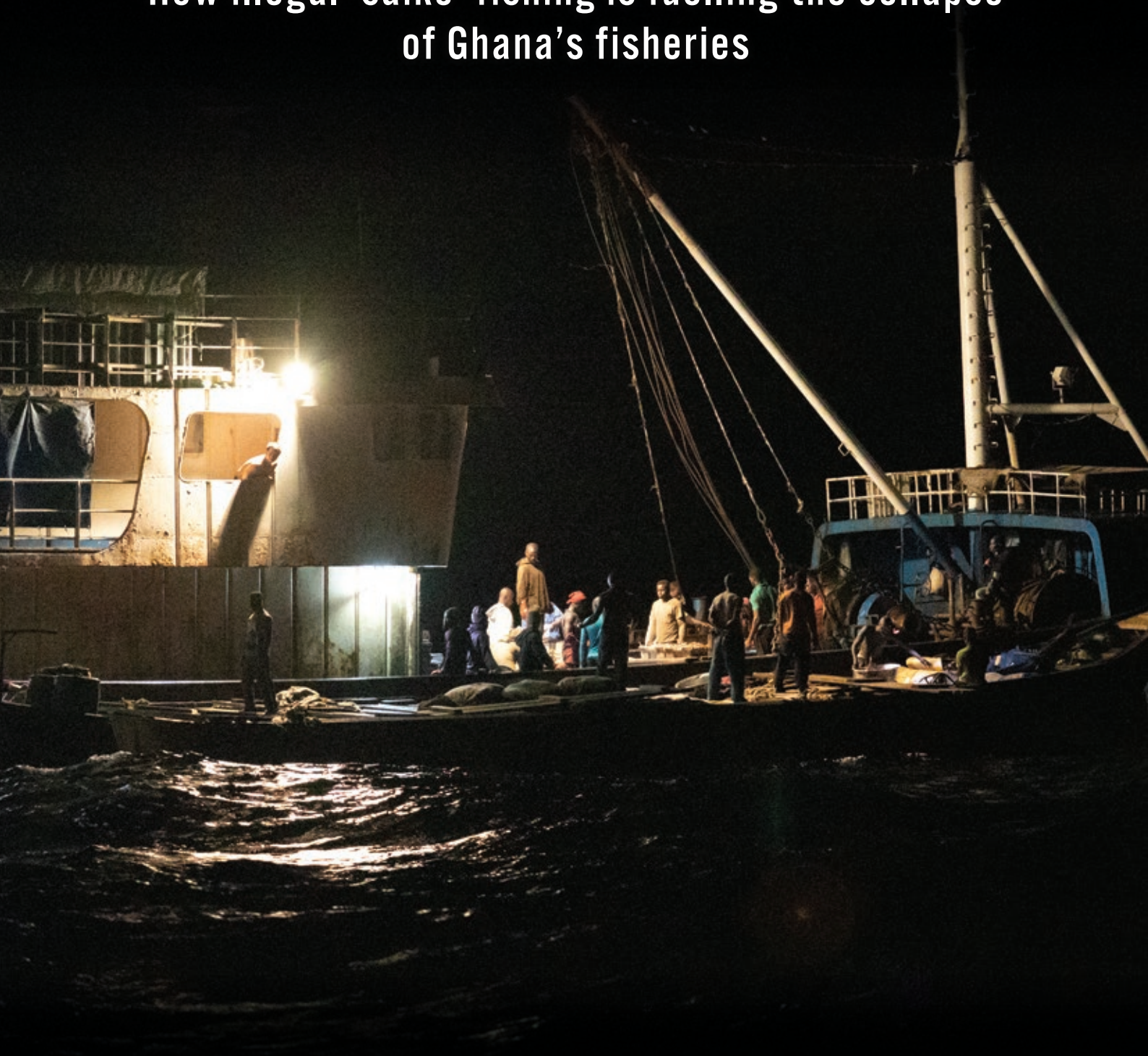


STOLEN AT SEA

How illegal 'saiko' fishing is fuelling the collapse of Ghana's fisheries



Hen Mpoano



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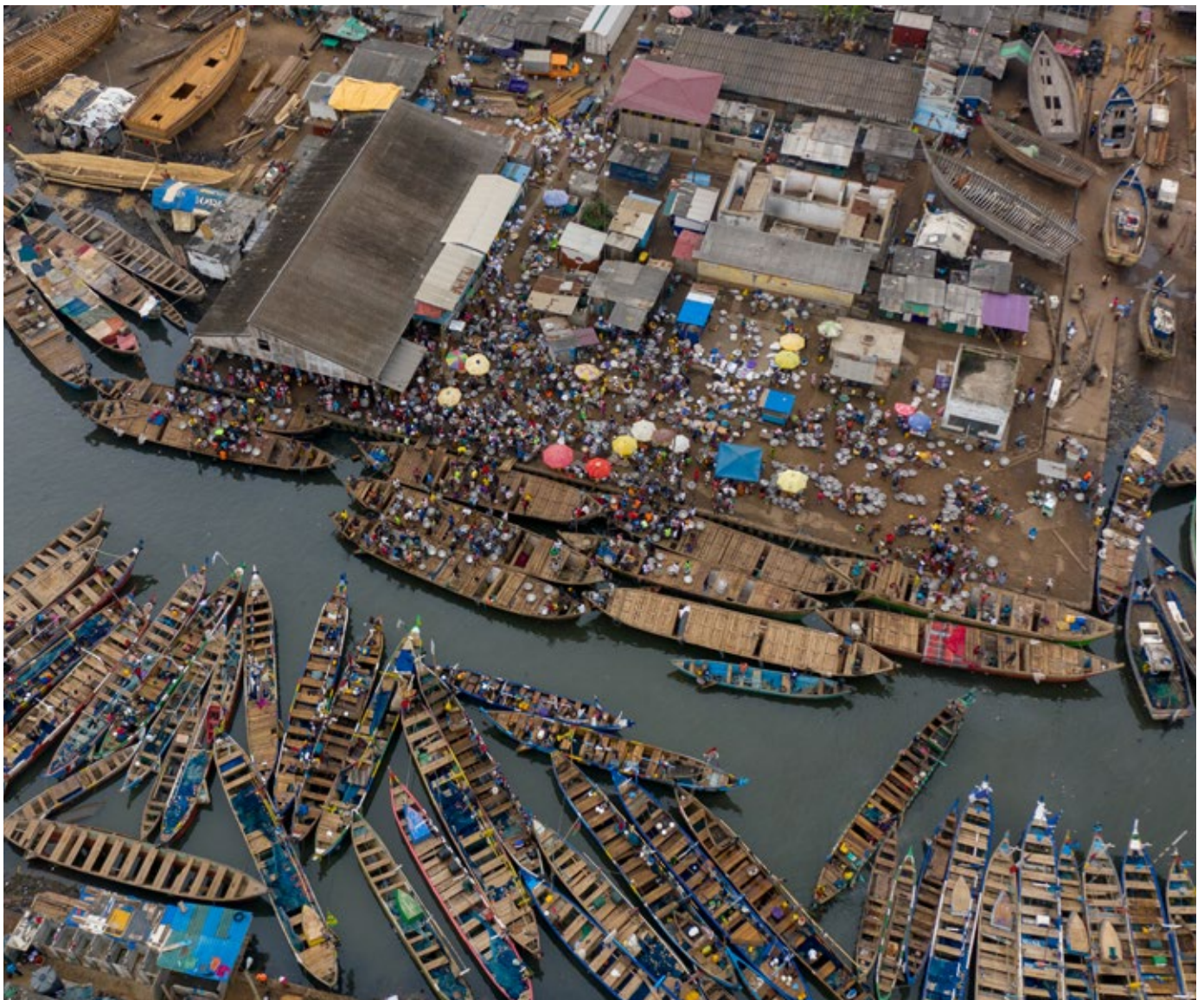
Executive summary

Saiko is the local name for illegal fish trans-shipments in Ghana, where industrial trawlers transfer frozen fish to specially adapted canoes out at sea. It used to be a practice whereby canoes would buy the unwanted by-catch of industrial vessels. However, the practice has developed into a lucrative industry in its own right, for which industrial fishers actively fish.

Today, industrial trawlers not only target the demersal (bottom-dwelling) species for which they are licensed, but the same species as the artisanal fishing community, including the severely depleted small pelagics such as sardinella and mackerel. These catches, which often contain juvenile fish, are landed by the *saiko* canoes for onward sale to local markets. This has severe implications for Ghana's artisanal fishing sector, which is critical to food security and provides significantly more jobs than the *saiko* industry.

Saiko is prohibited under Ghana's fisheries laws, attracting a fine of between US\$100,000 and US\$2 million. The minimum fine increases to US\$1 million where catches involve juvenile fish or the use of prohibited fishing gears. Although *saiko* activities are widespread, there is a very low risk of arrest and sanction. Cases are generally settled through opaque out of court settlement processes, and there are no known examples of the minimum fines in the legislation being paid. In addition, most of the industrial vessels engaged in *saiko* are linked to foreign beneficial owners, which also contravenes Ghanaian law.

As *saiko* is an illegal and unreported fishing practice, there is limited information on the quantity of fish in the *saiko* trade, the composition of catches, and the implications for sustainable fisheries management. This briefing provides an overview of the current scale and impact of *saiko*, based on extensive quantitative and qualitative fieldwork in country.



Aerial view of *saiko* canoes landing fish at Elmina port © EJF

Key findings

This study estimates that approximately **100,000 metric tonnes of fish** were landed through *saiko* in 2017. **We estimate the value of this fish sold at sea to be between US\$ 40.6 and US\$ 50.7 million, and between US\$ 52.7 and US\$ 81.1 million when sold at the landing site.** This research represents the first comprehensive attempt to estimate the volume and value of fish landed through *saiko*, as a basis to better understand the ecological and socioeconomic implications of the practice.

The figures indicate that, up to now, the impact of the industrial trawl fleet on Ghana's marine fisheries resources has been severely underestimated.

Combining *saiko* landings with official landings reported by the industrial trawl fleet of 67,205 metric tonnes, it is estimated that trawlers caught approximately 167,000 metric tonnes of fish in 2017. **This suggests that just 40% of catches were landed legally and reported to the Fisheries Commission in 2017**, despite observers being present on a number of vessels.

Estimated landings of the trawl fleet in 2017 were similar in magnitude to the landings of the entire artisanal (small-scale) fishing sector (see **Figure** below) and stand in stark contrast to the figures set out in Ghana's 2015-2019 Fisheries Management Plan. According to the Management Plan, the industrial trawl fleet reported landings of just 18,500 metric tonnes in 2014, with 107 vessels in operation. Reconstructed landings of 167,000 metric tonnes for 2017 are nine times the official statistics for 2014, despite fewer vessels in operation (76 licensed vessels at the end of 2017) and a two-month closed season for the trawl fleet.

