

## Characterizing transshipment at-sea activities by longline and purse seine fisheries in response to recent policy changes in Indonesia

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### ABSTRACT

Fishing activities are important for food resources and economics globally, with more than 120 million people depending on fishing for their livelihood. Fisheries management, and the related crackdown on illegal fishing has been rapidly evolving in the last several years, particularly in Indonesian waters. This is critically important because of the significant fisheries resources within the region (estimated at more than \$2 billion USD per year). The changes in regulations, including a moratorium on foreign vessels and on transshipment by foreign vessels, as well as changes in legislation related to domestic vessel activities means that Indonesia is in the limelight on addressing illegal, unreported and unregulated (IUU) fishing activities. An expert group identified key behaviours by vessel operators that indicate violations of these regulations, in particular the regulations on foreign and domestic transshipment. In this paper the transshipment indicators in purse seine and long line vessels developed in the workshop are characterised, governance changes are discussed, and the perverse consequences and impacts of new policies that have recently been implemented are highlighted.

### 1. Introduction

Human food resources have become global commodities. Approximately 23% of food consumed worldwide now moves through global supply chains [1]. Global seafood flows are estimated to be approximately 28 million tonnes worth an estimated \$131.6 billion USD [2], forming 10% of all food trade, and 1% of overall global trade [3]. While the number of countries involved in seafood trade has remained constant over the last 20 years, the number of partnerships has increased by 65%, the quantity by 58%, and the value by 85% in real terms [2]. China and Thailand have emerged as major new players in global seafood trade over this period, and increasing exports from Asia and South America [2] have been observed. For some countries these exports form a major portion of their economies, reaching up to 40% of the value of traded commodities [3]. Given the potential impact of maritime activities on marine resources, in 1995 the Food and Agricultural Organization (FAO) developed a code of conduct to establish international standards for behaviour and responsible fishing (and other maritime) activities. The goal was to ensure the appropriate conservation and management of living aquatic resources [4].

Transshipment, or the exchange of goods between alternative modes

of transport, has become an increasingly important component of fisheries supply chains, occurring either in port or at-sea. Defined by the Food and Agriculture Organization (FAO) as the “act of transferring the catch from one fishing vessel to either another fishing vessel or to a vessel used solely for the carriage of cargo” [5], transshipment has been believed to be one activity that can improve cost efficiency for fisheries.

Transshipment allows fishing vessels to specialize on production, increasing their efficiency and decreasing fuel costs associated with moving fish products to market. For instance, as China's fishing fleet expanded from a primarily domestic operation to a global footprint, the industry moved to utilizing specialized catching vessels, operating with transshipment vessels that moved catch [6]. This foreign expansion has been estimated at 4.6 million tonnes per year, with 3.1 of that coming from the waters of African countries [6].

However, transshipment is linked to a number of serious issues. Lack of transparent reporting of catches is a serious issue. For instance, only between 25% and 50% of the current foreign Chinese catch is reported [6]. This lack of reporting is linked to transshipment, which makes catch documentation difficult, and forces managers to reconstruct catches indirectly [7].

Transshipment also opens market access, with potentially major

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impacts on harvesting rates and sustainability. Market access has a strong effect on fisheries and their outcomes in terms of sustainability. Market access can lead to depletion of vulnerable species at the local scale, as has been found in the Solomon Islands [8] or globally where local markets were < 14 km away [9]. International flows of fish extend this impact significantly. For instance, in 2003 it was estimated that people in Hong Kong consumed between 130,000 and 290,000 t of reef fish per year, supported by imports across Southeast Asia. These imports exceeded Southeast Asia's production capacity by six times [10].

