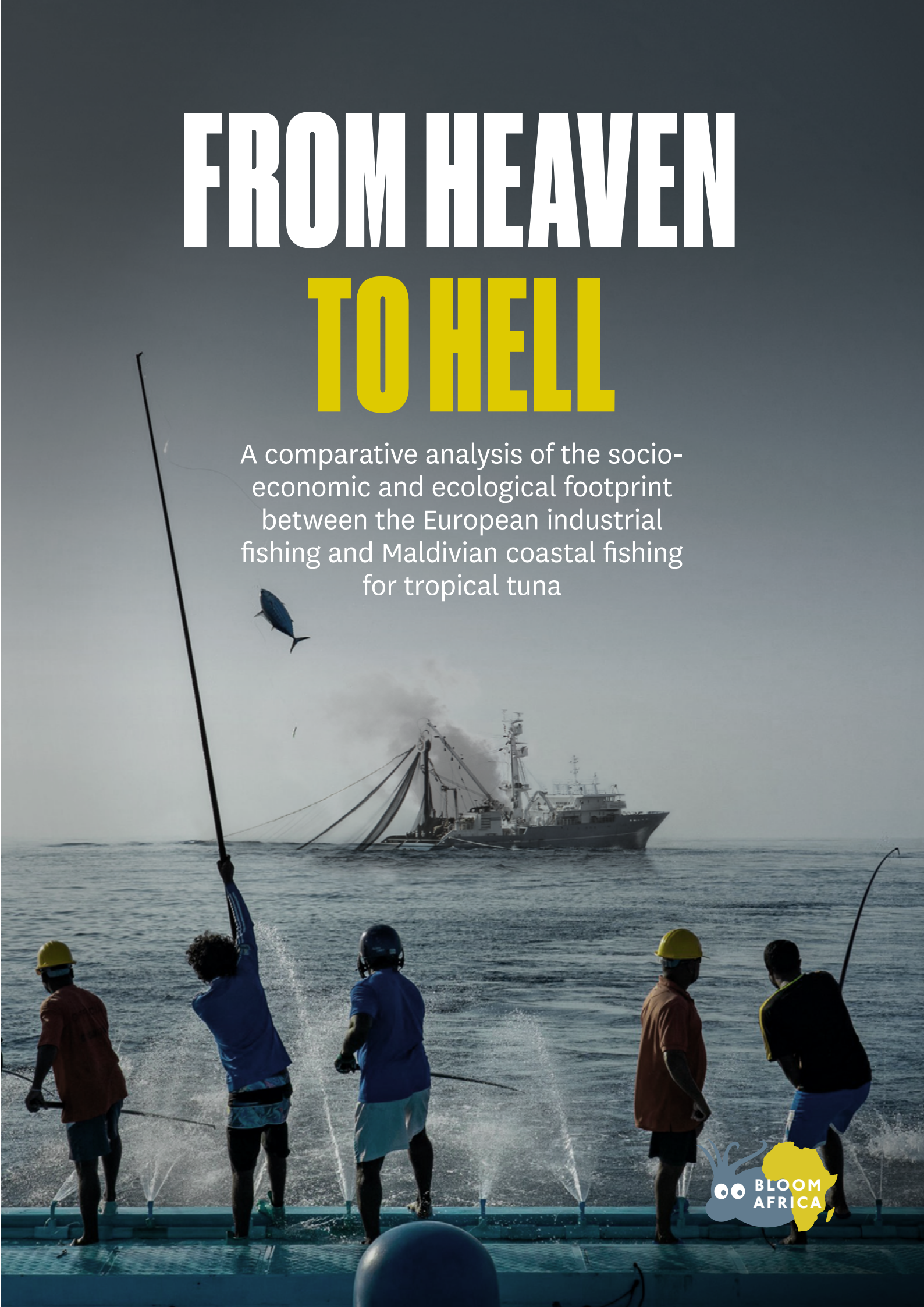
FROM HEAVEN TO HELL

A comparative analysis of the socio-economic and ecological footprint between the European industrial fishing and Maldivian coastal fishing for tropical tuna



BLOOM AFRICA

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EVERYTHING YOU NEED TO KNOW IN 3 PAGES

The tropical tuna fishing industry claims that the fishing method they use (the 'purse seine', which consists of a net deployed in open water and closed over the shoals of fish like a purse) has the most virtuous carbon footprint of all tuna fishing methods. But when this method is compared with pole-and-line fishing as practiced in the Maldives, a method that is infinitely more selective and respectful of marine ecosystems, it becomes clear that seine fishing is three times more polluting, and has a disproportionate impact on marine biodiversity, due in particular to the massive use of drifting fish aggregation devices, high-tech floating rafts deployed by the industry to attract schools of tuna. The socio-economic impact of seine fishing is also deplorable, since it generates 30 times fewer jobs, and its profitability is based solely on a wide range of European Union (EU) subsidies and tax breaks. The industry's self-congratulation is based on comparisons with the worst fishing methods used to catch tuna, not the most virtuous. A crude ploy that has become a persistent myth of 'low-carbon fishing' that has never been accurately assessed. Our analysis 'From heaven to hell' puts the final nail in the coffin of the lies deliberately planted by industry in the public arena.

> **"Purse seine fisheries are those that emit the least CO_2 in the atmosphere per kilo of protein produced. "[1]**
>
> *OPAGAC, a Spanish tropical tuna fisheries lobby*

The European tuna fishing industry is constantly trumpeting the energy efficiency of its vessels by comparing them with those of other fisheries that emit more greenhouse gases: a type of fallacious reasoning known as the 'false dilemma', which consists of encouraging people to accept a harmful practice by comparing it to an even more harmful practice, without presenting the full range of possible solutions. According to this narrow vision, the impact of tuna fishing is approached only from the energy angle and not from a broader ecosystemic perspective that would consider the economic, social, and ecological performance of fleets. In this new opus of the Tuna Gate' series, we continue to delve into the opaque world of tropical tuna fishing — the flagship species of the European market — and continue to shed light on the devastating impact of European vessels on the climate and biodiversity.

We take the opposite approach to the industry by comparing the practices of the European industrial purse seine fleet with those of the Maldivian coastal pole-and-line fleet, a fishery recognized as one of the most responsible because of its low environmental impact and numerous socio-economic benefits. These two fisheries are relatively comparable in terms of target species and fishing grounds for the European fleet operating in the Indian Ocean.

While the European tuna fleet is made up of some fifty French and Spanish industrial vessels up to 116 m long that fish around the globe using a particularly destructive fishing technique called purse seining, their practice is also combined with the intense use of 'fish aggregating devices' (FADs) — highly technological floating and drifting rafts that exploit the natural tendency of tuna species to gather under floating objects. In the Maldives, however, there remains a radi-

1 OPAGAC (2021) La pesca de cerco de atún tropical es la que menos emisiones de CO2 libera a la atmósfera para producir un kilo de proteína.

cally different selective fishing model: pole-and-line fishing. This far more selective method of fishing is practiced close to the atolls by some 1,000 vessels of no more than 35 meters in length and provides employment, economic stability and food security for an entire country.

The impact of these two fishing models on biodiversity is diametrically opposed. Seine fishing combined with the use of FADs by Europeans leads to high volumes of by-catch, up to 13% of the total catch volume, whereas discards by Maldivian fishers are almost non-existent, at around 0.02%. Hundreds of thousands of marine animals are thrown overboard by Europeans, mostly dead or dying, including tuna that are too small or damaged, but also other bony fish species, marlin, sharks, rays, and sea turtles. This list includes vulnerable or critically endangered species such as the silky shark, the blue marlin and the Kemp's ridley turtle, the catches of a few individuals of which can affect the reproductive potential of the entire species.

In addition to the official statistics for these so-called 'by-catches', there are the countless marine animals that become entangled in the meshes of the nets hung below the rafts and which remain widespread in the ocean despite their prohibition. This phenomenon is said to be a source of mortality for hundreds of thousands of silky sharks annually. The thousands of 'drifting' FADs deployed each year by European manufacturers in the Indian and Atlantic oceans also pose serious marine pollution problems, since at least 40% of these devices are lost outside fishing zones, and can run aground on shores, destroy coral reefs or sink to the ocean floor, releasing the metals and plastics they contain. In reality, the number of FADs lost at sea is undoubtedly far greater, as shown by the statistics published by Compagnie Française du Thon Océanique (CFTO), one of the three French companies that fish for tropical tuna. Of the nearly 2,750 FADs deployed by the company's vessels in 2021, only 34 were recovered from the sea.