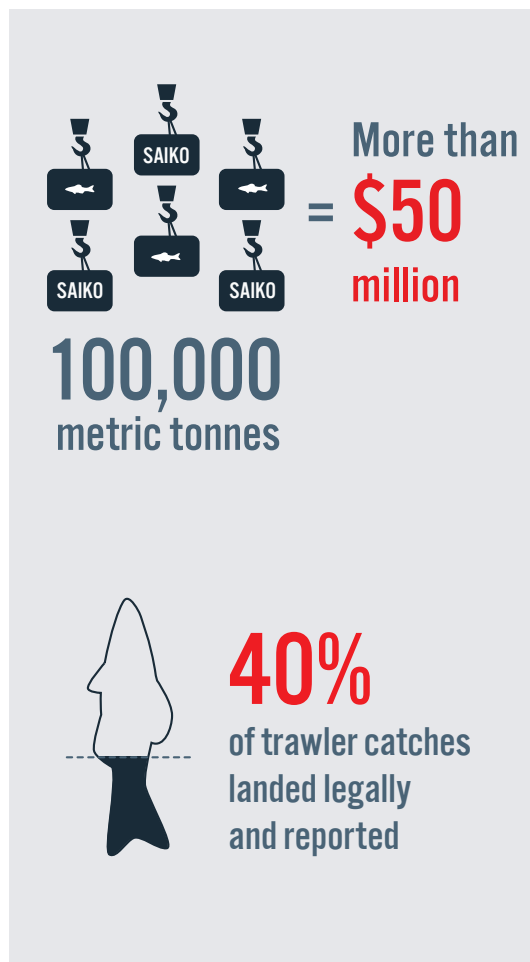
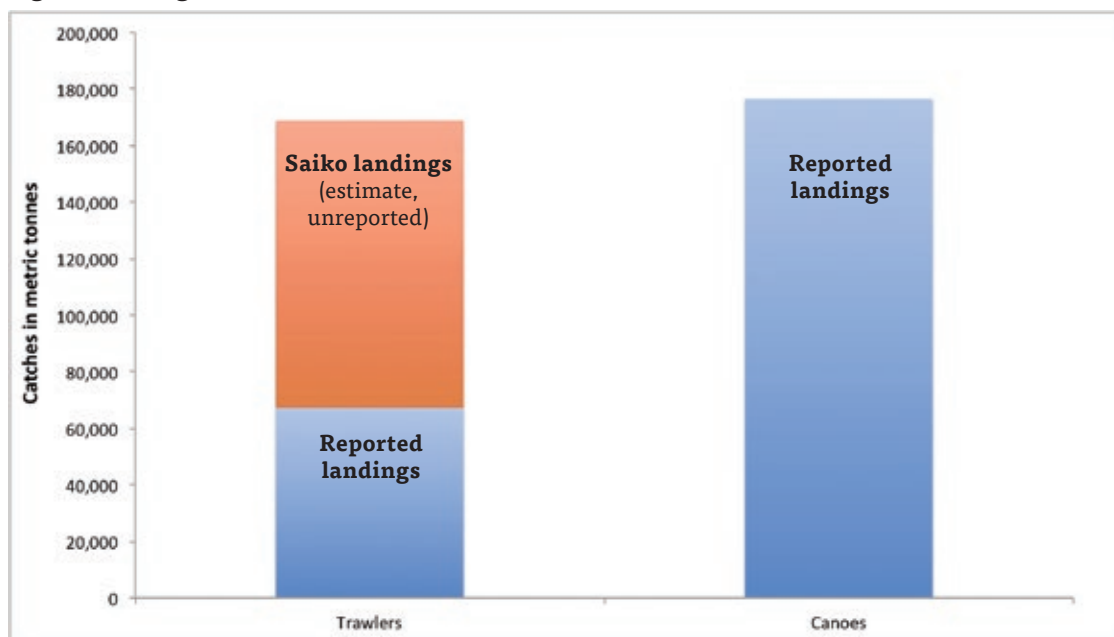


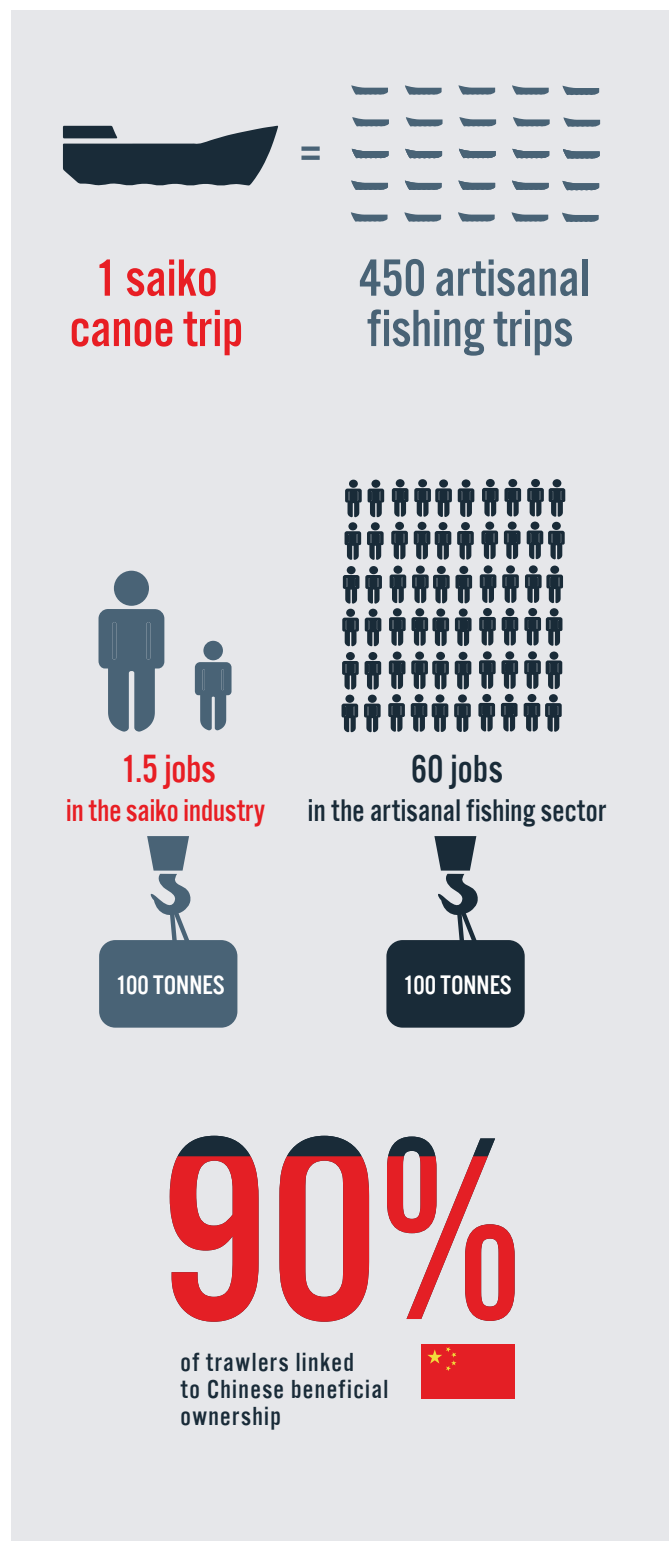
Figure: Landings of the industrial trawl and artisanal sectors in 2017



Notes:

- Reported landings for the trawl and artisanal sectors are derived from the annual report of the Fisheries Commission for 2017 (unpublished).
- Estimate of unreported catches for the industrial trawl fleet excludes discards and other unreported catches.
- Artisanal landings do not include unreported catches not captured in official statistics.

The magnitude of *saiko* landings sheds light on the inequitable distribution of benefit flows from Ghana's marine fisheries resources. The *saiko* industry has expanded rapidly in recent years, at a time of severe declines in the catches of artisanal fishers. In 2017, around 80 *saiko* canoes landed the equivalent of over 55% of the landings of the entire artisanal sector. With the capacity to hold around 26 tonnes of fish, **an average *saiko* canoe lands in a single trip the equivalent of approximately 450 artisanal fishing trips.**



The employment provided by Ghana's artisanal fishing sector dwarfs the number of individuals employed in the *saiko* trade. The artisanal sector provides direct employment for over 100,000 fishers across 292 landing sites in 186 coastal villages. Based on 176,578 metric tonnes of fish landed by the artisanal sector in 2017, **this equates to direct employment for around 60 fishers per 100 metric tonnes of fish caught.**

In contrast, it is estimated that the *saiko* industry provides direct employment for up to 1,500 crewmembers, watchmen and hustlers at the three landing sites of Elmina, Apam and Axim, although this is likely to be an over-estimate. Based on an estimated 100,000 metric tonnes of fish landed through *saiko* in 2017, this equates to **around 1.5 jobs per 100 metric tonnes of fish caught, 40 times less than if the fish were caught by artisanal fishers.**

The same catches brought by artisanal fishers would therefore see the benefits from Ghana's fisheries distributed widely across the coast. Instead, *saiko* concentrates profits in the hands of a few individuals who have seen their bargaining power increase over time. Processors report being obliged to purchase *saiko* fish, despite making a loss due to spoilage, so as not to lose favour with *saiko* owners and to secure a future supply.

Saiko allows industrial trawlers to effectively steal the fish from small-scale fishers, before selling it back to local communities at a profit.

The majority of these trawlers are linked to Chinese beneficial owners, in spite of local laws prohibiting foreign ownership and control in the trawl sector.

From the perspective of artisanal fishers, *saiko* is seen as enabling foreign-backed industrial trawlers to engage in destructive fishing practices and unfair competition on a massive scale. By allowing *saiko* to continue, it becomes ever more challenging to secure the buy-in of artisanal fishers to address their own destructive fishing practices and issues of over-capacity in the canoe sector. And yet, these actions are also critical to saving Ghana's fisheries from collapse.

Saiko provides a route for trawlers to sell illegally harvested fish, perpetuating the illegal fishing activities of the industrial trawl fleet. It serves as a disincentive for trawlers to reduce their by-catch, and rather incentivises the targeting of species that are in high demand for local consumption. This includes the severely depleted small pelagic stocks, such as sardinella, that are the key target of the artisanal fleet. Landings include significant quantities of juvenile fish harvested before they have had an opportunity to reproduce.

The scale and composition of *saiko* catches is highly concerning for the long-term viability of Ghana's fisheries resources and undermines all efforts to rebuild stocks through measures such as closed seasons. The first-ever closed season for the artisanal fishing sector took place from May to June 2019.

This research suggests that Ghana's artisanal fishing sector, and the wider Ghanaian economy, is losing tens of millions of dollars each year to *saiko* through the misappropriation of catches, degradation of stocks and depression of prices in the market. With *saiko* landings valued at more than US\$50 million annually, and with much of this benefit accruing to vessels with Chinese beneficial ownership, eliminating the practice should result in at least part of this revenue being captured by the artisanal sector and the economic benefit staying in Ghana.

There is an urgent need to eliminate *saiko*, to have any hope of securing sustainable fisheries in Ghana and the livelihoods of fisher folk.

Enforcement must be intensified, and offenders sanctioned with the full force of the law to ensure deterrence. This should include any foreign beneficiaries that are found to be profiting from the trade. More broadly, it is imperative that the fishing effort of the trawl fleet be reduced to sustainable levels, far beyond the targets in the Management Plan which to date remain unfulfilled.



Image of an industrial trawler captured by a local fishing canoe in Ghana © EJF

Recommendations

In light of the findings of this study, it is recommended that the government of Ghana:

1. Immediately issues a statement to clarify that *saiko* remains illegal under the national fisheries law framework, regardless of whether or not the trans-shipment is carried out under the supervision of an authorised officer.
2. Investigates all suspected cases of *saiko* fishing and, where sufficient evidence exists, ensures cases are prosecuted transparently through the court process and that, at the very least, the minimum fine set out in the law is imposed with respect to the *saiko* canoe and industrial trawl operator.
3. Works with the government of China to identify the beneficial owners of industrial trawlers operating in Ghana, bring beneficial ownership into line with the requirements of Ghanaian law and ensure all aspects of their operations are carried out legally.
4. Maintains the prohibition against *saiko* in place in the revision of the 2002 Fisheries Act, ensuring the provisions are clarified to remove any doubt surrounding legality or the level of applicable fine and including the possibility to suspend or withdraw a fishing licence in the case of a first *saiko* offence.
5. Carries out routine inspections of fishing gear and catches of industrial trawlers to ensure they are only targeting species of the type and size dictated by their licence.
6. In the future fisheries act, introduces strict conditions on by-catch, restrictions on the characteristics of fishing gear (mesh size) and an obligation to land all target and non-target catch in either Sekondi or Tema port. Ensures this information is accessible to the public.
7. Conducts a revised scientific assessment to determine the impact of the trawl fleet on both demersal and small pelagic stocks, taking into account legal and illegal catches, and updates recommendations concerning the necessary reduction in fishing effort to achieve maximum sustainable yield (MSY).
8. Adopts all necessary measures, including a reduction in the number of licensed trawlers and fishing days, and implementation of closed seasons, to ensure the fishing effort of the industrial trawl fleet is brought down to sustainable levels.
9. Co-operates with neighbouring countries through the Fisheries Committee for the West Central Gulf of Guinea (FCWC) to ensure full implementation of the 2017 Strategy to Combat Illegal Transshipment at Sea, which requires that trans-shipments of fish in FCWC member states shall only take place in a designated port.

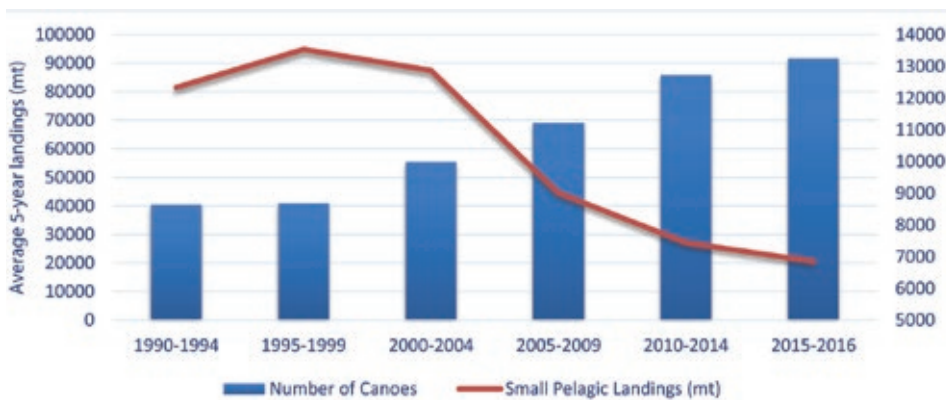
1. Introduction

Ghana's marine fisheries are in steep decline. Decades of over-exploitation by both the artisanal and industrial fleets have pushed the populations of some key species, such as sardinella, to the brink of collapse¹. Other important species, such as sea breams, groupers, snappers and octopus, are considered severely overfished².

