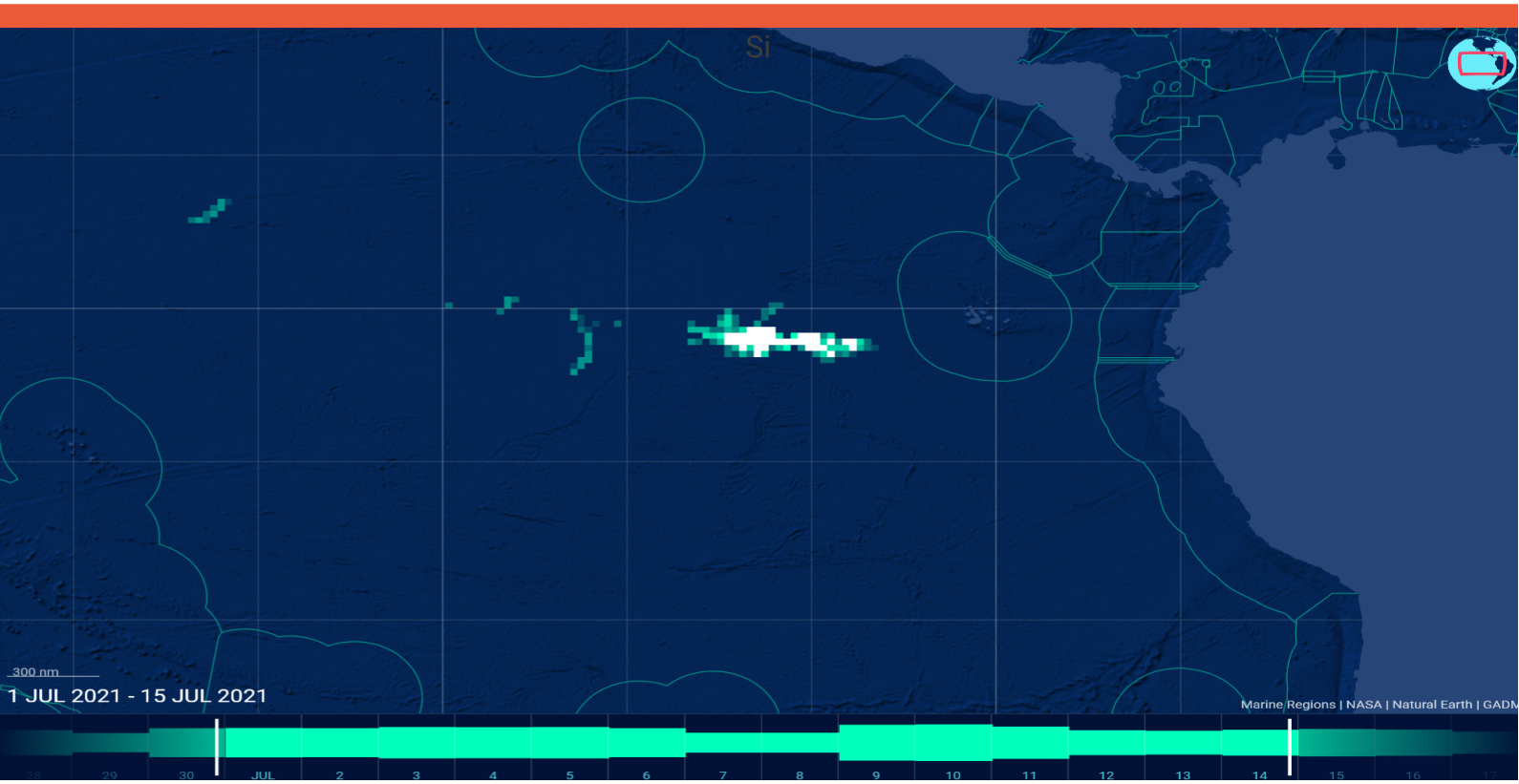
Global Fishing Watch



Global Fishing Watch Map - Report Workspace

Situation Report: Southeast Pacific Distant Water Squid Fleet, July 1-15, 2021

GFW-2021-FA-SQUID-JULY2021-1

Category: Situation Report
Region: Southeast Pacific
Analysis Period: July 1-15, 2021

Contents

Summary - July 1-15, 2021

Global Fishing Watch in support of coastal States in Latin America seeks to improve transparency for the squid fleet operating in the Southeast Pacific by generating a series of periodic reports on the fleet's activity in 2021. The reports review the spatial and temporal distribution of the fleet, along with fishing effort, encounters, loitering events and port visits. The analysis also aims to identify possible dark vessels—vessels that do not publicly broadcast their location or appear in public monitoring systems.

The following are key highlights from July 1-15, 2021:

- The squid fleet was mainly operating on the high seas an average of 330 nautical miles west of Ecuador's (Galápagos) exclusive economic zone. In June, the fleet was operating 470 nautical miles west of Ecuador's (Galápagos) exclusive economic zone; their location in July suggests the fleet is moving toward Ecuador's (Galápagos) exclusive economic zone boundaries.
- Two vessels identified on AIS operating inside the Convention Area could not be matched to the South Pacific Regional Fisheries Organisation (SPRFMO) register of authorized vessels.
- One squid vessel was using two Maritime Mobile Service Identity numbers while transiting and fishing in the Southeast Pacific Ocean.

Number of vessels active in the area	• 293 unique MMSI associated to 292 squid fishing vessels • 11 fish carriers • 3 bunker vessels (tankers)
Main area of vessel activity	High seas adjacent to southeast of Ecuador's (Galápagos) exclusive economic zone
Total number of fishing days	3,184
Carrier vessel encounter events	86
Carrier vessel loitering events	220
Port visits	1
Average distance from the Ecuador's (Galápagos) exclusive economic zone	330 nautical miles

Situation Report: Southeast Pacific Distant Water Squid Fleet, July 1-15, 2021

Introduction

The jumbo flying squid (*Dosidicus gigas*) is the most abundant cephalopod species in the southeastern Pacific Ocean and one of the most important cephalopod fisheries in the world (Ibáñez et al., 2015). The range of this species extends from southern Chile to the North American coast (FishSource), falling within the remit of the South Pacific Regional Fisheries Management Organisation (SPRFMO), where it is the second largest fishery of this intergovernmental management body. This species is of clear socio-economic importance, both commercially on the high seas within the SPRFMO area and within the exclusive economic zones (EEZ) of Chile and Peru, as well as for small-scale fishers. In particular, in Peru where the squid fishery constitutes the largest artisanal fishery.

