BREAKING THE VICIOUS CIRCLE

How the trade in illegal bycatch from Ghana's industrial trawl fleet is imperilling the sustainability of artisanal fisheries

A report by the Environmental Justice Foundation

ENVIRONMENTAL JUSTICE FOUNDATION

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Protecting People and Planet

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We investigate and expose abuses and support environmental defenders, Indigenous peoples, communities and independent journalists on the frontlines of environmental injustice.
Our campaigns aim to secure peaceful, equitable and sustainable futures.

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Our investigators, researchers, filmmakers and campaigners work with grassroots partners and environmental defenders across the globe.

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Executive summary

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Populations of small pelagic fish traditionally harvested by artisanal fishers in Ghanaian waters are severely overfished and in a state of collapse. The alarming state of Ghana's small pelagic fisheries results in part from persistent illegal, unreported and unregulated (IUU) fishing by the industrial trawl fleet, most of which is owned or controlled by foreign actors based in the People's Republic of China. The use of illegal fishing gear by trawlers results in large volumes of bycatch, known locally as *logo* fish — juvenile and undersized fish, including small pelagic fish like sardinella and chub mackerel, and species of little to no commercial value, which are either discarded or sold to coastal communities for profit.

As Ghana is ramping up efforts to tackle IUU fishing, notably through the adoption of a new fisheries law, this report takes stock of the current fishing practices of the industrial trawl fleet and evaluates the effectiveness and efficacy of the measures recently adopted by the Ghanaian government — including a crackdown on illegal trans-shipments, the adoption of a directive requiring trawlers to use more selective nets, and more severe sanctions. The report also assesses the socio-economic impacts on artisanal fishing communities of the persistent targeting of small pelagic fish by the trawl fleet for the *logo* fish trade.

The measures taken by the Ghanaian government appear to have had positive effects. *Saiko* trans-shipments have virtually come to a halt, the average size of small pelagic fish caught by trawlers appears to have increased, and illegal discards appear to have decreased.

However, these commendable measures did not put an end to the illegal bycatch, dumping, and landing of undersized small pelagic fish by the industrial trawl fleet. Persistent demand for *logo* fish in artisanal fishing communities with a history of *saiko*, coupled with the inadequate design and enforcement of bycatch regulations, is providing a lasting economic incentive for industrial trawlers to continue harvesting small pelagic fish. Operators of the industrial trawl fleet have incorporated the trade in bycatch into their business model to maximise profit, routinely flouting regulations by using illegally modified nets to target and profit from the sale of small pelagic fish.

The systematic harvesting of small pelagic fish by the industrial trawl fleet is posing a critical threat to a collapsing fishery, to the detriment of artisanal fishing communities. Trawlers directly compete with artisanal fishers for dwindling fish stocks, depriving them of their traditional source of subsistence and livelihood. Declining catches are making fishing increasingly precarious for artisanal fishers, and have diminished local supply in fresh fish, pushing prices to an unprecedented high and further squeezing margins for artisanal fish processors and fishmongers. Meanwhile, the *logo* fish trade is diverting capital away from local fishers, further exacerbating inequalities and reinforcing dynamics of exclusion both within and between coastal communities.

Urgent action is needed to break this vicious circle and ensure a more sustainable and equitable future for Ghana's fisheries.

Key findings

- 70% of interviewed crew members indicated that industrial trawlers are fishing with a modified net. A rope is threaded through the codend mesh to prevent the escape of small pelagic fish and maximise bycatch. 92% of crew members stated that modified nets increase the bycatch of undersized fish.

- Anecdotal evidence suggests that illegal discards have decreased in recent years, but they remain common practice: 86% of crew members admitted to dumping fish. The total discards of the industrial trawl fleet are estimated conservatively at between 4,264 and 7,216 tonnes of fish per year, equivalent to 7.4–12% of the reconstructed catch.

- Illegal *saiko* trans-shipments have all but stopped, but a limited number of trans-shipments took place in late 2024 and early 2025, with *saiko* landings reported in Apam and Elmina. In some cases, a modest amount of fish was trans-shipped to compensate artisanal fishers for damage caused to their net by a trawler.

- Based on crew testimony, it is estimated that between 53% and 60.5% of all fish landed by trawlers are bycatch, which far exceeds the 15% bycatch allowance formerly authorised by the Ghanaian government.

- EJF analysed the content of bycatch slabs produced by trawlers. 69% of specimens belonging to regulated species were under the minimum legal landing size. This proportion reached 96% for chub mackerel, and 97% for round sardinella. 43% of all specimens contained in the slabs belonged to unregulated species. 69 out of a total of 84 identified species are unregulated.

- There has been a statistically significant increase in the size of landings for certain small pelagic species since the adoption in 2022 of a ministerial directive requiring more selective nets. On average, the size of round sardinella increased by 5.2 cm, the size of chub mackerel increased by 3.4 cm, and the size of Atlantic bumper increased by 4.2 cm. However, despite the increase in size, round sardinella and chub mackerel remained overwhelmingly under the minimum legal landing size.

- 94% of interviewed artisanal fishers reported a decrease in catch volume in recent years, and 83% reported a decrease in the average size of fish caught. 87% of fishers declared that their income had declined in recent years, and 67% reported that their financial situation had deteriorated.

- Trade in *logo* fish is still ongoing, driven by demand from coastal communities formerly involved in the *saiko* trade. Frozen fish slabs landed by industrial trawlers in the port of Tema are sold and transported by vans to Apam and Elmina. In these communities, 50% of interviewed fish processors, and 36% of fishmongers, declared that they were mainly or exclusively sourcing their fish directly from the vans.

- Respondents reported that the price of fish had increased dramatically. 88% of artisanal processors and fishmongers declared that their income had declined in recent years, and 76% reported that their financial situation had deteriorated.

Introduction

Populations of small pelagic fish traditionally harvested by artisanal fishers in Ghanaian waters are severely overfished and in a state of collapse.[1] The alarming state of Ghana's small pelagic fisheries results in part from persistent illegal, unreported and unregulated (IUU) fishing by the industrial trawl fleet, most of which is owned or controlled by foreign actors based in the People's Republic of China.[2] The use of illegal fishing gear by trawlers results in large volumes of bycatch, known locally as *logo* fish — juvenile and undersized fish, including small pelagic fish like sardinella and chub mackerel, and species of little to no commercial value, which are either discarded or sold to coastal communities for profit.[3] Despite meaningful steps taken by the Ghanaian authorities to tackle these challenges, progress remains insufficient and urgent action is needed to restore Ghana's fish populations and safeguard the livelihoods of the people who depend on them.

Until recent years, trade in *logo* fish was taking place at sea through the trans-shipment of frozen fish slabs from trawlers to specially adapted canoes, an illegal practice known as *saiko* and estimated to be worth between US$50 and 80 million in 2017.[4] As much as 60% of the industrial trawl catch is believed to have been traded through *saiko*, remaining unreported while fueling the overexploitation of small pelagic fish populations on which artisanal fishing communities depend for subsistence and livelihoods.[5]

Following a 2021 decision by the European Commission to notify Ghana of the possibility of being identified as a non-cooperative country in the fight against IUU fishing,[6] the government of Ghana took decisive action to tackle illegal trans-shipments. In line with previous commitments made at the highest level of government,[7] the Ministry of Fisheries and Aquaculture (MoFA/MoFAD) announced a crackdown on *saiko*.[8] On the occasion of the 2021 closed season, the Ghana Industrial Trawlers Association gave assurances that '*saiko* ha[d] stopped',[9] and intelligence collected by EJF confirms that illegal trans-shipments all but came to a halt in 2021–2022.[10]