Transshipment has also been implicated in illegal fishing, where it is estimated to account for between US \$10 and \$23.5 billion worth of catch annually [11]. Transshipment allows fishing companies to exploit legal loopholes in fisheries regulations and to reduce costs (e.g. [7]). Illegal fishing involving transshipment is often linked to other crimes, including money laundering, transport of drugs, and human trafficking [12,13]. Use of transshipment vessels facilitates these illicit activities, making them more difficult to detect by intermingling illicit activities with otherwise lawful catch and commercial activities [13]. As an indication of its importance, transshipment has been recognized by the United Nations Food and Agriculture Organization's International Plan of Action as a key target for intervention to reduce IUU fishing [14]. The International Plan of Action to prevent, deter and eliminate IUU fishing (IPOA-IUU Fishing) was formed in 2001 under the auspices of the United Nations Food and Agriculture Organization's Code for the Conduct of Responsible Fisheries [4]. This International Plan was followed by the first Regional Plan of Action (RPOA-IUU Fishing) in 2007, which covered the shared waters of 11 countries in the Indonesian region ([15]; <http://www.rpoaiuu.org/joint-ministerial-statement/>). In 2012, Indonesia formulated a National Plan of Action to Prevent and Combat IUU Fishing 2012–2016 [15].

IUU fishing results in significant economic losses for Indonesia [16], estimated at a minimum of \$2 billion USD each year [17]. In addition, IUU fishing threatens the sustainability of fish resources, increases habitat degradation and endangers the livelihoods of small scale fishers. Significant efforts have been made by the Indonesian government to reduce IUU fishing in national waters [18].

Some of the more recent efforts to reduce IUU fishing include a six-month moratorium on issuing new fishing licences within Indonesian Fisheries Management Areas (IFMAs) enacted in 2014 (56/2014) and a ban on transshipment at-sea (also enacted in 2014 (57/2014)). To further reduce IUU fishing, changes to the legal catch size of lobsters and crabs was implemented in 2015 (01/2015) and a complete a ban on all trawl fishing activities in the IFMA was decreed in 2015 (02/2015). Finally, also in 2015, Indonesia developed a special task force to combat IUU.

### 1.1. Transshipment in longline and purse seine fisheries in Indonesia

The Ministry of Marine Affairs and Fisheries of Indonesia (hereafter referred to as MMAF), through the Ministerial Regulation No. 30/2012 article 1 on Fishing Business within Indonesia's Fisheries Management Areas (FMAs), uses a definition of transshipment similar to that of the UN FAO. Transshipment was a common practice in tuna longline and purse seine fisheries in Indonesia until it was banned by the Indonesian government in 2014. Enforcement of this ban has remained a significant challenge, in part due to the difficulty in detecting and monitoring transshipment activities at-sea. In particular, there is a lack of direct fisheries officials on vessels to observe activities and there is incomplete coverage of vessels by global position system (GPS) tracking systems. Hence, it is essential to develop indicators that can be used to infer transshipment events from vessel tracking data that is currently available. To date, there has been no synthesis of indicators of transshipment at-sea practices in Indonesian waters. Herein, an overview of transshipment at-sea events is provided, current regulations that specifically address transshipment are discussed, and a suite of indicators for longline and purse seine fisheries in Indonesian waters as a useful tool to underpin monitoring, control and surveillance activities to reduce

IUU are presented.

## 2. Methods

General patterns of transshipment by longline and purse seine vessels operating in the Indonesian waters were determined through reviewing the existing literature. This was followed by a series of focus group discussions (FGD). These discussions involved fisheries and statistical modelling experts (national and international), scientists, fisheries managers from the Directorate General for Capture Fisheries and Surveillance Division under MMAF. Discussions also included fishing association members (Indonesian Tuna Longline Association) who were gathered to develop a common understanding on characteristics of transshipment events, based on their knowledge and experience in a professional capacity. The process resulted in a list of potential indicators for transshipment activities, which fell into two categories: quantitative indicators and qualitative indicators (see [Supplementary materials, Table 1](#)). After the first discussion, three subsequent workshops took place in which participants clarified and added information. Workshops were attended by nominated staff of various agencies and stakeholder groups (most of whom who had previously provided input).

## 3. Results and discussion

### 3.1. National and sub-national regulations on transshipment

The *maritime axis* policy from Indonesia's president was put forward by the MMAF minister in late 2014. Eliminating IUU fishing practices is one of the main issues addressed by the minister with various measures and regulations identified as sources of IUU practices seeding from the previous failed policy. Essential regulations included ministerial regulations number. 56/PERMEN-KP/2014 concerning a moratorium on foreign built vessels in November 2014 and number 57/PERMEN-KP/2014 concerning a transshipment ban in December 2014 (Fig. 1). Also important was regulation 2/PERMEN-KP/2015 on the prohibition of trawl and trawl like gears operation in Indonesian waters in January 2015 (Fig. 1).

