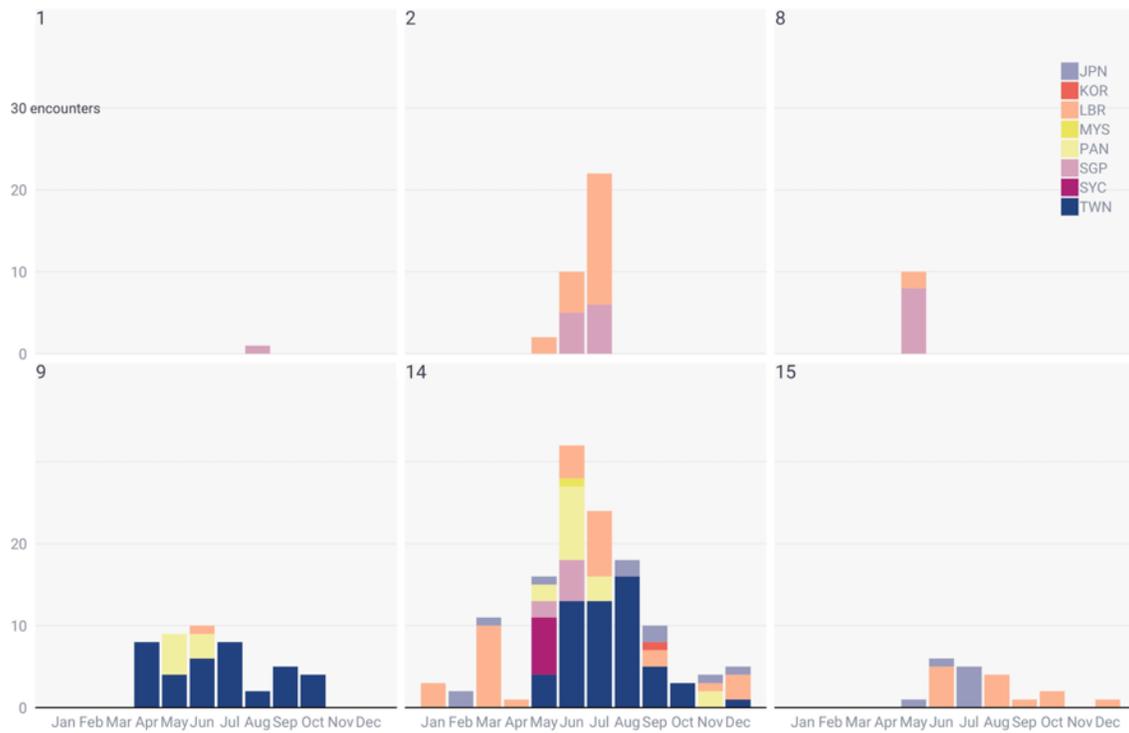


Figure 10 - Comparison of Loitering Events (b) and Encounters (c) by Carrier Vessels Specific to CCSBT Authorization with distribution of LSTLV catch of SBT as Reported by CCSBT (a). Note 10a was extracted from CCSBT-ESC/1809/04.

Non-CCSBT authorized carrier vessels were observed to have encounters with LSTLVs or exhibited loitering activity in Statistical Areas 9, 14 and 15. All three of these Statistical Areas have reported catch and effort of SBT by LSTLVs. As such, there is a greater risk that transshipments conducted by non-CCSBT authorized carrier vessels while in these Areas may involve transfers of SBT. Therefore, the activity of these carrier vessels while inside these three specific Areas may be of greater interest to CCSBT and therefore warrant close collaboration with ICCAT and IOTC, from whose ROPs observers are likely sourced and embarked onboard. In addition, greater collaboration with relevant flag State authorities of these carrier vessels would also help provide CCSBT the assurances needed that at-sea transfers conducted by their carrier vessels did not involve unreported transfers of SBT.

4.6 Seasonal Carrier Vessel Activity

Figures 11 and 12 outline observed encounters between carrier vessels (Figure 11) and LSTLVs (Figure 12) in CCSBT Statistical Areas by month throughout calendar year 2017. The encounters are broken down by month and flag State of the vessel. Figure 13 illustrates the observed loitering activity of carrier vessels within CCSBT Statistical Areas in 2017, also broken down by month and carrier vessel flag State.



Source: Global Fishing Watch

Figure 11 - Count of Encounters for each Carrier Flag State by CCSBT Statistical Area and Month

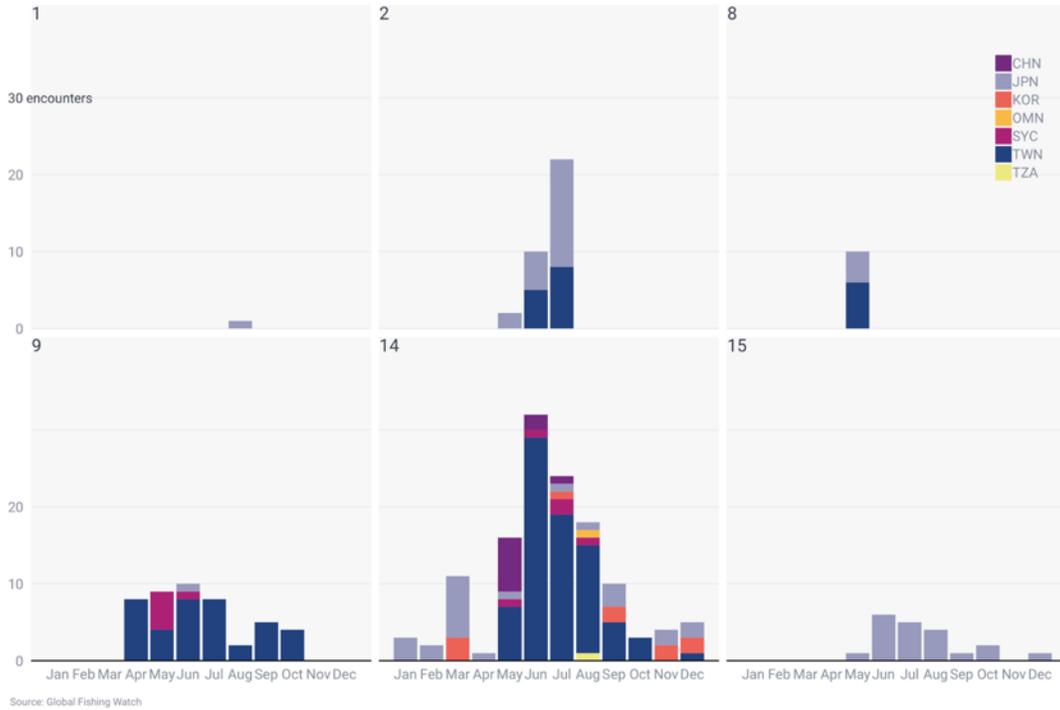


Figure 12 - Count of Encounters for each Fishing Vessel Flag State by CCSBT Statistical Area and Month