Using our public data and machine learning, Global Fishing Watch is investigating the activity of the squid fleet for July 1-15, 2021. Our analysis draws on a combination of sources of information:

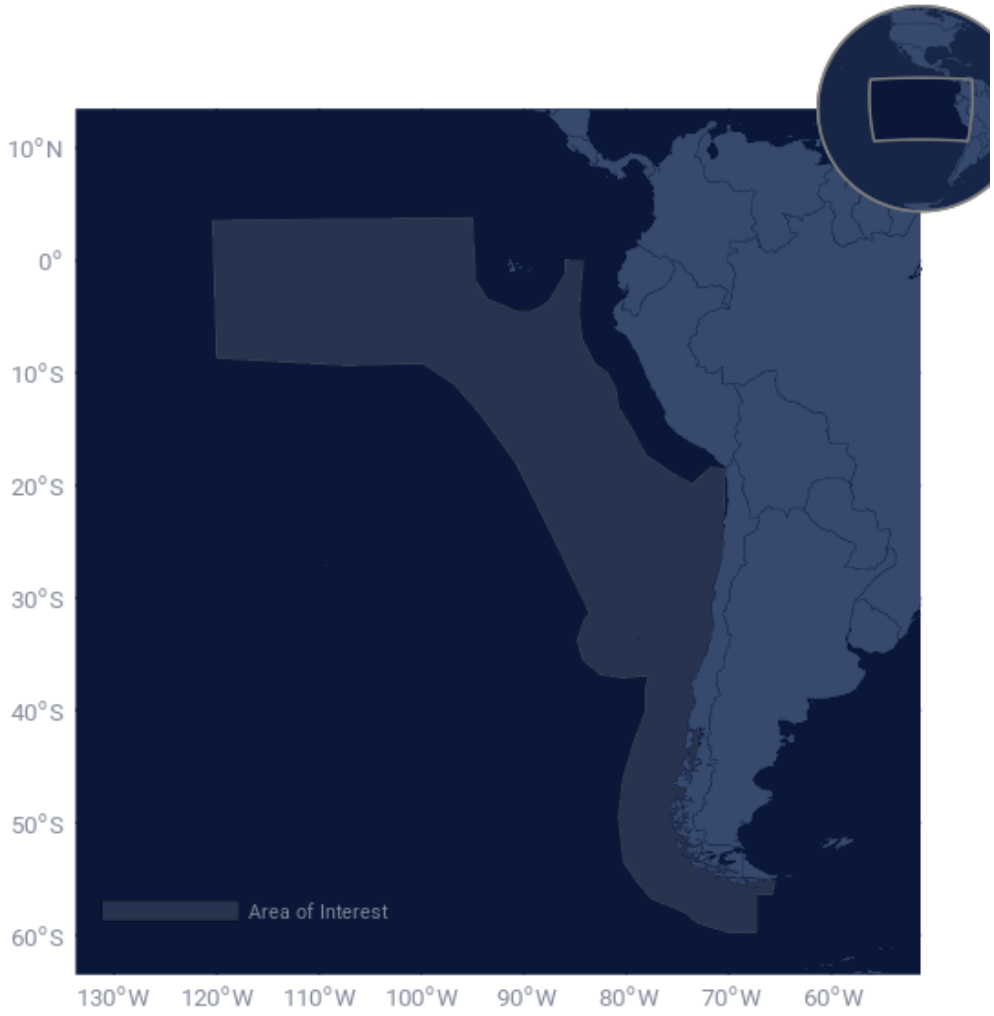
1. **Automatic identification system (AIS):**
   AIS transmits a ship's position so that other ships are aware of its position. The International Maritime Organization (IMO) and other management bodies require large ships, including many commercial fishing vessels, to broadcast their position with AIS in order to avoid collisions.

2. **Visible infrared imaging radiometer suite (VIIRS**):
   The Suomi National Polar-orbiting Partnership (NPP) satellite has a sensor with a spatial resolution of approximately 0.74 square kilometers, capable of detecting low light signals from the Earth. Called VIIRS, it is able to detect fishing vessels that use bright lights to attract target species to the surface such as the squid fishery in the eastern equatorial Pacific.

3. **SPRFMO registry**
   According to the CMM 05, Record of Vessels, the SPRFMO Commission established a register of fishing vessels which are authorised to fish in the SPRFMO Convention Area.

The analysis focuses on the area of interest (AOI) described below (Figure 1) during July 1-15, 2021. This area was selected based on historic activity of the squid fleet in the region, in particular along Peru and Ecuador's (Galápagos) exclusive economic zone (EEZ) and an area on the equator about 1,500 nautical miles west of the Ecuadorian Galápagos' EEZ.

Figure 1: Area of Interest Within the Southeast Pacific Ocean



Vessel tracking analysis

Using AIS data and the Global Fishing Watch fishing effort algorithm for night time squid fishing[1] a total of 291 unique Maritime Mobile Service Identification (MMSI) numbers, associated with 290 squid fishing vessels, completed an estimated total of 3,184 fishing days[2] over the first 15 days of July (Figure 2). All identified vessels are flagged to China. The status of the top 10 vessels detected in the AOI is summarized in Table 2. The number of AIS messages received per vessel operating inside the AOI in July varied significantly, ranging from 6 to 12,841 transmissions received.

[1] Global Fishing Watch has developed algorithms to automatically detect different types of fishing activity from vessel tracking data. Kroodsma, D. *et al*, 2018. Tracking the global footprint of fisheries. Science, 359 (6378), pp.904-908.
[2] This study considered a 'fishing day' as any 24-hour period where the Global Fishing Watch algorithm detected at least one hour of movements that were consistent with night time squid jigging.