### 3.2. Response to implementation of regulations

Transshipment was common practice in Indonesia prior to November 2014, stemming from efforts to increase fishing efficiency and decrease

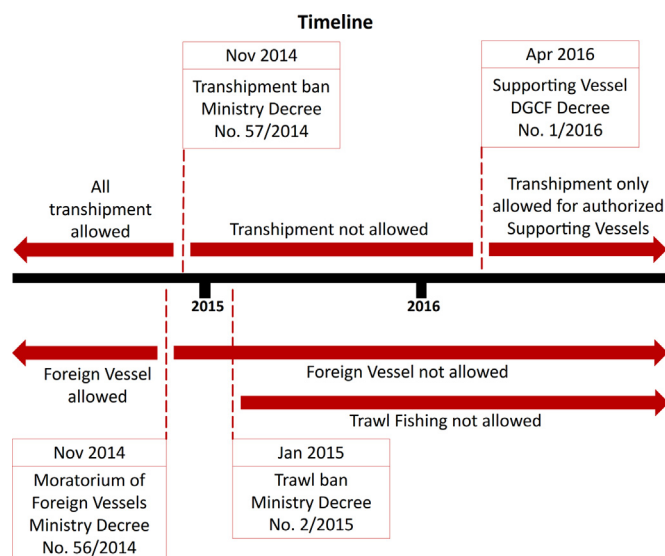


Fig. 1. Timeline of and regulations related to transshipment developed by the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia.

costs so as to maximize profit. However, as previously mentioned, transshipment practices are difficult to assess with respect to the potential role they play in IUU practices. It has been widely appreciated that transshipment, including unlicensed transshipment to foreign vessels, has been a major issue in IUU fishing in Indonesia. Significant change has been observed in the marine fisheries sector, including a notable reduction of IUU fishing within Indonesian waters since the implementation and associated enforcement of these regulations (Saut Tampubolon, Febrianto Wardhana, pers. comm, 13 June 2017).

The Indonesian Tuna Longline Association (ATLI) has objected to the transshipment ban, arguing that it unfairly disadvantages its members, who mostly operating wooden vessels without refrigeration or freezing capacity (Saut Tampubolon. pers. comm. 18 July 2017). The objection relates to the difficulty in maintaining the catch quality, which is important for financial compensation for catch. In practice, tuna longline fishers try to process the catch within twelve days. This is important to retain the fresh quality required for the target high value market in Japan.

The legislation banning transshipment also has implications for the tuna purse seine fishery. Tuna purse seiners based in Bitung, for example, mostly supply product for canned tuna. Purse seine fishers have argued that their fishing operations are conducted by groups of vessels, with one specialized fish carrier vessel moving catches to port (Figs. 2 and 3). They state that transshipment is required to maintain an appropriate fish supply (both in quantity and quality) and to prevent the

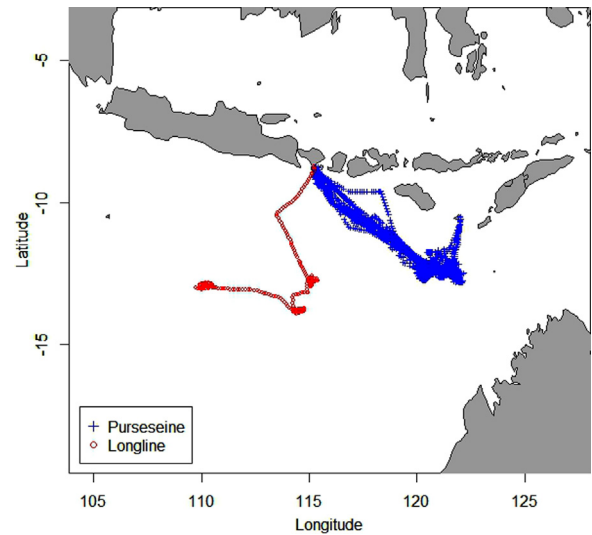


Fig. 3. Typical patterns for purse seine and long line fishing in Indonesia (based on tracks of movements of actual fishing vessels). Note the long distances travelled.