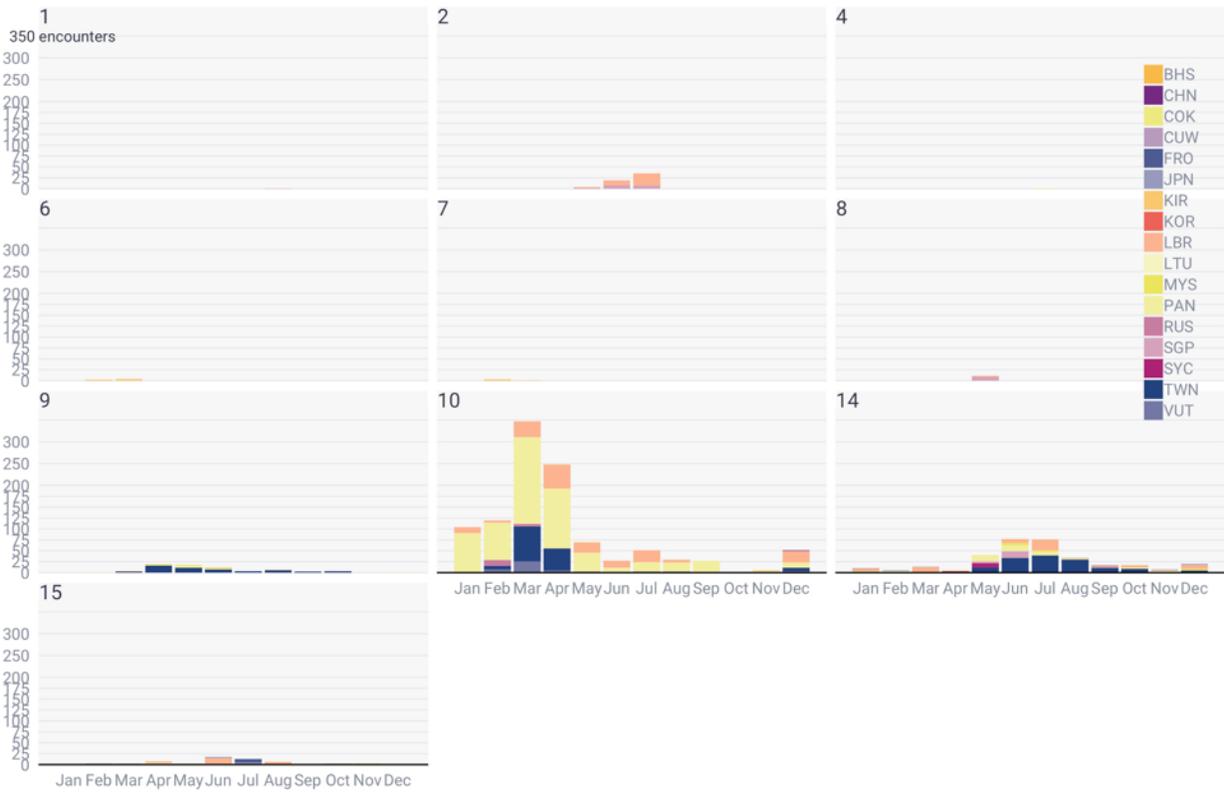


Figure 13 - Count of Loitering Events for each Carrier Vessel Flag State by CCSBT Statistical Area and Month

The majority of AIS-detected encounters and loitering events were observed in Statistical Areas 9, 10, and 14. Most encounters occurred in Statistical Area 14, followed by smaller amounts of activity in Statistical Area 9. The encounters occurred primarily between Taiwanese-flagged carrier vessels and Taiwanese- and Japanese-flagged LSTLVs. Encounters were largely observed occurring during June, July, and August regardless of Statistical Area. This seasonal trend appears to correspond to the seasonal distribution of SBT where; “...During the summer months (December – April), they tend to congregate near the surface in the coastal waters off the southern coast of Australia and spend their winters [June, July, August] in deeper, temperate oceanic waters”⁹. This may indicate that stronger transshipment reporting and monitoring protocols are needed by CCSBT in June, July and August specifically for Statistical Areas 9, 14 and 15 when catch and subsequent at-sea transfers of SBT are more likely to occur.

Section Key Findings

The following findings are further expanded in Section 8, Key Findings:

- *CCSBT has no centralized VMS and no ability to independently cross-reference vessel location data or validate catch, effort and at-sea transfers of SBT:* The Secretariat is also unable to assess whether all carrier vessels comply with CCSBT VMS measures as most carrier vessels authorized by Members are flagged to Non-Member flag States.
- *Significant carrier vessel activity occurs in CCSBT Statistical Areas.* AIS data clearly indicates CCSBT Statistical Areas have high levels of carrier vessel activity conducted by a combination of carrier vessels with and without CCSBT authorization. The level of effort and potential transshipment activity, especially by non-CCSBT authorized carrier vessels, is in stark contrast to the small number of CCSBT-authorized carrier vessels that reported at-sea transfers SBT in 2017.
- *CCSBT Member ability to authorize, and reliance on, non-Member flagged carrier vessels to transship SBT.* Of the 10 carrier vessels that reported transfers of SBT in 2017, 10 were flagged to non-Members from which nearly 78 percent of all reported at-sea transfers of SBT originated. Flag State authorities of these carrier vessels have no obligation to CCSBT to ensure their vessels comply with CCSBT management measures or report to CCSBT to validate their transshipment activity.
- *CCSBT Member reliance on non-CCSBT ROPs and observers to provide for all independent monitoring of SBT transfers at-sea.* In 2017, all reported at-sea transfers of SBT originated from carrier vessels with ICCAT or IOTC observers embarked on board who are depended on to represent the collective interests of CCSBT. This near full reliance on non-CCSBT programs increases the risk that CCSBT could be exposed to unacceptable levels of data inconsistencies or

⁹ <https://www.ccsbt.org/en/content/about-southern-bluefin-tuna>

anomalies without holding any direct means to correct deficient observer reporting processes or protocols or otherwise enhance reporting protocols or procedures.

5 Anomalous Activity

Carrier vessel trips during calendar year 2017, as reported by the ICCAT and IOTC ROPs, were analyzed in a comparative analysis with AIS data of carrier vessels observed operating within CCSBT Statistical Areas to cross-verify the reported information. On the surface, the 90 reported at-sea transfers of SBT as reported by ICCAT and IOTC appears to correspond to the 90 transshipments of SBT as reported by the CCSBT Secretariat. However, further analysis of AIS and reported information appears to highlight potential anomalous activity.

5.1 Reported and Observed Activity of Taiwanese-flagged Carrier Vessels

CCSBT reported 90 transshipments of SBT were conducted at-sea in 2017 by LSTLVs flagged to Taiwan, Japan, and Korea. Taiwan self-reported 32 of their LSTLVs were involved in 49 at-sea transfers of SBT during the 2017/2018 fishing season (Taiwan CCSBT Member 2018). The flag State or specific identity of the carrier vessels involved in these 49 at-sea transfers were not included in the reporting provided by Taiwan. IOTC and ICCAT ROP reports were consistent with CCSBT that 90 at-sea transfers of SBT occurred in 2017 (see ICCAT Observer Reports – Current/Previous, IOTC-2018-CoC15-04a [E], and IOTC-2018-CoC15-04b [E]). The flag State of the carrier vessels involved in these transfers were identified as Japan, Singapore, Liberia, Panama, Korea and Seychelles. Although the IOTC ROP reported IOTC observers were deployed on Taiwanese-flagged carrier vessels 18 times during 2017, no reporting indicated Taiwanese-flagged carrier vessels were involved in at-sea transfers of SBT.

Based on the reported information, a reasonable assumption can be made that no Taiwanese-flagged carrier vessels were involved in at-sea transfers of SBT. However, this should not be misconstrued that no Taiwanese-flagged carrier vessels were present and operating in CCSBT Statistical Areas during 2017. In fact, at least 11 Taiwanese-flagged carrier vessels were observed on AIS to be operating in CCSBT Statistical Areas, four of which were authorized by CCSBT and observed to have 58 separate encounters with LSTLVs and were observed in 108 individual loitering events. Three of the remaining seven carrier vessels were not authorized by CCSBT but were observed to have 34 separate encounters with LSTLVs and 229 individual loitering events. The 92 encounters associated with these seven carrier vessels all took place within CCSBT Statistical Areas 9 and 14. All but three of the encounters involved Taiwanese-flagged LSTLVs (Figure 7).

5.2 Encounters following Potential Fishing Effort in CCSBT Statistical Areas

For this report, an 'observed trip' was defined as vessel movements observed on AIS by a specific carrier vessel which occurred between a port of departure and a port of entry.

CCSBT, ICCAT and IOTC documents indicate that the 90 at-sea transfers of SBT in 2017 were conducted by 10 carrier vessels during 14 total trips.

As CCSBT is a species-based RFMO with no defined Convention Area boundaries, it is impossible to determine with VMS or AIS data alone whether the spatial movements of carrier vessels and LSTLVs involved capture and transfer of SBT. However, AIS data was used to analyze vessel movement histories to help identify encounters between vessels which occurred after an LSTLV exhibited vessel movements consistent with fishing effort while in known SBT habitat areas. Figure 14 details instances where these types of encounters occurred between carrier vessels and LSTLVs. Encounters highlighted by blue dots represent those events where the carrier vessel did not report at-sea transfers of SBT during their trip, although the LSTLV involved had previously fished in the yellow-shaded CCSBT Statistical Areas. Of note are the number of these encounters that occurred following LSTLV fishing effort in Statistical Areas 9 and 14, both of which are waters known to be highly productive SBT fishing grounds, based on 2017 fishing effort results found in CCSBT document CCSBT-ESC/1809/04.