Table 1: 10 Most Active Squid Fishing Vessels Operating in the Southeast Pacific During July 1-15, 2021

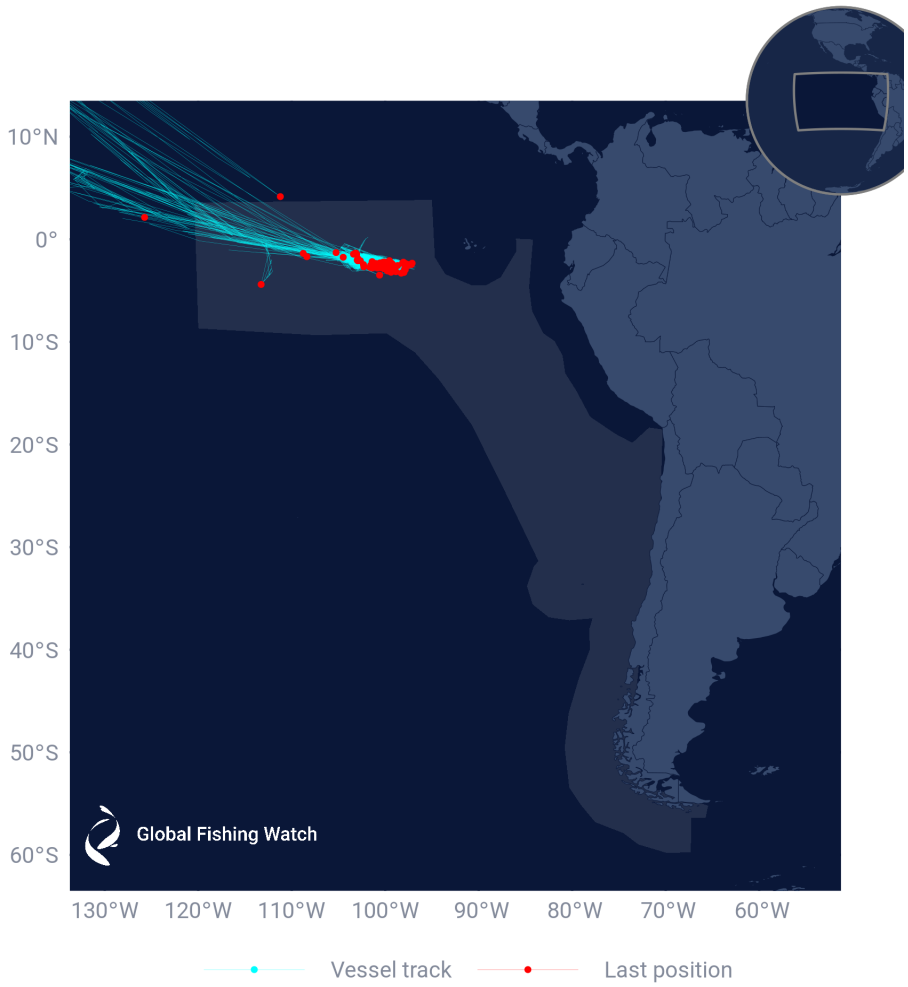
Note: Click to see the full list of vessels[3]

Vessel name	IMO	Fishing days[4]	AIS positions	Flag
JINHAIYANG1	8779475	9	12,841	China
NINGTAI65	8778500	10	12,803	China
JIADE58	9912177	10	12,239	China
FUYUANYU7671	9900100	12	12,216	China
HUSHUNYU6	8774774	15	12,212	China
HONGPU31	9907043	14	12,191	China
JIADE56	9912189	14	11,973	China
XINJILI56	9820582	10	11,947	China
HUSHUNYU8	8774798	15	11,896	China
RUNDA216	9902952	11	11,860	China

[3] https://docs.google.com/spreadsheets/d/1AFc-kvH4tGuC0RCb5WUpEK4gGOK7dNc2VwfJ2JxUo9g/edit#gid=715077582

[4] This study considered a 'fishing day' as any 24 hour period where the Global Fishing Watch algorithm detected at least one hour of movements that were consistent with night time squid jigging.

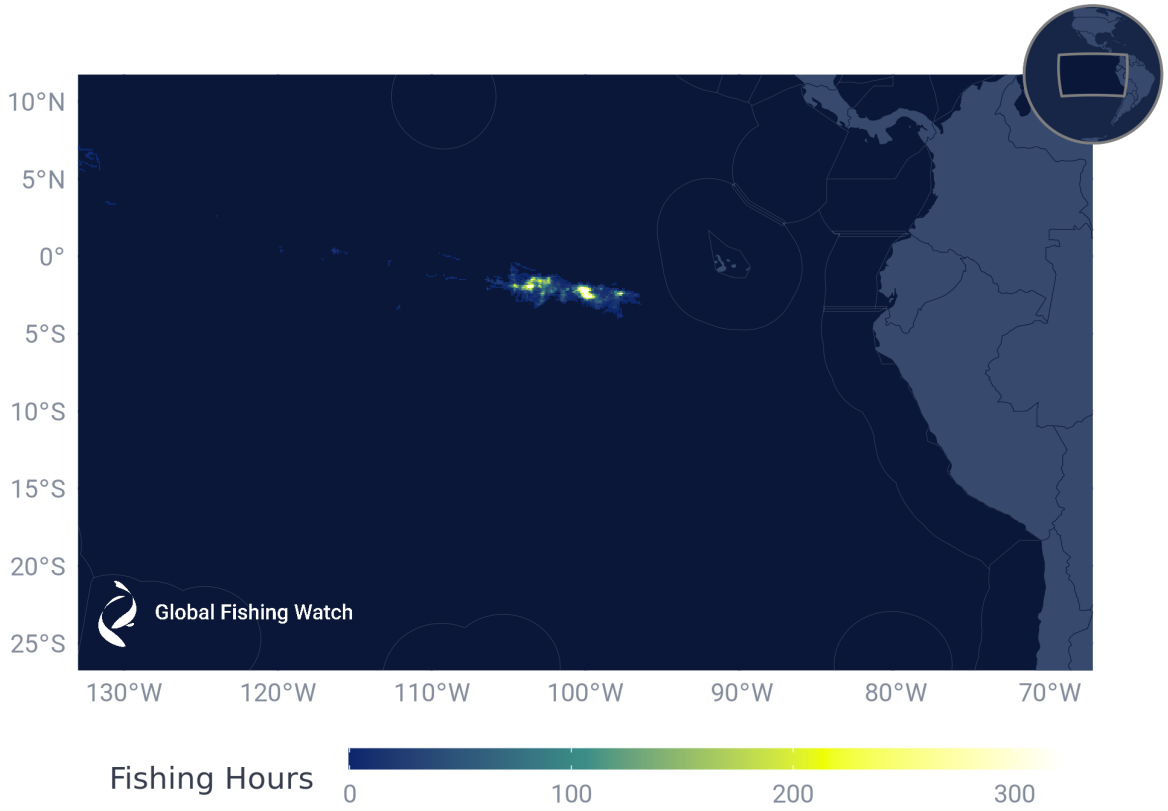
Figure 2: AIS-Detected Squid Vessel Activity During July 1-15, 2021



Red points in the Figure above represent the last position of each fishing vessel. The blue lines represent the track of the vessels during July 1-15, 2021.