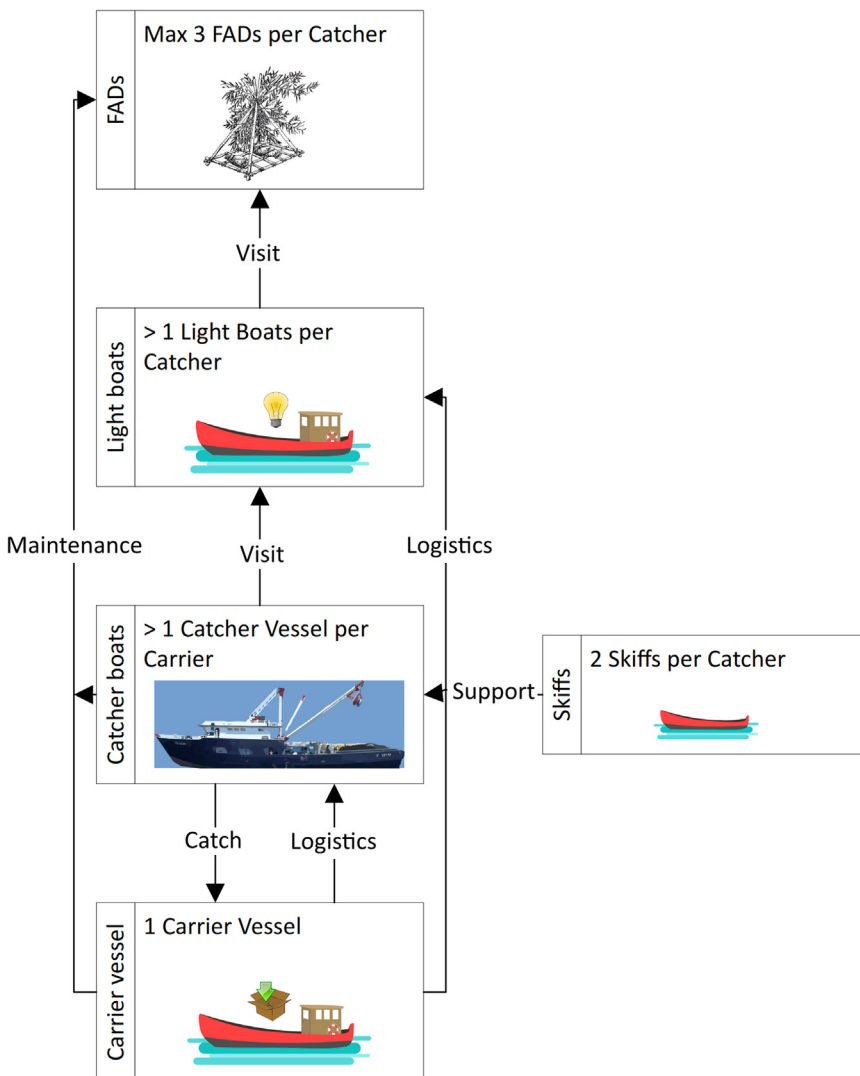
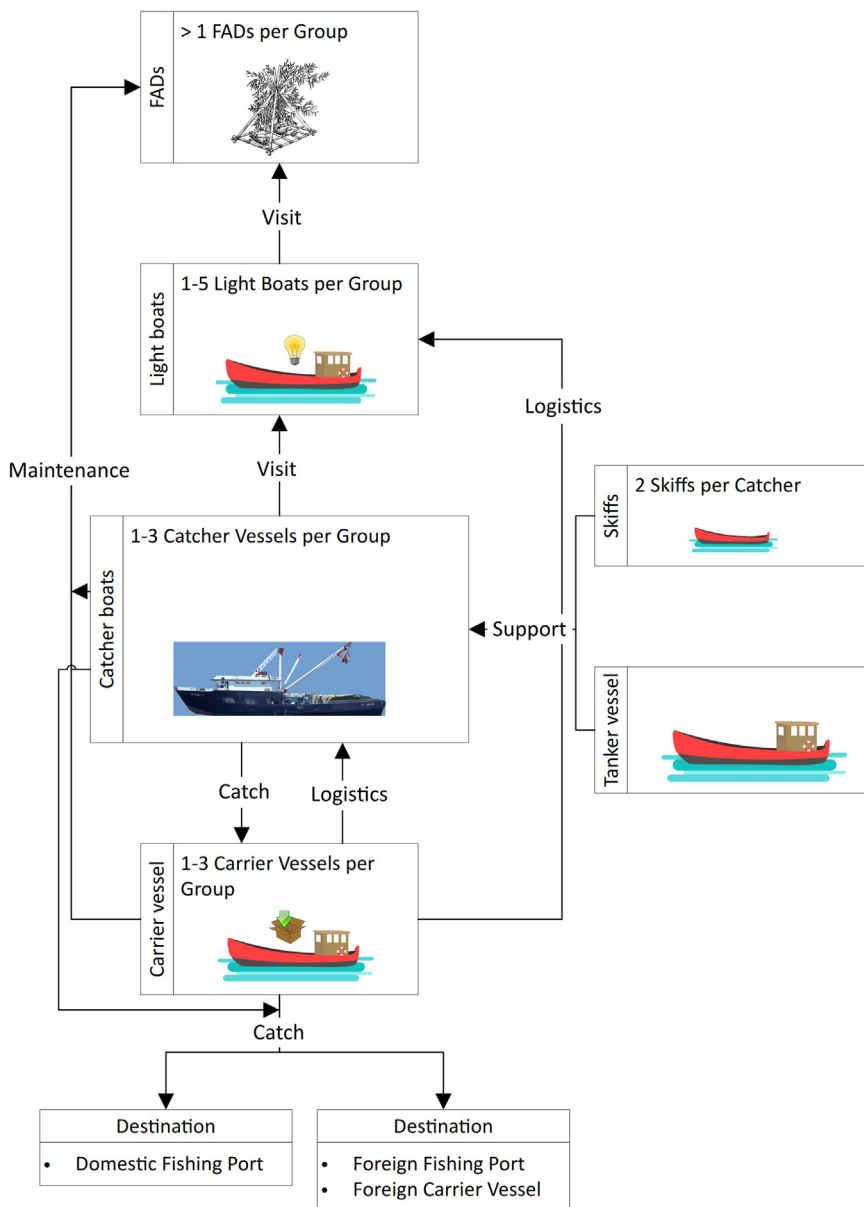