While it is possible these encounters only involved at-sea transfers of tuna and tuna-like species other than SBT, as these Statistical Areas are documented as highly productive for SBT, the encounters represent those where there may be greater potential that transfers of SBT occurred. CCSBT may wish to consider stronger independent monitoring and reporting mechanisms for carrier vessels and LSTLVs whose catch, effort and at-sea transfer activity is specifically tied to CCSBT Statistical Areas 8 and 9.

This analysis is able to show transshipments that are at risk of having unreported SBT catch loaded onboard. This information can then feed into risk-based prioritizing of high seas boarding and inspection and port inspection.

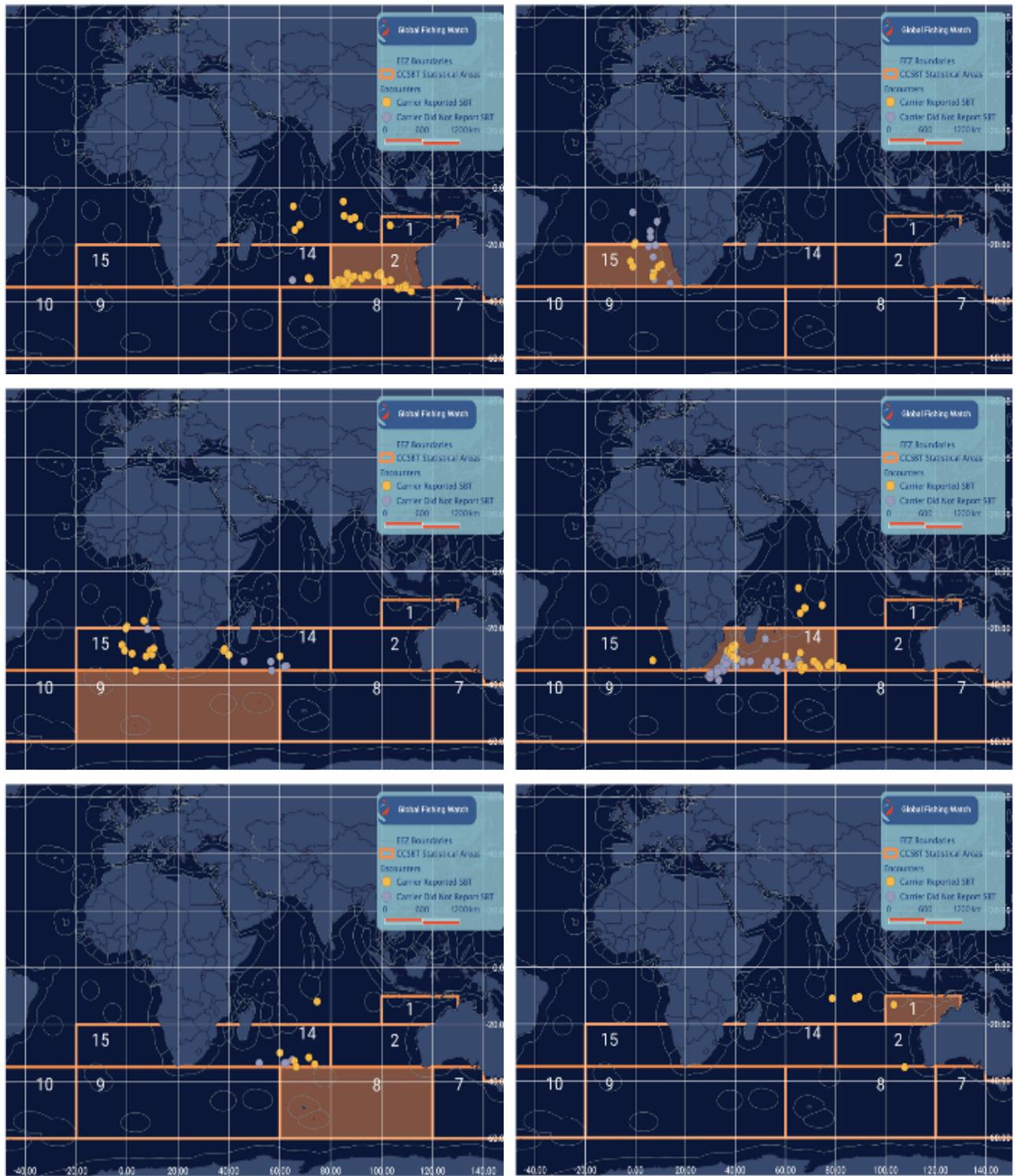


Figure 14 – Carrier Vessel and LSTLV Encounters (yellow represents those events where the carrier vessel did report at-sea transfers of SBT during their trip, and blue represents those where the carrier did not) after LSTLV Fishing Effort in CCSBT Statistical Areas. Shaded in CCSBT Statistical Area indicates where fishing occurred prior to encounter.

5.3 Vessel Authorizations and Monitoring Gaps in CCSBT Statistical Areas

To gain a better understanding of the vessel movements and behavior of carrier vessels and LSTLVs relative to CCSBT Statistical Areas, GFW analyzed the historical activity of those vessels involved in AIS-detected encounters. These vessels appeared to be a combination of those which did not hold CCSBT authorizations and those vessels considered authorized by CCSBT due to their inclusion in 2017 on either the CCSBT Record of Carrier Vessels or CCSBT authorized vessel list.

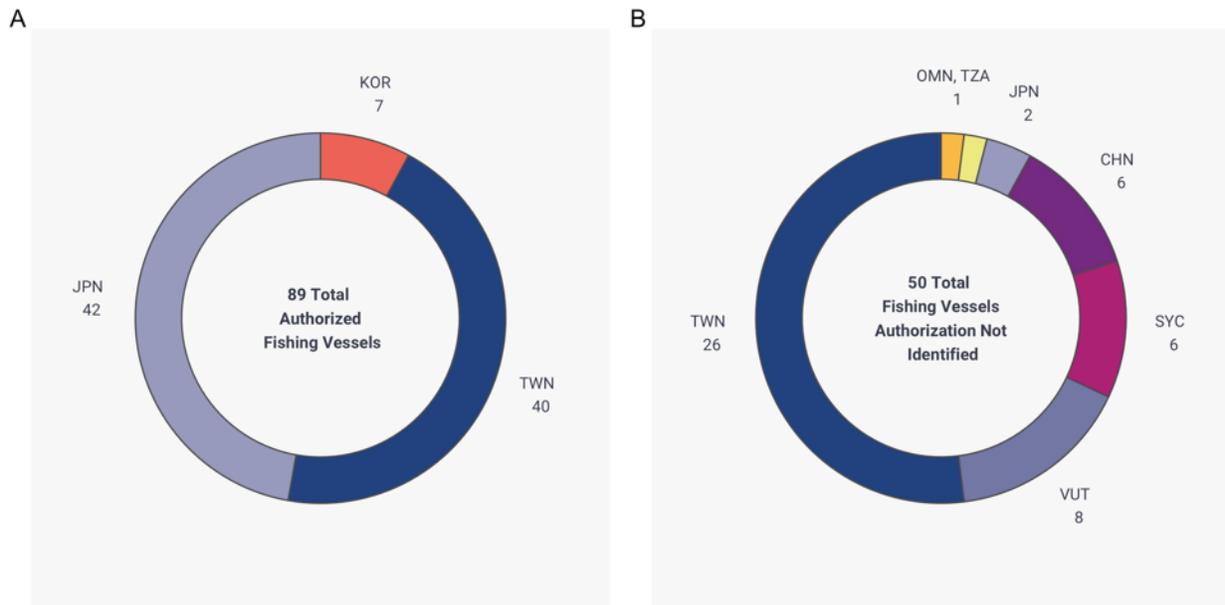
In 2017, 139 distinct LSTLVs were observed on AIS to have vessel movements consistent with fishing effort inside CCSBT Statistical Areas accounting for 204,807 vessel-hours (Table 5). Many CCSBT-authorized LSTLVs were observed with vessel movements consistent with fishing effort in multiple Statistical Areas throughout 2017; however, a subset of LSTLVs that appeared to not hold CCSBT authorizations were also observed in the Statistical Areas with vessel movements consistent with fishing effort. Statistical Area 14 appeared to have the most fishing effort based on the AIS activity of LSTLVs. This Area accounted for 83 distinct LSTLVs operating within it during 2017 although 43 percent appeared to not hold CCSBT authorizations. Statistical Area 8, located far south of typical tropical tuna distributions, had 11 distinct LSTLVs exhibit vessel movements consistent with fishing effort, of which only 3 vessels appeared to be authorized by CCSBT.