By contrast, FAD deployment is much more regulated in the Maldives, with the Maldivian Ministry of Fisheries and Agriculture maintaining some 50 anchored (i.e. non-drifting) FADs close to the atolls, which do not generate the negative effects of drifting FADs. This coastal fishing model is not without its critics, however, as it is also the source of juvenile catches, the only black spot in its assessment.

In terms of its impact on the climate, the carbon footprint of tuna caught by European vessels between the time of capture, its processing into mainly canned products, and its distribution, is almost three times higher than that of tuna caught by pole-and-line fishing in the Maldives. Vessel fuel consumption accounts for 64% of the total carbon footprint of canned tuna, with European tuna seiners burning almost 180 million liters of diesel every year. Added to this are the greenhouse gas emissions associated with tuna canning (18% of the carbon footprint), sea freight transport of frozen tuna and cans (7%) maintenance of the cold chain, and the rotation by air of European crews working on these vessels, which epitomizes the delusion represented by this model, even though this item represents only a tiny fraction of emissions (<1%). Rarely considered in the carbon footprint

FACTS AND FIGURES ON TROPICAL TUNA FISHING

→ 5 billion kilos fished each year worldwide;[2]
→ More than $40 billion in annual market value;[3]
→ The most widely consumed fish in Europe;[4]
→ The most consumed fish in France, with 4kg/year/inhabitant consumed.[5]

2 ISSF (2023) A snapshot of the large-scale tropical tuna purse seine fishing fleets as of June 2023.
3 The Pew Charitable Trusts (2020) Netting billions 2020: a global tuna valuation.
4 Eumofa (2022) The EU fish market.
5 FranceAgriMer (2022) Chiffres-clés des filières pêche et aquaculture en France en 2022.

of 'seafood', emissions associated with the extraction by fishing of the 'blue carbon' contained in tuna, which would otherwise have been trapped in the ocean via the action of the biological pump, represent 12% of the total carbon footprint. Yet, this carbon sink, currently disrupted by fishing, is of vital importance in the fight against climate change, as it enables the ocean to sequester carbon over timescales ranging from a hundred to a thousand years, whereas the carbon sequestration time of terrestrial plants is of decennial time scale.

Lastly, the economic profitability of the European industrial fleet relies on tens of millions of euros allocated each year by the EU, in the form of so-called 'direct' subsidies via structural and investment funds, so-called 'indirect' subsidies via tax relief on diesel prices and fishing agreements with Global South countries, or through a range of tax 'gifts' such as exemption from customs duties on tuna canned in Indian Ocean canneries and destined for Europe. The European Union, for example, financed the construction of some fifteen tuna seiners to the tune of 72 million euros between 1990 and 2000, some of which were over 100 meters in length. In comparison, the Maldivian pole-and-line fishing industry is also subsidized, but on an entirely different scale, and Maldivians do not benefit from preferential export tariffs, which contributes to a system of unfair competition.

Our results are indisputable. While industrial lobbies are 'seeking a new narrative'[6] and are constantly presenting a glowing record in terms of their 'carbon impact' and 'food security', it appears on the contrary that European tuna fishing is a fishing model that is particularly destructive of the climate, biodiversity and jobs, and would not exist without the complicity of the public authorities, who keep this fleet segment alive through their unfailing political support. Despite mounting evidence of the extremely damaging model of European industrial vessels, the European Commission and EU Member States — led by France and Spain — continue to use public power and money to serve solely a few destructive industrialists.

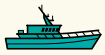
While scientists belonging to two intergovernmental platforms on the climate and biodiversity — the IPCC and IPBES — are sounding the alarm about the vertiginous degradation of the ocean, the planet's main climate regulator, it is high time that institutions overcome their denial and get back to what they were created for: the defense of the general interest and not the interests of a handful of industrialists, whose highly subsidized fishing fleets have a disproportionate impact on the climate and biodiversity.

6 Europêche (2021) Europêche seeks a new narrative on fisheries — Keep eating EU wild fish: it's good for your health, it's good for our planet — CO_2 emissions from fishing are already down by 40 %.

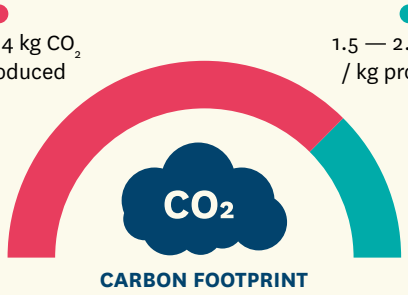
COMPARATIVE GRAPHS & SUMMARY OF THE STUDY

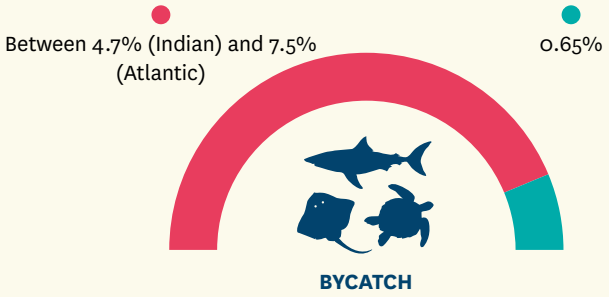


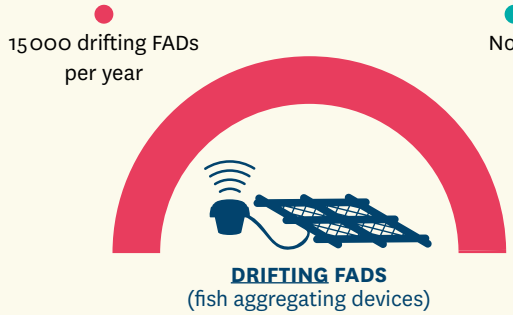
PURSE SEINE FISHERY (EUROPEAN UNION)



POLE-AND-LINE FISHERY (MALDIVES)







CARBON FOOTPRINT[a]

(Includes emissions linked to fuel consumption, canning, maritime freight, cold chain, crew rotation, and the extraction by fishing of marine biomass that would otherwise have contributed to sequestering carbon in the ocean)

BYCATCH[b]

(discards + by-products consummed onboard or sold on local markets)

- Bycatch estimated at 11,600 tonnes in the Indian Ocean, compared with 6,400-9,500 tonnes in the Atlantic. In the Atlantic, ~50% of these catches are thrown overboard, the rest being sold locally. Little data is available on the purpose of these catches on the Indian Ocean side.
- Pole-and-line bycatch is estimated at 553 tonnes. Almost all of these catches are either consumed by fishers or sold on the local market, leading to discards estimated at 0.02% of the total catch.

FISH AGGREGATING DEVICES DEPLOYED IN THE INDIAN OCEAN[c]

- FAD-related pollution: ghost fishing, plastic and electronic pollution, washing up on beaches, destruction of coral reefs, etc.
- No drifting FAD, but around 50 anchored FADs.

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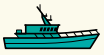
a Values calculated from STECF data on fuel consumption and catches over the 2009-2020 period, IOTC catches, and the energy efficiency of Maldivian pole-and-line reported by the International pole-and-line Foundation (IPNLF). The range of values represents the variability between years.

b Data from the scientific literature (see rest of the report).

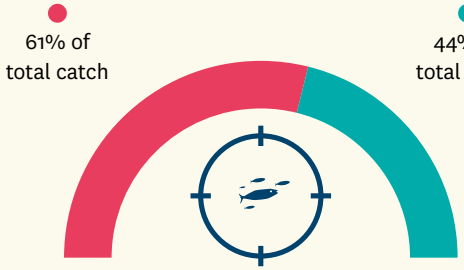
c Averages over the 2015-2021period; IOTC.



PURSE SEINE FISHERY
(EUROPEAN UNION)



POLE-AND-LINE FISHERY
(MALDIVES)



JUVENILE CATCH
(all species combined)

JUVENILE CATCH[d]
(in the Indian Ocean, all species combined)



FULL TIME EQUIVALENT (FTE)

FULL TIME EQUIVALENT (FTE)[e]



SUBSIDIES

SUBSIDIES[f]

The amount of subsidies was estimated by taking into account direct subsidies (European funds), indirect subsidies (fuel tax concessions) and hidden subsidies (fisheries agreements).