However, rather than putting an end to the illegal bycatch of undersized small pelagic fish, the crackdown on *saiko* led to a transformation of the *logo* fish trade, with trawlers directly landing bycatch at the port of Tema to be sold back to coastal communities.[11] In an effort to address unsustainable levels of bycatch and the continuing overexploitation of small pelagic fish populations, and in line with the recommendations of a 2019 technical audit,[12] MoFA adopted a directive (the Gear Directive) requiring trawlers to install nets in compliance with technical specifications designed to increase selectivity (10-m maximum vertical opening, 60-mm minimum mesh size and ban on braided twines for the codend, prohibition of modifications reducing gear selectivity).[13] MoFA also revoked a 2015 15% bycatch allowance abused by trawlers to justify the landing of undersized fish.[14] Inspections were carried out to ensure compliance with the Gear Directive and vessels that failed to comply were grounded.[15]

In January 2025, the newly elected Ghanaian government issued a firm commitment to tackle IUU fishing.[16] In April, it ordered a 12-month suspension of the fishing licence of four trawlers repeatedly found in violation of fisheries laws and regulations prohibiting the bycatch, dumping, and trans-shipment of undersized fish[17] — a move that marks a commendable escalation of sanctions from the low-level fines usually imposed on offenders.[18]

In August 2025, Ghana adopted a new fisheries law, with provisions designed to protect and restore small-scale fisheries and strengthen the fight against IUU fishing.[19] The new law notably provides for an extension of the inshore exclusion zone (IEZ) banning industrial trawling from the entirety of Ghana's territorial sea (12 NM).[20]

As Ghana is ramping up efforts to tackle IUU fishing, this report takes stock of the current fishing practices of the industrial trawl fleet — with a focus on the use of illegal fishing gear and the illegal bycatch, discarding, trans-shipment, and landing of undersized small pelagic fish — and evaluates the effectiveness and efficacy of the measures recently adopted by the Ghanaian government. The report also assesses the socio-economic impacts on artisanal fishing communities of the persistent harvesting of small pelagic fish by the trawl fleet for the *logo* fish trade.

Methods

The findings of this report are informed by a combination of semi-structured stakeholder interviews, analyses of fish slabs produced by trawlers, and desk-based research.

To assess the prevalence of the use of illegal fishing gear and trans-shipments, and quantify bycatch and discards by the industrial trawl fleet, EJF interviewed crew employed on board trawlers (n = 58), representing 47% of the vessels and 61% of the companies licensed to trawl in 2024–2025. Where respondents granted permission for the interview to be filmed, care was taken to ensure their identity was strictly protected. Supporting evidence (photos and videos) was collected where possible to corroborate claims made by interviewees.

To determine the size and species composition of bycatch caught by the industrial trawl fleet, EJF analysed frozen fish slabs produced by trawlers between September 2019 and March 2025 (n = 69), including slabs landed by trawlers at the port of Tema, and slabs landed by *saiko* canoes in coastal communities. The sample represents at least 56% of fishing companies licensed to operate trawlers during that period.[21] Each individual fish (n = 19,004) was identified to the species level, measured (standard length, fork length, and total length), and weighed. Differences in mean landing size between years were tested using an analysis of variance (ANOVA) followed by a Tukey test of honestly significant difference.

Finally, to assess socio-economic impacts on coastal communities, and document the evolution of the *saiko* industry and *logo* fish trade, EJF interviewed artisanal fishers (n = 54) as well as artisanal fish processors and fishmongers (n = 33) in Apam, Elmina, and Sekondi.

Responses to surveys were collected using the KoboCollect application. All datasets were analysed in R Studio.

1. Systematic harvesting of illegal bycatch by industrial trawlers

Ghanaian-flagged industrial trawlers persistently engage in a range of IUU fishing practices, including the use of unauthorised fishing gear, and the bycatch, discarding, trans-shipment, and landing of undersized fish, which all constitute offences under Ghanaian law (**Box 1**).

Industrial trawlers docked at the port of Tema (source: Shandong Zhonglu Oceanic Fisheries Co. Ltd).

Box 1: IUU fishing offences under Ghanaian law

Use of illegal fishing gear

Trawlers are required to operate a net with a minimum mesh size of no less than 60 mm in stretched diagonal length in the codend.[22] The use of topside chafers, and arguably of any device having the effect of obstructing the mesh, is prohibited.[23] More generally, trawlers are required to 'avoid' any device or construction that reduces gear selectivity.[24] However, modifications to the underside of the codend are permissible 'for the purpose of preventing wear and tear'.[25]

As a condition attached to industrial fishing licences, trawlers are prohibited from engaging in midwater trawling[26] (and, arguably, from keeping on board midwater trawl nets).

The possession of prohibited fishing gear constitutes an offence punishable by a fine of no less than US$5,000 and no more than US$500,000.[27] The use of prohibited or non-compliant fishing gear also constitutes IUU fishing, a distinct offence punishable by a fine of no less than US$200,000 and no more than US$1 million,[28] and the possible suspension or withdrawal of the fishing licence in case of repeated offences.[29] Illegal gear may be seized and forfeited upon conviction.[30]

Bycatch of juvenile and undersized fish

As a general rule, juvenile fish caught as bycatch must be released immediately to their natural habitat or environment in a manner that causes them no harm.[31] The intentional catch and taking on board of juvenile fish constitutes an offence punishable by a fine of no less than US$200,000 and no more than US$1 million.[32] The taking on board of undersized fish (irrespective of maturity) also constitutes the distinct offence of IUU fishing.[33] The minimum sizes for a limited number of fish species are specified in the regulations.[34] Illegal bycatch may be seized and forfeited upon conviction.[35]

Dumping of fish

The dumping of any fish suitable for human consumption constitutes an offence punishable by a maximum fine of 500 penalty units[36] (GH₵6,000,[37] or about US$480).

Unauthorised trans-shipment

As a general rule, industrial vessels are required to land their catch in designated ports.[38] The trans-shipment of fish at sea is generally prohibited[39] but may exceptionally be authorised by the Fisheries Commission.[40] Unauthorised trans-shipment constitutes an offence punishable by a fine of no less than US$100,000 and no more than US$2 million.[41] The trans-shipment from an industrial vessel to a canoe is specifically prohibited,[42] as is the trans-shipment of undersized fish, which constitutes the distinct offence of IUU fishing.[43]

Landing of undersized fish

The landing of undersized fish is prohibited[44] and constitutes the offence of IUU fishing.[45] The minimum landing sizes for 24 commercially important species, including small pelagic fish like round and flat sardinella (*Sardinella aurita* and *S. maderensis*) and chub mackerel (*Scomber colias*), are specified in the regulations.[46] Other species are unregulated. Undersized catch may be seized and forfeited upon conviction.[47]

1.1 Use of illegal fishing gear

Testimony by crew employed on board industrial trawlers points to the widespread use of illegally modified gear by trawlers. While all trawlers installed a new net meeting the specifications of the Gear Directive, 70% of respondents indicated that the vessels they were working on had subsequently modified the net (**Figure 1**). The most common form of modification described by crew is the use of a rope or several ropes threaded through the codend mesh at regular intervals to tighten it. Several respondents explained that this alteration is done with the specific intent to prevent the escape of small fish and maximise bycatch. The rope is easily removed and hidden before coming back to port to deceive inspectors.

'The eyes of the nets are bigger so when we lift it after we have caught the fish, the majority of the fish escape. So, now, we use ropes to tie the net [...]. We cut the ropes in three-yard pieces and we arrange them from the bottom to the opening. [...] So they are not able to escape when we tie it like that [...].'

Crew member, industrial trawler

'The reason why we put the rope, is to make the eyes of the net close to catch the smallest fish we need. [...] We catch every fish, even those born today we can catch by putting the rope.'

Crew member, industrial trawler

Several respondents also claimed that some fishing companies had kept and were occasionally still using old nets that do not comply with the Gear Directive, including midwater trawl nets. Information obtained by EJF suggests that a vessel may have recently been using a midwater trawl net rigged to ground gear in order to trawl with a very large vertical opening and catch both demersal and pelagic fish.

A number of respondents also stated that nets were modified to prevent wear and tear, which is legal under Ghanaian law (see **Box 1**). However, it would seem that some of the modifications made to that end also have the effect of preventing the escape of small fish from the codend. The 2019 gear audit found that 'protective coverings of the codend are also made of stiff braided polyethylene twine with some having mesh sizes smaller than or equal to those in the codend itself'.[48] It would seem that provisions allowing the protective modification of nets are abused to maximise bycatch.