Table 5 - Fishing in CCSBT Statistical Areas by Distinct Fishing Vessels

CCSBT Statistical Area	Fishing Hours	Distinct Vessels	Vessels Authorized By CCSBT	Vessels Not Authorized by CCSBT
14	127828	83	JPN - 9 KOR - 6 TWN - 32	CHN - 5 OMN - 1 TWN - 23 SYC - 6 TZA - 1
2	39727	36	JPN - 17 TWN - 12	JPN - 1 TWN - 1 CHN - 4 SYC - 1
9	21182	26	JPN - 17 KOR - 2	TWN - 7

15	5835	15	JPN - 14	JPN - 1
5	3340	8	0	TWN - 2 VUT - 6
8	3307.	11	TWN - 3	TWN - 7 CHN - 1
4	2341	3	TWN - 1	VUT - 2
1	1247	4	JPN - 2 TWN - 1	JPN - 1

This activity is further broken down in Figure 15 by CCSBT authorization and LSTLV flag State. 89 LSTLVs appeared to hold CCSBT authorization while 50 did not appear to be authorized by CCSBT. The majority of LSTLVs who appeared to not hold CCSBT authorizations were flagged to Taiwan.



Source: Global Fishing Watch

Figure 15 - Distinct Fishing Vessels by CCSBT Authorization and Flag State

GFW further investigated the activities of LSTLVs by analyzing AIS-detected encounters after the LSTLVs were observed exhibiting vessel movements consistent with fishing within CCSBT Statistical Areas. Figure 16 provides an example of an encounter where LSTLV fishing effort in Statistical Areas, without the benefit of access to VMS or AIS data, may have gone unseen by the Secretariat.

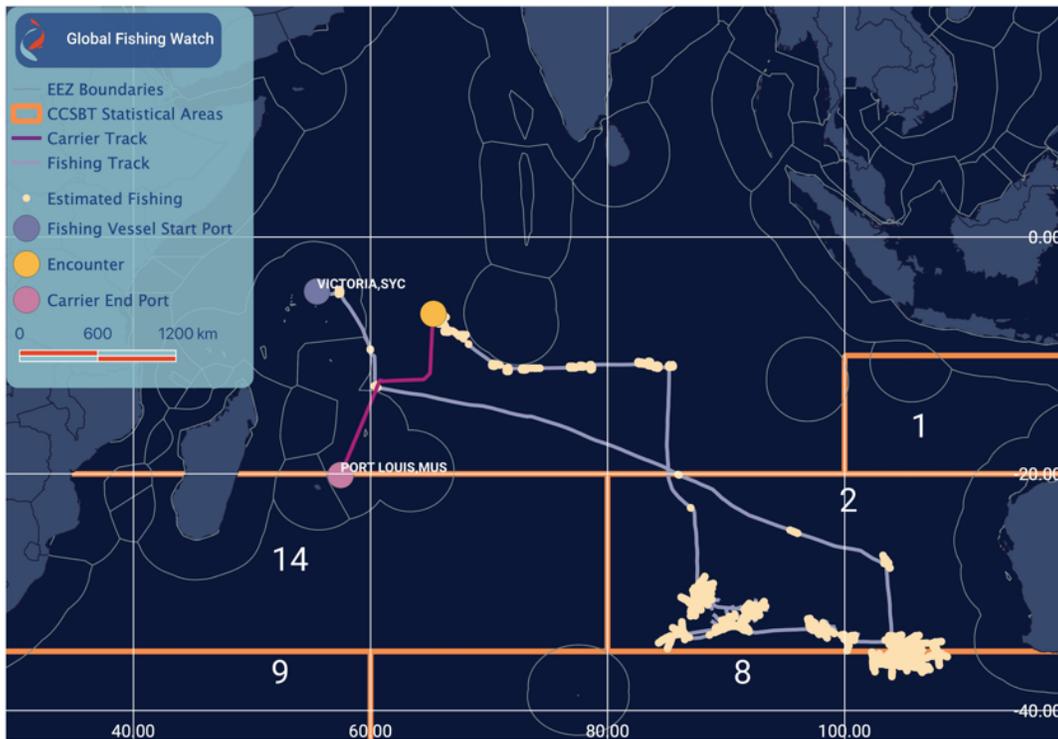


Figure 16 - Example Tracks of a Singapore-Flagged Carrier Vessel having an Encounter with a Taiwanese-Flagged LSTLV after fishing effort inside CCSBT Statistical Areas

A carrier vessel flagged to Singapore was observed in an AIS-detected encounter with an LSTLV flagged to Taiwan within IOTC Convention Area waters where tropical tuna and tuna-like species are targeted, caught and transshipped at-sea. Both vessels were authorized by CCSBT but, as an added complication, Singapore, the flag State of the carrier vessel involved, is non-Member of CCSBT and an NCP of IOTC. Prior to the detected encounter, the LSTLV involved was observed on AIS exhibiting potential fishing effort in CCSBT Statistical Areas 2 and 8. While the waters of Statistical Area 2 are located closer where fishing effort for tropical tunas is targeted, Statistical Area 8 is in more southern latitudes where fishing effort targeting SBT is more likely to occur. The LSTLV then transited north into tropical IOTC Convention Area waters where the encounter with the carrier vessel occurred. The carrier vessel then made a port call in Port Louis, Mauritius –a port often used for offloading catch, including SBT.

These vessels would have been required to submit transshipment declarations if an at-sea transfer of catch occurred during the encounter. However, given the geolocation of the encounter, one might automatically assume the LSTLV only fished in tropical waters and targeted and caught only tropical tunas. While the observer embarked on the carrier vessel would have been required to document and report transfers of SBT, and CCSBT CDS documents outlined the Statistical Area where SBT was caught, the established reporting protocols leave little room for independent verification of activity without the benefit of VMS or AIS data. This is especially true for the Singaporean-flagged carrier

vessel as its flag State is under no obligation to report on the activities of the carrier vessel or provide VMS data to CCSBT or IOTC since it is not a Member of either RFMO.

Given the lack of a centralized VMS implemented by both CCSBT or IOTC, details of this type of fishing effort would largely be unseen by both the CCSBT and IOTC Secretariats although the flag State authorities of the vessels involved should be monitoring their flagged vessels' movements. Even if this flag state monitoring were to occur, as the vessels are flagged to two different flag States, only the vessel movements of one of the vessels would have been seen by the authorities of that flag State given the lack of VMS data-sharing protocols between national authorities.

Another example of potentially unseen fishing effort can be seen in Figure 17. In this instance, a CCSBT-authorized carrier vessel flagged to Taiwan was observed on AIS to have an encounter with an LSTLV, also flagged to Taiwan. This encounter occurred after the LSTLV was observed to have vessel movements consistent with fishing effort in CCSBT Statistical Areas 9, 8, and 2. While the carrier vessel was authorized by CCSBT, the LSTLV appeared to not hold an authorization by CCSBT. Much like the previous example, while the LSTLV may have been targeting tropical tunas in Statistical Area 2, it was much more likely targeting and catching SBT in the more southern latitudes of Statistical Areas 9 and 8. The AIS-detected encounter occurred within Statistical Area 2, after which the carrier vessel made a port call to Port Louis, Mauritius, where catch, including any SBT, was likely offloaded by the carrier.

Although CCSBT reporting protocols have been established to document catch and at-sea transfers of SBT, this type of fishing behavior would have remained unseen by the CCSBT Secretariat without the benefit of access to VMS or AIS data. As such, there is no real opportunity for independent verification of activity, especially where it may be warranted, given the authorization status of the LSTLV involved. Instead, CCSBT relies heavily on Member self-reporting, a point amplified given the lack of tools like centralized VMS which could help identify a risk exists that SBT may have been caught in this scenario and transferred at sea unreported.