But Europeans also benefit from another tax advantage. Products exported to European markets from canneries in the Seychelles and Mauritius are exempt from customs duties, which amount to 24% in the case of the Maldives.

d Averages over the 2015-2021 period; IOTC.
e Averages over the 2009-2020 period; STECF.
f Averages over the 2019-2021 period; STECF, EMFAF, fishing agreements, Maldivian newspapers.

COASTAL POLE-AND-LINE FISHING VERSUS INDUSTRIAL SEINE FISHING: TWO RADICALLY OPPOSED MODELS

THE MALDIVIAN FLEET: TUNA CAUGHT ONE BY ONE, FOR MAXIMIZED SOCIAL BENEFITS

The Maldives is an archipelago of 26 natural atolls, made up of 1,190 coral reef islands in the Indian Ocean. The islands' fishing industry is almost exclusively dependent on tuna, which accounts for 90% of total catches,[7] of which nearly 75% are pole-and-line caught.[8] This sector plays a major role in food supply, employment generation and the national economy. **In 2021, the fishing and fish processing sector in the Maldives accounted for 4.1% of GDP.[9] In 2017, it employed 17,589 fishers, accounted for 11% of the workforce, and 98% of the country's physical exports, generating 196 million US dollars**. But beyond these exports, which are important for foreign currency earnings, almost half of the tuna caught by pole-and-line vessels is consumed by the local population, who have the highest fish consumption in the world, with an average of 142 kilograms of fish consumed per capita each year.

Pole-and-line fishing is carried out using traditional boats called *mas dhonis*. There are just under a thousand of these vessels, measuring between 18 m and 35 m in length (figures 1 and 2). These vessels operate around 20 km — 130 km from the atolls and catch around 90,000 tonnes of tuna each year (average for 2009-2020), mainly skipjack or 'listao' tuna, but also yellowfin tuna at the margins. This traditional fishing method involves two distinct stages: catching the baitfish and catching the tuna, both of which are invariably carried out from the same vessel and during the same fishing trip. Baitfish — species of small reef fish including the silver sprat (*Spratelloides gracilis*) — are usually caught inside the atolls using simple haul nets deployed from the boat, then kept alive in the vessel. When a school of tuna is located, water is sprayed on the ocean surface and live bait is thrown overboard, to encourage a feeding frenzy.

Unlike European vessels, Maldivian fishers use a small number[10] of anchored 'fish aggregating devices' (FADs), which do not generate the negative impacts of drifting FADs. 'Anchored' FADs, which are fixed to the seabed and remain in one place, are most often found around tropical islands such as Réunion, the Maldives, etc., where they are used by small-scale coastal fishers. They offer a number of advantages, including:

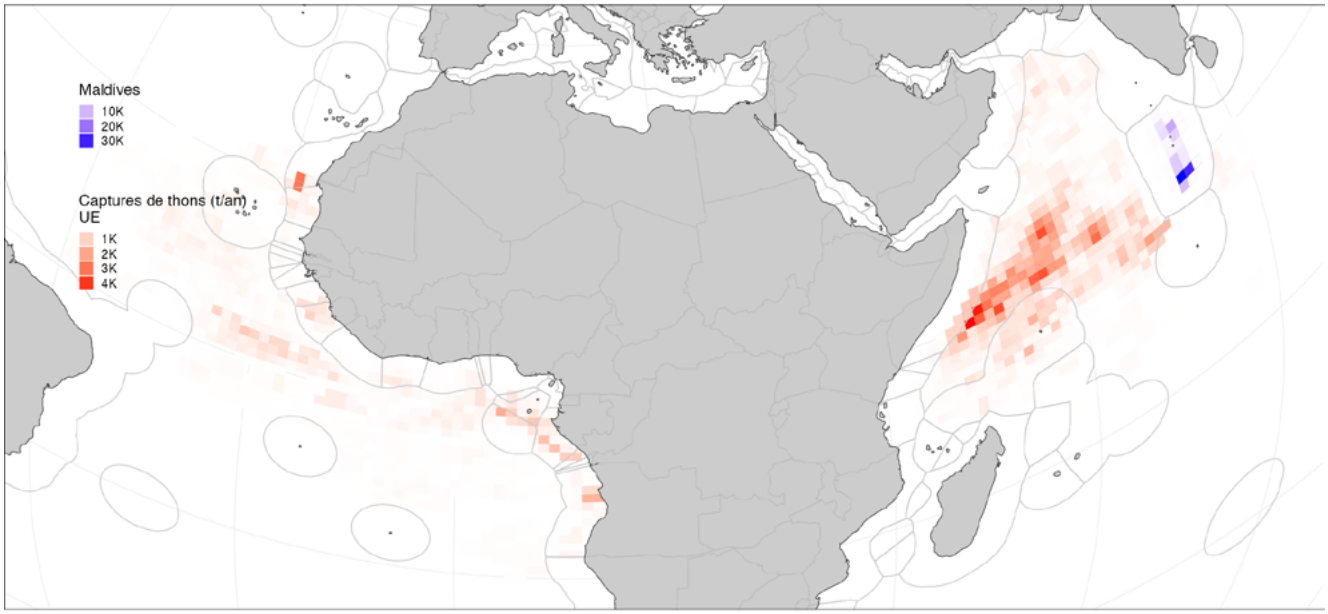
- Reducing fishing pressure along the coast (lagoons, etc).
- Ensuring a certain level of catches of commercially valuable fish (such as tuna, marlin, mahi mahi, etc...).
- Securing fishing activities outside the protected waters of the lagoon.
- Ensuring food security and livelihoods for coastal communities during the monsoon season and severe weather conditions.
- Reducing the carbon footprint of fishing, as fishers do not have to travel far to catch fish.

Overall, Maldivian pole-and-line vessels make 57% of their catches on anchored FADS and 37% on free schools.[11] In addition to the use of anchored FADs, whose impact on marine ecosystems is infinitely lower than for drifting FADs, the impact of Maldivian fishers on biodiversity is all the more limited as **pole-and-line fishing is a highly selective practice. By-catch rates are extremely low, at around 0.65%,[12] which represents around 550 tonnes of marine animals caught each year when they are not targeted. Furthermore, the majority of these by-catches are either sold on the local market or consumed directly by the fishers, which ultimately leads to almost zero discards of dead animals at sea, in the range of 0.02%**. Furthermore, this fishery's interactions with 'endangered, threatened or protected' species are extremely low.

In contrast to this coastal model, European industrial fishing is rampant.

7 FAO (2019) Fishery and aquaculture country profiles: the Republic of Maldives.
8 IOTC catch data for the 2009-2020 period.
9 Government of the Maldives (2022) Annual gross domestic product.
10 The Maldivian Ministry of Fisheries and Agriculture maintains a network of some 50 anchored FADs.
11 Averages calculated over the 2015-2021 period from the IOTC Indian Ocean catch size dataset. Available at: https://iotc.org/data/datasets.
12 Miller *et al.* (2017) Bycatch in the Maldivian pole-and-line tuna fishery.

→ Figure 1. Distribution of tuna catches for 2021 by the Maldives (pole-and-line, shown in shades of blue; 129,000 tonnes) and by the European Union (seine, shown in shades of red; 315,000 tonnes, including 235,000 tonnes in the Indian Ocean).



→ Figure 2. Illustrative image of pole-and-line fishing as practiced in the Maldives. This fishery is renowned for its selectivity, low carbon footprint and numerous socio-economic benefits.



THE EUROPEAN FLEET: INDUSTRIAL WAR MACHINES THAT DESTROY THE HEALTH OF ECOSYSTEMS

ANATOMY OF A DESTRUCTIVE FISHERY

The European Union is a major player in the global purse seiner fleet targeting tropical tuna species; this type of vessel, with its disproportionate impact, accounts for 66% of the annual tropical tuna catch in the world.[13] On a global scale, 39 of the 50 largest registered purse seiners belong to European companies (including the 8 largest vessels).

Since 2020, this European fleet of tropical tuna seiners has comprised some fifty vessels registered in France and Spain, mainly active in the western Indian Ocean and to a lesser extent in the Atlantic Ocean[14] (figure 1). The plundering of African waters began as early as 1964 with the arrival of the first Spanish tuna seiners in the Gulf of Guinea, before gradually spreading to the Indian Ocean in the early 1980s.[15] **These vessels are monsters of steel and technology, with an average length of 82 meters and with the largest, the ALBATUN DOS, which is owned by Spanish shipowner Albacora (the biggest player in European tuna fishing), reaching up to 116 meters long**. They catch an average of 330,000 tonnes of tuna every year,[16] including nearly 193,000 tonnes in the Indian Ocean alone. This ocean is now the nerve center of European tuna fishing, where the bulk of catches are made, which are then processed directly on site in factories in Seychelles and Mauritius, or transshipped to other factories in Thailand, Ecuador or Spain. **This distant European purse seine fleet employs nearly 30 times fewer sailors than the Maldivian pole-and-line fishery, since it generates 0.006 full-time equivalents (FTEs) per ton of tuna landed, compared with 0.18 FTEs for the pole-and-line fishery**.