Despite clear prohibitions under Ghanaian law, records of infractions and sanctions obtained by EJF show that cases involving the use of illegal nets have rarely been reported and prosecuted in recent years. Charges are instead often brought for the dumping of fish,[49] which carries a much lower penalty (see **Box 1**). This may be for reasons of prosecutorial expediency, as the use of illegally modified nets is harder to prove.

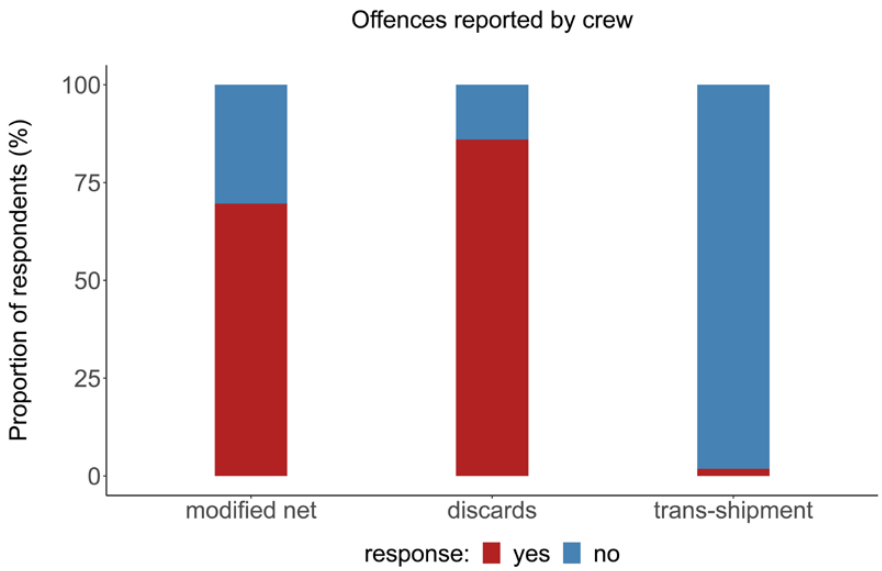


Figure 1: Proportion of interviewed crew members who reported having witnessed IUU fishing offences by industrial trawlers in 2024–2025.

1.2 Bycatch of undersized fish

The frequent rigging of nets with devices designed to tighten the codend mesh results in substantial volumes of bycatch of small pelagic fish, including juvenile and undersized fish. 92% of respondents stated that modified nets increased the bycatch of small fish. When asked to estimate the typical proportion of bycatch in any given haul, half of respondents indicated a bycatch ratio of at least 50% (median value) (**Figure 2**). The estimated bycatch ratio based on crew testimony is 52.7–61.3% of the total catch (95% confidence interval), slightly higher than the 46% bycatch ratio estimated based on observer reports in a 2020 study.[50] While the estimates provided by crew are unlikely to be precisely accurate, at the minimum they show a clear consensus that bycatch ratios are very high, far exceeding the 15% bycatch allowance formerly authorised by the government — and at levels clearly incompatible with the sustainable exploitation of fish stocks that are already in a state of collapse.

Respondents explained that bycatch is an integral part of the business model for many fishing companies. While small pelagic fish have a lower commercial value compared to high-grade demersal species, they remain in high demand in some artisanal fishing communities and there is 'good money' to be made in the *logo* fish trade. As trawlers do not have enough time in a 30-day fishing trip to fill their holds with high-grade demersal fish, increasing bycatch is an economic strategy designed to maximise profit efficiency. According to respondents, revenue from the sale of bycatch is sufficiently high to cover the vessels' operating costs.

> ***'The logo fish is now very lucrative. One box of logo fish is now selling at almost 500 cedis. So the captain, when he gets logo fish, he is able to fill the cargo with it, to make up his tonnage. Because now there are no more fish in the sea like in the past, he prefers more of the logo fish.'***
>
> Crew member, industrial trawler

An analysis of fish slabs produced by trawlers suggests that the average size of small pelagic fish caught as bycatch may have increased since the entry into force of the Gear Directive, although most fish still remain under the minimum landing size (see **Section 1.5**).

The fact that bottom trawlers are able to catch large quantities of small pelagics is in and of itself a cause for concern, irrespective of size or maturity. While the observed bycatch of small pelagic species can be explained in significant part by illegal fishing practices such as the use of midwater trawl nets or of nets with an increased vertical opening, and fishing in shallow waters inside the Inshore Exclusion Zone reserved for artisanal fishers,[51] it is not evident that compliance with existing regulations would be sufficient to prevent the bycatch of small pelagics. In particular, there is reason to question whether the maximum vertical opening of 10 m authorised by the Gear Directive is appropriate.

Crew sorting bycatch of small pelagic fish on board industrial trawlers. © EJF

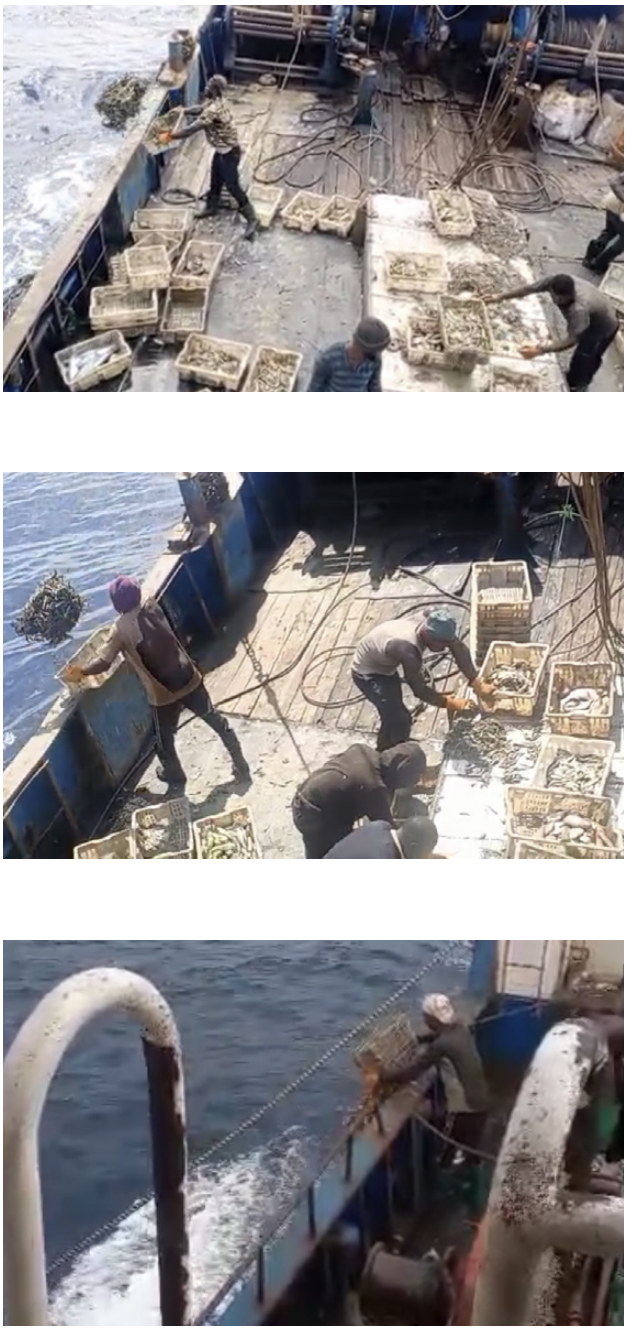
1.3 Discards

According to crew testimony, the discarding of bycatch remains common practice in Ghana's industrial trawl fleet. 86% of respondents stated that trawlers were dumping fish (**Figure 1**), a claim supported by video evidence. Only the smallest, lower-grade fish are discarded, while larger fish are kept and processed for landing.

When asked to estimate the volume of discards, respondents who admitted to dumping fish provided values ranging from 9 to 140 baskets/day (**Figure 2**). The estimated discards volume based on crew testimony is 26–44 baskets/day (95% confidence interval). This estimate is quite imprecise but generally consistent with information obtained from government sources.