The status of small pelagic stocks –the sardinellas, anchovy and mackerel³ –is of particular concern because of their role in food security and livelihood provision. Ghana's artisanal sector employs around 80% of fishers in the country, and provides livelihoods for over two million people, or 10% of the country's population⁴. Around 200 coastal villages rely on fisheries as their primary source of income⁵, with limited alternative sources of livelihood or employment.

Although fishing effort by the artisanal fleet has been increasing, catches of small pelagics fell to 19,608 metric tonnes in 2016, a sharp decline from the peak in reported landings of 138,955 metric tonnes recorded in 1996⁶ (**Figure 1**). Incomes of Ghana's canoe fishers have declined by as much as 40% over the past 10-15 years⁷, with many local fishermen now going to sea and returning with no catch⁸. According to recent assessments, Ghana's small pelagic fishery could collapse within the next three to seven years if there is no change to business as usual⁹.

Figure 1: Landings of small pelagic stocks (sardinellas, anchovy and mackerel) and effort in number of canoes targeting small pelagics from 1990 to 2016



Source: Scientific and Technical Working Group (2018)

1.1. Illegal 'saiko' fishing

A growing concern for fisheries management in Ghana is the negative impact of illegal and indiscriminate fishing practices of the industrial trawl fleet. **Although flagged to Ghana, over 90% of these vessels are linked to Chinese beneficial owners, in spite of national laws prohibiting foreign ownership and control in the sector**¹⁰. Chinese companies operate through Ghanaian 'front' companies to import their vessels and obtain a licence to fish, with opaque arrangements shielding the foreign partner from scrutiny. This lack of transparency has impeded efforts to identify the true beneficiaries of illegal fishing and impose sanctions that provide a strong deterrent¹¹. At the end of 2017, 76 industrial trawlers held licences to fish in Ghana's waters¹².

In recent years, certain forms of illegal fishing have increased in the industrial trawl sector, most notably in the form of 'saiko'. Saiko is the local name for illegal fish trans-shipments, where industrial trawlers transfer frozen fish to specially adapted canoes out at sea. The frozen fish is then landed and sold at market.

Saiko used to be a practice whereby canoes would buy the unwanted by-catch of industrial vessels, contributing to food security in seasons when artisanal catches were low¹³. Over time, the practice has developed into an industry in its own right¹⁴. Industrial trawlers now not only target the demersal species, such as groupers, snappers and octopus, for which they are licensed, but the same fish as the artisanal fishing community¹⁵, leading to conflict.

The *saiko* operators then sell the fish back to fishing communities raising serious questions of equity in Ghana's fisheries sector. Juvenile fish make up a significant proportion of *saiko* landings¹⁶, eroding the reproductive potential of the resource and driving further stock declines.

Saiko is prohibited under Ghana's fisheries laws¹⁷, attracting a fine of between US\$100,000 and US\$2 million¹⁸. The minimum fine increases to US\$1 million where catches involve juvenile fish or the use of prohibited fishing gears¹⁹.

Between March and September 2018, after a two-month closed season for industrial trawlers, the government of Ghana intensified enforcement action against *saiko*²⁰, resulting in at least one high profile arrest²¹. This action led to a notable decline in *saiko* activities at the major *saiko* landing site of Elmina in Ghana's Central Region²². During this period, trawlers were required to land their by-catch at either Sekondi or Tema port: this 'official' by-catch was packed in cardboard and labelled with information on the trawler company that caught the fish, for onward transport to local markets (see **Section 5**). This allowed government fisheries inspectors to monitor this catch, and to check that it did not contain juveniles.

In October 2018, the Minister for Fisheries and Aquaculture Development made a statement to industry representatives²³ that *saiko* trans-shipments at sea between industrial trawlers and canoes could be considered legal provided they are carried out under supervision²⁴. Since this announcement, *saiko* landings have re-commenced at Elmina, with up to 10 or 15 *saiko* canoes landing fish each day²⁵.

While Section 132 of the 2002 Fisheries Act provides that trans-shipment may take place under the "supervision of an

authorized officer", Regulation 33(2) of the 2010 Fisheries Regulations specifically prohibits the trans-shipment of fish at sea from Ghanaian industrial vessels to canoes. A recent legal opinion²⁶ found that since the entry into force of the 2010 Fisheries Regulations, only those forms of trans-shipment that are not expressly prohibited under the Regulations may be considered legal if supervised by an authorised officer. As *saiko* is prohibited in the Regulations, the legal opinion concluded it cannot be authorised.

Indeed, trans-shipments at sea are notoriously difficult to monitor, providing a route for illegally caught fish to enter supply chains, and presenting a risk factor for other forms of trafficking and illicit trade. For this reason, the Fisheries Committee for the West Central Gulf of Guinea (FCWC)²⁷, to which Ghana is a Contracting Party, has agreed that trans-shipments of fish in member states shall only take place in a designated port. This obligation is set out in the FCWC Convention and recently approved "Strategy to Combat Illegal Transshipment at Sea"²⁸.

2. Aim of study

As *saiko* is an illegal and unreported fishing practice, there is limited information on the quantity of fish in the *saiko* trade, the composition of catches, and the implications for sustainable fisheries management. This research aims to provide an overview of the current scale and impact of *saiko*, based on extensive quantitative and qualitative fieldwork in country. The research represents the first comprehensive attempt to estimate the volume and value of fish landed through *saiko*, as a basis to better understand the ecological and socioeconomic implications of the practice.



'Official' by-catch and slabs of *saiko* fish for sale at Elmina market © EJF

3. Methods

3.1. Data collection

Catches of the industrial trawl fleet landed through *saiko* are not captured in official statistics. For this study we relied on multiple methods, using both quantitative and qualitative data to estimate the volume and value of fish in the *saiko* trade.

Observations played a vital role in understanding how *saiko* is being practiced at the landing site. Through observations it was possible to see who is involved in the *saiko* trade, the sizes of the canoes involved, and how the trading of the *saiko* fish takes place.

Quantitative data collection took place in mid-2017. Elmina port, the most important hub for the *saiko* trade, was visited over a one-month period to record the number of *saiko* landings. Data were collected on four days per week (Monday, Wednesday, Thursday and Friday), for a total of 16 days. The number of slabs of fish landed by each *saiko* canoe was counted and additional observations recorded that may have influenced the number of *saiko* landings (e.g. weather patterns, number of industrial trawlers observed from the coast, etc.). The specific dates of data collection are not disclosed here to protect the identity of the individual(s) involved in the field survey.

For the rest of 2017, data collector(s) present in Elmina port recorded broad patterns of *saiko* activity and influencing factors, such as the weather, but did not undertake specific counts of *saiko* canoe numbers or slabs landed. Data collection did not take place in February-March during the two-month closed season for the industrial trawl fleet.

Qualitative data were obtained through open and semi-structured interviews. A total of 70 interviews were

conducted between March and June 2018, building on an initial round of 29 interviews held in April and May 2017. Interviews were held in Apam, Axim, Elmina and Half Assini. Interviewees included fish processors and traders, fisheries officers, fishermen, Chief fishermen, workers on *saiko* boats, *saiko* operators and *saiko* boat owners (see **Table 1** for details). The duration of the interviews ranged from 20 minutes to 2 hours. In addition, two focus groups were conducted in the Western Region of Ghana, involving five participants at Half Assini and eleven participants at New Town.

Interviews with stakeholders in the *saiko* industry and key informants were used, in particular, to triangulate the estimates of *saiko* landings derived through *in situ* monitoring and to extrapolate the landings observed over a one-month period in mid-2017 to obtain an estimate for the year.

This study also makes use of academic literature as well as grey literature.

3.2. Ethics

Saiko is controversial in the locations where it is being practiced and opinions on the issue are divided. Data are limited and individuals with stakes in the practice often wish to maintain the status quo.

To allow respondents to make an informed decision about whether to participate in the study, the aim of the research, namely to create an overview of the *saiko* trade, was made as clear as possible at the outset. Interviews with individuals involved in the *saiko* trade were conducted in perceived 'safe' settings to avoid disclosing the identity of participants. Because of the sensitive nature of this research the names of participants are not disclosed in the report.



Saiko canoe waiting to unload at Elmina port © EJF

Table 1: Details of qualitative data collection

Location	Region	Dates	Details of qualitative data collection
Apam	Central	April 2018	<ul style="list-style-type: none"> • 21 interviews: <ul style="list-style-type: none"> ○ 10 processors ○ 1 processor and canoe owner ○ 1 artisanal canoe owner ○ 4 artisanal fishermen ○ 3 <i>saiko</i> watchmen ○ 2 <i>saiko</i> hustlers
Axim	Western	March - April 2018	<ul style="list-style-type: none"> • 18 interviews: <ul style="list-style-type: none"> ○ 3 processors ○ 2 fishmongers ○ 1 secretary to several artisanal canoes ○ 1 artisanal fisherman ○ 1 Chief fisherman ○ 2 <i>saiko</i> canoe owners ○ 7 <i>saiko</i> crew members ○ 1 <i>saiko</i> watchman
Elmina	Central	<p>April - May 2018</p> <p>May - June 2017</p>	<ul style="list-style-type: none"> • 41 interviews: <ul style="list-style-type: none"> 19 in 2018: <ul style="list-style-type: none"> ○ 3 processors ○ 2 fishmongers ○ 2 fish buyers ○ 1 artisanal canoe owner ○ 1 fisherman ○ 2 <i>saiko</i> owners ○ 2 <i>saiko</i> operators ○ 4 <i>saiko</i> hustlers ○ 2 <i>saiko</i> watchmen 22 in 2017: <ul style="list-style-type: none"> ○ 4 processors ○ 1 fishmonger ○ 2 Chief fishermen ○ 4 fishermen ○ 3 <i>saiko</i> watchmen ○ 2 <i>saiko</i> crew ○ 2 <i>saiko</i> owners ○ 1 <i>saiko</i> operator ○ 3 <i>saiko</i> hustlers or former hustlers
Half Assini	Western	March 2018	<ul style="list-style-type: none"> • 6 interviews: <ul style="list-style-type: none"> ○ 1 fish trader ○ 5 artisanal fishermen • 1 focus group: <ul style="list-style-type: none"> ○ 5 artisanal fishermen active in light fishing
New Town	Western	March 2018	<ul style="list-style-type: none"> • 1 focus group: <ul style="list-style-type: none"> ○ Chief fisherman and his secretary ○ 9 artisanal fishermen
	Central, Western, Greater Accra	2017 and 2018	<ul style="list-style-type: none"> • Regular interviews with employees of the Fisheries Commission, NGOs and other interest groups

Box #1: How does saiko operate – trans-shipments in practiceⁱ

A *saiko* operation begins with the *saiko* operator establishing contact with one or more trawler companies based in Tema. Once this contact is established, the *saiko* canoe owners and crew must be on standby at all times. A call from the Tema office or from a trawler can come at any time, at which point they must get ready for departure:

“I’m waiting now. It can be that the trawler calls in an hour or next week, you don’t know.”

(*Saiko* canoe owner, Elmina)

When the owner or right-hand man receives a call to go out for a trans-shipment, the operation begins. The *saiko* owner or his right-hand man calls on the watchmen to get things ready. The watchmen, usually one for a small *saiko* canoe and two for a bigger canoe, call the crew to prepare for departure. The hustlers and crew gather thick blankets, food and water for the journey, as well as supplies for the trawler crew and captain. A bigger *saiko* canoe needs around 130 blankets made of thick cloth to keep the slabs of fish frozen during transport. The *saiko* canoes do not have cooling facilities but with the cloth they can keep the deep-frozen slabs of fish frozen for multiple days.

Although the practice has changed from solely trading supplies for by-catch, supplies still play a vital role in the trans-shipments. When a *saiko* canoe gets a call that a trans-shipment will take place, there is a list of supplies to bring

to the trawler. The supplies include cans of soft drink, rice, water and even furniture and livestock such as pigs. Because of these supplies the trawlers can stay out longer at sea to fish.