Seiner

A 'seiner' is a vessel that uses the fishing gear known as a 'purse seine', i.e. a vertical net nearly 2 km long and 300 m high that is deployed around schools of tuna previously detected by sonar[17] with the help of a small support vessel (figure 3). At the end of the encircling process, to prevent the fish escaping through the bottom, the net is closed at the bottom using a special cable. The animals are then trapped and have no chance of escape. The pocket is then progressively reduced to capture the fish using a landing net called a 'salabarde'. As well as being highly effective — several dozen tonnes of fish can be hauled up during each operation — this fishing method has even more serious consequences when combined with the use of fish aggregating devices (FADs).

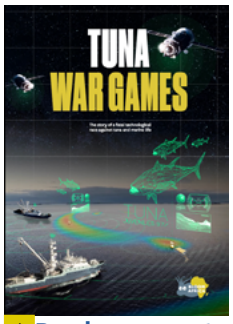
Today, European tuna fishers make almost all their catches using drifting 'fish aggregating devices' (FADs), a fishing technique with particularly disastrous consequences for the environment. It is estimated that over a hundred thousand of these devices are deployed worldwide every year by industrial fishers.[18] French and Spanish vessels deploy an average of 15,000 FADs in the Indian Ocean every year.[19]

These FADs —whose embarked technology to target tuna- continuously improves (see infographic below) — are made up of two parts: a floating part, consisting of a raft of around 6m² made of various materials (plastic tubes, bamboo, metal frame, etc.) and fitted with plastic floats; and a submerged part, generally made up of ropes, tarpaulins and old nets, which can extend up to 100 meters below the surface. Many species, including tuna, tend to gather around these devices, for reasons that are still poorly understood.

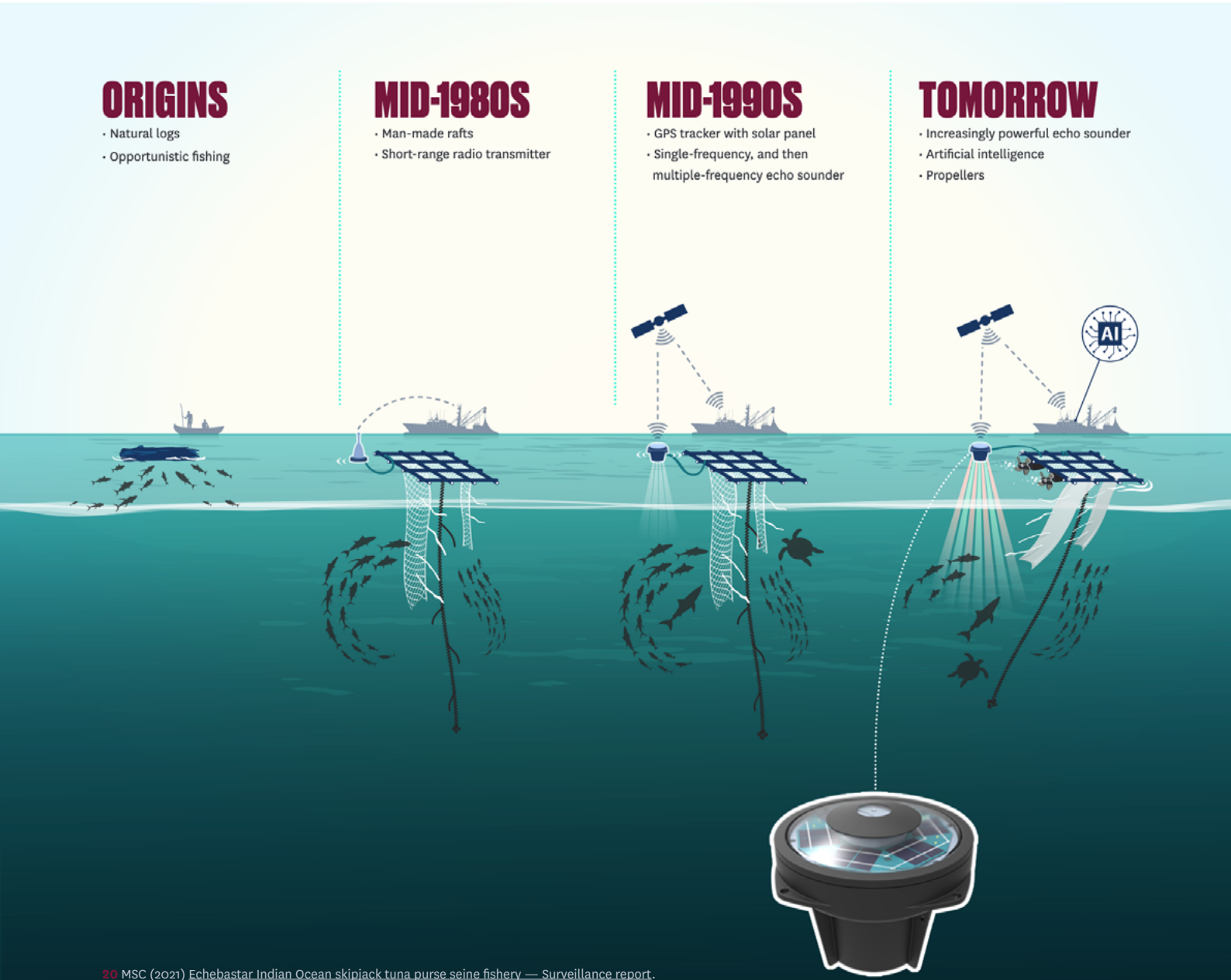
13 ISSF (2023) A snapshot of the large-scale tropical tuna purse seine fishing fleets as of June 2023.
14 A handful of Spanish vessels are also present in the Pacific Ocean, but their fishing is minimal. The companies owning all these European-registered vessels also own 46 other purse seiners registered in non-European countries: European shipowners own 100% of the large purse seiners listed in Curacao (3), El Salvador (6), Guatemala (2), Mauritius (4), Oman (1), Seychelles (12) and Tanzania (1), as well as part of the fleet in Belize (3, or 30%), Ecuador (8, or 9%) and Panama (7, or 29%). They operate worldwide, both on the high seas and in the exclusive economic zones (EEZs) of a number of countries, thanks to a network of fishing agreements, including the heavily subsidized ones negotiated by the European Commission for its fleet. There are also a number of 'support vessels', which do not fish, but whose role is to transport and deploy FADs to increase the fishing capacity of fishing vessels.
15 Carmona (2022). Changes in the Spanish fish-canning industry since Spain's entry to the European Union.
16 STECF data averaged over the period 2009-2020.
17 Ifremer (2012) Les sennes tournantes et coulissantes.
18 IRD (2022) Pêche au thon : comment réduire la pollution ?
19 Average calculated over the 2015-2021 period based on IOTC data.

PURSE SEINES AND FADS: A DANGEROUS COMBINATION FOR BIODIVERSITY

Invented in the 1980s, but actually deployed on an industrial scale in the following decade, FADs quickly won over European manufacturers thanks to their outstanding efficiency. In recent years, their use has become almost systematic. One example is the Spanish fishery Echebastar, which carried out 97% of its fishing activities using FADs in 2020,[20] just like the French fishery, CFTO (English: French Oceanic Tuna Company), with 96.5% in 2021.[21]



➜ Read our report entitled 'Tuna war games'



20 MSC (2021) Echebastar Indian Ocean skipjack tuna purse seine fishery — Surveillance report.
21 MSC (2023) CFTO Indian Ocean purse seine skipjack fishery — 1st Surveillance audit report.

Seine fishing combined with the extensive use of FADs by Europeans is causing severe damage to biodiversity, particularly through huge volumes of catches of non-targeted species, or targeted species that are too small or damaged to be marketed.