Figure 17 - Example Tracks of a Taiwanese-Flagged Carrier Vessel Authorized by CCSBT having an Encounter with a Taiwanese-Flagged LSTLV not Authorized by CCSBT with Previous Fishing Effort inside CCSBT Statistical Areas

In both examples, the carrier vessels involved visited Port Louis, Mauritius after the AIS-detected encounter with the LSTLV. This port is a common offloading port for carrier vessels operating in the Indian Ocean, to include activities that involve at-sea transfers of catch from LSTLVs that fished previously within primary CCSBT Statistical Areas. As such, carrier vessels entering this port may warrant closer inspection specifically relating to quantities of SBT included in offloads as there is potential that some quantities of SBT may have been caught, transferred at-sea, and gone unreported.

5.4 Reported Activity Matched with AIS Data for ICCAT and IOTC ROP trips

For this study, GFW conducted a comparative analysis of AIS data with ICCAT and IOTC ROP reported information for 2017. This analysis determined that nearly 63 percent of the 27 reported at sea transfers of SBT as reported by the ICCAT ROP could be matched with AIS data (Table 6). Distribution of these detected and reported events be seen in more detail in Figure 18. Over 58 percent of all reported transshipments during each of the 4 carrier trips were matched with AIS detected encounter and/or loitering events (Table 6).

Table 6: Matched Encounters and Loitering Events to ICCAT ROP Reported At-Sea Transfers of SBT

Trip ID ⁺	Reported TS – All ⁺	Reported SBT TS ⁺	SBT Matched Events		All Matched Events
			Encounters	Loitering	Encounters/Loitering*
199	28	9	7	7	25
201	36	11	6	3	16
203	17	6	4	4	15
206	57	1	0	0	25

+ Trip ID and Reported Transshipments Count are found in the ICCAT Observer Reports - Previous/Current

* As mentioned in section 4.4, it is possible that the loitering events are inclusive of encounter events. Therefore, this column reflects the total matched events (considering both encounter and loitering events) in the associated carrier trip.

Note: 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.

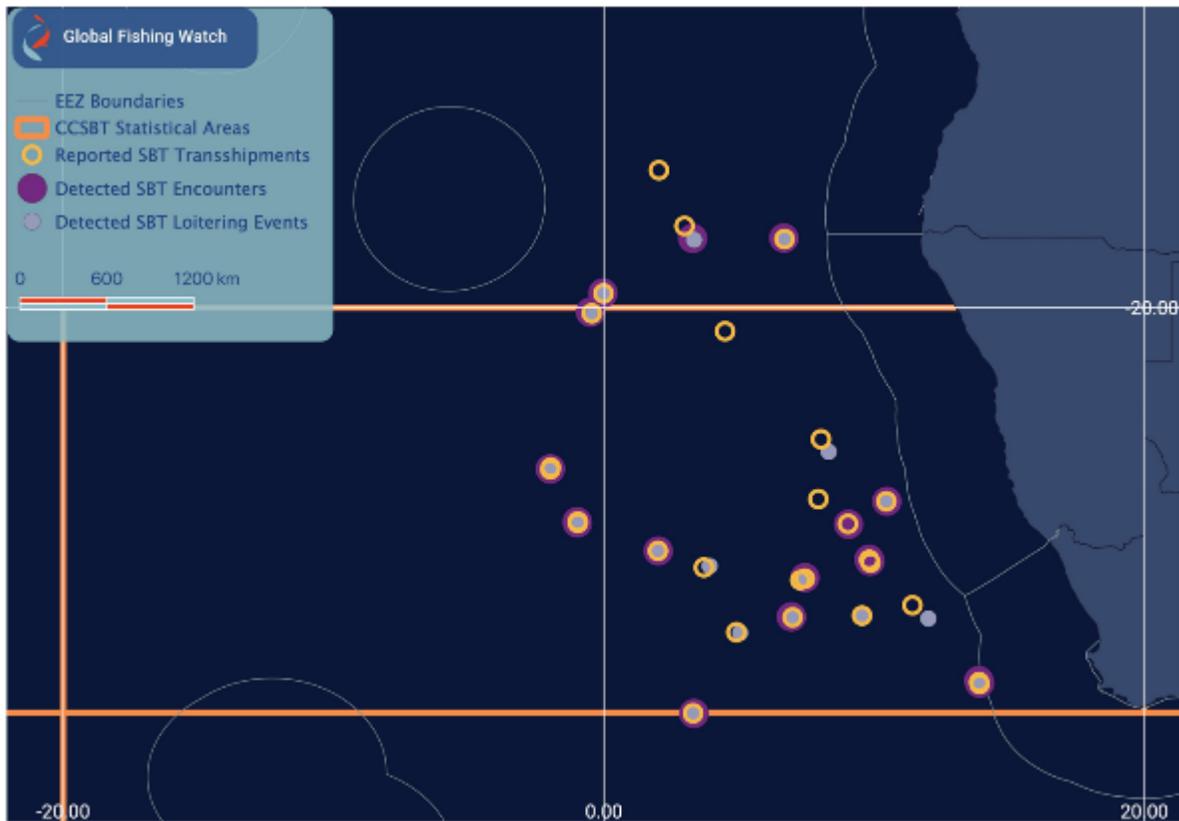


Figure 18: AIS-Matched Encounters to ICCAT ROP Reported At-Sea Transfers of SBT

The IOTC ROP reported 63 at-sea transshipments of SBT in 2017. These transshipments occurred during 14 carrier vessel trips where an IOTC observer was deployed. These 14 trips were attributed to 10 carrier vessels that are also inclusive of the four carrier vessels identified by the ICCAT ROP to have been involved with at-sea transfers of SBT. The IOTC ROP did not provide detailed information on ROP deployments like the information provided by the ICCAT ROP such as date and geolocation of all at-sea transshipments, including those involving transfers of SBT. As such, matching of reported activity to AIS-detected encounters could not be done for these 63 reported transfers.

Overall, the IOTC ROP reported IOTC observers made 60 deployments on carrier vessels in 2017, during which 1,259 at-sea transshipments were reported. The carrier vessels involved in these transshipments were flagged to Taiwan, Vanuatu, Korea, Malaysia, Seychelles, Panama, Liberia, Singapore and Japan. The 90 at-sea transfers of SBT are inclusive of the 1,259 at-sea transshipments reported by IOTC indicating that just over seven percent of all reported IOTC transshipments in 2017 involved transfers of SBT.

Section Key Findings

The following findings for this section are expanded further on in Section 8, Key Findings:

- *AIS-detected encounters occurred after LSTLVs were observed with unseen fishing effort in CCSBT Statistical Areas:* AIS analysis indicated most encounters occurred north of the primary CCSBT Statistical Areas. Without benefit of VMS or AIS data to supplement reported information, fishing effort of these LSTLVs remain unseen from CCSBT oversight and offer no means cross-checking or verification by the Secretariat.
- *Fishing effort in Statistical Areas and CCSBT authorization:* Nearly 205,000 hours of potential fishing effort was observed via AIS conducted by 139 LSTLVs within CCSBT Statistical Areas. Nearly 36 percent of the LSTLVs were not authorized by CCSBT. Likewise, six carrier vessels not authorized by CCSBT were observed in AIS-detected encounters with LSTLVs in the Statistical Areas. Additional management controls should be considered by CCSBT to ensure carrier vessels and LSTLVs not authorized by CCSBT are not involved in unauthorized catch and at-sea transfers of SBT.
- *ROP matched trips to AIS tracks:* Without an established centralized VMS, access to and analysis of AIS appears to be a valuable supplementary dataset that can be used by the Secretariat to assist with cross-verification and validation of reported data on fishing effort and at-sea transfers of SBT relevant to CCSBT Statistical Areas.

6 Port Activity

CCSBT reporting of in-port transshipments of SBT are limited to those that are conducted by the LSTLV fleets of Members that target and catch SBT and self-reported by Members in their annual summary reporting requirements. In 2017, there were a total of 27 in-port transshipments of SBT reported to have taken place. These in-port transshipments involved LSTLVs flagged to Japan, Korea and Taiwan. No further details of port activity involving carrier vessels were provided by Japan, Korea and Taiwan, the only three CCSBT Members to authorize carrier vessels for at-sea transfers of SBT.