Assuming a constant discard rate of between 26 and 44 baskets per vessel per day across the whole fleet, a weight of about 20 kg for a full basket of fresh fish,[52] 25 fishing days per trip,[53] 8 fishing trips per vessel per year,[54] and 41 vessels licensed to fish per year,[55] it is possible to estimate the total yearly volume of discards for the industrial trawl fleet at between 4,264 and 7,216 tonnes of fish. This imprecise but conservative estimate would represent between 8% and 13.6% of the fleet's reported total yearly landings,[56] or 7.4–12% of the reconstructed catch[57] (see **Figure 2**).

While large quantities of undersized fish are still routinely and illegally dumped by the trawl fleet, anecdotal evidence suggests that discards volumes may have decreased in recent years. A number of crew members stated that they were dumping less now than in the past, with a greater proportion of the catch being instead boxed for landing. This was corroborated by testimony from artisanal fishers: 61% of respondents stated that visible evidence of discards (like dead fish floating at the surface) was observed less frequently in recent years.



Crew of industrial trawlers illegally dumping fish. © EJF

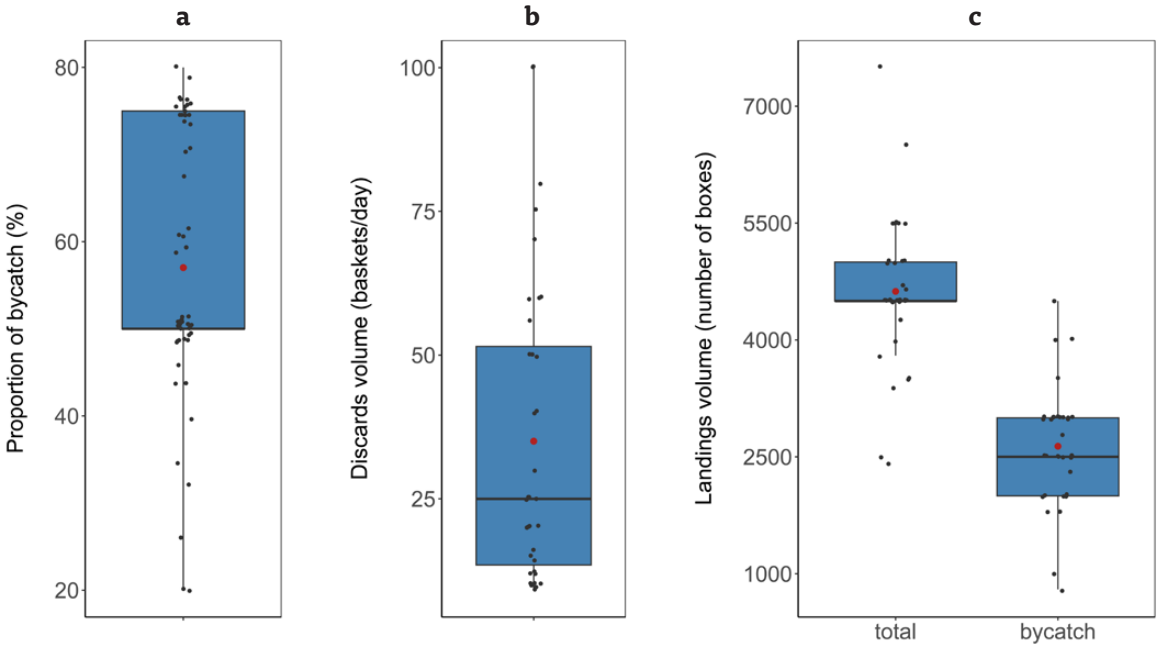


Figure 2: Proportion of bycatch in a typical haul (**a**), volume of fish dumped (**b**), and volume of fish landed (for both total landings and bycatch landings) (**c**), estimated by interviewed crew members. Units for discards volume were harmonised assuming 1 basket = 2 pans, and taking into account the reported number of hauls per day. The red dot represents the mean. Jitter was added to better visualise individual data points. Evident outliers were removed.

Industrial trawler fishing in Ghanaian waters.

Suspected *saiko* trans-shipment captured by EJF in 2019.

1.4 Unauthorised trans-shipments

Crew members and respondents from artisanal fishing communities unanimously stated that *saiko* trans-shipments and landings had all but stopped (**Figure 1**). However, crew and artisanal fishers' testimony, corroborated by intelligence collected by EJF, indicates that a limited number of trans-shipments took place in late 2024 and early 2025. The recent sanctioning of four trawlers (LONG XIANG 607 and 608, FLORENCE 2, and MENG XIN 10) for 'multiple illegal fishing practices, including unauthorised transshipments',[58] is evidence that trans-shipments have not entirely come to a halt. Information obtained by EJF indicates that trans-shipments have recently been occurring in two different sets of circumstances.

In the first instance, a trawler with large volumes of bycatch contacts a canoe to organise a transfer. Slabs of frozen fish are then sold and transferred to the canoe, in typical *saiko* fashion. However, the volumes involved appear to be much lower than in the past (around 20–50 slabs per operation), reportedly to avoid attracting attention at landing sites (see **Section 2.2**).

In the second instance, slabs of frozen fish are transferred to an artisanal fishing canoe as compensation for a damaged net. When a trawler causes damage to an artisanal fishing net (which constitutes an offence under Ghanaian law[59]), the fishers are typically invited to file a complaint with the company office in Tema. However, many fishers are reluctant to undertake a costly journey to Tema with no short-term guarantee of payment, and demand immediate compensation instead. Negotiations result in a limited number of slabs (around 15–20) being offered as compensation for the damaged net.[60] Multiple such incidents have been reported, and at least one case involving fishers from the Ekumfi district was corroborated by EJF investigators. Such operations are reportedly carried out with the sanction of government observers posted on board trawlers.

EJF gathered testimony suggesting that trans-shipments may also have occurred as a means for trawlers to get rid of large stingrays – valuable but apparently prohibited bycatch. Such accounts could not be confirmed.

1.5 Landing of undersized fish

While unwanted bycatch — typically the smallest and lower-grade fish — is illegally discarded at sea, a substantial fraction of small pelagics caught by trawlers is kept on board and processed for landing. According to crew testimony, the majority of boxes of fish landed by trawlers consist of *logo* fish. Trawlers with a typical cargo capacity of 4,500 boxes reportedly land around 2,500 boxes of *logo* fish per trip (**Figure 2**), with bycatch representing an estimated proportion of 53–60.5% of landings (95% confidence interval). The landing of *logo* fish is confirmed by records available in trade databases.[61]

The catch and landing of *logo* fish is not illegal in and of itself, provided that the fish are above the minimum landing size stipulated in the regulations (**Box 2**). However, EJF's analysis of 69 fish slabs produced by trawlers between 2019 and 2025 shows that trawlers routinely and persistently land undersized fish, in violation of the regulations.

Box 2: Logo fish and the definition of bycatch in Ghanaian law

In Ghana, the term '*logo* fish' is used generally to refer to bycatch of low to medium commercial value, mostly juvenile and undersized fish including small pelagic fish. After each haul, fish are sorted by quality grade, and the smallest, lower-grade fish are often discarded. *Logo* fish — the fraction of the bycatch deemed of sufficient value to warrant keeping on board — are frozen in slabs, and packaged in boxes for landing, each box containing two slabs of unsorted fish from a mix of species.

Under Ghanaian law, since industrial fishing licences are granted generally for the exploitation of all fish stocks without reference to particular target species (except for tuna vessels), bycatch is defined based on the size of the fish and not based on the concept of non-target species. Accordingly, only the catch and landing of undersized fish are prohibited, not the catch and landing of particular species (see **Box 1**).

It is therefore legal for bottom trawlers to land large volumes of small pelagic fish, provided that the fish are above the minimum landing size. The stipulation on the licence document that vessels should not use midwater trawl nets does not prohibit the catch and landing of pelagic fish.

This is a major loophole that incentivises trawlers to keep targeting small pelagic fish, precipitating the collapse of this fishery.