Fig. 2. Allowable transshipment patterns by supporting vessel with purse seine vessels, as per regulation approved by DGCF no. 1/2016. As per the regulation, one purse seine vessel (catcher) can fish at/use 3 up to three fish aggregating devices (FADs) at maximum. In its fishing operation, the catcher visits 1–3 light boats (near the FAD location) that help aggregating the fish. 2 skiff boats are also used to help the purse seine operation when deploying its nets. A carrier vessel transshipping the catches, with one carrier vessel can transship catches from more than one catcher vessel. The carrier vessel also brings logistics for the catcher and lights boats. The maintenance of the FADs is done by the carrier vessel.



**Fig. 4.** Transshipments patterns historically employed by purse seiner fishers operating in groups (prior to 2014; see Fig. 1). Between 1 and 3 catcher purse seine vessels (from 30 to 200 GT) can operate in a group and fish on an unlimited number of FADs. They typically use 1–5 light boats per group. Transshipment generally involves 1–3 carrier vessels per group. Carrier vessels then transport catch to a domestic fishing port, to foreign fishing ports or to foreign carrier vessels. The carrier vessels supply logistics for the catcher vessels and the light boats, and they provide maintenance for FADs and possibly for catcher vessels. Typically, 2 small skiffs per catcher are used to assist the catcher vessel (setting the nets). Tanker vessels provide support for catcher vessels (e.g. fuel, water and repair workshop, if required).

canning industry from collapse (Afrizal, pers. Comm., 23 November 2017). As a result of these issues raised by the fishing industry, the Director General (DG) of capture fisheries in Indonesia issued a response in the form of regulation 1/PER-DJPT/2016. This new regulation temporarily allows transshipment at sea for purse seine fishing operation by groups, with a carrier vessel to support for several catcher vessels in the same group (see Fig. 2 for description of legally allowable patterns of transshipment at sea). The stated aim of this regulation is to prevent the collapse of the tuna canning business.