Bringing the right supplies is crucial to maintaining a good relationship with the trawlers: the wrong supplies can result in not being called again for a trans-shipment. To establish relationships with the trawlers, the *saiko* canoes often bring extra supplies to please the captain and crew. The *saiko* operator may also offer the Ghanaian members of the trawler crew extra supplies or money to obtain valuable information about the quality of the fish. With trans-shipments often taking place at night, bad quality fish is usually hidden beneath the good fish. Building a good relationship with the crew may even motivate them to package more high-quality fish in slabs for the next trans-shipment.

When the blankets are on board, the fuel is arranged and the supplies are packed, the *saiko* canoe is ready to leave. The captain receives the coordinates of the location to meet the trawler. The duration of a trip varies greatly, from six to eight-hour trips in the Elmina-Winneba waters, up to multiple day trips at the border of Côte d’Ivoire.

While the *saiko* canoe is at sea, the watchmen prepare for the landing of the fish and are ready to act in case something happens to the canoe. A watchman may be required to go to sea if the *saiko* canoe runs out of petrol or has trouble with the engine. It is essential that such problems are solved quickly to ensure the fish are not spoiled, and to maintain a good relationship with the trawler. Delays can mean the *saiko* canoe not being called again, which can put the owner out of business.



Crew preparing a *saiko* canoe at Elmina port © EJF



Slabs of saiko fish being offloaded at Elmina port © EJF

On arrival at the trawler, one or two *saiko* crewmembers of high rank climb onboard. Once onboard, they check the quality of the fish and strike a deal, usually with the Chinese captain and his right-hand man. Checking the quality of the fish is often a guess because most trans-shipments take place at night and the lower quality fish is generally stored beneath the higher-quality fish in the ship's hold. The *saiko* canoes therefore rely a lot on the Ghanaian members of the trawler crew for information about the quality of the fish in the slabs.

When the fish is of poor quality, the *saiko* canoes generally still buy the fish but in lower quantities. This often depends on their relationship with the trawler and trawler company: not buying the fish after a call from Tema can ruin a relationship and put a canoe out of business. However, this works both ways. If a *saiko* canoe continually receives low value fish it will be hard to make a profit and the *saiko* canoe may decide not to do business with that particular trawler or company anymore.

When a deal is struck the trans-shipment of fish starts. The Ghanaian members of the trawler crew pass the 11 kg slabs of frozen fish to the crew of the *saiko* canoe. While the fish is being transferred, one or two people count the number of slabs. For a medium sized canoe, a full consignment of 2,200 slabs can take three hours to load. Where the trawler has more fish than one canoe can carry, the canoe will call other canoes in Elmina to come and load the remaining fish – a trawler may supply around five canoes at a time.

When the trawler is empty and the canoe packed, both go on their way. The *saiko* canoes from Elmina land the fish at the landing site and the trawlers continue fishing, now having supplies and storage space available again.

When a *saiko* canoe returns before the market opens at around 06:00, or after it is closed at around 18:00, the watchmen stay on the canoe to guard the fish. It is essential to sell the fish as fast as possible, to keep it fresh and prevent spoilage. As soon as the fish deteriorates in quality it becomes harder to sell, leading to more spoilage and less profit or even losses.

Most of the slabs are sold in smaller quantities on the spot to fish traders and small processors. There are also larger buyers who place pre-orders, which can go up to a few thousand slabs. These buyers come with small trucks and retrofitted minibuses ('trotros') from all across the Central and Western Regions, and from inland urban centres such as Kumasi. The fish is packed in cloth and can remain frozen for more than six hours, enough to reach the cold stores around Kumasi.

During the unloading, the watchmen go into the canoe's hold and hand the slabs over to helpers standing on the deck of the canoe who hand them over to hustlers and carry women. The process is watched over by a trusted helper of the canoe owner, or by the canoe owner himself, who counts the number of slabs leaving the canoe and controls to whom they go. The hustlers and carry women then bring the 11 kg slabs to the buyers, or they are handed over to the fish traders and small processors waiting next to the *saiko* canoe. The hustlers carry the fish to the trucks and retrofitted trotros. They are generally not paid by the owners of the *saiko* canoes but rather make their living from taking small amounts of fish from the slabs using a screwdriver. Some buyers prefer to pay the hustlers and forbid them to take off fish from the slabs. The hustlers help to pack the trucks and cars for transport. Purchasers of larger quantities of fish often make use of the same trusted hustlers, as fish can easily go missing in the hectic market.

¹ Källér, R. (2017). Reeling in on by-catch: The *saiko* story. How *saiko* reproduces access to resources and maintains its position in Ghanaian fisheries. MSc Thesis. University of Amsterdam.

4. Results

4.1. Estimate of saiko landings

Saiko landings take place at three locations in Ghana, shown in **Figure 2**. Elmina in the Central Region is the most important landing site for *saiko* landings, followed by Apam, close to Winneba in the Central Region, and Axim in the Western Region. In this Section, the nature and extent of the *saiko* trade at each of the three locations is discussed and a reconstruction of *saiko* landings made.

Figure 2: Map of saiko landing sites



Source: Hen Mpoano (2015)

(a) Elmina

Elmina is home to the biggest *saiko* market. The port currently houses around 60 *saiko* canoes, of which around one-third are 'large' canoes of 55 feet upwards, with a capacity of 2,500 to 4,000 blocks of frozen fish, known as 'slabs' (**Table 2**). A slab weighs around 11 kg²⁹.



Saiko canoes moored at Elmina port © E/JF

Table 2: Saiko canoe distribution

Saiko canoe	Length (feet)	Slabs per trip (number)	Weight of fish (metric tonnes)
Small	40-55	1,500-2,500	16.5 – 27.5
Large	>55	2,500-4,000	27.5 – 44.0

During the one-month period of quantitative data collection in mid-2017, an average *saiko* canoe in Elmina was recorded as landing around 2,400 slabs of fish, equating to 26.4 tonnes of fish in a single landing (Table 3). The highest quantity of fish landed on a single day (by all *saiko* canoes) was 73,000 slabs or 803 tonnes of *saiko* fish. On this day, over 30 canoes were observed landing fish at Elmina of which: 20 large canoes (of > 55 feet) landed 56,000 slabs (616 tonnes) and 12 small canoes (of ≤55 feet) landed 17,000 slabs (187 tonnes) of frozen fish. On an average day, around 16 *saiko* canoes were recorded landing fish at Elmina port during the period of observation.

In general, it was found that larger canoes (>55 feet in length) tended to operate more frequently, often trans-shipping on a contract basis for industrial fishing companies. These larger canoes brought in around 2,863 slabs of *saiko* fish on average, or around 31.5 tonnes of fish per trip. A smaller canoe would bring in 1,940 slabs of fish on average, or around 21.3 tonnes of fish.

During the period of observation, around 8,466 metric tonnes of *saiko* fish were observed being landed at Elmina port. As noted in Section 3.1, this excludes *saiko* landings that took place on Tuesdays, Saturdays and Sundays, which could not be recorded because of logistical constraints.

Extrapolating the recorded landings for the entire month in question, it is estimated that around 9,563 tonnes of fish were landed at Elmina port. This estimate assumes that *saiko* activities took place on 24 days of the month in question, assuming limited to no activity on the traditional non-fishing day of Tuesday³⁰ and two days of inactivity due to unforeseen circumstances. Landings on Saturdays and Sundays were estimated based on the average landings on other days. This is likely to be a conservative estimate, given that multiple respondents confirmed that Saturdays and Sundays tend to be busier than weekdays for *saiko* activity.

Extrapolating the recorded landings for the rest of the year, it is estimated that around 81,700 metric tonnes of *saiko* fish were landed at Elmina port in 2017 (Table 4). This estimate takes into account the two-month closed season for industrial trawlers in February and March 2017, during which no *saiko* activities took place. Taking the monthly figure of 9,563 tonnes (see above calculation) and extrapolating this to a 10-month period would result in an estimate for 2017 of >95,000 tonnes. However, interview data suggested that *saiko* activities fluctuated during the year depending on factors such as market demand, timing of

closed seasons, abundance of small pelagics and seasonality/ weather conditions. The estimate of 81,700 tonnes (approx.) is therefore informed by qualitative interview data on broad patterns of *saiko* activity across the year (Table 5).

Table 3: Characteristics of saiko landings observed at Elmina port during period of data collection in mid-2017

Saiko landings recorded at Elmina port in mid-2017	
Average number of slabs per <i>saiko</i> canoe (number)	2,400
Average weight of fish per <i>saiko</i> canoe (tonnes)	26.4
Average number of <i>saiko</i> canoes active per day (number)	16
Highest number of active <i>saiko</i> canoes recorded in a single day (number)	32
Lowest number of active <i>saiko</i> canoes recorded in a single day (number)	8
Highest recorded weight of fish landed in a single day (tonnes)	803
Lowest recorded weight of fish landed in a single day (tonnes)	299

Table 4: Estimated saiko landings at Elmina port in 2017

Saiko landings at Elmina port extrapolated for 2017	
Estimated number of active <i>saiko</i> days in 2017 (days)	242
Estimated number of <i>saiko</i> slabs landed (number)	7,429,765
Estimated weight of <i>saiko</i> fish landed (kg)	81,727,415
Estimated weight of <i>saiko</i> fish landed (tonnes)	81,727

Table 5: Summary of qualitative observations on saiko landings in 2017 and estimated number of saiko canoes landing

Month	Qualitative observations	Estimated number of saiko canoes landing per day
January*	Saiko canoes very active prior to closed season in February and March.	11 large canoes, 8.5 small canoes
February	Closed season	None
March	Closed season	None
April*	High demand for fish prior to start of rainy season. Period of intense saiko activity.	11 large canoes, 8.5 small canoes
May	Lower season for saiko activity. Period of rain, fish less abundant, rough seas. Blocks of ice lost earlier.	3 large canoes, 2 small canoes
June	Fish less abundant, rough seas. Blocks of ice lost earlier.	3 large canoes, 2 small canoes
July	Bumper season, abundance of fish. Increased catches by trawlers.	11 large canoes, 8.5 small canoes
August	Bumper season, abundance of fish. Increased catches by trawlers.	11 large canoes, 8.5 small canoes
September	Fish less abundant compared to bumper season, although landings remained high.	10 large canoes, 5 small canoes
October	Fish less abundant compared to bumper season, although landings remained high.	10 large canoes, 5 small canoes
November	Fish less abundant compared to bumper season, although landings remained high.	10 large canoes, 5 small canoes
December	More fish available due to seasonal upwelling.	10 large canoes, 5 small canoes

*Qualitative data indicate landings likely to be higher than July; however, July quantities applied here to ensure a conservative estimate.

(b) Apam

Apam is the second most important landing site for saiko activities and is home to around 20 saiko canoes. According to interviews with key informants and individuals involved in the saiko trade, landings take place throughout the year, with between two and ten saiko canoes landing fish every day.

Based on qualitative data, it is estimated that around 19,100 metric tonnes of saiko fish were landed in Apam in 2017. This assumes, conservatively, an average of three saiko canoes landing fish in Apam each day, with bigger canoes landing more frequently than smaller canoes. As for Elmina, the estimate for Apam assumes 24 days of saiko activity per month, excluding the traditional fishing holiday of Tuesday and other factors limiting saiko for an additional two days per month. It also takes into account the temporary suspension of saiko activity during the closed season for industrial trawlers in February and March 2017. Average landings of saiko canoes per trip were assumed to be equivalent to Elmina, at around 2,400 slabs per trip.



Slabs of saiko fish impounded after the arrest of a saiko canoe at Apam
Photo credit: Fisheries Enforcement Unit

Table 6: Estimated saiko landings at Apam in 2017

Estimated saiko landings at Apam	
Average number of slabs per saiko canoe (number)	2400
Average weight of fish per saiko canoe (tonnes)	26.4
Average number of saiko canoes active per day (number)	3
Estimated number of active saiko days in 2017 (number)	242
Estimated number of saiko slabs landed (number)	1,743,126
Estimated weight of saiko fish landed (kg)	19,174,386
Estimated weight of saiko fish landed (tonnes)	19,174

(c) Axim

In Axim, saiko operates on a smaller scale than in Elmina and Apam. Axim is home to three saiko canoes, each with a carrying capacity of around 1,500 slabs of fish. According to interviews with saiko canoe owners and crew, saiko canoes operate from Axim every one to two weeks, trans-shipping between 500 and 1,500 slabs of fish at a time. To reach the estimated landings, an average of 1,000 slabs was assumed for each saiko trip, with between one and two saiko trips assumed to take place every week. As for Elmina and Apam, the estimate also takes into account the two-month closed season for industrial trawlers in February and March 2017. Based on these assumptions, an estimated 759 metric tonnes of fish were landed through saiko at Axim in 2017 (Table 7).