Every year, more than 21,000 tonnes of marine animals in the Indian and Atlantic oceans are declared collateral victims of the greed of a handful of European industrialists.[22,23,24] Fishing statistics are generally reported in tonnes of fish, which makes it difficult to estimate the considerable number of animals killed. These volumes, estimated on the basis of data from on-board observers on a limited number of sea voyages, are certainly underestimated, as attested by the much higher volumes of by-catch kept on board to be sold on local markets in Abidjan and estimated independently.[25] These so-called 'by-catches' are made up mainly of targeted tuna species which are too damaged or too small to be marketed, as well as non-targeted tuna species, representing between 59% and 83% of the volume. The remaining by-catch comprises a wide variety of species: other 'bony' fish (such as dolphinfish and oceanic triggerfish, accounting for 10% to 30%), swordfish and other billfishes (such as sailfish, accounting for 2% to 5%), sharks (mainly silky sharks, but also oceanic whitetipe sharks, etc.; representing 1% to 8%), rays (including Manta rays; <1%) and sea turtles (<1%).[26] Although cases of marine mammal mortality induced by seine fishing are rare in the Indian and Atlantic oceans, interactions with these animals still account for 3% of fishing operations; interactions that can lead to stress and significant injury when the animals are caught in the net.[27] The by-catch rate is also highly dependent on the fishing strategy employed, ranging from 6% to 13% for catches made under FADs, whereas it does not exceed 3% on free schools. It is also higher in the Atlantic basin (7.5%) than in the Indian basin (4.7%), regardless of whether or not drifting FADs are used. These figures may seem 'acceptable' or even low compared to other destructive fishing practices, an argument often put forward by industrialists to justify their misdeeds. However, compared to the extremely high volumes fished by European tropical tuna vessels, they represent a considerable quantity of marine animals, all the more so as they often come from vulnerable species, even those in critical danger of extinction, such as the silky shark, the blue marlin and the Kemp's ridley turtle,[28] where the mortality of a few animals can have dramatic consequences for the entire population. Finally, unlike pole-and-line fishing in the Maldives, up to half of Europeans' by-catch is thrown overboard, usually dead or dying, with the remainder ending up on local African markets, particularly in Abidjan, under the name 'faux poisson' ('fake fish' in French).[29]

Furthermore, these figures do not consider the animals that become entangled in the mesh of the nets hung below the rafts, even though this phenomenon is a source of mortality for hundreds of thousands of silky sharks every year.[30] Recently, the NGO Shark Project highlighted that "*With close to 1,000 tonnes of cumulated annual discards or more than 50,000 animals reported by the 28 vessels of the three currently MSC certified fleets alone, the total annual dimension of discards from large purse seine vessels in the Indian Ocean may easily be two to three times higher than these numbers without even considering any retained bycatch or discards by the large number of small purse seine vessels operated for example by the Indonesian fleet. The extent of discards of possibly 2,000 tonnes or more and the resulting total silky shark mortality is therefore at least ten times higher than previously assumed, while industry continues to claim that purse seine fleets are only responsible for a very small percentage of 1.3% (Garcia & Herrera 2018) of the total fishing induced mortality of silky sharks in the Indian Ocean.*"[31]

Repeated observations of the impact of FADs on shark populations have led the regional fisheries management organizations of the Atlantic Ocean (ICCAT) and Indian Ocean (IOTC) to make

22 Amandè *et al.* (2012) Precision in bycatch estimates: the case of tuna purse-seine fisheries in the Indian Ocean.
23 Amandè *et al.* (2010) Bycatch of the European purse seine tuna fishery in the Atlantic Ocean for the 2003–2007 period.
24 ICCAT (2017) Bycatch of the European purse-seine tuna fishery in the Atlantic Ocean for the period 2010-2016.
25 ICCAT (2016) Tuna fisheries catch landed in Abidjan (Côte d'Ivoire) and sold on local fish market for the period 1982-2014.
26 Bourjea *et al.* (2014) Marine turtle interaction with purse-seine fishery in the Atlantic and Indian oceans: Lessons for management.
27 Escalle *et al.* (2015) Cetaceans and tuna purse seine fisheries in the Atlantic and Indian Oceans: interactions but few mortalities.
28 Voir la liste rouge des espèces de l'UICN.
29 ICCAT (2017) Retaining by-catch to avoid wastage of fishery resources: How important is by-catch landed by purse seiners in Abidjan?
30 Filmalter *et al.* (2013) Looking behind the curtain: quantifying massive shark mortality in fish aggregating devices.
31 Sharkproject (2022) *Carcharhinus falciformis* — a massive bycatch in the industrial purse seine industry but systematically un-derreported and deprived of any protection in the Indian Ocean.

the use of so-called 'non-entangling' FADs compulsory from 2016[32] and 2020,[33] which should no longer include nets but only ropes and pieces of canvas. Despite these provisions, and in the absence of real constraints and controls, a report in 2022 revealed that none of the drifting FADs, some clearly linked to European companies, resourcefully recovered from Kenyan shores since 1 January 2020, complied with this obligation.[34] **Beyond the obvious destruction of biodiversity, these FADs also pose serious marine pollution problems long after they have ceased to operate, since it is estimated that at least 40% of the FADs deployed in the Atlantic and Indian Oceans end up drifting away from fishing grounds and are therefore abandoned or lost at sea, representing no less than 529 tonnes of marine waste per year for the French fleet alone.[38] In the central and western Pacific, over 90% of FADs are never recovered after deployment.[39] In reality, the number of FADs lost in the Indian Ocean is undoubtedly just as high or even higher, as attested by an audit report carried out on behalf of the CFTO as part of the MSC certification of its skipjack tuna fishery in the Indian Ocean.[40] While some 2,750 FADs were deployed in 2021 by CFTO vessels, only 34 were recovered at sea.** Satellite tracking of FADs shows that around 10% end up stranded on beaches or coral reefs, mainly in the Maldives and Seychelles, representing between 1,500 and 2,000 devices each year.[41] Damage to coral reefs is becoming increasingly frequent and well-documented, as in the Mayotte Marine Natural Park, where the stranding of a FAD recently damaged 200 m² of coral reef,[42] or in Aldabra Atoll, a UNESCO World Heritage site, where fishing nets and FADs are the main types of waste found stranded around the island.[43] Analysis of the serial numbers of the FADs beached around the Seychelles islands revealed that three quarters of these FADs belong to Spanish companies.[44] Furthermore, as FADs are equipped with electronic beacons to track their drift and estimate the quantity of fish available under the rafts, the loss and beaching of these beacons induces considerable electronic pollution (batteries, solar panels, electronic circuits, etc.), with impacts that are still largely unknown but undoubtedly negative.

THE LONG ROAD TO THE NECESSARY LIMITATION OF FADS

Regional tuna fisheries management organizations currently limit the number of FADs per seiner to 300 functional buoys (i.e., with active satellite communication) in the Atlantic[35] and Indian Ocean,[36] which is still far too high given their environmental impact. In February 2023, an ambitious resolution was adopted at a turbulent special meeting of the IOTC in Mombasa, Kenya.[37] It provided for the number of FADs per seiner to be limited to 200 from 2026, with only FADs equipped with operational beacons authorized for launching (effectively prohibiting the deployment of unreferenced floating objects in the water, a widespread practice today). Above all, this resolution provided for a 72-day period during which the use of FADs was prohibited. However, in the face of this much needed (but insufficient) progress, the European Commission and the French government, subject to the will of the French and Spanish industrial lobbies, obtained the cancellation of this resolution on 18 August 2023, by seeking the support of nine other countries, all closely linked to European tuna interests, but first and foremost Seychelles, Mauritius and Thailand. As if a gift for services rendered, the latter seems to have since obtained a golden agreement setting customs fees at 0%, just like the two other countries mentioned above. For the Maldives, who do not give in to the whims of European tuna boats, it is 24% more!

Let's hope that this outrageous denial of democracy will convince a majority of countries of the need for much stronger constraints for Europeans: a total and definitive ban on FADs.

A MASSACRE OF JUVENILE FISH ORCHESTRATED BY EUROPEAN SEINERS

FADs also threaten population renewal, as they are responsible for the capture of large numbers of juvenile yellowfin and bigeye tuna, two species considered overfished in the Indian Ocean.[45] Here are a few figures[46] to understand the scale of the disaster (figure 4):

- 98% of yellowfin tuna caught on FADs are juveniles (with an average size of 54 cm), compared with 22% on free schools (117 cm).