The AIS tracking data for the first 15 days of July (Figure 2) shows squid vessels arriving from the North Central Pacific to the west of Ecuador (Galápagos) EEZ. Furthermore, the squid fleet is more concentrated and grouped together than last month (June 2020), where the squid fleet was more dispersed and extended along the Eastern Equatorial Pacific Ocean. The fleet operation area was 470 nautical miles in June while during July it was 330 nautical miles west of Ecuador's (Galápagos) -- average distance between vessels locations and Ecuador's (Galápagos) EEZ boundary.

Figure 3: AIS-Detected Squid Fishing Effort During July 1-15, 2021



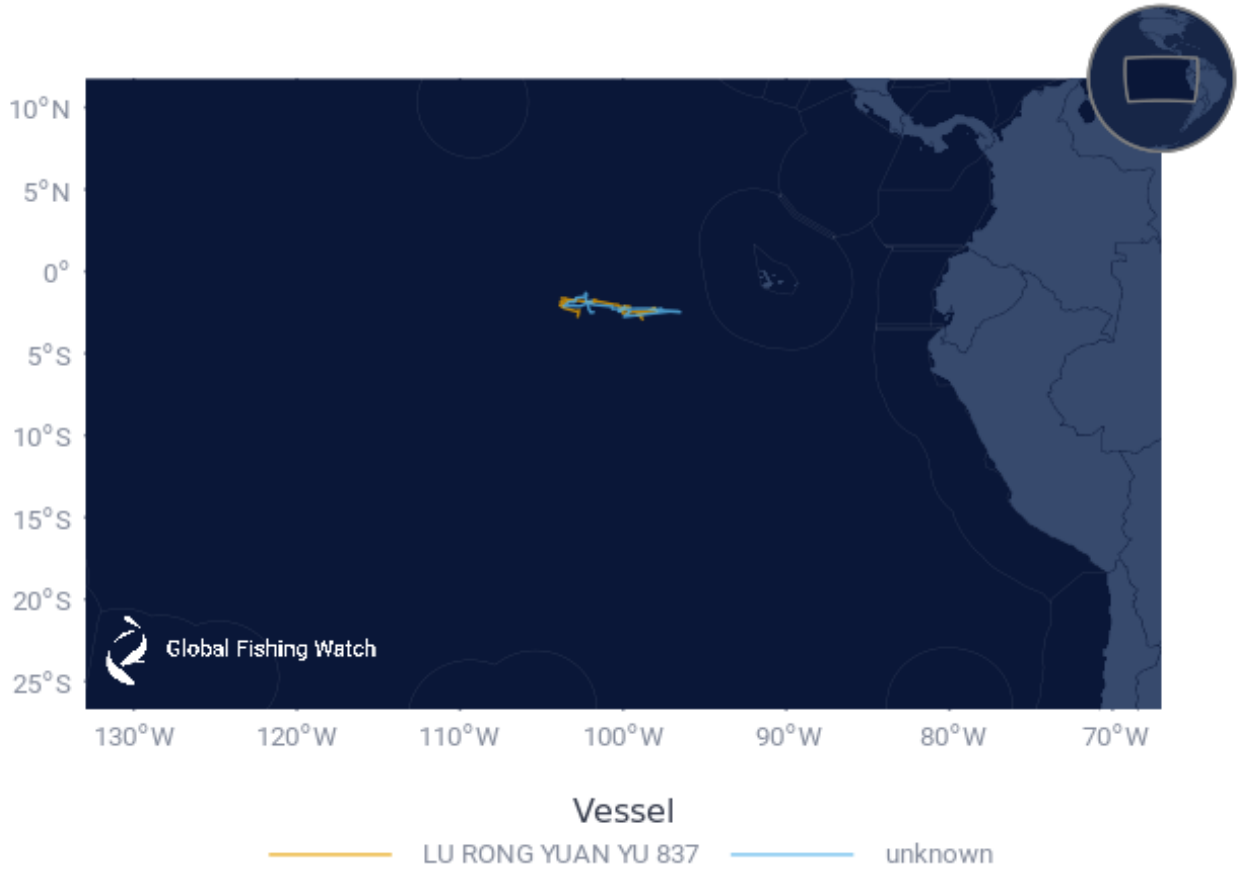
Unidentified vessels and vessel unmatched to a SPRFMO authorization

AIS identified two vessels active inside SPRFMO that could not be matched with an authorization to fish inside the Convention Area. The first vessel was broadcasting with the MMSI 135596865 and did not provide any identity information to allow a match. The second vessel with the MMSI 412549299 broadcast the name LU RONG YUAN YU 837 which cannot be found in the SPRFMO registry database. Figure 4 below displays the track of both of the vessels, which were operating in the high seas west of Ecuador (Galápagos) EEZ.

Table 2: Vessels Not Matched to a SPRFMO Authorization

Vessel name	MMSI	callsign	IMO	Flag	SPRFMO authorization
Unknown	135596865	-	-	Unknown	Unidentified
LU RONG YUAN YU 837	412549299	BZVM9		CHN	Unmatched