Research also points to Axim being used occasionally as a landing site for canoes coming from Elmina. This is not included in the estimated saiko landings for Axim in Table 7.



Saiko canoe moored at Axim in Western Region © EJF

Table 7: Estimated saiko landings at Axim in 2017

Estimated saiko landings at Axim	
Average number of slabs per saiko canoe (number)	1000
Average weight of fish per saiko canoe (tonnes)	11
Average number of saiko canoes active per day (number)	1
Estimated number of active saiko days in 2017 (number)	69
Estimated number of saiko slabs landed (number)	69,000
Estimated weight of saiko fish landed (kg)	759,000
Estimated weight of saiko fish landed (tonnes)	759

(d) Total saiko landings (all landing sites)

Based on the above calculations, it is estimated that more than 100,000 metric tonnes of fish were landed through saiko in 2017 (Table 8).

According to the Fisheries Commission, the industrial trawl fleet reported official landings to the government of 67,205 metric tonnes of fish in 2017³¹. Combining reported landings with unreported (illegal) saiko landings, total landings by the industrial trawl fleet were approximately 167,000 metric tonnes in 2017, excluding any additional catches discarded by industrial trawlers at sea.

Table 8: Total saiko landings in Ghana in 2017

Landing site	Number of saiko canoes	Number of slabs of fish landed	Saiko landings in 2017 (metric tonnes)
Elmina	60	7,429,765	81,727
Apam	20	1,743,126	19,174
Axim	3	69,000	759
Total	83	9,241,891	101,660

4.2. Estimate of value of the trade

Estimates of the value of fish involved in the *saiko* trade are presented below. The prices of slabs sold at sea and at the point of landing are based on interviews and personal observations at the landing sites. As prices depend on seasonality and composition of fish in the slab, the values are shown as a range. The number of *saiko* slabs landed was estimated in **Section 4.1.** above.

(a) Value of *saiko* fish traded at sea

The value of *saiko* fish traded at sea in 2017 (i.e. the value of fish at the point of trans-shipment) was obtained by multiplying the reconstructed number of *saiko* slabs landed in 2017 in Ghana by the ex-vessel price per slab at sea in Ghanaian Cedis (GHS). These prices were then converted from Ghanaian Cedis (GHS) to US Dollars (USD)³².

Value of *saiko* fish traded at sea (**VS_{sea}**) = No. of *saiko* slabs landed (**TS**) x Ex-vessel price per slab at sea (**PS_{sea}**).

(b) Value of *saiko* fish sold at the landing site

The value of fish landed by *saiko* canoes in 2017 (i.e. the value of fish at the point of first sale at the landing site) was obtained by multiplying the reconstructed number of *saiko* slabs landed in 2017 in Ghana by the ex-canoes price per slab at landing in Ghanaian Cedis (GHS). These prices were then converted from Ghanaian Cedis (GHS) to US Dollars (USD)³³.

Value of *saiko* fish sold at landing site (**VS_{shore}**) = No. of *saiko* slabs landed (**TS**) x Ex-canoes price at landing site (**PS_{shore}**).

The results of the calculations are set out in **Table 9.** The price of a slab of *saiko* fish sold by a trawler to a *saiko* canoe at sea ranges between GHS 20 and GHS 25, resulting in a total value of *saiko* fish sold at sea of between US\$ 40.6 and US\$ 50.7 million in 2017. At the point of landing and sale at the market, the price of a slab of *saiko* fish ranges between GHS 26 and GHS 40, resulting in a total value of between US\$ 52.7 and US\$ 81.1 million in 2017.

It should be noted that the potential value of the *saiko* fish is not always realised by the *saiko* canoe owner due to spoilage either prior to or following trans-shipment (see **Box #1**).

Table 9: Value of *saiko* fish sold at sea and at the landing sites in 2017

Stage	Per slab ⁱ	Total slabs landed in 2017 (millions) ⁱⁱ	Value (GHS millions)	Value (USD millions) ⁱⁱⁱ
Ex-trawlers (price at sea)	20	9.24	184.8	40.6
	25	9.24	231.0	50.7
Ex- <i>saiko</i> canoes (price at landing site/market)	26	9.24	240.3	52.7 ^{iv}
	40	9.24	369.7	81.1 ^{iv}

Notes:

ⁱ Prices of slabs of *saiko* fish are based on interviews and personal observations at landing sites (Apam, Axim and Elmina). It is noted that these are on the lower end of the range of prices encountered during this research to ensure a conservative estimate.

ⁱⁱ See **Section 4.1.** for calculation. Equivalent to 101,660 metric tonnes.

ⁱⁱⁱ GHS to USD exchange rate as at 24 May 2018.

^{iv} Total potential value of *saiko* fish landed – the value may not be fully realised due to spoilage prior to or following trans-shipment.

4.3. Change in the *saiko* trade over time

The scale of the *saiko* trade has grown significantly over the past decade. According to respondents, the past three to four years saw a rapid expansion of the trade, with the highest landings taking place in 2017. The practice has changed significantly since it started out as a barter trade system in the 1980s. The wealth being made by the *saiko* canoe owners has attracted not only those active in the fishing industry, but many outsiders not formerly active in fisheries. The possibility to rent a *saiko* canoe in Elmina has increased the number of people active in the industry, as it has become less capital intensive to establish and run a *saiko* operation.

In 2017, around 60 *saiko* canoes were estimated to be operating out of Elmina port, an almost two-fold increase on the number documented in 2015³⁴. In Apam, the practice took off around ten years ago, with the number of *saiko* canoes increasing from around five canoes a decade ago, to around 20 canoes in operation today.

“10 years ago, the trade in [saiko] slabs took off and it grew a lot since then.” (Fisherman, Apam #1).

In Axim, *saiko* has remained relatively constant throughout the years. According to those interviewed, the same three owners that were operating 15 years ago are still operating today at more or less the same scale. When asked why *saiko* never developed further in Axim, participants responded that *saiko* is capital intensive and that there is no real market in Axim for *saiko* fish. When available, fresh fish is preferred by processors and traders in Axim. Indeed, most *saiko* fish landed in Axim was observed being transported for sale elsewhere.

Over time, larger canoes have become increasingly active in the *saiko* industry, often working on a contract basis with the trawler companies. The trawler companies demand large sums of money as a deposit, out of which the *saiko* transactions are paid. The deals often go through a middleman at the trawler company, who takes a share of the profit.

“Sometimes I go directly, but mostly I am in contact with a Chinese guy working in the office in Tema. They tell me when they come so I don’t order before. This guy gets a percentage of the slabs I buy, around 1 GHS per slab.”
(*Saiko* owner, Elmina #1).

Besides the increase in volumes of fish trans-shipped, the price of slabs bought at sea has also increased due to the high demand for *saiko* fish onshore. The slabs of fish that are sorted and contain large numbers of small pelagic fishes, such as sardinella, are in high demand at the market and are sold for higher prices. According to multiple respondents, the size of fish in *saiko* slabs has declined over the years, and now consists largely of juveniles. Profits have also declined due to the number of canoes in the *saiko* business.

“The fish are smaller in size compared to six years ago. They also used to be cheaper at sea, at around 10-15 GHS. Now we sell them for more on the land but the profit has decreased during the years as now there are more people into saiko. Before, the canoes I work for went once a week but now they go more often. We have good contact with companies now so we can go a lot.”
(*Saiko* watchman, Elmina #1).

According to those in the *saiko* trade, the power balance has shifted gradually towards the trawler companies and larger canoe owners, in part due to competition between *saiko* operators.



Slabs of *saiko* fish containing small pelagics © Hen Mpoano

“The trawlers call each other to discuss a price. It is hard to negotiate – even when the fish is of bad quality you have to take it. It happened that I finally drove the price down and started loading the canoe, but I was told to stop by the China captain as another canoe wanted to pay more. I couldn’t do anything!” (*Saiko* owner, Elmina #4)

4.4. Composition of *saiko* catches

According to multiple respondents active in the *saiko* industry, slabs of *saiko* fish are often made up of high proportions of small pelagics, such as sardinella and mackerel. This was confirmed through observations during this research. According to one processor:

“Buying saiko slabs you can see what is inside...sorted slabs with a lot of Eban [sardinella] are more expensive because people like them more.” (Processor, Elmina #5).

Over the years, *saiko* has changed from a barter trade system in which by-catch was traded informally for supplies out at sea, to a lucrative industry in its own right. This has come with a change in the approach to the practice by the trawlers and *saiko* canoes. Respondents active in the *saiko* industry note that trawlers now target fish specifically to cater for the *saiko* trade. As demand from local markets is highest for slabs of sorted fish, particularly small pelagics, the trade in these slabs is more profitable.

Respondents pointed out that slabs containing mostly small pelagic fish are in high demand and can sell for around GHS 45. At the other end, slabs containing primarily puffer fish are bought from trawlers at the lowest price:

“Slabs with only puffer fish are the cheapest and sell for around GHS 20 only. There are only a few women who process them.” (*Saiko* owner, Elmina #3).

Respondents noted that different fishing companies trans-ship different sorts of fish, and that one can characterize the fishing companies according to the slabs they bring in. According to one *saiko* operator:

“Nasaa brings in mixed fish of which the quality is not as good.”
(*Saiko* owner, Elmina #3).

The study heard how vessels fishing in Côte d’Ivoire bring in large quantities of small pelagic fishes for the *saiko* trade. The slabs are more deeply frozen, contain larger sizes of fishes, and are therefore preferred by the *saiko* operators and buyers. In the words of one *saiko* owner:

“When you come back with deep-frozen Eban [sardinella] from ‘presson’ [Côte d’Ivoire] you will sell all straight away, even when the market is flooded with fish. These fishes you want!”
(*Saiko* owner, Elmina #3).

See **Box #2** for further details.

4.5. Impacts of saiko

(a) Artisanal and semi-industrial fishers

Tensions between ordinary fishers and those involved in the *saiko* trade appear to have intensified in recent years, as trawlers and canoe fishers have come to compete increasingly for the same resources. As one watchman in Elmina noted:

“There is tension between fishers and saiko, who are acting as big men because they earn a lot of money. They also target the same fish now. It used to be different...less trawlers fished where the normal fishers fish. The trawlers [now] destroy everything, normal fishermen don’t catch anything anymore.” (Saiko watchman, Elmina #1)

This was confirmed by multiple respondents interviewed for this study. *Saiko* is viewed as helping trawlers to deplete fish stocks, leaving less fish available and forcing artisanal fishers to make use of illegal and destructive fishing practices such as light, dynamite and carbide.

According to one semi-industrial fisherman at Elmina:

“The saiko is helping the trawlers empty the sea, there is no fish anymore to catch.” (Semi-industrial fisherman, Elmina #1).

Respondents called on government to address *saiko* before attempting to tackle illegal practices within the artisanal and semi-industrial fleets. As stated by one light fisher during a focus group discussion in Half Assini:

“Why should we stop light fishing [an illegal practice] and not catch anything anymore, while the China boats can do what they want”.

Another participant replied:

“We see trawlers meeting up with big saiko canoes here, they help them.” (Focus group discussion, Half Assini).

In Apam some fishers oppose the *saiko* trade because of the negative impact on their catches. However, they find it difficult to discuss the topic with their leaders.

“Of course, we discuss saiko, we discuss all kinds of fishing, it is what we do. It is a bad practice and helping the China boats emptying the sea. But in Apam the saiko is everywhere so you should be careful when discussing it, many people are involved.” (Fisherman, Apam #2).

According to respondents, *saiko* influences the price of fish caught by artisanal fishers. Although the prices of different sources of fish vary depending on availability and catches, in general, frozen *saiko* fish is sold at around GHS 2.8-4.1 per kg, compared to GHS 4.6-5.0 per kg for fresh mackerel and sardinella caught by artisanal canoes and semi-industrial vessels (**Table 10**).

In communities where the trade in *saiko* fish takes place, the large quantity of fish it introduces to the local market depresses prices resulting in less profit for artisanal fishers. According to respondents in Elmina and Apam, *saiko* has a significant impact on the price of small pelagics, which negatively affects fishers that target these species with *ali* (driftnet) and *poli/watsa* (purse seine) gears. Fishers targeting larger pelagic species using hook and line or driftnet techniques are less affected, as prices are not notably influenced by *saiko* landings.