However, in practice, fishers still face difficulties. For instance, fishers may procure a large catch on a day when a carrier vessel is unable to receive all the catches (Afrizal, pers. comm., 23 November 2017). Furthermore, this regulation is specific to purse seiners only and the transshipment exemption does not apply to tuna longline or other fishers across all Indonesian waters.

Internationally, conservation management measures (CMM) and resolutions by Regional Fisheries Management Organizations allow transshipments at port and at sea with several conditions. The Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC) have developed a Regional Observer

programme to prevent fish laundering, and to minimise the distorted reporting of catches through at-sea transshipment, supporting the effort of deterring and eliminating IUU fishing activities in their management areas. The IOTC established a programme for transshipment by large-scale tuna vessels fishing (LSTVs) at sea, which only allowed at-sea transshipment of tuna and tuna-like species and sharks by large-scale tuna longline vessels (LSTLVs). This transshipment only allows specific carrier vessels authorised to receive transshipments from these vessels at sea (IOTC Resolution 14/06). In 2017, the IOTC commission extended the allowance for transshipment to cover Indonesian wooden longline vessels, as an amendment to IOTC Resolution 14/06.

The WCPFC established conservation management measures (CMM) on the regulation of transshipment (CMM 2009–06 on Regulation of Transshipment and CMM 2016–03 for the protection of WCPFC Regional Observer Programme Observers). Each Member, Cooperating Nonmembers and Participating Territories CCMs shall ensure that flag states vessels are responsible for carrying observers from the WCPFC Regional Observer Programme (ROP). Additionally, transshipment at port is also permitted when an ROP observer is on board to prepare a complete report to the commission.



### 3.3. Transshipment patterns

Historically, Indonesian fishers did not incorporate transshipment into their operating procedures. Due to the proximity of their fishing grounds to port and the absence of freezing facilities on Indonesian vessels, catch was historically delivered directly to port by the fisher (Figs. 1 and 3). However transshipments to a carrier boat have become commonplace, particularly for tuna fisheries, since longline technology was first introduced to Indonesian fishers in the 1980s. The increased fishing efficiency afforded by transshipment has seen the practice extensively and rapidly adopted by the fishing industry, within Indonesia and around the world. Furthermore, as fishers now travel much longer distances (Fig. 3), transport of catch to port benefits from cold storage or rapid transit to ensure high quality product reaches the marketplace and attracts the most return on investment. Transshipment is common practice between fishing vessels. The practice occurs either from a fishing vessel to a carrier vessel, between carrier vessels; or from a carrier vessel to a small boat (see Fig. 2).

In Indonesia, current practice by both tuna purse seiner and tuna longline fishers includes the use of transshipment. However, the expansion of transshipment practices has not been followed with appropriate monitoring, recording and reporting of catches. This lack of consistent monitoring makes it difficult for fisheries managers to manage and evaluate fisheries, in particular the sustainability of fish stocks. In addition to the potential stock depletion issue, both decreased catch volume and decreased of fish size have emerged as international concerns [3].

Until the enactment of recent regulations, transshipment at sea was a common practice for tuna purse seiners operating in groups (Fig. 4). The main method employed was to tranship the catch from the catcher's vessel to a carrier vessel; either whole fresh, frozen in bulk, or both. The carrier vessels play an important role in transporting the catch to fishing ports or jetties of processing plants, while functioning as logistics distributors to the catchers. This practice reduces time and cost for fishers, both at ports and at sea, thereby increasing efficiency and profit. At the same time, this practice increases pressure on the stocks since it enables the fishers to spend more time fishing at sea

Since the ban on transshipment was enacted in November 2014, regulations for transshipment in longline vessels have been modified in Indonesia. Under ministerial decree 12/2016, transshipment at sea is again allowed for longline vessels. However, for legal transshipment to occur, there are several requirements inter alia: Both carrier vessels and fishing vessels must have a common port registered in their fishing license; an ROP observer must be on board; the Vessel Monitoring System (VMS) must be activated; the vessels must report to a port administrator and the vessel operator must submit a written transshipment declaration prior to transshipping the catch. This compliance requirement is currently being objected to by Indonesian Tuna Fishing Association (Asosiasi Tuna Longline Indonesia; ATLI). This objection is mainly because most Indonesian fishing vessel are wooden, and hence, are not eligible for ROP observers by MRAG-IOTC. Hence, compliance is made difficult if not impossible for fishers.