Figure 4: Tracks of Unauthorized and Unidentified Vessels



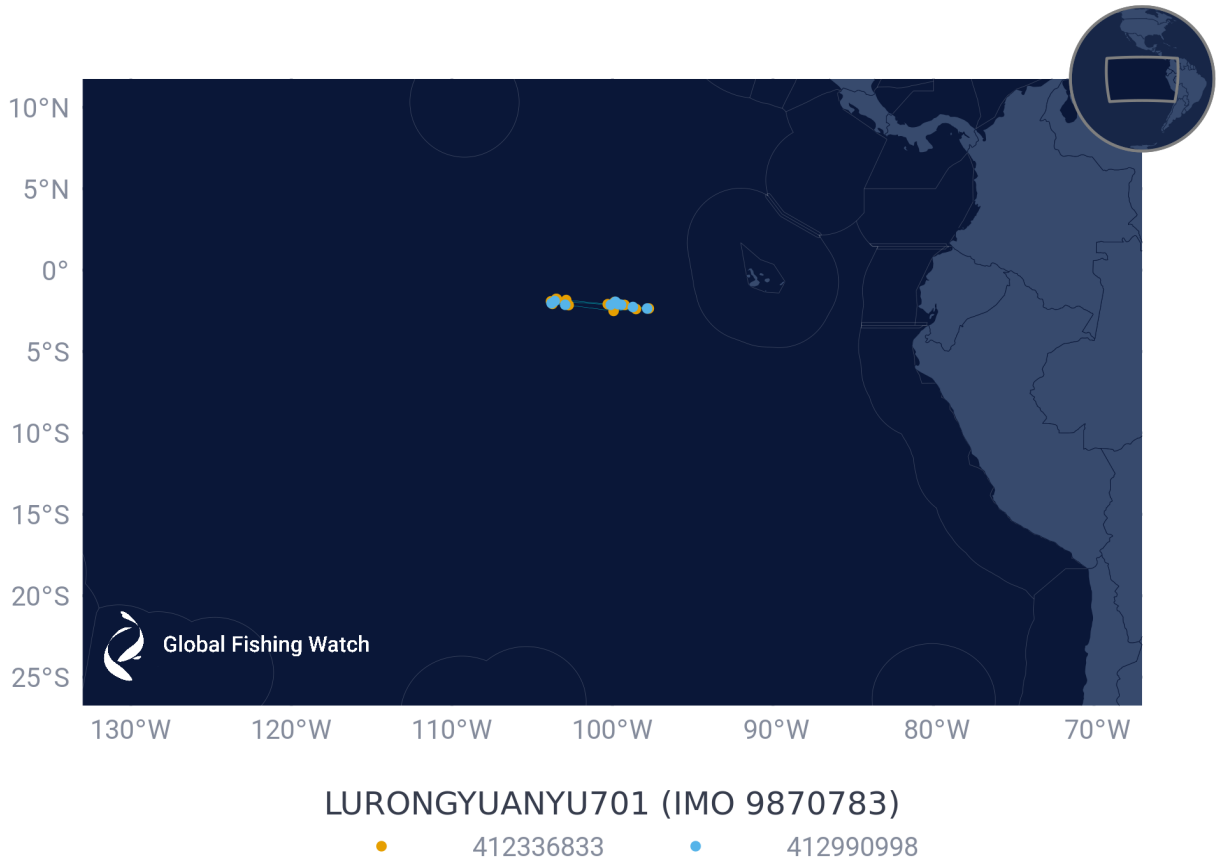
AIS misuse and irregularities

One squid vessel appears to be using two MMSI numbers. The LU RONG YUAN YU 701, authorized by the SPRFMO with IMO number 9870783 appears to be broadcasting with both MMSI 412336833 and 412990998. During July 1-15, the LU RONG YUAN YU 701 transmitted a total of 10,456 positions.

Table 3: LU RONG YUAN YU 701 Vessel Information

Vessel name	MMSI	callsign	IMO	Flag	SPRFMO authorization
LU RONG YUAN YU 701	412336833	BZYM2	9870783	CNH	1999-12-31
LU RONG YUAN YU 701	412990998	BZYM2	9870783	CHN	1999-12-31

Figure 5: Vessel Using Two MMSI Numbers



Support vessels: Transhipment and bunkering

Based on AIS data, 14 support vessels (11 carrier vessels and 3 bunker vessels) were operating within the AOI from July 1-15, 2021.

Table 4: 10 Most Active Support Vessels Operating in the Southeast Pacific Ocean

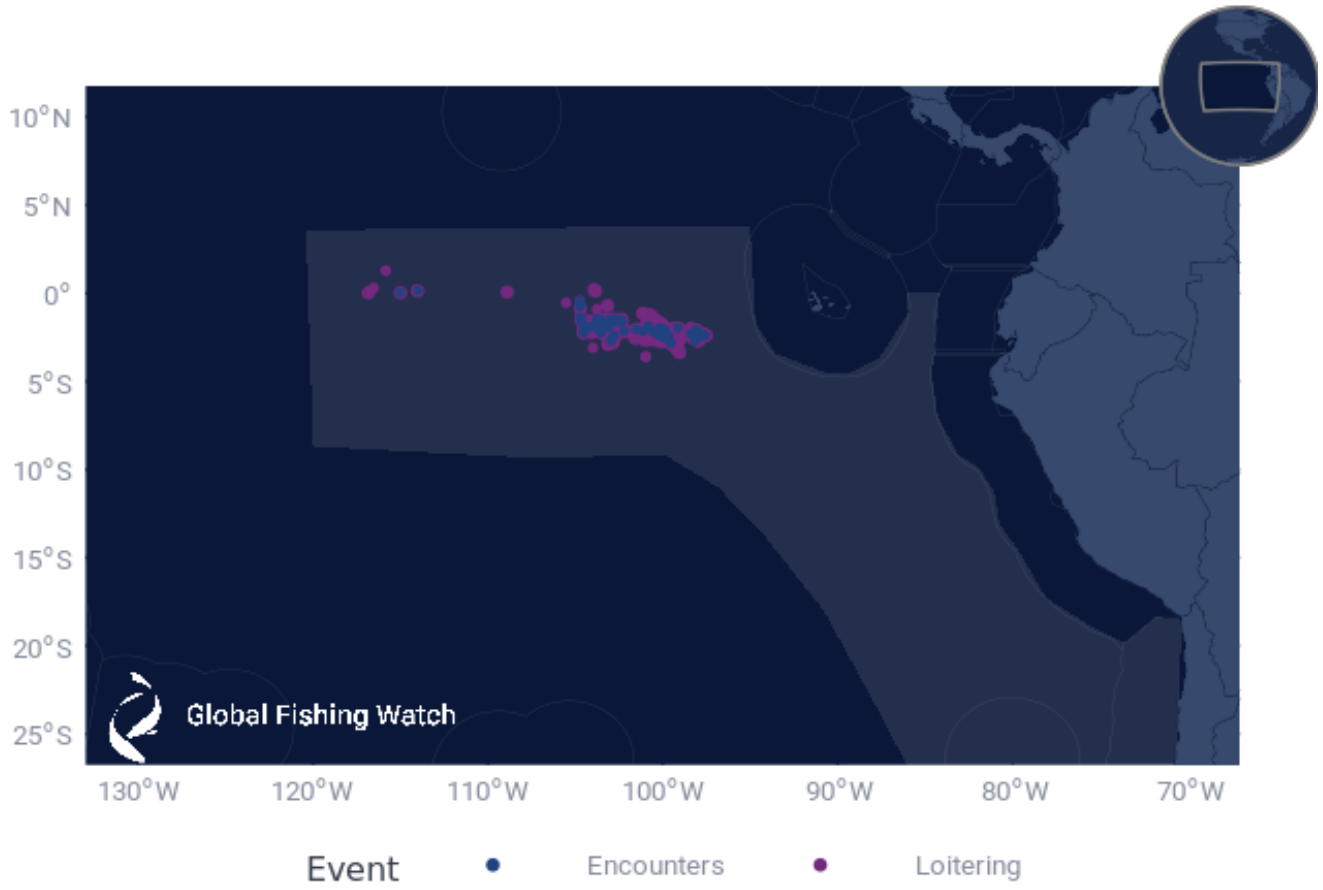
Note: Click to see the full list of vessels.