6.1 CCSBT Port Inspection Resolution

Currently, the CCSBT Port Inspection Resolution requires Members to inspect at least five percent of landing and transshipment operations by foreign-flagged fishing vessels - including carrier vessels other than container vessels - in designated ports annually (CCSBT MSIP 2018). The CCSBT Secretariat reported two issues with implementation of the Resolution related specifically to carrier vessels (see CCSBT-CC/1810/10):

1. Since coming into effect, the Secretariat had not received any port inspection reports for 2017 that included carrier vessels; and
2. It appeared Non-Member flagged carrier vessels were generally not being counted by port State Members as foreign vessels in terms of the Resolution when they land domestically caught SBT into Members' domestic ports. Japan had seven such port visits by carrier vessels flagged to Liberia, Singapore and Vanuatu. Korea had one port visit by a carrier vessel flagged to Singapore and Taiwan had four port visits by carrier vessels flagged to Korea, Singapore and Vanuatu.

6.2 AIS Analysis of Port Visits by Carrier Vessels

An analysis of the port visits conducted by the 22 carrier vessels identified to have had AIS-detected encounters with LSTLVs within CCSBT Statistical Areas during 2017 indicated that relatively few ports were visited by these carrier vessels (Figure 16). Port Louis, Mauritius, Singapore, and Cape Town, South Africa were the three most visited ports by carrier vessels after an AIS-detected encounter with an LSTLV. All three of these ports are known offloading ports where tuna, including SBT, are likely offloaded.

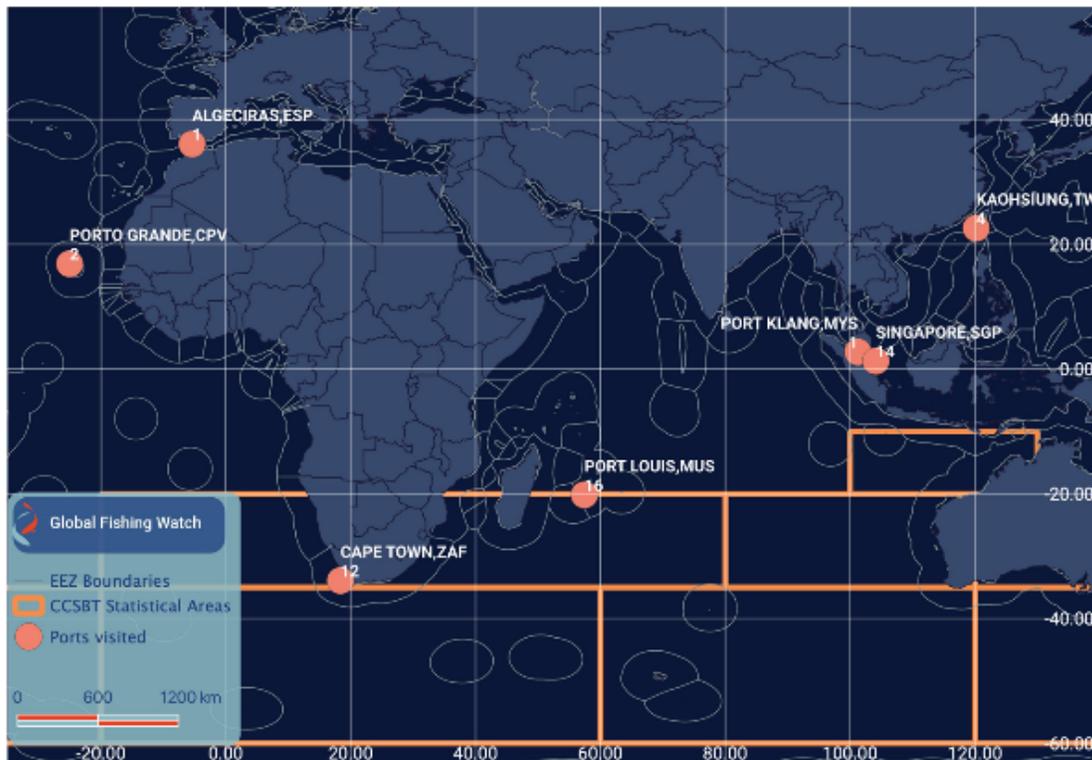
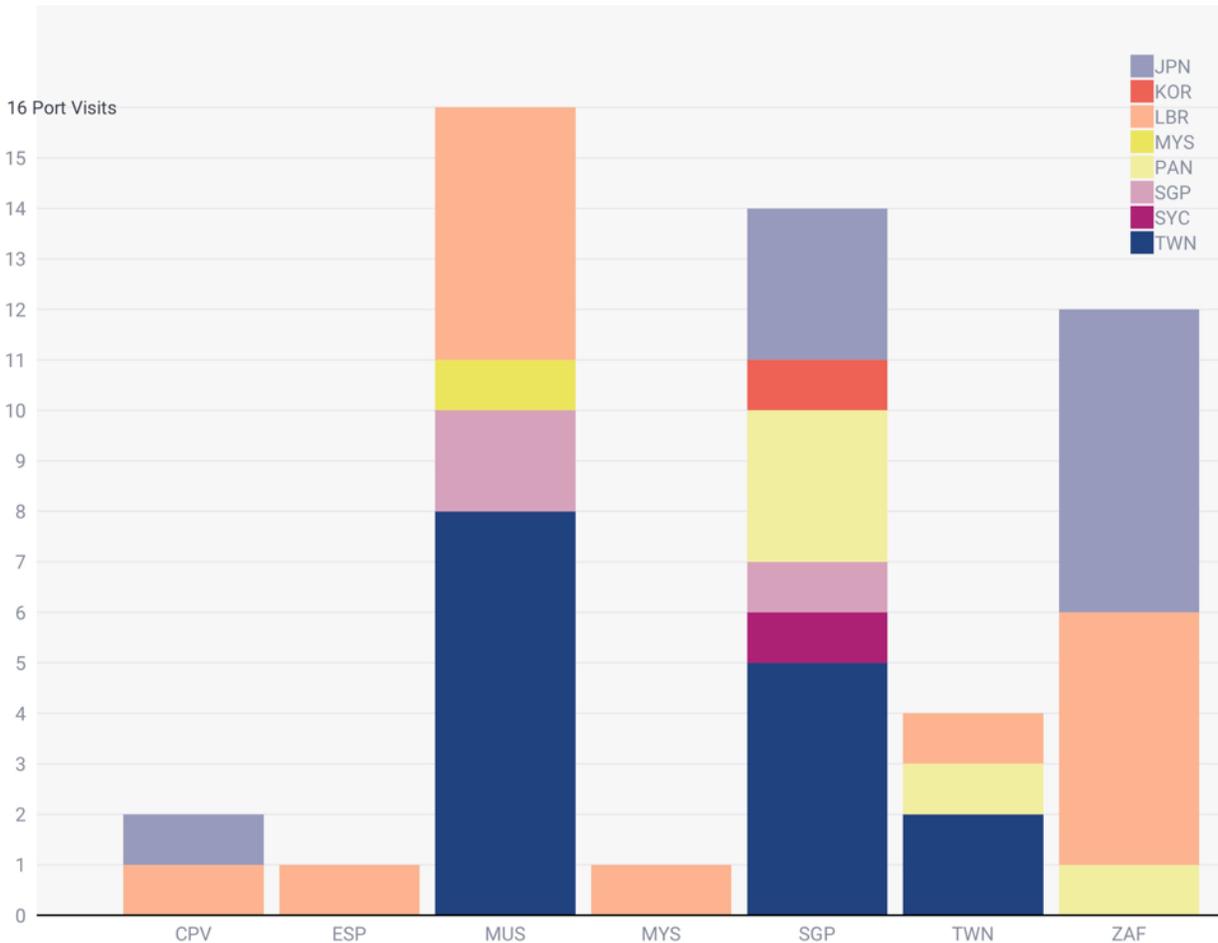


Figure 16 - Ports Visited by Carriers after Encounters with Fishing Vessels in the CCSBT Statistical Areas

The remaining ports identified to have been visited by the 22 carrier vessels were in Malaysia, Taiwan, Spain, and Cape Verde. Taiwanese- and Liberian-flagged carrier vessels had the highest number of port visits followed by Japanese-flagged carrier vessels (Figure 17). Taiwanese-flagged carrier vessels were only observed to have made port calls in Port Louis, Singapore, and Kaohsiung. Liberian-flagged carrier vessels visited many different ports except for Singapore. Japanese-flagged carrier vessels were observed visiting only Porto Grande, Singapore, and Cape Town, while a single Malaysian-flagged carrier vessel only visited Port Louis. The single Singapore-flagged carrier vessel made port calls only at Port Louis and Singapore. Panamanian-flagged carriers were observed to make port calls in Singapore, Kaohsiung, and Cape Town.