Longline fishers also tranship their catch at sea. Longliners not only transport catch to carrier vessels, but they also move fish to other catcher vessels. Transshipments may occur between vessels within a single company or between vessels from different different companies (Fig. 5).

### 3.4. Transshipment indicators identified by experts

To aid in developing analytical tools to reduce IUU fishing, identification of both qualitative and quantitative transshipment indicators was a primary focus. Indicators considered behaviour (such as movement patterns, co-occurrence of particular vessel types, VMS transmission), geographic region (inside, near or outside the economic exclusion zone (EEZ), and type of fishing (at fish aggregating devices using purse

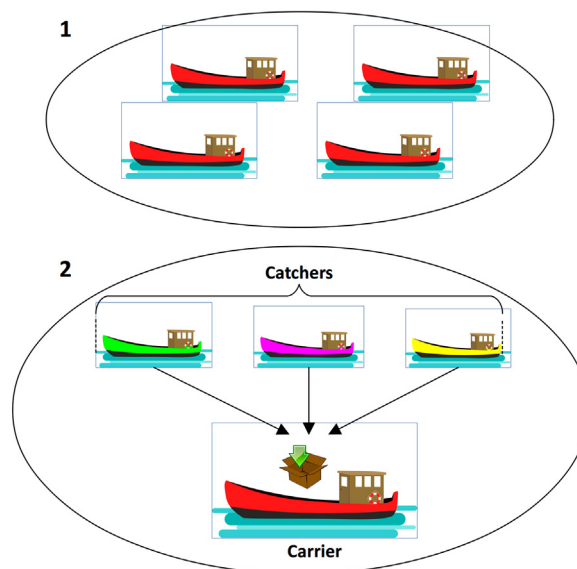


Fig. 5. Typical transshipment pattern for a longline fishery. The upper panel (1) depicts transshipment between catcher vessels within a single company (there may or may not be a separate carrier vessel). The lower panel (2) depicts transshipment from catcher vessels from different companies to a single carrier vessel.

seine nets for instance). For example, a meeting of catcher and carrier vessels near the border area indicates transshipment. Vessels often turn off the VMS transmitter one or two days prior to transshipment, and carrier vessels have a shorter trip duration relative to a catcher vessel when conducting transshipment. In addition, carrier vessels engaged in transshipment tend to travel at high speeds and follow a straight path. Another indicator includes the co-occurrence of catcher vessels: when catcher vessels co-occur with small vessels near landing ports, transshipments may be more likely to take place (see [Supplementary Materials](#) for comprehensive description of indicators and changes in activities before and after the ministerial decree of 2014).

Furthermore, as regulations are enacted and enforcement takes place, the banning of transshipment at sea can result in some unintended consequences. Anecdotally, it has been reported that some fishers may now be unloading their catch on land. Here, it may temporarily reside for some days in refrigerated containers before being picked up again by a vessel and transferred elsewhere. Such perverse outcomes may be technically permissible, but are an unintended consequence of the new regulations.

## 4. Conclusions

The recent changes in fishing regulations, the moratorium on foreign vessels, and the change in transshipment practices allowed means that Indonesia is in the limelight with respect to addressing illegal, unreported and unregulated (IUU) fishing. The Fisheries Minister of Indonesia also has acknowledged the link between IUU fishing activities and other organized fisheries criminal activities including tax fraud, money laundering, transport of illicit drugs and corruption. The country is taking a comprehensive approach to resolving these complex, transnational criminal activities. The pressures on fish resources will only grow as the world's population continues to expand and there is increased demand for global food security. For an island nation in which fishing activities comprise a significant component of the country's income, transshipment is an important management issue that is fraught with challenges, for fishers and managers alike. The recent changes in legislation and the increased enforcement of illegal activities highlight the potential for unintended consequences and changes in strategies as fishers respond to new policies and livelihoods may be under threat.

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## Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.marpol.2018.06.010>.

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