MMSI	Vessel name	Flag	Type
412421071	XINJILILENG6	CHN	Fish carrier
412549015	NINGTAILENG8	CHN	Fish carrier
372382000	OCEANRUBY	PAN	Tanker
354003000	SHENJU	PAN	Fish carrier
351960000	MINGHANG5	PAN	Fish carrier
356399000	HETAI	PAN	Fish carrier
636018227	WEI NING	LBR	Fish carrier
374245000	OCEANSPLENDID	PAN	Tanker
355827000	HAIFENG728	PAN	Fish carrier
373451000	ZEFYROSREEFER	PAN	Fish carrier

Encounters and loitering events

Encounters and loitering events by support vessels occurred in the key areas the fishing vessels were concentrated in July 1-15, Figure 6 shows encounters and loitering events distribution. Each dot represents a possible transshipment and loitering event. See also Global Fishing Watch Map - Carrier Vessel encounter analysis workspace. Fourteen non-fishing vessels had a total of 86 encounters and 220 loitering events in the Southeast Pacific Ocean during July 1-15, 2021. Non-fishing vessels were flagged to China, Liberia and Panama; which accounted for 23 percent, 20 percent and 57 percent of encounters respectively, and 31 percent, 12 percent and 57 percent of loitering events, respectively.

Figure 6: Distribution of Encounters and Loitering Events by Support Vessels With Squid Vessels



Port visits

The ZEFYROS REEFER, a Panama-flagged fish carrier with MMSI 373451000, registered one port visit in Rio de Janeiro, Brazil, before entering the AOI.

Figure 7: Port Visit During July 1-15, 2021

Looking at the ‘dark fleet’

VIIRS image analysis

The Suomi National Polar-orbiting Partnership satellite has a sensor with a spatial resolution of approximately 0.74 square kilometers, capable of detecting low light signals from the Earth. Called the Visible Infrared Imaging Radiometer Suite (VIIRS) it is able to detect fishing vessels that use bright lights to attract target species to the surface such as the squid fishery in the eastern equatorial Pacific.

The analysis of AIS data shows no distant water vessels operating within any of the coastal States’ waters inside the study AOI in July 1-15, 2021. To supplement the AIS analysis, VIIRS vessel detections were used to identify potential nighttime fishing incursions into the EEZs by large industrial squid vessels. No suspicious VIIRS detections were identified in July inside any coastal States’ EEZs.

According to the VIIRS daily detections between July 1-15, 2021 the squid fleet started their departure from the Equatorial Pacific high seas west of Ecuador (Galápagos) EEZ (Figure 9); the same pattern was detected with AIS data (Figure 2). VIIRS detections suggest that the fleet could be arriving at the Ecuador (Galápagos) EEZ boundary by the end of July.