32 ICCAT (2015). Recommendation by ICCAT on a multi-annual conservation and management program for tropical tunas
33 IOTC (2019) Résolution 19/02.
34 IOTC (2022) Systematic non-compliance of drifting fish aggregating devices (dFADs) with Resolution 19/02 'Procedures on a Fish Aggregating Devices (FADs) Management Plan' Voir le document d'information pour la 19ème session du comité de conformité de la IOTC.
35 ICCAT (2024). Compendium — Management recommendations and resolutions adopted by ICCAT for the conservation of Atlantic tunas and tuna-like species.
36 IOTC (2019) Résolution 19/02.
37 IOTC (2023) Résolution 23/02.

- For bigeye tuna, the situation is even more alarming: 100% of catches on FADs are juveniles (with an average size of 52 cm), compared with 49% on free schools (97 cm).

Contrary to what might have been expected, the figures for these two species are not much better for Maldivian bait boats: their catches are also almost entirely made up of juveniles, whether caught under anchored FADs or on free schools. With all species considered together — yellowfin (*Thunnus albacares*), bigeye (*Thunnus obesus*) and skipjack (*Katsuwonus pelamis*) — the average proportion of juveniles caught by Maldivian bait boats is 44%, compared with 61% for European tuna boats operating in the Indian Ocean.[47] Nevertheless, over the 2015-2021 period, the volumes caught by bait boat fishers were five times lower (15,000t vs. 78,000t) for yellowfin tuna and 57 times lower (300t vs. 18,000t) for bigeye tuna, so their impact on these species is much less significant. Skipjack tuna, the main species targeted by bait boats, with an annual catch of nearly 86,000t over the 2015-2021 period, is fished more 'cleanly', with a lower proportion of juveniles — nonetheless reaching 34%! In the Maldives, longline and handline fishing are the only fisheries that catch the majority of mature individuals and therefore do not threaten the reproductive potential of these species.

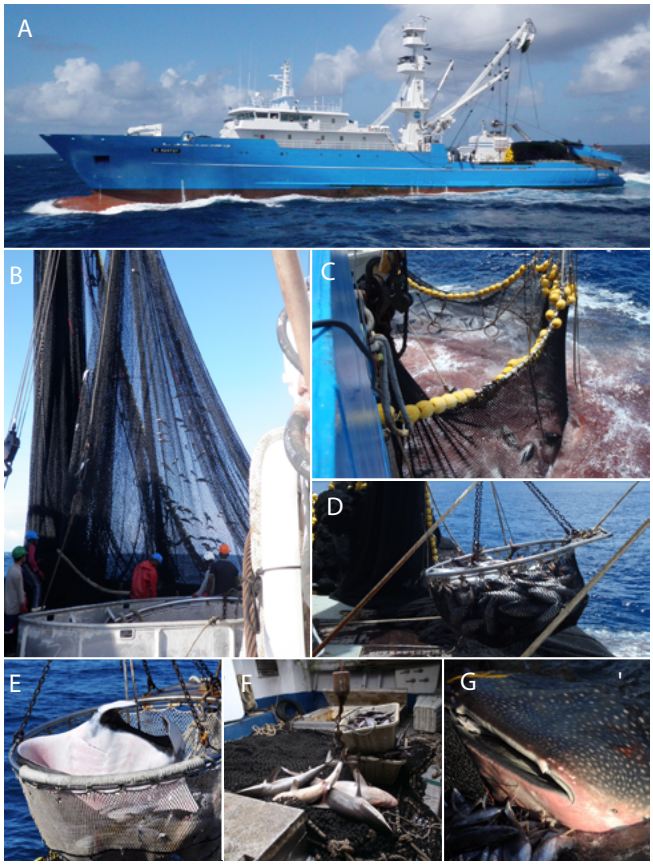
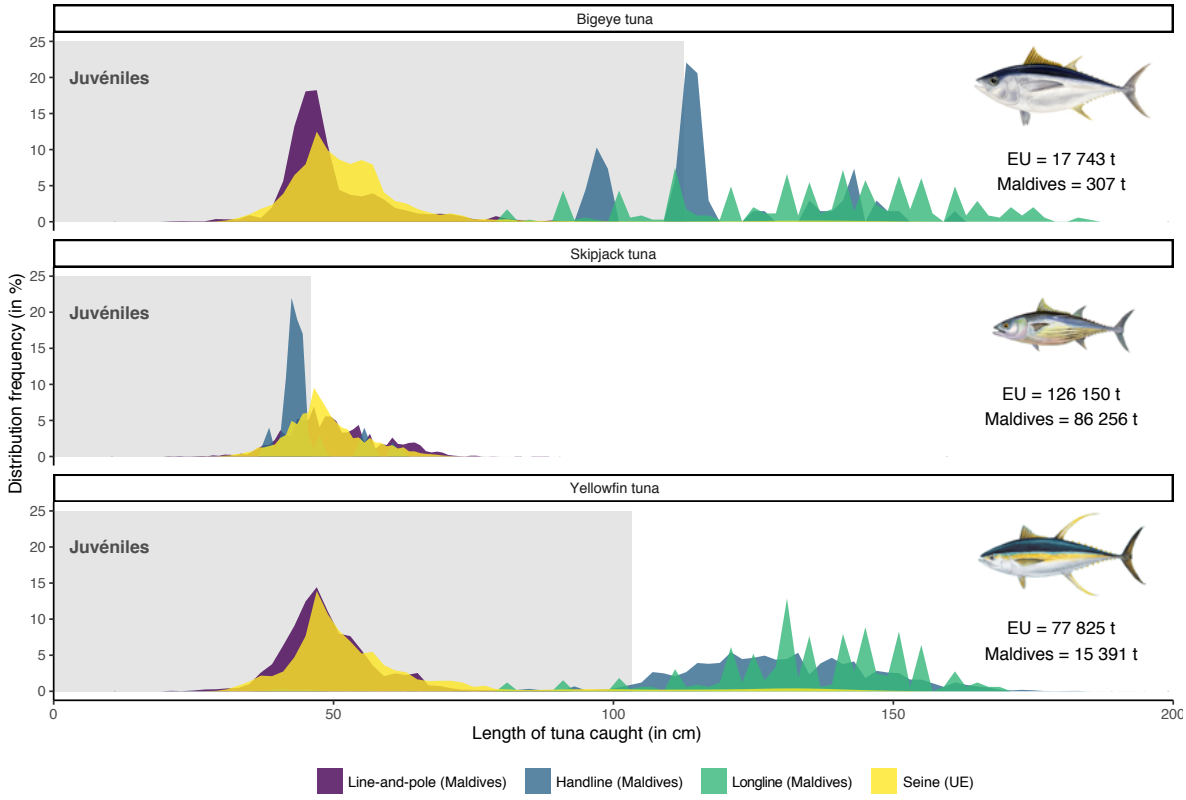


Figure 3. Illustrative images of European seine fishing. The gigantic size of the vessels (A) and the net (B). After encircling the school of tuna, the net is progressively reduced (C) to allow the tuna to be caught using a landing net called a salabard (D). By-catch examples: manta ray (E), silky sharks (F), whale shark (G).

38 Imzilen *et al.* (2022) Recovery at sea of abandoned, lost or discarded drifting fish aggregating devices.
39 Western and central Pacific fisheries commission (2020) Report on analyses of the 2016/2020 PNA FAD tracking programme.
40 MSC (2023) CFTO Indian Ocean purse seine skipjack fishery — 1st Surveillance audit report.
41 Maufroy *et al.* (2015) Large-scale examination of spatio-temporal patterns of drifting fish aggregating devices (dFADs) from tropical tuna fisheries of the Indian and Atlantic Oceans.
42 Parc naturel marin de Mayotte (2023) Echouage d'un dispositif de concentration de poissons (DCP) dérivant issu d'un thonier senneur.
43 Burt *et al.* (2020) The costs of removing the unsanctioned import of marine plastic litter to small island states.
44 Island Conservation Society (2015) Environmental impacts and causation of 'beached' Drifting Fish Aggregating Devices around Seychelles Islands: a preliminary report on data collected by Island Conservation Society.
45 IOTC (2024) Status summary for species of tuna and tuna-like species under the IOTC mandate, as well as other species impacted by IOTC fisheries.
46 IOTC size dataset for the period 2015-2021.
47 These figures were calculated by weighting the percentages of juveniles of each species by the contribution of each species to the total volume landed.