In 2018, during the period of increased enforcement against *saiko* (see **Section 1**), artisanal fishers in Apam and Elmina reported higher economic yields for their fish products compared to the same period in 2017 when *saiko* was fully operational. As a result of limited *saiko* fish on the market, artisanal fishers could sell the same quantity of fish for GHS 500, which in 2017 they would sell for GHS 400. Buyers from the region around Apam also reported buying fish from artisanal fishers in 2018, when previously they would have bought *saiko* fish.

Table 10: Market price of fish of various origins

Origin of fish	Price at the market (GHS/kg)*
Trawlers	
Saiko	2.8 - 4.1
Cartons mixed fish from Tema (official landed by-catch)	5.5 - 6.0
Canoes and semi-industrial	
Fresh mackerel	4.6
Fresh sardinella	4.7-5.0
Imports	
Imported mackerel	6.2-8.0
Imported sardinella	7.5

Notes:

* Approximate prices based on observations and qualitative data collected in Apam, Cape Coast and Elmina (Central Region).

(b) Processors and traders

For fish processors and traders, the availability of *saiko* fish is seen as a way to obtain cheap fish to process and ensure a supply of fish when artisanal catches are low. However, processors generally prefer working with fresh fish as *saiko* fish is often spoiled and results in a lower quality of processed product.

“I also smoke *saiko* fish but it stays fresh less long and has less of a ‘glow’ to it. Smoked [fresh] fish stays fresh better for a longer time; [smoked] *saiko* goes out of date faster. People like the taste [of smoked fresh fish] more as it’s a bit stronger, less fragile.” (Processor, Elmina #1).

Profits derived from processing *saiko* fish are reported to be around three times lower than profits derived from processing fresh fish. Many processors interviewed in Apam reported losses from processing *saiko* fish in 2017. However, because of a lack of fresh fish brought by artisanal fishers, they felt they had no other choice than to buy *saiko* fish.

“Every day last year around this time we were buying 100-150 slabs because there was no fresh fish. Last year we made a GHS 15,000 loss because so much of the *saiko* fish was spoiled.” (Processor, Apam #3).

Processing *saiko* fish is often seen as a gamble with lower returns compared to fresh fish and a higher risk of running a loss after processing. *Saiko* operators hold a lot of power: as fish resources become scarcer, processors report being obliged to buy *saiko* fish to have at least some fish to process.

“Of the *saiko* you have to buy it to be able to buy it from them next time when there is no fresh fish otherwise they don’t give it to you when there is no fresh fish. The *saiko* men hold a lot of power.” (Processor and canoe owner, Apam).

In 2017, when *saiko* was fully operational, respondents reported processing large quantities of *saiko* fish –around 500 slabs a week –as catches from the artisanal fleet were low. In 2018, following strict enforcement of the prohibition against *saiko*, processors were able to purchase more fish from artisanal fishers. According to one processor in Apam:

“I now get Eban (*sardinella*), which wasn’t there last year around this time when *saiko* was still on. I do think the ban is positive and I see more fish being landed now than at the same time last year when *saiko* was in full force.” (Processor, Apam #4).

The same processor went on to state that:

“The ban is really positive. The *saiko* destroys everything. We buy it out of hardship because there is no other fish available.” (Processor, Apam #4).

According to another processor:

“We had to buy – it was *saiko* or no fish, we had to gamble on it. Now they stopped *saiko* there seems to be more fresh fish around.” (Processor, Apam #3).

(c) *Saiko* workers

Individuals active in the *saiko* trade are also aware of its impacts. As one watchman in Elmina noted:

“I have no choice but to work as a watchman. I know *saiko* is bad but there is no fish anymore, the trawlers have been emptying the sea and there is no fish anymore.” (Saiko watchman, Elmina #2)

An argument heard multiple times during the research is that “*saiko* also creates jobs” (Fisherman, Elmina #1). A *saiko* canoe employs around eight crew for a small canoe, up to 13-15 crew for a large canoe. Besides direct crew, a *saiko* canoe usually employs one or two watchmen, depending on the size of the canoe. In addition, a group of hustlers and junior watchmen work at the *saiko* landing sites of Apam and Elmina.

Based on these figures, and assuming 83 *saiko* canoes currently in operation (see **Section 4.1**), it is estimated that *saiko* provides direct employment for a maximum of 1,500 people at three fishing communities (Elmina, Apam and Axim). This is likely to be an over-estimate as it assumes all *saiko* canoes are ‘large’ in size, but provides an indication of an upper threshold of direct employment related to the *saiko* trade.

In 2018, when the prohibition against *saiko* was strictly enforced, a number of the hustlers shifted to working on artisanal vessels. They stated that they preferred *saiko* due to the stable landings, which created more work opportunities and a consistent income. At Elmina and Apam, the decrease in *saiko* activities in 2018 resulted in unemployment. In Axim, crewmembers of *saiko* canoes have turned to other forms of labor such as artisanal fishing or carpentry.



Fishmonger in Central Region © EJF

Box #2:
The saiko trade and Côte d'Ivoire

According to respondents, Ghanaian *saiko* canoes travel to the area around Half-Assini close to the border with Côte d'Ivoire to meet up with industrial vessels fishing in neighbouring waters. Fishers from Half-Assini and New Town would regularly spot *saiko* canoes heading towards the border to meet up with industrial vessels. According to individuals involved in the *saiko* trade, it is usually the larger *saiko* canoes that make this journey. These canoes work on a 'contract basis', registering at industrial fishing companies and paying through a contact person in Tema.

“You can recognize the slab per company. Some people have a really good relationship with one boat or company and do a lot of trans-shipments for them; they make a lot of money. Some are on the payroll of companies and go all the time to the Côte d'Ivoire border.”

(*Saiko* canoe owner, Elmina #2).

Blocks of fish coming from Côte d'Ivoire are viewed as high value *saiko* fish as they often contain sorted small pelagic fishes, such as sardinella. Fish coming from Côte d'Ivoire is commonly known as 'presson fish' and is more deeply frozen: it therefore stays fresh for longer, around four days in a canoe without going bad. The slabs are often sorted and contain larger sizes of fish. *Presson fish* is in high demand and sells out immediately at Elmina, even when the market is flooded with *saiko* fish from elsewhere and prices of other fish are low.

As a result of the higher operational costs associated with a trip to the border area, prices of fish bought from industrial vessels in this area are also lower. A slab of fish that would normally cost around GHS 30 in the waters off Elmina would cost around GHS 22-25 when trans-shipped near the border with Côte d'Ivoire. According to a *saiko* accountant at Elmina, trips to the border take around four days.

5. Discussion

5.1. The magnitude of the illegal saiko trade

This study has estimated that approximately 100,000 metric tonnes of fish were landed through *saiko* in 2017, to a value of between US\$ 40.6 and US\$ 81.1 million. Combined with official landings reported by the industrial trawl fleet of 67,205 metric tonnes³⁵, it is estimated that trawlers caught approximately 167,000 metric tonnes of fish in 2017. This suggests that just 40% of catches were landed legally and reported to the Fisheries Commission in 2017, despite observers being present on a number of vessels³⁶. Additional catches that were subsequently discarded at sea are not reflected in this estimate.

These figures indicate that, up to now, the impact of the industrial trawl fleet on Ghana's marine fisheries resources has been severely underestimated. **Estimated landings of the trawl fleet in 2017 were similar in magnitude to the landings of the entire artisanal sector³⁷ (Figure 3)**, and stand in stark contrast to the figures set out in the 2015-2019 Fisheries Management Plan³⁸ on which current efforts at sustainable management are premised. According to the Management Plan, the industrial trawl fleet reported landings of just 18,500 metric tonnes in 2014, with 107 vessels in operation³⁹. Reconstructed landings for 2017 (official landings plus landings through *saiko*) are nine times the official statistics for 2014, despite fewer vessels in operation (76 licensed vessels at the end of 2017) and a two-month closed season for the trawl fleet⁴⁰.

The Management Plan recommends a reduction in the capacity of the trawl fleet to 48 vessels with a view to achieving a maximum sustainable yield (MSY) of 30,637 metric tonnes. This assumes annual catches per industrial trawler of 638 tonnes; however, based on the estimated landings for 2017, average catches per industrial trawler may be in the region of 2,000 metric tonnes⁴¹. Indeed, a 2014 study of Chinese bottom trawlers operating in West Africa calculated mean catches per vessel of 1,256 tonnes, excluding discards⁴².

Taking 1,250 metric tonnes as a conservative estimate for the trawl fleet in Ghana, around 24-25 trawlers would be required to catch the MSY of 30,637 metric tonnes.

5.2. Inequities in Ghana's marine fisheries sector

The magnitude of the illegal *saiko* trade sheds light on the inequitable distribution of benefit flows from Ghana's marine fisheries resources. According to the findings of this study, the *saiko* industry has expanded rapidly in recent years, at a time of severe declines in the catches of artisanal fishers. In 2017, 60 *saiko* canoes were estimated to be operating out of Elmina port, a two-fold increase on the number documented in 2015⁴³. Multiple respondents confirmed this trend, while citing a shift in power within the industry to the trawler companies and owners of larger/multiple *saiko* canoes.

As a consequence of the *saiko* trade, the profits from Ghana's marine fisheries are now concentrated in the hands of a few powerful interests, to the detriment of tens of thousands of fishers along the coast. In 2017, 80 *saiko* canoes landed approximately 100,000 metric tonnes of fish, equivalent to over 55% of the landings of the entire artisanal sector (see **Figure 3**).

With the capacity to hold 2,400 slabs of fish (26 tonnes approx.), an average *saiko* canoe lands in a single trip the equivalent of around 450 artisanal fishing trips⁴⁴.

According to multiple respondents interviewed, trawlers now target the same fish species as artisanal fishers to supply the *saiko* trade. Slabs of small pelagic fish are highly sought after and fetch the highest prices at the landing site. **With a ready market for *saiko* catches and low risk of sanction, trawlers have an incentive to target the species traditionally caught by artisanal fishers.**

This represents a significant loss to local fishing communities. The employment provided by Ghana's artisanal fishing sector dwarfs the number of individuals employed in the *saiko* trade. It is estimated that the *saiko* industry directly employs up to 1,500 crewmembers, watchmen and hustlers at the three landing sites of Elmina, Apam and Axim (see **Section 4.5**), although this is likely to be an over-estimate.

Based on an estimated 100,000 metric tonnes of fish landed through *saiko* in 2017, this equates to around 1.5 jobs per 100 metric tonnes of fish caught. In comparison, the artisanal sector provides direct employment for over 100,000 artisanal fishers across 292 landing sites in 186 coastal villages⁴⁵.



Artisanal fishing canoes at Cape Coast © EJF

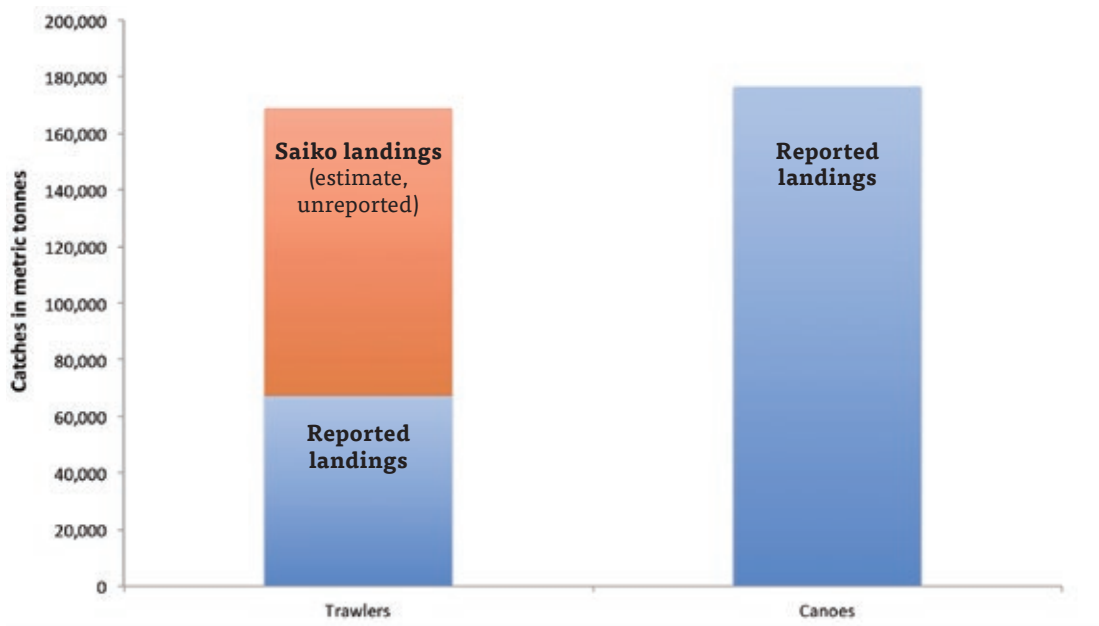


Hook and line fishermen unloading their catch at Elmina port © EJF

Based on 176,578 metric tonnes of fish landed by the artisanal sector in 2017, this equates to direct employment for around 60 fishers per 100 metric tonnes of fish caught— 40 times more than in *saiko* fishing.