Figure 8: Daily VIIRS Detections, July 1-15, 2021

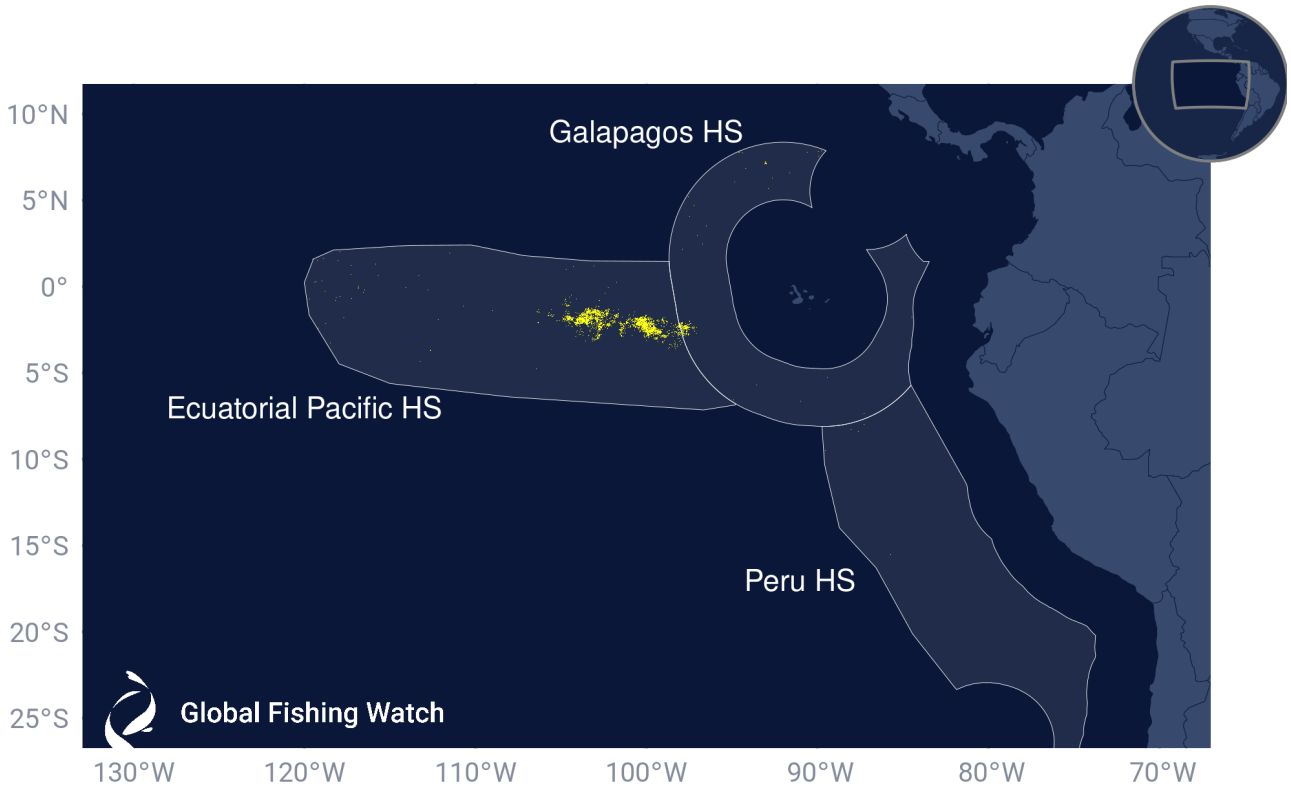
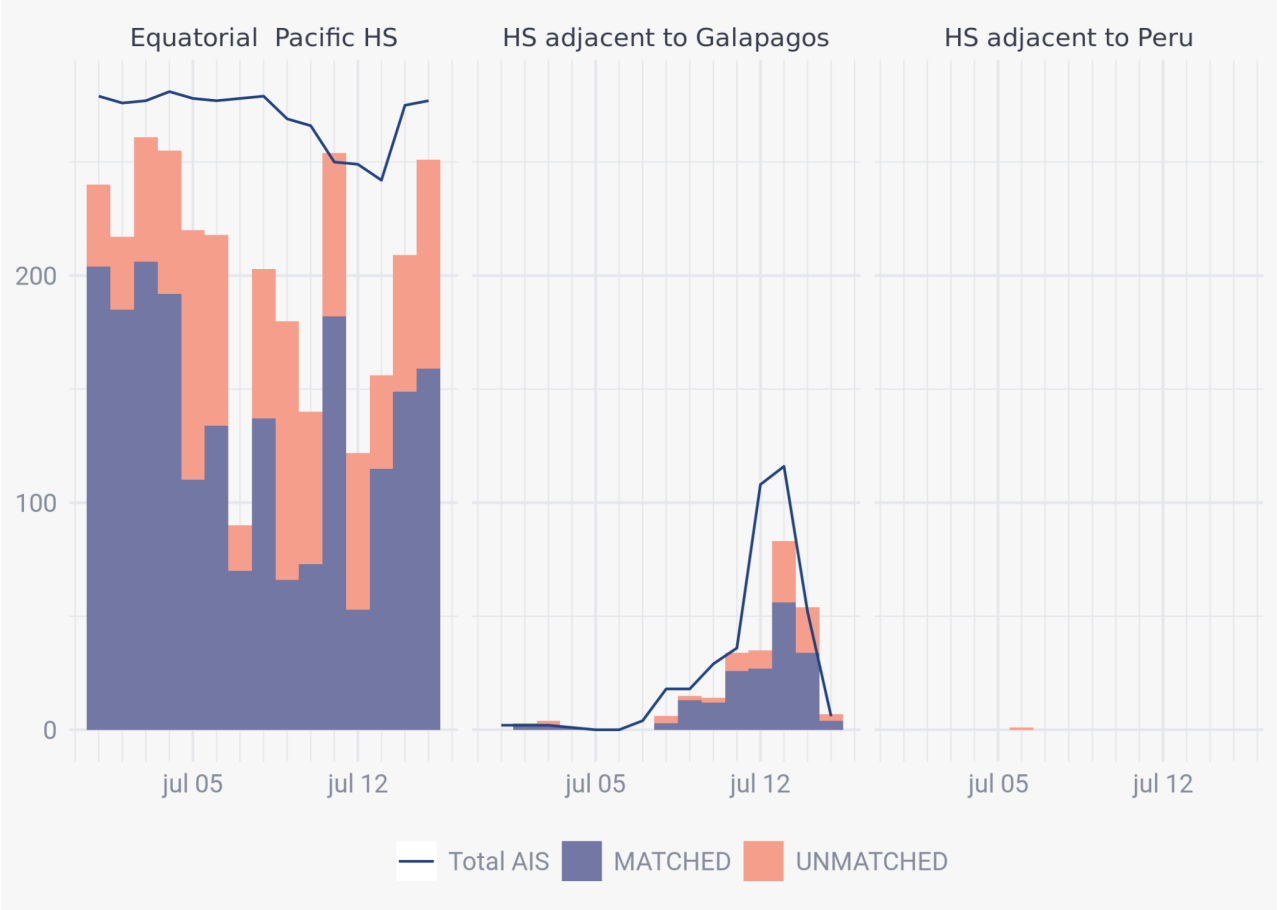


Figure 9 shows the number of VIIRS detections as a bar graph for three areas of the study's AOI. The bars are split by whether or not detections were matched directly to AIS. The line graph overlaid represents the daily count of squid vessels transmitting on AIS. If the bars were greater than the line chart, it would indicate the existence of a 'dark fleet'—vessels that stopped transmitting AIS data. For the first half of July 2021 and for these three regions the bars are less than the daily AIS count of squid vessels, suggesting a high proportion of the fleet is using AIS. And, the total daily AIS and VIIRS count of squid vessels was the same amount on July 11, 2021.

The increase of daily VIIRS detections inside the area of high seas adjacent to Ecuador's (Galápagos) EEZ mainly corresponded to the squid fleet's movement toward the west of Ecuador's (Galápagos) EEZ, as previously described with VIIRS and AIS information.

Figure 9: Daily Count of VIIRS Detections and Active AIS for Squid Vessels inside Area of Interest



Note: HS refers to High seas

Historic links to IUU fishing reports

Three squid fishing vessels identified as active in the AOI during July 1-15, 2021 had prior records that were associated with illegal, unreported and unregulated (IUU) fishing events. Vessels are described in Table 5.