Figure 4. **Length of tuna caught by European (purse seine) and Maldivian (pole-and-line, handline, and longline) fishers. Data covers the period 2015-2021 and is taken from the IOTC database. All catches are represented, whether from FADs or free schools. Shaded areas indicate sizes corresponding to juvenile, immature individuals. Average annual catch volumes for European purse seiners and Maldivian bait boats are shown for each species on the right of the figure.**



A CARBON FOOTPRINT THAT TRIPLES IN SIZE

Based on vessel consumption and catch data, and the reconstruction of tuna value chains — from landing to processing and distribution — we have also been able to make an initial estimate of the carbon footprint of tropical tuna fishing (figure 5).

THE DEPENDENCE OF EUROPEAN SHIPS ON FUEL

Our analysis reveals that the overwhelming majority of greenhouse gas (GHG) emissions from European tuna seiners comes from the heavy fuel consumption of these vessels, which accounts for 59% of their total carbon footprint. Despite having very few vessels — just 50 or so (0.3% of the fleet) — French and Spanish tropical tuna vessels are extremely energy-hungry, consuming an average of 53 and 124 million liters of diesel per year respectively over the 2009-2020 period, which represents 16% and 19% of the total fuel used by the fishing fleets of these two countries, all segments combined.[48] The diesel consumption of these tropical tuna boats releases around 470,000 tonnes of carbon dioxide into the atmosphere every year. Despite European and international targets for reducing greenhouse gas emissions, emissions from fossil fuel use have risen steadily over the past decade, from 372,000 tonnes in 2009 to 531,000 tonnes of CO_2 in 2020.

With annual catches of 96,000 and 237,000 tonnes of tuna, vessels flying French and Spanish flags have energy efficiencies ranging from 415 to 804 l/tonnes, i.e., higher overall than the average value of 489 l/t reported for world fisheries.[49] The low end of this range is widely used by the tuna lobby to boast low carbon impact, highlighting the hyper-efficiency of industrial fishing as a 'pro-climate' argument. But their 'carbon impact' is not limited to their gargantuan fuel consumption, rendered 'acceptable' by equally enormous catches — far from it...

Indeed, today's tuna seiners use so many FADs that they depend on 'support vessels' to transport, deploy and recover them. France and Spain employ some twenty support vessels, up to 46 meters in length, operating mainly in the Indian Ocean. Fuel consumption by these vessels releases an additional 32,000 tonnes of CO_2 every year, or 4% of the total carbon footprint of tuna.[50]

CANNING TUNA: A MAJOR CONTRIBUTOR TO GREENHOUSE GAS EMISSIONS

Once landed, the tuna travels long distances before being 'transformed' into canned food (see box 'The tuna trail: from the Indian Ocean to our plates'). Tuna caught in the Indian Ocean is mainly transported to canneries in Mauritius, the Seychelles and Madagascar, and even to factories in Thailand and Europe. On the Atlantic side, Abidjan is the main tuna port for EU purse seiners, with three canneries processing the majority of European catches. However, less than 10% of the catch is processed into loins. The Spanish company Echebastar and the French company Sapmer, for example, have invested in vessels capable of freezing tuna between -40°C and -60°C, enabling them to access a high-end market and sell tuna loins, which are then sold as steaks in the USA and Europe, or as sashimi in Japan. **Our analysis shows that tuna canning is also a major source of GHG emissions, since it accounts for 18% of the total carbon footprint alone, which**

48 STECF data averaged over the period 2009-2020.
49 Parker *et al.* (2018) Fuel use and greenhouse gas emissions of world fisheries.
50 Ougier, 2024. PhD thesis. According to the results of this thesis, over the period 2015-2019, French and Spanish tuna vessels employed around twenty support vessels. The fuel consumption of a support vessel corresponds to 15.3 ± 1.5% of the consumption of a tuna seiner.

is equivalent to 146,000 tonnes of CO_2 released every year. This part of the production chain comprises a number of stages – defrosting, cutting, cooking, carcass cleaning, can lining, can sterilization, packaging, purification of plant wastewater, etc. – each of which releases CO2 through the production of electricity or heat, or the transportation of the materials/goods required to carry out all these stages.[51]

Although the distances covered by tuna from their landing site to their ultimate destination are sometimes very long, sea freight transport accounts for only 7% of the total footprint, which still corresponds to 53,000 tonnes of GHGs. The low carbon impact of sea freight is linked to the colossal quantities of goods transported. But let's not forget that this mode of transport is far from responsible, since in order to travel the planet, merchant ships use one of the dirtiest fuels in the world — a viscous residue of petroleum, heavy and difficult to burn — which emits not only carbon dioxide, but also nitrous oxide (a powerful GHG with a warming potential 300 times greater than that of CO2) and sulfur particles known for their harmful effects on human health.

OCEAN CARBON STORAGE DISRUPTED BY INDUSTRIAL FISHING

Fishing has also prevented the deep sequestration of large quantities of carbon through the sedimentation of animal carcasses, i.e. one of the main export routes of the biological carbon pump (see box). This 'blue carbon' contained in marine organisms extracted from their environment by fishing is eventually released into the atmosphere, either by respiration/excretion for the parts that can be consumed by human beings, or by waste treatment for the parts that cannot be consumed.[52] **Emissions of almost 95,000 tonnes of CO_2 — 12% of the total carbon footprint of tropical tuna fishing — result from the extraction of this marine biomass by fishing.** These emissions are often neglected in the carbon balance of marine products, even though this carbon would have remained trapped in the ocean in the absence of fishing. This carbon sink should not be neglected in the fight against climate change, since it enables carbon sequestration over long time scales. Fish carcasses that reach the ocean floor can sequester carbon in the deep ocean for 800 to 1,000 years, making it a more effective carbon sink in terms of sequestration time than terrestrial forests, whose carbon renewal time is only around 40 years.[53] Furthermore, these estimates do not take into account the carbon exported at depth via the production by tuna of dense, carbon-rich fecal matter that sinks rapidly to the ocean floor, another major export route of the biological carbon pump.[54]

THE POTENTIAL OF THE BIOLOGICAL CARBON PUMP TO MITIGATE CLIMATE CHANGE

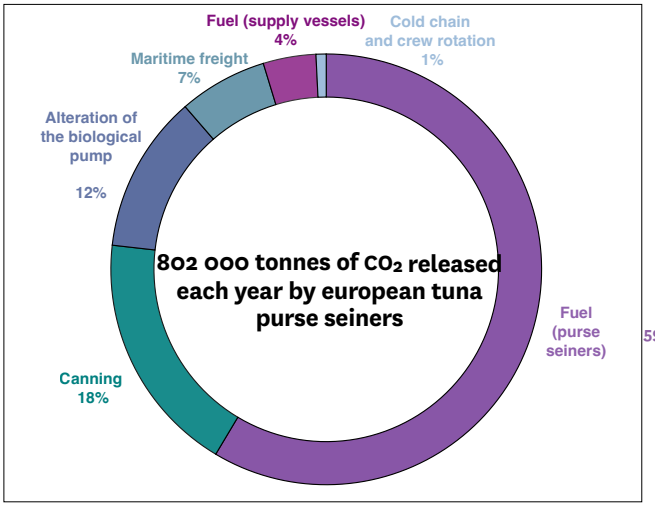
The biological carbon pump is a series of biological processes that transport carbon from the ocean surface to the seabed. At the ocean surface, some of the CO_2 from the atmosphere dissolves in the water. This dissolved carbon is absorbed by phytoplankton during photosynthesis to produce organic matter. This matter, which includes carbon, is either transferred to higher trophic levels (zooplankton, fish, etc.) or sinks to the ocean floor via various export routes. The deeper the carbon is exported, the longer it will be trapped by the ocean before returning to the atmosphere. Fishing, by removing animals from the ocean that would have sequestered carbon, prevents this pump from working properly.

51 Hospido *et al.* (2006) Environmental assessment of canned tuna manufacture with a life-cycle perspective.
52 Mariani *et al.* (2020) Let more big fish sink: Fisheries prevent blue carbon sequestration—half in unprofitable areas.
53 Mouillot *et al.* (2023) Industrial fisheries have reversed the carbon sequestration by tuna carcasses into emissions.
54 Bianchi *et al.* (2021) Estimating global biomass and biogeochemical cycling of marine fish with and without fishing.