EJF's analysis of fish slabs produced by trawlers found that 69% of the fish contained in the slabs and belonging to regulated species were under the minimum landing size prescribed by the regulations. This figure masks very strong differences between species (**Table 1**), including between small pelagic species: for example, while only 7% of round scad (*Decapterus punctatus*) were undersized, 96% of chub mackerel (*Scomber colias*), and 97% of round sardinella (*Sardinella aurita*) were under the minimum landing size. These findings are generally consistent with those of the biological monitoring carried out by the Fisheries Commission in 2023, which found that only 1% of round scad landed by trawlers were immature, while virtually all round sardinella were immature and under the minimum landing size.[62]

Table 1: Proportion of undersized fish in slabs produced by industrial trawlers between 2019 and 2025, by species. Unregulated species and regulated species not found in the sample are not included (sources: type determined from the FishBase database;[63] minimum landing sizes from the Fisheries Regulation 2010, Schedule, Table 1).

species	type	minimum landing size (cm)	proportion of undersized fish
Brachydeuterus auritus	benthopelagic	14	0.82
Caranx rhonchus	pelagic	21	1
Chloroscombrus chrysurus	pelagic	10	0.16
Decapterus punctatus	benthopelagic	10	0.07
Dentex canariensis	demersal	22	1
Lutjanus fulgens	demersal	16	0.99
Pagellus bellottii	demersal	14	0.98
Pomadasys incisus	demersal	14	1
Pseudupeneus prayensis	demersal	14	0.91
Sardinella aurita	pelagic	18	0.97
Sardinella maderensis	pelagic	18	0.99
*Scomber colias**	pelagic	18	0.96
*Sepia hierredda***	demersal	14	0.75
Sphyraena spp.	pelagic	30	1

* incorrectly listed in the Regulations as *Scomber japonicus*.
** incorrectly listed in the Regulations as *Sepia officinalis*.

Slab of *logo* fish landed by the industrial trawl fleet, containing small pelagics and other bycatch.

Boxes of *logo* fish landed by an industrial trawler at the port of Tema, and boxes of *logo* fish to be loaded into a van for shipping.

These results clearly indicate that trawlers routinely land very large quantities of undersized fish, in violation of applicable regulations. Yet despite MoFA's decision to revoke the bycatch allowance,[64] and the information known to the Fisheries Commission from biological monitoring, to EJF's knowledge no trawling company was prosecuted for landing undersized fish, illegally landed bycatch was not seized, and offenders are effectively given a free reign to continue trading in undersized fish, aggravating the collapse of severely threatened fish populations.

This is only the tip of the iceberg, as only a small fraction of species found in landings are regulated. Slabs contained specimens belonging to a total of 84 different species, 69 of which are not regulated. Overall, 42.5% of all specimens contained in the slabs belonged to unregulated species, which raises concerns over potentially severe impacts on a range of fish populations.

Importantly, the data shows a significant increase over time in the size of landings for certain small pelagic species (**Figure 3**). Between 2022 and 2025, on average the size of round sardinella (*S. aurita*) increased by 5.2 cm, the size of chub mackerel (*S. colias*) increased by 3.4 cm, and the size of Atlantic bumper (*C. chrysurus*) increased by 4.2 cm (see **Table S1** in the Annex for detailed results of statistical analyses). However, despite the increase in size, round sardinella and chub mackerel remained overwhelmingly under the minimum legal landing size.

These results can be interpreted in at least two different ways. One possible explanation is that the mean size of small pelagic fish caught by the trawl fleet has increased since 2022, which could be interpreted as evidence that the nets used by trawlers have become more selective since the entry into force of the Gear Directive. This would represent meaningful but insufficient progress, as most fish still remain under the minimum landing size. This interpretation assumes that the same fraction of the catch is consistently discarded to only keep the largest fish relative to the mean size of the catch.

Another possible explanation is that a larger fraction of the catch is discarded, including increasingly large fish to keep only the largest individuals for landing. This scenario would be concerning, as it could be compatible with a decrease in the size of catches. In the absence of publicly available comprehensive statistics on catch or landings volumes by species, it is not possible to test this hypothesis. However, it may be considered less likely in view of anecdotal evidence suggesting that discards volumes have decreased in recent years (see **Section 1.3**).

On the balance of probabilities, the data appears to suggest that measurable progress may have been achieved by the Gear Directive, resulting in increased selectivity, reduced bycatch, and reduced dumping for key small pelagic species.

However, the fact that large quantities of small pelagic fish, including a disproportionately high fraction of immature individuals, remain present in the landings of industrial trawlers, is highly concerning in the context of a collapsing fishery that is critically important for food security and the livelihoods of coastal communities.

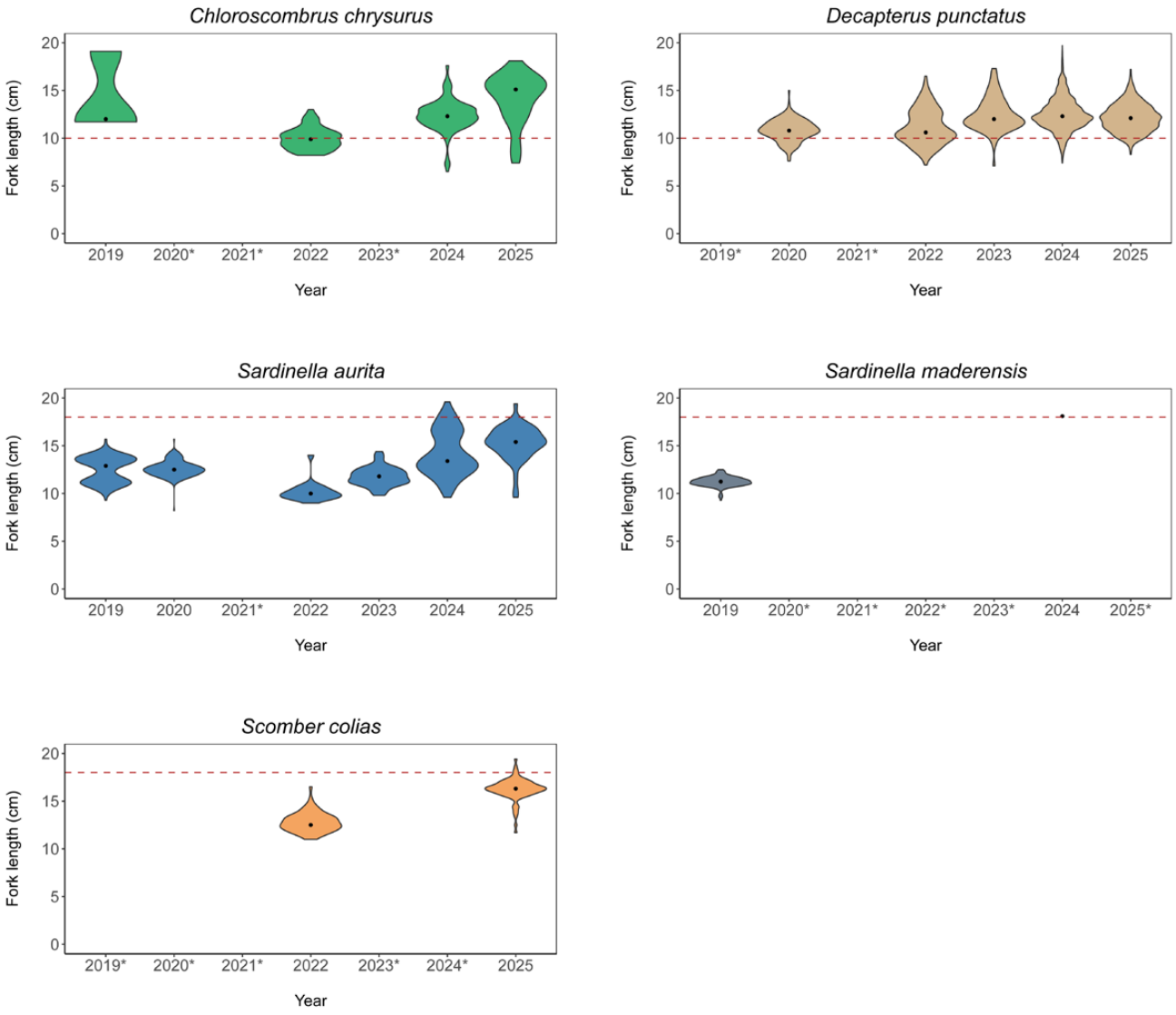


Figure 3: Yearly size distribution of fish contained in 69 slabs produced by industrial trawlers between 2019 and 2025, for five species of small pelagic fish. The black dot represents the median value, and the red dotted line represents the minimum legal landing size. Years for which no data was available for a particular species are denoted with an asterisk (*). Results of statistical analyses are presented in Table S1 (see Annex).