Figure 10: AIS Tracks of Vessels with Historical links IUU Fishing Reports

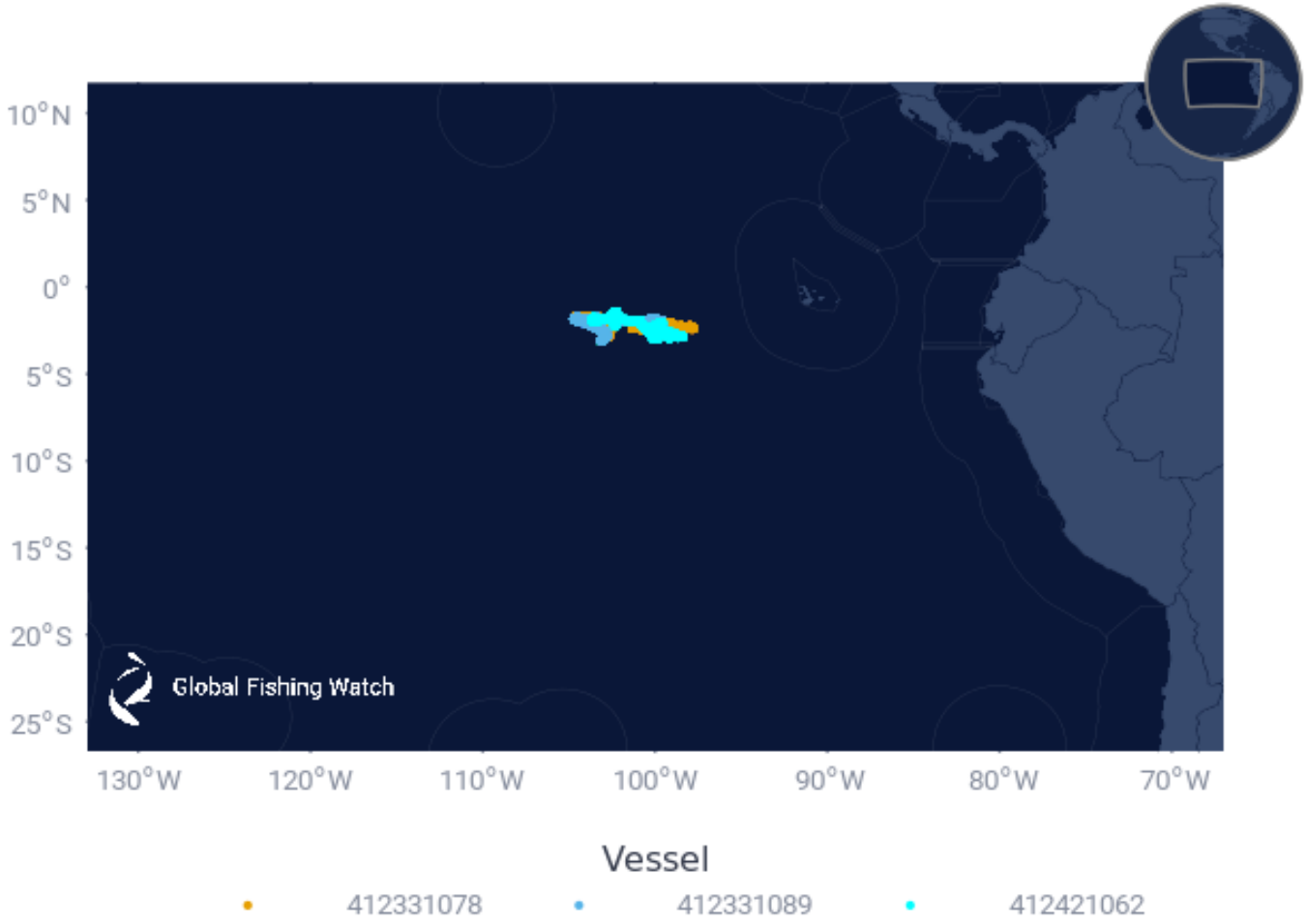


Table 5: Vessels Identified with Links to Historic IUU Fishing Cases

Vessel Name	MMSI	IMO	Flag	Type of fishery	SPRFMO List 2020	Date	Media report	AIS positions July 1-15 2021
JING YUAN 626	412331089	9784568	China	Squid	Authorized	2/21/2018	Argentina	233,325
HUA XIANG 801	412421062	9822695	China	Squid	Authorized	3/19/2020	Argentina	19,987
LU RONG YUAN YU 688	412331078	8775883	China	Squid	Authorized	5/01/2020	Argentina	13,272

IUU historical list for three 3 vessels registered and authorized by the SPRFMO related to IUU fishing activities from 2018 to 2020.

Conclusions

The analysis identified two vessels that could not be matched to a SPRFMO authorization which, if confirmed, would indicate a degree of unregulated squid fishing, albeit small. Additionally, three vessels with previous IUU-related historic events were identified. This finding can help alert port States to conduct the appropriate inspections.

AIS data can increase the transparency of the squid fishery in the Southeast Pacific and can be used by flag and coastal States to support monitoring control and surveillance of the fishery. It is recommended States cross check the AIS data with reported information from fishing and carrier vessels to help ensure vessels are correctly authorised and reporting catch inline with SPRFMO CMMs.

Annex 1 - Caveats & Disclaimer

AIS provides the only open source monitoring tool for high seas fishing. AIS relies on voluntary transmission, and is restricted to the vessels which have AIS devices installed and operating, making the data records incomplete. An additional source of uncertainty in AIS-based data relates to poor satellite reception, in areas with high vessel traffic, such as the South China Sea and English Channel. That said, the reception is generally good in the focal area of this report, however, the boats operating within the squid fishery often use Class B AIS transponders that broadcast at a lower rate when the vessels move slower than two knots. The majority of squid vessels fish by drifting with the currents[5] at a speed less than two knots, therefore the AIS messages received by these vessels and estimates surrounding their AIS-based fishing effort will be conservative. Nevertheless, in the absence of any other information, these data can be used to characterize the spatial extent and relative activity of the squid fleet in the area. This report was completed by manual review of AIS data and may differ to the information displayed in our automated public map or carrier vessel portal.

'Encounter Events' are identified when AIS data indicates that two vessels may have conducted a transshipment, based on the movements of the two vessels. Global Fishing Watch identifies encounters from AIS data as locations where two vessels, a carrier and fishing vessel, were within 500 meters for at least two hours and traveling at a median speed less than 2 knots, while at least 10 kilometers from a coastal anchorage.

'Loitering Events' is when a single vessel exhibits behavior indicative of a potential encounter event. Loitering is estimated using AIS data, including vessel speed, duration in a given location, and distance from shore. Loitering occurs when a carrier vessel travels at average speed of < 2 knots, while at least an average of 20 nautical miles from shore. It is possible that loitering events do not indicate a potential transshipment, but another event in which a vessel may remain fairly steady, including maintenance or waiting outside of port for permission to dock.

[5] Taconet, M., Kroodsma, D., & Fernandes, J.A. 2019. Global Atlas of AIS-based fishing activity - Challenges and opportunities. Rome, FAO. page 352. http://www.fao.org/3/ca7012en/CA7012EN.pdf

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Global Fishing Watch is an international nonprofit organization dedicated to advancing ocean governance through increased transparency of human activity at sea. By creating and publicly sharing map visualizations, data and analysis tools, we aim to enable scientific research and transform the way our ocean is managed. We believe human activity at sea should be public knowledge in order to safeguard the global ocean for the common good of all.

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