Source: Global Fishing Watch

Figure 17 - Ports Visited by Carriers by Flag state after Encounters with Fishing Vessels in the CCSBT Statistical Areas

Four of the seven port States visited by carrier vessels are party to the FAO Port State Measures Agreement (PSMA)¹⁰. Malaysia, and Singapore have yet to accede to the PSMA, and Taiwan, although in agreement to follow PSMA requirements, is unable to ratify the PSMA. Having a better understanding of carrier vessel port visits by those carrier vessels operating in CCSBT Statistical Areas and having encounters with LSTLVs should help the Secretariat and Members to identify those ports more conducive to offloading of SBT. Consequently, these ports may also represent the most important port locations to ensure effective port inspection programs are in place to more effectively monitor, regulate, and report at-sea transfers and landings of SBT.

CCSBT Members may be able to use the information provided in this analysis to better understand the value of acceding to the PSMA. Additionally, this information may

¹⁰ <http://www.fao.org/port-state-measures/resources/detail/en/c/1113476/>

encourage CCSBT to enhance their Port Inspection Resolution to help ensure that illicitly caught SBT or unreported transshipped catch sourced from CCSBT Statistical Areas have a greater chance of being detected when landed in port.

Section Key Findings:

The following findings for this section are expanded further on in section 8, Key Findings:

- *There is a lack of reported information on the activities of authorized carrier vessels:* CCSBT has implemented little to no reporting protocols on the activities of authorized carrier vessels. To compound matters, although Members are obligated to submit port inspection reports to CCSBT on fishing vessels including carrier vessels, no Members provided these reports for all of 2017.
- *In the absence of VMS, analysis of AIS data can be effectively used to identify port visit trends by carrier vessels:* AIS data can be used to highlight those ports most often used by carrier vessels and likely used for offloading of SBT sourced from CCSBT Statistical Areas. These, in turn, may represent the most important port locations to monitor and regulate the landing of SBT. The most heavily visited port by carrier vessels appears to be Port Louis, Mauritius. CCSBT may wish to consider engaging port State authorities of the highly frequented ports, especially those of CCSBT Non-Members, in an effort to establish inspection protocols of carrier vessels landing SBT to include sharing of landing data related to SBT with the CCSBT Secretariat.

7 Data Caveats

The analysis presented in this report relies on commercially available AIS data and publicly available information. Therefore, AIS data is limited to only those vessels that transmit on AIS and do so by providing accurate vessel identity information. Low satellite coverage or high-density areas can also limit AIS data usefulness. 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 Kroodsma et al. 2018). AIS data tends to be sparser and more limited for vessels equipped with a Class-B AIS device (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).

8 Key Findings and Recommendations

Carrier vessel activity in the CCSBT Statistical Areas during calendar year 2017 was reviewed via a comparative analysis of commercially available AIS data with publicly

available information related to carrier vessels and transshipment. The resulting analysis produced the following nine key findings. Recommendations relative to these key findings are provided for consideration by CCSBT Members as options for addressing the issues raised.

- **Key Finding 1:** *CCSBT has no centralized VMS and no ability to independently cross-check vessel location data and validate catch and effort and at-sea transfers of SBT:* The Secretariat also is unable to assess whether carrier vessels are complying with CCSBT VMS measures; a notable gap as most of the carrier vessels authorized by CCSBT Members to conduct at-sea transfers of SBT at sea are flagged to Non-Member flag States who are under no obligation to report to CCSBT on the activities of their carrier vessels.
 - *Recommendation:* Implement a centralized VMS to increase opportunities for the CCSBT Secretariat to provide independent cross-checking and validation of reported information and provide Member with appropriate tools to effectively self-report compliance issues.

- **Key Finding 2:** *Significant carrier vessel activity observed in CCSBT Statistical Areas:* CCSBT Statistical Areas had high levels of carrier vessel activity in 2017 conducted by a combination of both CCSBT-authorized and non-authorized carrier vessels. AIS data indicated at least 78 distinct carrier vessels operated inside these Areas with 22 carrier vessels having over 200 encounters with LSTLVs and 59 non-CCSBT authorized carrier vessels exhibiting over 1,230 loitering events. This level of effort and potential transshipment activity, especially by non-CCSBT authorized carrier vessels, is in stark contrast to the small number of CCSBT-authorized carrier vessels that reported at-sea transshipments of SBT in 2017. This amount of carrier vessel activity, especially by non-Member flagged non-CCSBT authorized carriers, represent a significant risk to CCSBT that some catches and subsequent at-sea transfers of SBT are not being reported.
 - *Recommendation:* Implement Member annual reporting requirements specific to the activities of carrier vessels they authorize to conduct at-sea transfers of SBT.

 - *Recommendation:* Members annual transshipment reports should be extended to include an accounting for the activities of all Members' flagged carrier vessels determined to have operated in CCSBT Statistical Areas during the previous year, regardless of CCSBT authorization. Ensuring member States not only evidence transshipments that include SBT but also transshipments that do not include SBT will greatly assist in closing the current data gaps.

 - *Recommendation:* Through coordination with member States as well as non-member flag States, port States and coastal States, using AIS and VMS analysis

identify undeclared transshipments that involve fishing activity from inside CCSBT statistical areas as high risk, and therefore subject to greater scrutiny and priority for high seas boarding and inspections or port inspection.

- **Key Finding 3:** *CCSBT Member ability to authorize, and reliance on, non-Member flagged carrier vessels to transship SBT:* The CCSBT transshipment program enables Members to authorize non-Member flagged carrier vessels to transship SBT. Of the 10 carrier vessels that reported transshipments of SBT in 2017, 7 were flagged to non-Member States and these carrier vessels were responsible for nearly 78 percent of all reported at-sea transfers of SBT. Flag State authorities of these carrier vessels have no obligation to CCSBT to ensure their vessels comply with CCSBT management measures, report to CCSBT to validate their transshipment activity, or even cooperate with those Members that authorize the carrier vessels as these flag States have no representative interest in complying with the CCSBT management regime.
 - *Recommendation:* Remove the ability for Members to authorize non-Member flagged carrier vessels to be involved with at-sea transfers of SBT, leading to the regulation that only CCSBT (or IOTC and ICCAT) member's vessels can be involved in transshipment events involving the transfer of SBT.

- **Key Finding 4:** *CCSBT Member reliance on non-CCSBT ROPs and observers to provide for all independent monitoring of SBT transfers at-sea:* Although Annex II of the CCSBT Resolution on Transshipment established an ROP, it appears no Member utilized the ROP or CCSBT observers to provide for independent observing of SBT transferred at-sea in 2017. Instead, all reported at-sea transfers of SBT originated from carrier vessels with either an ICCAT or IOTC observer embarked on board. Near full reliance for independent monitoring of at-sea transfers of SBT on non-CCSBT observers and ROPs, especially where these programs were established for management objectives of species other than SBT, increases the risk CCSBT will be exposed to reporting of at-sea transfers of SBT that contain data inconsistencies or anomalies, be misreported, or even go unreported; all with no direct influence in establishing procedures to minimize these reporting issues
 - *Recommendation:* Require near real-time (within 24 hours) reporting of all at-sea transfers of SBT by both vessels involved to the relevant flag, coastal, and port State authorities, as well as the CCSBT Secretariat.
 - *Recommendation:* Strengthen ROP data sharing agreements with both ICCAT and IOTC to ensure full accounting of every at-sea transfer involving SBT, and require carrier observers sourced from both ICCAT and IOTC to submit independent reports of all at-sea transfers of SBT to all relevant authorities including the CCSBT Secretariat. Annual transshipment reporting should be consistent with the data

provided by the ICCAT ROP, to include geolocation information and SBT estimated quantities of every at-sea transfer of SBT.