2. Socio-economic impacts on artisanal fishing communities

The persistence of the illegal bycatch and selling of undersized small pelagic fish by Ghana's industrial trawling companies is having profound repercussions for artisanal fishing communities. Artisanal fishers are catching less and increasingly smaller fish, while many fish processors and fishmongers are buying frozen fish slabs landed by trawlers instead of sourcing their fish from local fishers.

2.1 Declining catch and revenue

The landings of the artisanal fleet, especially landings of small pelagic fish, have continuously declined over the last decades.[65] According to the latest available Fisheries Commission data, artisanal landings dropped by a further 4.15% between 2022 and 2023, despite a small increase in the number of active canoes,[66] suggesting a more pronounced decline in catch per canoe. In 2022, the Commission also noted that 'data from fish landing sites [...] indicates the sizes of fish being landed now are much smaller than previous indicating a clear case of growth and recruitment overfishing'.[67]

Interviews conducted with artisanal fishers indicate that these worrying trends have not been reversed. The overwhelming majority (94%) of respondents reported a decrease in catch volume in recent years, and 83% reported a decrease in the average size of fish caught. Many respondents pointed out that fishing trips resulting in no catch had become more frequent.

While the decline in catches experienced by artisanal fishers is attributable in part to overcapacity in the artisanal fleet and environmental factors, the persistent deliberate harvesting of undersized small pelagic fish by the industrial trawl fleet is also having a substantial impact on fish populations, threatening the livelihoods of artisanal fishers.

87% of fishers declared that their income had declined in recent years, and 67% reported that their general financial situation had deteriorated, consistent with findings of previous studies reported in the literature.[68]

Artisanal fishmonger waiting for a canoe to land the day's catch.

Artisanal landing site and fish market at Elmina.

2.2 Persistence of the *logo* fish trade and transformation of supply chains

The *saiko* trade profoundly reshaped supply and value chains in artisanal fishing communities, with lasting consequences still observed today. The lure of easy profit led a number of fishers to turn to *saiko*, while artisanal fish processors and fishmongers ('fish mothers') who traditionally sourced their fish from artisanal fishers switched to *saiko* for their supply.

> ***'When saiko became a business, those who engaged in it after a year indicated that it was good, lucrative business. So it changed a lot of people's lifestyles, and their income levels rose high. [...] This led a lot of people to venture into it. And it had an impact on the entire communities in which the saiko trade was taking place. And this raised more people's hopes to venture into the saiko business. [...] The fish processors who used to buy from the artisanal fishers turned to buying saiko fish since there were no fresh fish available.'***
>
> Community representative, Apam

When *saiko* landings dried up as a result of the government crackdown on illegal trans-shipments, demand for frozen fish remained high, and fish processors and fishmongers who used to source their fish from *saiko* landings switched to other sources of supply. Community monitoring and interviews by EJF reveal that trade in *logo* fish is still ongoing, albeit in a different form. Instead of being trans-shipped at sea, *logo* fish are now landed by industrial trawlers at the port of Tema and transported in vans to former *saiko* hubs in the Central Region, such as Elmina and Apam. In 2024–2025, EJF recorded no fewer than 131 and 32 van shipments of *logo* fish in Elmina and Apam, respectively.[69] In these communities, 50% of interviewed fish processors, and 36% of fishmongers, declared that they were mainly or exclusively sourcing their fish directly from these vans or the cold stores they supply.

When asked why they were not sourcing their fish from artisanal fishers, many respondents reported a preference for using fresh fish landed by canoes but pointed to dwindling supply and a dramatic increase in price (**Figure 4**). But a number of fishmongers indicated that they preferred dealing in frozen fish, which allows them to supply a greater range of customers and markets. As most artisanal fishmongers do not have access to a freezer and cold storage facilities, they cannot freeze the fish themselves and those who deal in frozen fish are dependent on trawlers or cold stores for their supply. Some respondents also explained that frozen fish slabs occasionally contain high-value species, increasing the likelihood of profit.

At the same time, respondents indicated that the price of frozen fish slabs had also increased, mainly as a result of higher transport costs. At the peak of the *saiko* period, a slab would cost as little as GH₵35–50, but the price of a box containing two slabs bought from the vans or cold stores now reportedly reaches GH₵300–600, depending on location.

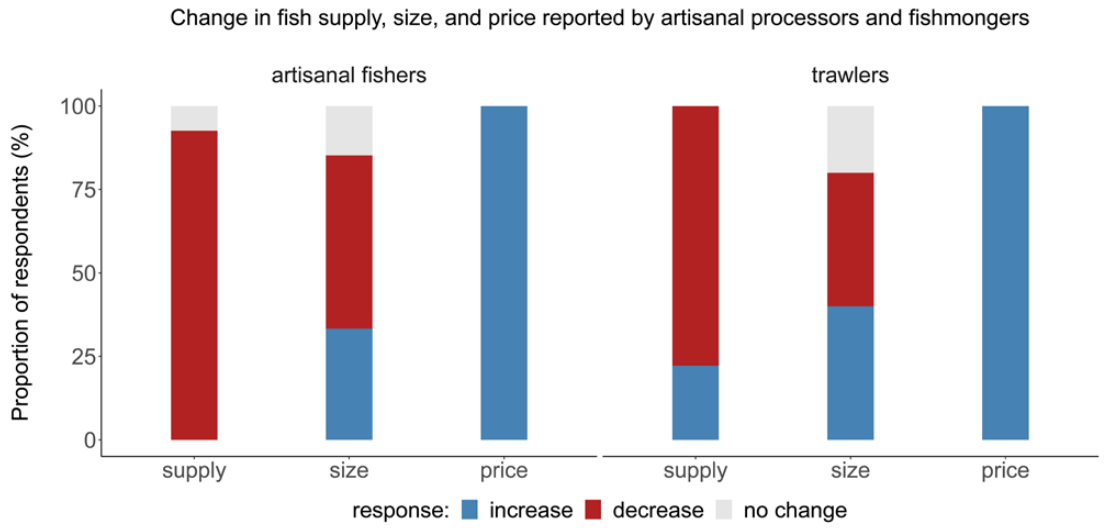


Figure 4: Change in fish supply, size, and price reported by artisanal processors and fishmongers, by type of supplier (left: artisanal fishers, right: vans transporting frozen fish landed by industrial trawlers).

As a result of the general increase in the price of fish, artisanal fishers and fishmongers have seen their income plummet in recent years — especially when compared to the time of the *saiko* trade, remembered by many as a time of abundance.[70] 88% of respondents declared that their income had declined in recent years, and 76% reported that their general financial situation had deteriorated. Dwindling financial resources have also made it increasingly difficult for women to finance fishing trips, further compounding difficulties for canoe owners.

While *logo* fish landed by trawlers at the port of Tema has become the main source of supply for frozen fish in Apam and Elmina, high prices have paved the way for a resurgence of *saiko*. Intelligence collected by EJF and stakeholder testimony indicate that a limited number of *saiko* trans-shipments took place in late 2024 and early 2025, involving several trawlers and at least one canoe from Apam. Presumably intending to take advantage of a perceived lapse in surveillance and law enforcement due to the Ghanaian general election and change of administration, this *saiko* canoe reportedly did regular runs every two or three weeks, moving reduced volumes (20–50 slabs) at a time and landing at night to avoid attracting attention. More than one canoe may be involved, with *saiko* landings reported in Apam and Elmina and possibly also in Winneba and Senya. As EJF investigators were visiting in April–May 2025, *saiko* landings had apparently stopped after the trawlers involved had been sanctioned.