The same catches brought by artisanal fishers would see the benefits from Ghana's fisheries distributed widely across the coast. Instead, ***saiko* concentrates profits in the hands of a few individuals who have seen their bargaining power increase over time.** Processors report being obliged to purchase *saiko* fish, despite making a loss due to spoilage, so as not to lose favour with *saiko* owners and to secure a future supply. Overall, communities are becoming poorer, while witnessing the gradual extinction of their resource through indiscriminate fishing by the industrial fleet.

Figure 3: Landings of the industrial trawl and artisanal sectors in 2017



Notes:

- Reported landings for the trawl and artisanal sectors are derived from the annual report of the Fisheries Commission for 2017 (unpublished).
- Estimate of unreported catches for the industrial trawl fleet excludes discards and other unreported catches.
- Artisanal landings do not include unreported catches not captured in official statistics.

5.3. Ecological impacts of the saiko trade

According to respondents in this study, the size of fish in the *saiko* trade has declined over the years. Juveniles now make up a significant proportion of fish in the slabs, which are harvested before they have had an opportunity to reproduce. This is highly concerning for the long-term viability of the resource and undermines all efforts to rebuild stocks through measures such as closed seasons⁴⁶. The first-ever closed season for the artisanal fishing sector took place from May to June 2019.

In a speech in October 2018, the Minister of Fisheries and Aquaculture Development announced to industry that *saiko* transshipments could be considered legal provided they are carried out under the supervision of on-board observers to ensure they do not involve under-sized fish⁴⁷ (see **Section 1**). Soon after this announcement, landings by *saiko* canoes re-commenced at Elmina port after a period of low *saiko* activity due to heightened enforcement. In the months prior to the announcement, trawlers had switched to landing their by-catch at designated ports (the major ports of Sekondi and Tema). This ‘official by-catch’ was recorded in government statistics and packaged in labelled boxes for onward sale to local markets.



Frozen blocks of fish being prepared for trans-shipment from a trawler to a *saiko* canoe © Hen Mpoano

Since mid-2018, EJF has been monitoring landings of by-catch from the industrial trawl fleet, initially in the form of 'official by-catch' sold in boxes at Tema port, and subsequently slabs of *saiko* fish landed at Elmina. Analyses have been carried out on a fortnightly basis to assess species composition and presence of juveniles against length at maturity indices.

Initial results of this monitoring found **that around 63% of pelagics and demersals in the slabs of saiko fish were below the minimum size specified in the 2010 Fisheries Regulations (Figure 4)**, compared to 20% of individuals in by-catch landed at Tema port (Figure 5; see also Table 12).

These findings raise serious doubts as to the capacity of the observer programme to achieve any measure of oversight or sustainability in the *saiko* trade, in contrast to controls on landings at designated ports. Indeed, numerous studies have emphasised the difficulties of monitoring at-sea trans-shipments, in terms of preventing illegally caught fish from entering supply chains, and other forms of illicit trade⁴⁸.

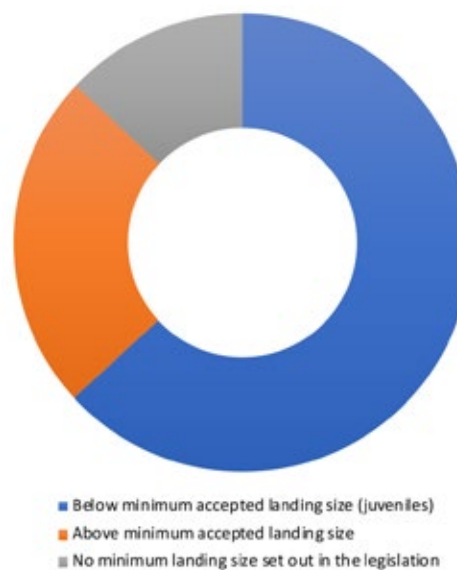
The quantity of juvenile fish in *saiko* landings has crucial implications for a number of Ghana's fish populations. The species *Decapterus punctatus* (Round Scad) and *Caranx rhonchus* (False Scad) together made up around 68% of individuals in the *saiko* slabs analysed (Table 12), of which 77% of individuals were below the minimum size specified in the 2010 Fisheries Regulations. These species are also the target catch of the artisanal fleet⁴⁹.

The demersal species *Pagellus bellottii* (Red Pandora) is also targeted by artisanal fishers using hook and line and set nets, with juveniles comprising 92% of individuals in the *saiko* slabs analysed (Table 12). These fishers compete with industrial trawlers for fishing grounds beyond the Inshore Exclusion Zone (IEZ) reserved for artisanal fishers⁵⁰, for example in shallower areas around rocky outcrops which are sensitive to damage by bottom trawl gear⁵¹.



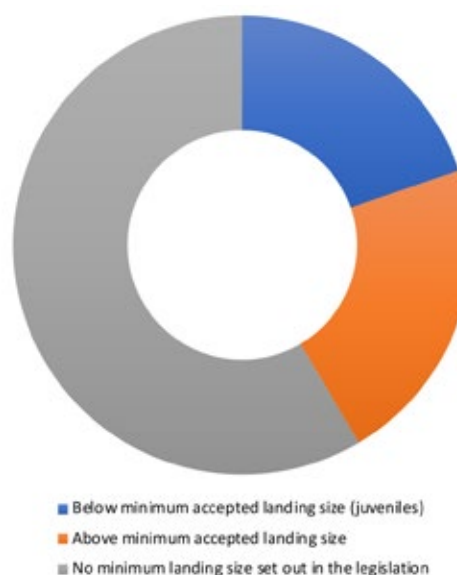
Slab of *saiko* fish analysed in April 2019 of which 45% of individuals were juvenile *Sardinella aurita* © EJF

Figure 4: Overview of length at maturity indices of fish in twelve saiko slabs landed at Elmina port (analysed between October 2018 and April 2019)



Source: EJF (unpublished)

Figure 5: Overview of length at maturity indices of fish in five boxes of by-catch landed by trawlers at Tema port (analysed between July and October 2018)



Source: EJF (unpublished)

Table 12: Preliminary results of analyses of trawler by-catch landed at Tema port (July-October 2018) and saiko landings at Elmina (October 2018-April 2019)

Species	Total individuals	% of total	Number of juveniles	Juveniles as % of total individuals of species
By-catch landed at Tema				
<i>Ariomma bondi</i> (Silver-rag Driftfish)	603	41.4	Not listed in LI 1968	N/A
<i>Decapterus punctatus</i> (Round Scad)	322	22.1	0	0
<i>Brachydeuterus auritus</i> (Bigeye Grunt)	136	9.3	134	98.5
<i>Chromis cadenati</i> (Cadenat's Chromis)	76	5.2	Not listed in LI 1968	N/A
<i>Caranx rhonchus</i> (False Scad)	74	5.1	72	97.3
<i>Pagellus bellottii</i> (Red Pandora)	71	4.9	71	100
<i>Priacanthus arenatus</i> (Atlantic Bigeye)	23	1.6	Not listed in LI 1968	N/A
<i>Scomber colias</i> (Atlantic Chub Mackerel)	23	1.6	23	100
<i>Dactylopterus volitans</i> (Flying Gurnard)	22	1.5	Not listed in LI 1968	N/A
Other*	108	7.4	9	8.3
Total	1458	100	309	21.2
Saiko landings at Elmina				
<i>Caranx rhonchus</i> (False Scad)	2232	43.9	2232	100
<i>Decapterus punctatus</i> (Round Scad)	1203	23.7	163	13.5
<i>Ariomma bondi</i> (Silver-rag Driftfish)	522	10.3	Not listed in LI 1968	N/A
<i>Sardinella aurita</i> (Round Sardinella)	429	8.4	426	99.3
<i>Brachydeuterus auritus</i> (Bigeye Grunt)	252	5.0	195	77.4
<i>Pagellus bellottii</i> (Red Pandora)	185	3.6	171	92.4
<i>Engraulis encrasicolus</i> (European anchovy)	102	2.0	5	4.9
<i>Lagocephalus laevigatus</i> (Smooth Puffer)	71	1.4	Not listed in LI 1968	N/A
Other*	85	1.7	21	24.7
Total	5081	100	3213	63.2

*Species representing less than 1% of total individuals encountered are grouped in the category 'Other'.

Multiple respondents in this study confirmed the prevalence of small pelagics in *saiko* landings. They noted that slabs of sorted small pelagic fish are in high demand and fetch the highest prices on the market (see **Section 4.4**). A recent analysis of *saiko* landings by the University of Cape Coast found that small pelagics make up around 55% of the fish contained in the *saiko* slabs⁵².

Based on an estimate of 100,000 metric tonnes of fish landed through *saiko* activities in 2017, this would suggest that trawlers caught as much as 50,000 metric tonnes of small pelagics in 2017 for the *saiko* trade.

This represents more than twice the reported catches of small pelagics by the artisanal sector, which currently stand at around 20,000 metric tonnes.

The initial results of monitoring by EJF have confirmed the presence of small pelagics in *saiko* landings. Out of twelve slabs of *saiko* fish analysed between end October 2018 and April 2019, eight contained *Sardinella aurita*, accounting for up to 45% of the individuals in the slabs (**Table 13**). Of the individuals recorded, 99% were below the minimum accepted landing size set out in the 2010 Fisheries Regulations.

Table 13: Slabs of *saiko* fish containing *Sardinella aurita* (fortnightly monitoring, October 2018-April 2019)

Slab	Date of analysis	Number of individuals (<i>Sardinella aurita</i>)	% of total individuals in slab	Number below minimum size specified in LI 1968	% of individuals below minimum size
1	5 November 2018	35	11.9	35	100
2	26 November 2018	55	17.6	55	100
3	10 December 2018	80	18.2	77	96
4	24 January 2019	2	0.5	2	100
5	6 February 2019	3	0.7	3	100
6	20 February 2019	18	3.7	18	100
7	21 March 2019	1	0.2	1	100
8	17 April 2019	235	44.5	235	100

Source: EJF (unpublished)

It is clear from these findings that trawlers are having a measurable impact on small pelagic stocks and are likely a key contributing factor to the collapse of the fishery, despite being licensed to fish for demersal species.

Small pelagics reside in the mid-water column, and should not be caught by bottom trawlers using the appropriate size of mesh and fishing gear for the species they are licensed to target. The quantities of small pelagics observed in the *saiko* trade are therefore indicative of pelagics being targeted by trawlers, rather than by-catch. If the collapse of the fishery is to be averted, the activities of the industrial trawl fleet must be addressed as a matter of urgency.

5.4. Socioeconomic impacts of saiko

Over time, *saiko* has evolved into a lucrative and targeted industry in its own right that is no longer limited to the trade in unwanted by-catch but competes directly with artisanal fishers. As the impacts of *saiko* have become increasingly apparent, opinions within fishing communities have shifted against the trade.

Artisanal fishers consider *saiko* to be a major driver of declining catches. They express serious concerns about the destructive activities of trawlers, considering *saiko* as enabling trawlers to fish in an illicit manner, and thereby “empty the sea”. They see *saiko* as a means for trawlers to land their catch unreported, and to stay out at sea for long periods of time. *Saiko* also depresses prices on the market, particularly for small pelagics, resulting in less profit for artisanal fishers.

Failure to put to an end to the *saiko* trade has implications for addressing illegal practices and over-capacity in the artisanal sector. As catches have declined, fishers have turned increasingly to destructive fishing practices, such as the use of dynamite, poisons, and under-sized mesh nets, in an attempt to secure their livelihoods. Fishers say they are struggling to make ends meet, and that government should first address the destructive practices of the trawl fleet before targeting the activities of the canoes.

Until *saiko* is stopped and ambitious measures taken to regulate the trawl fleet, it will be very difficult to secure the buy-in of artisanal fishers to regulate their own activities.