- *Recommendation:* Report publicly the geolocation data of all declared SBT transshipments in line with data provided by the ICCAT ROP.
- **Key finding 5:** *AIS-detected encounters occurred after LSTLVs were observed with unseen fishing effort in CCSBT Statistical Areas:* AIS analysis indicated encounters occurred north of the primary CCSBT Statistical Areas. Without the benefit of VMS or AIS data to supplement reported information, fishing effort of these LSTLVs remain unseen from CCSBT oversight and offer no means cross-checking or verification by the Secretariat.
 - *Recommendation:* In the absence of member state VMS sharing or a centralized VMS, consider allowing the Secretariat to access and analyze AIS data to assist in determining the locations of LSTLV fishing effort to provide independent cross-checking and validation of reported information.
- **Key finding 6:** *Fishing effort in Statistical Areas and CCSBT authorization:* Nearly 205,000 hours of potential fishing effort was observed via AIS conducted by 139 LSTLVs within CCSBT Statistical Areas. Nearly 36 percent of these LSTLVs were not authorized by CCSBT. Likewise, six carrier vessels not authorized by CCSBT were observed in AIS-detected encounters with LSTLVs in CCSBT Statistical Areas.
 - *Recommendation:* Members consider mandating AIS for all their flagged LSTLV fleets to help assist the Secretariat with identifying anomalous fishing effort in SBT fishing grounds by LSTLVs not authorized by CCSBT.
- **Key finding 7:** *ROP matched trips to AIS tracks:* Access to, use, and analysis of AIS data appears to be a valuable supplementary dataset that can assist the Secretariat in the cross-verification and validation of reported data on fishing effort and at-sea transfers of SBT relevant to CCSBT Statistical Areas.
 - *Recommendation:* In the absence of a centralized VMS, consider mandating AIS for all CCSBT-authorized LSTLVs to use as a supplementary tool to complement existing management resolutions and MCS tools.
- **Key finding 8:** *There is a lack of reported information on the activities of authorized carrier vessels:* CCSBT has implemented little to no reporting protocols on the activities of authorized carrier vessels. To compound matters, although Members are obligated to submit port inspection reports on fishing vessels including carrier vessels to CCSBT, no Members have provided these reports for all of 2017.

- *Recommendation:* Require carrier vessels to submit transshipment declarations directly to the Secretariat in addition to the competent authorities of the port State where the carrier vessel intends to land SBT.
- *Recommendation:* Ensure that Members meet their obligations and submit to the Secretariat required port inspection reports on fishing vessels to include carrier vessels.
- *Recommendation:* Implement electronic monitoring to help aid in increased monitoring of transshipment activity.
- **Key finding 9:** *In the absence of VMS, analysis of AIS data can be effectively used to identify port visit trends by carrier vessels:* AIS data can be used to highlight those ports most often used by carrier vessels and likely used for offloading of SBT sourced in CCSBT Statistical Areas. These, in turn, may represent the most important port locations to monitor and regulate the landing of SBT fish product. The most heavily visited port by carrier vessels appears to be Port Louis, Mauritius.
 - *Recommendation:* Task the Secretariat to engage port State authorities of ports highly frequented by carrier vessels, especially those of CCSBT Non-Members, in an effort to establish inspection protocols of carrier vessels landing SBT to include sharing of landing data related to SBT with the CCSBT Secretariat.
 - *Recommendation:* Require Members to provide annual Port State Reports detailing landed quantities from authorized carriers and report on inspections undertaken with outcomes.

9 Conclusion

By building a more complete picture of carrier vessel activity, policy makers can focus on strengthening management measures that govern their actions by having a good understanding of what is actually happening out on the water, far from direct oversight of management and inspection authorities. This study identified risks associated with transshipment related to the CCSBT Statistical Areas within the context of how carrier vessels and at-sea transfers of SBT are currently monitored by the CCSBT. Results indicate gaps in the current CCSBT transshipment regulatory framework and MCS structure appear to be exploited creating opportunities where management oversight can easily be avoided. Moving forward, detecting and deterring noncompliant behavior associated with transshipment will rely on effective monitoring and control of the activity through the support of a wide range of tools such as VMS, robust data-sharing agreements amongst relevant authorities and potential use of AIS as a supplemental and complementary MCS tool. Importantly, current data-sharing agreements with IOTC and ICCAT should be strengthened to expand the collection and sharing of transshipment-related data to ensure robust monitoring of at-sea transfers of SBT, but also the vessels

involved in these interactions. This is especially true when fishing activities have a nexus to CCSBT Statistical Areas documented as highly productive SBT fishing grounds.

The apparent dearth of port State control mechanisms and reporting on these important inspections has been identified as a weakness in detecting noncompliant activity and potentially unreported quantities of SBT harvests. Carrier vessels not authorized to transship SBT which are documented to have operated previously in CCSBT Statistical Areas should be prioritized for inspection on port arrival, especially if there are indications the vessel may have transshipped SBT prior to arrival. If these port States are party to the PSMA, foreign-flagged carrier vessels can potentially be denied entry to port if unreported or unauthorized transshipments of SBT in CCSBT Statistical Area waters are identified to have occurred. CCSBT non-Member port States, especially those not party to the PSMA, that are identified to receive high levels of carrier vessels visiting their ports which previously operated in CCSBT Statistical Areas should also be prioritized for direct engagement. CCSBT should actively seek their cooperation to help strengthen port inspection controls, especially where the landings of these vessels involve quantities of SBT, to ensure effective responses to clear cases of CCSBT-related activities that appear to be in contravention of CCSBT management measures.

It appears the synthesis of AIS data with vessel authorization information to the extent presented in this report is not common practice by RFMO Compliance Committees. AIS data can provide an immense source of knowledge and insight into patterns of fishing fleet dynamics, including possible transshipments, occurring within RFMO Convention waters or Statistical Areas by vessel type, flag State, authorization, port visits, and across space and time. GFW intends to help facilitate more efficient and effective vessel monitoring in RFMOs by highlighting these patterns of activity and providing increased access to the AIS data, especially when there are links to possible transshipment events. By sharing this type of data, investigations into anomalous activity or possible noncompliant behavior to commence soon after these events are detected, thereby increasing the likelihood of successful interventions by flag, coastal or port State authorities. Likewise, flag State authorities could also use the AIS-based information directly to investigate potential unauthorized activities on their own accord.

This study highlights the value of improving the accuracy and depth of public availability of vessel registry information, transshipment authorization data, VMS/AIS data, and exchange of information between RFMOs and flag, coastal, and port State authorities. Detailed analysis of AIS data outlining vessel movements within an RFMO area of competence can provide valuable insight into fishing activity, including transshipment patterns. These analyses can help identify potential gaps or loopholes in management measures and provide preliminary indications whether specific measures are meeting intended goals and objectives. AIS is gaining greater acceptance as an additional source of data available to management authorities that can complement existing datasets such as VMS, transshipment declarations and vessel authorization information to help provide a more complete picture of activity occurring on the water. Collective use of these tools can ultimately help increase the ability for management authorities to detect anomalous behavior and ultimately ensure high levels of compliance with existing regulations. This

shift towards data transparency in tuna fisheries would lead to a more complete understanding of transshipment activity and stronger controls against IUU fishing.

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Annex 2: Detailed Methodology

AIS-Based Data Methods

GFW uses publicly broadcasted AIS data to estimate vessel information and vessel activity, including fishing, encounters and loitering events. 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 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, Miller et al. 2018).

Two sets of encounter data were used to analyze possible transshipment activity related to the CCSBT Statistical Areas. For section 4, all encounters between carriers and longline fishing vessels in 2017 within the CCSBT Statistical Areas was analyzed. In sections 5.2 and 5.3, all 2017 encounters between carriers and longline fishing vessels that occurred after the longline vessel fished within CCSBT Statistical Areas, but before a port visit and after a previous carrier encounter and/or port visit, were analyzed, regardless of if the encounter occurred outside the CCSBT Statistical Areas. Apparent 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). The hours of apparent fishing by a longline fishing vessel prior to an encounter with a carrier vessel were summed for each CCSBT Statistical Area and longline vessel to investigate patterns of fishing within the CCSBT Statistical Areas prior to possible transshipment activity.

The carrier and fishing vessels analyzed in this report were chosen based on the GFW database of fishing and carrier vessels. 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 (see 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). Because, the CCSBT transshipment resolution of focuses on LSTLVs (Large Scale Tuna Longline Vessels), any vessels not identified as longlines were removed from the analysis. If a fishing class was not identified through the GFW algorithm, a review of vessel tracks and web search using all available vessel identifiers, including vessel name, MMSI, flag State, callsign, and IMO unique identifier were used to assess vessel class. 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.

In addition, the study examined port visits by carriers after encounters or loitering events. 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.