Slabs of *saiko* fish observed in an artisanal fishing community in 2019. © EJF

The high price of fresh fish, coupled with the lasting appeal of frozen fish, is preventing or delaying the switch back to traditional sources of supply in communities formerly involved in the *saiko* trade. Persistent demand for frozen fish slabs in these communities is providing a strong incentive for the trawling industry to continue harvesting small pelagic fish, perpetuating a vicious circle that deprives artisanal fishers of their traditional source of subsistence and livelihood, while encouraging artisanal processors and fishmongers to buy from industrial fishing companies instead of local fishers, diverting capital away from coastal communities. Concerns have also been expressed over the control exercised by a few well-connected and economically advantaged actors over the *logo* fish trade, exacerbating inequalities and reinforcing dynamics of exclusion within coastal communities.[71]

The dynamics observed in former *saiko* hubs such as Apam and Elmina should not be taken to be representative of the situation in other artisanal fishing communities. While all communities are likely to be affected by declining catches, not all are affected equally. In communities with no history of *saiko* and more generally in communities with no connection to the *logo* fish trade, artisanal processors and fishmongers have always been and remain dependent on artisanal or semi-industrial landings for their supply, and are more vulnerable to the collapse of artisanal small pelagic fisheries. The *logo* fish trade is also generating inequalities between coastal communities.

Artisanal canoes moored at Apam, an artisanal fishing community and former hub of the *saiko* trade.

Aerial view of the Elmina fish market.

3. Conclusion and recommendations

The crackdown on illegal trans-shipments, the adoption of the Gear Directive, and the recent ramping up of sanctions by the Ghanaian government appear to have had measurable positive effects on Ghana's industrial trawl sector. *Saiko* trans-shipments have virtually come to a halt, the average size of small pelagic fish caught by trawlers appears to have increased, suggesting the use of more selective nets, and illegal discards appear to have decreased.

However, these commendable measures did not put an end to the illegal bycatch, dumping, and landing of undersized small pelagic fish by the industrial trawl fleet. Persistent demand for *logo* fish in artisanal fishing communities with a history of *saiko*, coupled with the inadequate design and enforcement of bycatch regulations, is providing a lasting economic incentive for industrial trawlers to continue harvesting small pelagic fish. Operators of the industrial trawl fleet have incorporated the trade in bycatch into their business model to maximise profit, routinely flouting the Gear Directive by using illegally modified nets to target and profit from the sale of small pelagic fish.

The systematic harvesting of small pelagic fish by the industrial trawl fleet is posing a critical threat to a collapsing fishery, to the detriment of artisanal fishing communities. Trawlers directly compete with artisanal fishers for dwindling fish stocks, depriving them of their traditional source of subsistence and livelihood. Declining catches are making fishing increasingly precarious for artisanal fishers, and have diminished local supply in fresh fish, pushing prices to an unprecedented high and further squeezing margins for artisanal fish processors and fishmongers. Meanwhile, the *logo* fish trade is diverting capital away from local fishers, further exacerbating inequalities and reinforcing dynamics of exclusion both within and between coastal communities.

In view of the evidence linking local fishing companies and vessels to foreign actors based in the People's Republic of China,[72] there is reason to believe that a potentially substantial share of the profits generated by the sale of bycatch is going to Chinese beneficial owners instead of benefiting Ghana's economy.

Urgent action is needed to break this vicious circle and ensure a more sustainable and equitable future for Ghana's fisheries. While key provisions of the new fisheries law, if effectively implemented and enforced, can help address the challenges highlighted in this report, a broader range of measures will be necessary. It is recommended that the government of Ghana adopt the following measures:

- As a matter of priority, intensify ongoing law enforcement efforts to ensure compliance with fisheries laws and regulations prohibiting the use of illegal gear and the bycatch, dumping and landing of undersized fish, notably:
  - Expedite the deployment of on-board CCTV and other electronic monitoring measures on all vessels;
  - Carry out frequent at-sea and in-port inspections by adequately trained personnel;
  - Systematically seize all illegal nets and bycatch found on board and landed in port;
  - Prosecute offenders before the courts and ensure at the very least that minimum applicable penalties are imposed, including in the context of out-of-court settlements;
  - Suspend, withdraw or refuse to renew the fishing licence of vessels and companies found to have committed serious or repeated infringements.
- Continue implementing a zero-tolerance policy for illegal trans-shipments and the *saiko* trade.
- Ensure that the proceeds of fines imposed on industrial fishing companies and of the sale of forfeited property, including illegal nets and bycatch, are transferred to the Fisheries Development Fund and used to support artisanal fishing communities, as required by law.
- Carry out a systematic review of the observer programme to ensure that observers are adequately trained and able to exercise their functions in safe working conditions and free from undue influence, and that infractions reported by observers are duly investigated in a timely manner.
- To prevent the harvesting of small pelagic fish by industrial trawlers, adopt legislative or regulatory measures, as appropriate, to:
  - Provide for the issuance of industrial trawling licences valid only for the exploitation of demersal fish stocks;
  - Prohibit the intentional catch and the selling, by the holder of an industrial fishing licence, of species not included within the scope of the licence;
  - Prohibit any alteration of fishing gear made with the intent to reduce its selectivity.
- To ensure that all catch are effectively landed and recorded to improve the quality of fisheries data for resource management purposes, adopt legislative or regulatory measures, as appropriate, to:
  - Increase the maximum penalty incurred for the dumping of fish, and introduce aggravating circumstances for the dumping of juveniles and selected small pelagic species;
  - Revoke the prohibition on the landing of undersized fish, to reduce the incentive for operators to discard bycatch.

- Expedite the adoption of revised Fisheries Regulations to give effect to the Fisheries and Aquaculture Act 2025, in particular to establish an extended IEZ within the entirety of Ghana's territorial sea (12 NM).

- Conduct a revised scientific assessment to determine the impact of the trawl fleet on small pelagic fish stocks, including estimates of bycatch and discards, and update recommendations concerning the necessary reduction in fishing effort to achieve maximum sustainable yield.

- Conduct a periodic review of laws and regulations regulating the technical characteristics of fishing gear (e.g. minimum mesh size, vertical opening) for the industrial trawl fleet, to assess their adequacy in view of documented impacts on small pelagic fish populations.

- Provide adequate support to artisanal fishing communities with a view to reducing precarity, including devising and implementing alternative or supplementary livelihood options.

- Improve transparency in the fisheries sector by implementing the principles of the Global Charter for Fisheries Transparency,[73] focusing as a matter of priority on the following measures:

  - Publish comprehensive and up-to-date lists of sanctions for IUU fishing offences, specifying the vessels and companies involved, the infractions committed, and the sanctions taken, on a regular basis and in an easily accessible format (Principle 2);

  - Make information on the beneficial ownership of fishing vessels available to the public, in a free and easily accessible format, and share all relevant information with the FAO Global Record of Fishing Vessels (Principles 2 and 3);

  - Refuse to register a vessel in the absence of a genuine link between the vessel and the intended flag state (Principle 4);

  - Publish, on a regular basis, comprehensive and up-to-date statistics on landings for both the industrial trawl fleet and the artisanal fleet, disaggregated by species (Principle 9).