Processors we spoke to also recognize the damage done by *saiko*, but are forced to buy *saiko* fish due to a lack of fish brought by artisanal fishers. Purchasing *saiko* fish was seen to be a gamble owing to high rates of spoilage and lower quality of the processed product, resulting in a risk of lost revenue after processing. Given the choice, processors would prefer to buy fresh fish landed by canoe fishers. They were therefore content to see more fresh fish on the market during the enforcement of the prohibition against *saiko* in 2018.

These findings are consistent with the results of consultations held in Central Region in March and April 2018, which found that fishers, processors and traders were overwhelmingly in support of an end to the illegal *saiko* trade⁵³. In a ten-point communiqué issued following the consultations, the communities called on government to strictly enforce the current prohibition against *saiko* and to ensure *saiko* remains prohibited in any form under the revised fisheries law framework.

6. Conclusions

This study has estimated that approximately 100,000 metric tonnes of fish were landed through *saiko* in 2017. We estimate the value of this fish sold at sea to be between US\$ 40.6 and US\$ 50.7 million, and between US\$ 52.7 and US\$ 81.1 million when sold at the landing site. This represents the first comprehensive attempt to estimate the volume and value of fish in the *saiko* trade, based on extensive quantitative and qualitative research.

The findings of this study highlight the massive scale of the illegal *saiko* trade and its impacts on Ghana’s marine fisheries. *Saiko* serves as a disincentive for trawlers to reduce their by-catch, and rather incentivises the targeting of species that are in high demand for local consumption.

This includes the severely depleted small pelagic stocks that are the key target of the artisanal fleet. *Saiko* landings include significant quantities of juvenile fish, eroding the reproductive potential and long-term viability of the resource. By providing a route for trawlers to sell illegally harvested fish, *saiko* supports and even perpetuates the illegal fishing activities of the industrial trawl fleet, impacting all sections of Ghana’s artisanal fishery.

The scale and composition of catches landed through *saiko* undermines all efforts to rebuild the country’s small pelagic fish stocks through measures such as closed seasons⁵⁴. After much debate⁵⁵, a closed season for the artisanal fishing sector took place from 15 May to 15 June 2019. However, any biological gains from this closed season will be dwarfed by the damage done by *saiko*.

This research suggests that Ghana’s artisanal fishing sector, and the wider Ghanaian economy, is losing tens of millions of dollars each year to *saiko* through the misappropriation of catches, degradation of stocks and depression of prices in the market. **With *saiko* landings valued at more than US\$ 50 million annually, and with much of this benefit accruing to vessels with Chinese beneficial ownership, eliminating the practice should result in at least part of this revenue being captured by the artisanal sector and the economic benefit staying in Ghana.**

Each year, the government supports the artisanal fishing sector with around US\$ 44 million in premix fuel subsidies, a figure set to increase⁵⁶. By allowing *saiko* to continue, the government risks seeing the artisanal sector it is trying to support collapse because of the activities of the foreign-owned trawl fleet.

The *saiko* industry has expanded rapidly in recent years, at a time of severe declines in the catches of artisanal fishers. In 2017, around 80 *saiko* canoes landed the equivalent of over 55% of the landings of the entire artisanal sector. An average *saiko* canoe lands in a single trip the equivalent of around 450 artisanal fishing trips.

Saiko has led to huge inequities in the distribution of benefit flows from Ghana's fisheries and power imbalances in the sector. A handful of interests now profit from the *saiko* trade at the expense of millions living in coastal communities. ***Saiko* allows industrial trawlers to effectively steal the fish from small-scale fishers, before selling it back to local communities at a profit.** The majority of these trawlers are linked to Chinese beneficial owners, in spite of local laws prohibiting foreign ownership and control in the trawl sector.

From the perspective of artisanal fishers, *saiko* is seen as enabling foreign-backed industrial trawlers to engage on a massive scale in destructive fishing practices that are both illegal and unreported. By allowing *saiko* to continue, it becomes ever more challenging to secure the buy-in of artisanal fishers to address their own destructive fishing practices and issues of over-capacity in the canoe sector. And yet, these actions are also critical to saving Ghana's fisheries from collapse⁵⁷.

It is increasingly clear that, up to now, the impact of industrial trawlers on fish populations – both demersal and pelagic – has been severely underestimated. There is an urgent need to eliminate *saiko*, to have any hope of securing sustainable fisheries in Ghana and the livelihoods of fisher folk.

Enforcement must be intensified, and offenders sanctioned with the full force of the law to ensure deterrence. This should include any foreign beneficiaries that are found to be profiting from the trade. More broadly, it is imperative that the fishing effort of the trawl fleet be reduced to sustainable levels, far beyond the targets in the Management Plan which to date remain unfulfilled⁵⁸.

Around 200 coastal villages in Ghana, and over 10% of the population, depend on marine fisheries for their income. Should the resource disappear, mass migration, higher food prices and social upheaval along the coast can be considered a very real prospect.



Artisanal fishing canoes at the landing beach at Cape Coast © EJJ

7. Recommendations

It is recommended that the government of Ghana:

1. Immediately issues a statement to clarify that *saiko* remains illegal under the national fisheries law framework, regardless of whether or not the trans-shipment is carried out under the supervision of an authorised officer.
2. Investigates all suspected cases of *saiko* fishing and, where sufficient evidence exists, ensures cases are prosecuted transparently through the court process and that, at the very least, the minimum fine set out in the law is imposed with respect to the *saiko* canoe and industrial trawl operator.
3. Works with the government of China to identify the beneficial owners of industrial trawlers operating in Ghana, bring beneficial ownership into line with the requirements of Ghanaian law and ensure all aspects of their operations are carried out legally.
4. Maintains the prohibition against *saiko* in place in the revision of the 2002 Fisheries Act, ensuring the provisions are clarified to remove any doubt surrounding legality or the level of applicable fine and including the possibility to suspend or withdraw a fishing licence in the case of a first *saiko* offence.
5. Carries out routine inspections of fishing gear and catches of industrial trawlers to ensure they are only targeting species of the type and size dictated by their licence.
6. In the future fisheries act, introduces strict conditions on by-catch, restrictions on the characteristics of fishing gear (mesh size) and an obligation to land all target and non-target catch in either Sekondi or Tema port. Ensures this information is accessible to the public.
7. Conducts a revised scientific assessment to determine the impact of the trawl fleet on both demersal and small pelagic stocks, taking into account legal and illegal catches, and updates recommendations concerning the necessary reduction in fishing effort to achieve maximum sustainable yield (MSY).
8. Adopts all necessary measures, including a reduction in the number of licensed trawlers and fishing days, and implementation of closed seasons, to ensure the fishing effort of the industrial trawl fleet is brought down to sustainable levels.
9. Co-operates with neighbouring countries through the Fisheries Committee for the West Central Gulf of Guinea (FCWC) to ensure full implementation of the 2017 Strategy to Combat Illegal Transshipment at Sea, which requires that trans-shipments of fish in FCWC member states shall only take place in a designated port.



Saiko canoes landing fish at Elmina port © EJF

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- 39 Ibid.
- 40 Republic of Ghana, Ministry of Fisheries and Aquaculture Development (MoFAD), 'Vessel Registry', accessed 15.12.17. <https://www.mofad.gov.gh/publications/statistics-and-reports/vessel-registry/>. To note that the licence list has not been published online since July 2018.
- 41 Approx. 167,000 metric tonnes caught by 76 vessels (number of licensed vessels at the end of 2017).
- 42 Pauly, D. et al. (2014). China's distant-water fisheries in the 21st century. *Fish and Fisheries*, 15, 474-488. <https://onlinelibrary.wiley.com/doi/abs/10.1111/faf.12032>.
- 43 According to the United Nations Food and Agriculture Organization (FAO), average discard rates for bottom trawlers targeting cephalopods are in the range of 18.5-24.8 percent and in the range of 18.6-20.8 percent for bottom trawlers targeting demersal finfish; Kelleher, K. (2005) Discards in the world's marine fisheries. An update. *FAO Fisheries Technical Paper*. No. 470. Rome, FAO. 2005. 131p.
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- 44 Assuming an average catch per unit effort (CPUE) of 59 kg of fish caught per artisanal fishing trip, based on 176,578 metric tonnes of fish caught by 12,000 canoes fishing 250 days of the year.
- 45 According to the 2016 Ghana Marine Canoe Frame Survey, 107,518 fishers were engaged in the artisanal sector in 2016. Dovlo, E., Amador, K., Nkrumah, B. et al. (2016). *Report on the 2016 Ghana Marine Canoe Frame Survey*. Fisheries Scientific Survey Division of the Fisheries Commission, Ministry of Fisheries and Aquaculture Development. August 2016.
- 46 In February 2019, the Minister of Fisheries and Aquaculture Development announced that the artisanal and inshore fishing sectors would observe a one-month closed season for fishing from 15 May to 15 June, and the trawl fleet later in the year. Kubi, V. (8.2.19), 'Fishing Season Closes May 15', *Daily Guide Network*, accessed 10.2.19.
- 47 Notwithstanding the fact that the prohibition against saiko trans-shipments set out in the 2010 Fisheries Regulations clearly precludes the authorization of saiko in any form, whether or not carried out under supervision (see Section 1). Saiko is in all cases illegal.
- 48 FCWC (2017). *Strategy to Combat Illegal Transshipment at Sea*. December 2017. <https://www.fcwc-fish.org/activities/projects/watf/reports-documents/1519-fcwc-strategy-to-combat-illegal-transshipment-at-sea.html>; Boerder, K., Miller, N.A. and Worm, B. (2018). Global hot spots of transshipments of fish catch at sea. *Science Advances*, Vol. 4, No.7. <http://advances.sciencemag.org/content/4/7/eaat7159>.
- 49 Nunoo F. K. E., Quansah E. E. K., and Ofori-Danson P. K. (2016), Preliminary Studies on Impacts of Ocean Acidification on Diversity of Fish Species Landed By Artisanal and Semi-Industrial Fisheries in Ghana, *International Journal of Marine Science*, 6(27): 1-22 (doi: 10.5376/ijms.2016.06.0027)
- 50 Six nautical miles or 30 metre depth, whichever is furthest.
- 51 Penney, R., Wilson, G. and Rodwell, L. (2017). Managing sino-ghanaian fishery relations: A political ecology approach, *Marine Policy*, 79, 46-53. <https://www.sciencedirect.com/science/article/pii/S0308597X16308132>
- 52 Prof. Denis Aheto, Director of the Centre for Coastal Management of the University of Cape Coast, pers. comm., November 2018.
- 53 Ten consultation sessions covering 15 communities in the Central Region across all 9 coastal districts were held during March and April in 2018. Overall, 464 fishers, processors and traders were engaged in the consultations, of which 273 were fishers, including crew and canoe owners, and 191 were fish processors and traders. The consultation sessions were stratified based on the five operational zones of the Fisheries Commission in the Central Region (Mfantisman, Cape Coast, Elmina, Senya, Winneba). All sessions were held in close proximity to the participating communities, and with the involvement of Fisheries Commission Zonal Officers.
- 54 In February 2019, the Minister of Fisheries and Aquaculture Development announced that the artisanal and inshore fishing sectors would observe a one-month closed season for fishing from 15 May to 15 June, and the trawl fleet later in the year. Kubi, V. (8.2.19), 'Fishing Season Closes May 15', *Daily Guide Network*, accessed 10.2.19.
- 55 Frimpong, E.D. (3.8.18), 'This year's ban on fishing postponed to 2019', *Graphic Online*, accessed 11.2.18.
- 56 According to the Budget Statement and Economic Policy of the Government of Ghana for the 2019 Financial Year.
- 57 Indeed, the Ghana National Canoe Fishermen Council (GNFCF), the representative body of artisanal fishers, has indicated that unless saiko and other forms of illegal fishing are addressed, their members will refuse to comply with the 2019 closed season for fishing.
- 58 The Management Plan sets a target of reducing the fishing days of the industrial trawl fleet by 50% over the first three years of the plan. Measures to implement this 'high priority' strategic action include reducing the number of vessels over the first three years of the Plan, and the implementation of closed seasons for two months annually, increasing to four months by Year 3 of the Plan (2017). However, new trawlers have continued to arrive from China, in spite of a 2012 moratorium on new fishing licences and replacement of old vessels, and it is furthermore unclear that the reduction in licensed vessels – from 107 vessels in 2014 to 76 vessels in 2017 – has led to an effective reduction in total trawling activities. See EJF and Hen Mpoano (2019). *Securing equitable and sustainable fisheries. The case for greater transparency in the management and governance of Ghana's fisheries sector and Akpalu*. W., Eriksen, S.S. and Godwin, K. (2018). *The Fisheries Sector in Ghana: A Political Economy Analysis*. Norwegian Institute of International Affairs. NUPI Report [7/2018].



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