Annex

Table S1: Results of statistical analyses investigating a change in the mean landing size of regulated species found in frozen fish slabs produced by industrial trawlers between 2022 and 2025. Differences in mean landing size between years were tested using an analysis of variance (ANOVA) followed by a Tukey test of honestly significant difference. Species with no or insufficient data in the relevant time period were excluded from the analysis. Note that *p*-values are affected by very large sample sizes.

species	ANOVA testing for a difference across all years			Tukey's HSD test for a difference between 2025 and 2022*		
	F-statistic	*p*-value	η^2	difference between means	95% confidence interval	adjusted *p*-value
Brachydeuterus auritus	$F_{3, 3070} = 93.17$	< 0.001	0.08	1.36	1.10, 1.63	< 0.001
Caranx rhonchus	$F_{3, 2020} = 435.14$	< 0.001	0.39	-1.57	-1.78, -1.36	< 0.001
Chloroscombrus chrysurus	$F_{2, 260} = 75.62$	< 0.001	0.37	4.18	3.35, 5.0	< 0.001
Decapterus punctatus	$F_{3, 2509} = 39.98$	< 0.001	0.05	0.98	0.61, 1.36	< 0.001
Pseudupeneus prayensis	$F_{3, 578} = 6.28$	< 0.001	0.03	1.28	0.41, 2.15	< 0.001
Sardinella aurita	$F_{3, 267} = 64.98$	< 0.001	0.42	5.22	3.94, 6.49	< 0.001
Scomber colias	$F_{1, 146} = 359.34$	< 0.001	0.71	3.42	3.07, 3.78	< 0.001
Sepia hierredda	$F_{1, 18} = 0.01$	0.92	0.00	-0.49	-10.97, 9.98	0.92

* in the absence of data for the year 2025 for *Sepia hierredda*, results for this species are reported for a comparison between the years 2024 and 2022.

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25 Fisheries Regulations 2010, s. 15(2).

26 This requirement is stipulated on the licence document. Under s. 65(2) of the Fisheries and Aquaculture Act 2025 (previously s. 76(3) of the Fisheries Act 2002), the Minister has competence to 'impose additional conditions or modify the terms of a fishing licence'.

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53 The maximum authorised duration of a fishing expedition is 30 days (Arthur-Mensah, G. (2023) 'Fisheries Ministry to deploy Electronic Monitoring System on fishing trawlers – Minister', Ghana News Agency, 14 June 2023, https://gna.org.gh/2023/06/fisheries-ministry-to-deploy-electronic-monitoring-system-on-fishing-trawlers-minister/), but effective fishing time may be less than 30 days.

54 Taking into account time spent at port to refuel and resupply, and awaiting the renewal of fishing licences, as well as the two-month closed season from July 1st to August 31st: see MoFA (2025), Notification of Ministerial Directive on the Implementation of the Closed Season in 2025, https://henmpoano.org/wp-content/uploads/2025/04/2025-CLOSED-SEASON-NOTIFICATION.pdf.

55 Based on available licence lists for the years 2024 and 2025: see MoFA (2024), List of licenced vessels for second quarter 2024 [on file with EJF] (34 vessels); MoFA (2024), List of licenced vessels for 4th quarter 2024 [on file with EJF] (45 vessels); MoFA (2025), List of licenced bottom trawlers - first quarter 2025, https://fishcom.gov.gh/wp/wp-content/uploads/2025/01/MCS-UPDATE-_1ST-QTR-2025.pdf (45 vessels).

56 Based on reported landings of 53,041 tonnes for the year 2023: see Fisheries Commission (2024) *2023 Annual Performance Report*, https://www.mofad.gov.gh/wp-content/uploads/2025/04/Very-final_2023-APR-FINAL-02082024_Board.pdf.

57 Catch was reconstructed by adding the estimated bycatch to the reported landings. The estimated discard ratio is markedly higher than the 3% ratio estimated based on observer reports for the year 2018: see Teye, C., Nunoo, F. K. E. & Ofori-Danson, P. K. (2020) 'An assessment of observer deployment on industrial trawlers in Ghana', *Regional Studies in Marine Science*, 39, 101474, https://doi.org/10.1016/j.rsma.2020.101474.

58 MoFA (2025), Press statement: Ministry of Fisheries and Aquaculture and the Fisheries Commission suspend fishing licences of four industrial vessels for repeated illegal transshipment and other offences, https://web.archive.org/web/20250506112412/https://www.mofad.gov.gh/press-release/ministry-of-fisheries-and-aquaculture-and-the-fisheries-commission-suspend-fishing-licences-of-four-industrial-vessels-for-repeated-illegal-transshipment-and-other-offences/.

59 Fisheries and Aquaculture Act 2025, s. 153. For the legal framework applicable prior to the entry into force of the new law, see Fisheries Act 2002, ss. 82 and 129.

60 According to artisanal fishers, the value of the fish slabs is largely insufficient to cover the cost of a damaged net. While a slab can fetch between GH₵200–400, an artisanal set gillnet can be worth GH₵50,000, including the price of weights.

61 The term *'logo* fish' is occasionally used in the product description. For example, according to available records, on 26 June 2024 the company Kenbonad Fisheries landed cargo described as '3000 CTNs × 25 kgs assorted frozen fish 2100 slab logos 200 kgs loose fish caught by registered Ghanaian vessel from Ghanaian waters for local consumption' (source: TradeData.Pro, https://tradedata.pro/).

62 Fisheries Commission (2024) *2023 Annual Performance Report*, https://www.mofad.gov.gh/wp-content/uploads/2025/04/Very-final_2023-APR-FINAL-02082024_Board.pdf.

63 https://www.fishbase.us/.

64 Kwado Nyarko, R. (2022) 'Fisheries Ministry to ban 15% landings of by-catch at Tema Port', My Joy Online, 23 July 2022, https://www.myjoyonline.com/fisheries-ministry-to-ban-15-landings-of-by-catch-at-tema-port/.

65 Asiedu, B., Okpei, P., Nunoo, F. K. E. & Failler, P. (2021) 'A fishery in distress: An analysis of the small pelagic fishery of Ghana', *Marine Policy*, 129, 104500, https://doi.org/10.1016/j.marpol.2021.104500 (analysis based on unpublished Fisheries Commission data for the 1998–2018 period).

66 Fisheries Commission (2024) *2023 Annual Performance Report*, https://www.mofad.gov.gh/wp-content/uploads/2025/04/Very-final_2023-APR-FINAL-02082024_Board.pdf.

67 MoFAD (2022) *Fisheries Management Plan of Ghana 2022–2026: A National Policy for the Management of the Marine Fisheries Sector*, https://www.fao.org/faolex/results/details/en/c/LEX-FAOC223697/.

68 Danquah, J. A., Odumale, R. C. & Appiah, M. (2021) 'Effects of Decline in Fish Landings on the Livelihoods of Coastal Communities in Central Region of Ghana', *Coastal Management*, 49, pp. 617–635, https://doi.org/10.1080/08920753.2021.1967562.

69 Results of community monitoring as of 31 May 2025.

70 It should be pointed out, however, that profits from the *saiko* trade were unevenly distributed, mainly benefiting a few well-connected canoe owners and fishmongers, to the detriment of artisanal fishers: see EJF & Hɛn Mpoano (2019) *Stolen at sea: How illegal 'saiko' fishing is fuelling the collapse of Ghana's fisheries*, https://ejfoundation.org/reports/stolen-at-sea-how-illegal-saiko-fishing-is-fuelling-the-collapse-of-ghanas-fisheries.

71 Owusu, V., Essien, R. S. & Adjei, M. (2025) 'The same old story: 'Saiko' practices and coastal livelihoods in Ghana's small-scale fisheries', *Marine Policy*, 173, 106573, https://doi.org/10.1016/j.marpol.2024.106573.

72 See EJF (2018) *China's hidden fleet in West Africa: A spotlight on illegal practices within Ghana's industrial trawl sector*, https://ejfoundation.org/reports/chinas-hidden-fleet-in-west-africa-a-spotlight-on-illegal-practices-within-ghanas-industrial-trawl-sector; EJF (2021) *At what cost: How Ghana is losing out in fishing arrangements with China's distant water fleet*, https://ejfoundation.org/reports/at-what-cost-how-ghana-is-losing-out-in-fishing-arrangements-with-chinas-distant-water-fleet.

73 Coalition for Fisheries Transparency (2023) *Global Charter for Fisheries Transparency*, https://fisheriestransparency.net/wp-content/uploads/2024/10/Coalition-for-Fisheries-Transparency-Global-Charter-2024-EN.pdf

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