EUROPEAN CREWS FLOWN TO THE ENDS OF THE EARTH

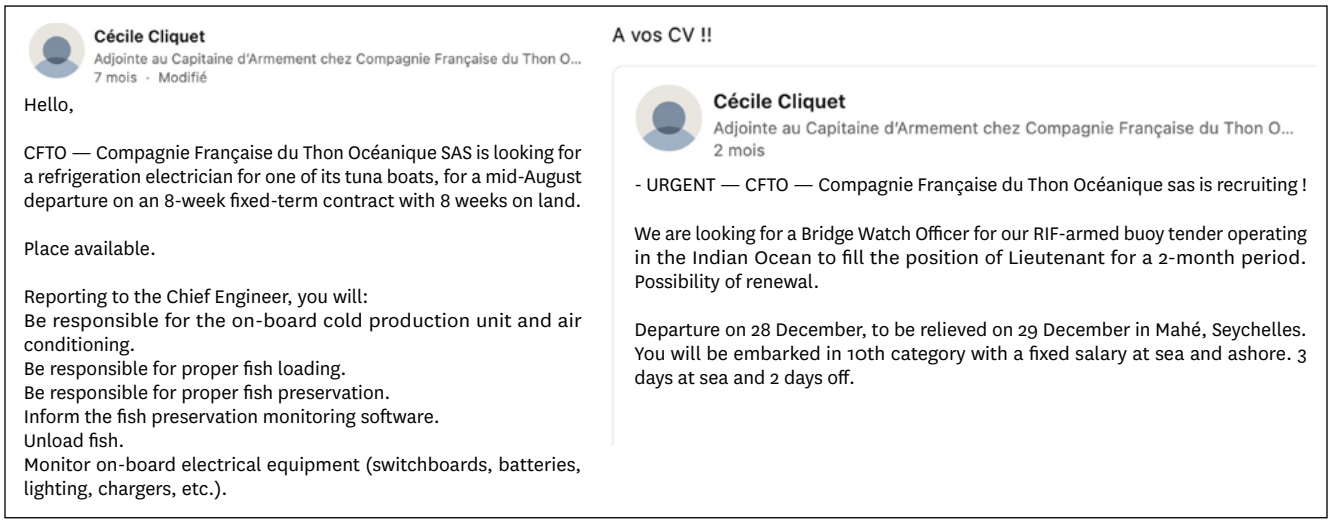
Another source of CO_2 emissions — systematically omitted from carbon footprints — is crew rotations (figure 6). Several hundred French and Spanish fishers work on the tropical tuna boats, alongside Seychellois, Senegalese, Ivorians, Ghanaians, Kenyans, Indonesians, Filipinos and others. French crews depart from Lorient or Brest, fly to Paris and then take one or more planes to Seychelles (Mahé), often via Qatar or Saudi Arabia, or the Ivory Coast (Abidjan). A crew rotation system allows vessels to operate almost continuously. Sailors embark for varying lengths of time — between 7 and 10 weeks — before enjoying an equivalent rest period in France and being replaced by other sailors. Every year, these round trips by air release an additional 5,000 tonnes of greenhouse gases. Although these emissions represent a small proportion of the total carbon footprint (less than 1%), they highlight a system that is fundamentally anti-environmental: sending hundreds of sailors thousands of kilometers away, several times a year, to fish for depleted tuna populations using destructive fishing methods; the fish is then processed in local factories, allowing social dumping to continue, in order to produce cheap fish for supermarkets.

→ Figure 5. Breakdown of the carbon footprint of European tuna seiners by sector of activity. Between 4.5-6.4kg of CO_2 are emitted to produce 1kg of tuna (canned or loins).



In total, an average of 802,000 tonnes of CO_2 are released every year by Europeans to produce tuna (mainly canned but also loins), which is equivalent to the carbon footprint of almost 98,000 French people[55] or the carbon footprint of a country like Somalia.[56] On a per unit net mass basis (after processing into cans or loins), between 4.5 and 6.4 kilograms of

→ Figure 6. Examples of job offers posted on Linkedin by CFTO to recruit French sailors to embark on a fishing trip in the Indian Ocean.



55 This figure was calculated by dividing total GHG emissions by the average carbon footprint of the French population in 2020, i.e. 8.2 tonnes of CO_2 per inhabitant per year, from the French Ministry of sustainable development, which, for reference, is more than 4 times higher than the 2 tonnes per capita per year needed to achieve the Paris Agreement objective of limiting the rise in the planet's average temperature to well below +2°C by the end of the century.

56 Source: CO_2 emissions per country.

57 STECF data averaged over the period 2009-2020.

CO_2 are released into the atmosphere to produce one kilogram of tuna (table 1). This is still lower than other sources of animal protein not linked to fishing, but real question is: do we really need to consume tuna in Europe that is fished thousands of kilometers away in the waters of Global South countries, which are directly dependent upon these resources? Is this a food security issue for Westerners? The answer is obviously no, and any means of reducing the carbon footprint (not to mention the many other negative impacts associated with seine fishing) of our food is a good way of limiting ongoing climate change.

Furthermore, these figures are a low estimate, as they do not take certain stages of the life cycle into account, such as emissions associated with the mining, processing and transport of fuel used for fishing, or emissions associated with the construction/renovation of vessels and nets. However, our estimates remain higher than those relayed by the industry, which do not consider the full range of emission sectors and generally stop at the landing of the fish, without taking into account the emissions associated with the downstream end of the chain. In addition, they are based on the wet weight of landed tuna, failing to allow for the reduction in fish mass after processing, which is halved during canning, thus artificially reducing the carbon footprint.

It should also be noted that the climate impact of European fishing companies is actually much greater, since many European-owned vessels fly flags of convenience and have therefore not been included in this analysis. Between 4.4 and 6.1 kilograms of CO_2 is released into the atmosphere to produce one kilogram of tuna per unit mass of final product (canned or loins). Almost 50% of the purse seiners owned by Spanish companies operate under flags of convenience such as Belize, Panama, Cape Verde, Curaçao, Guatemala, El Salvador, Seychelles, etc. France has 6 tuna seiners registered in Seychelles, Mauritius and Belize.

THE TUNA TRAIL: FROM THE INDIAN OCEAN TO OUR PLATES

The most important catching area for the EU tuna fleet is the western Indian Ocean, with an average of almost 193,000 tonnes of tuna caught annually. The other main catching area is the eastern central Atlantic (106,000 tonnes).[57] Spanish tuna seiners also fish in the eastern tropical Pacific in smaller volumes, varying between 14,000 and 62,000 tonnes depending on the year, under fishing agreements with Kiribati, the Solomon Islands and Micronesia. These industrial vessels mainly catch skipjack or bonito tuna (53%; *Katsuwonus pelamis*), yellowfin tuna (38%; *Thunnus albacares*) and bigeye tuna (9%; *Thunnus obesus*). Once landed, tuna caught in the Indian Ocean travels several thousand kilometers before reaching the European market.[58,59] Almost 90% of catches are landed in Port Victoria in Seychelles, with the remaining 10% landed directly in Mauritius or Madagascar, where they are canned. Of the catches landed in the Seychelles, almost a quarter are processed in the canning factories of Indian Ocean Tuna Ltd, a company whose shares are mainly held by the Thai seafood processing giant Thai Union, which also owns the Petit Navire brand. These canneries have monstrous production capacities, processing 80,000 tonnes of tuna a year and producing 1.3 million cans a day. However, three quarters of the catches landed in Seychelles are transshipped by refrigerated cargo ships or containers to supply canneries in Mauritius mainly (but also in Thailand, Madagascar and Spain) which currently has the largest processing capacity in the western Indian Ocean, with almost 105,000 tonnes of canned tuna each year. Nearly 80% of these canned tuna products will ultimately be shipped by cargo ship to Europe for distribution in the UK, France, Spain and Italy.

58 Lecomte et al. (2017). Indian Ocean tuna fisheries: between development opportunities and sustainability issues. See figure 25 (page 55) summarizing the value chain of tuna caught by the Maldivian baitboat fleet. This figure was used to estimate the carbon footprint associated with Maldivian catches in the Indian Ocean.

59 European Commission (2019). Ex-post and ex-ante evaluation study of the Fisheries Partnership Agreement between the European Union and the Republic of Seychelles and of its Implementing Protocol. See figure 4 (page 33) summarizing the value chain of tuna caught by the European tuna fleet in the Indian Basin. This figure was used as the basis for estimating the carbon footprint associated with Indian catches.

60 Miller et al. (2017) Rate of fuel consumption in the Maldivian pole-and-line tuna fishery.

POLE-AND-LINE FISHING: A MUCH MORE ECONOMICAL MODEL

For comparison, we also estimated the carbon footprint from Maldivian pole-and-line caught tuna using landing data published by the Indian Ocean Tuna Commission (IOTC) and energy efficiency values, ranging from 197 to 328 liters of diesel per ton of tuna caught, reported by the *International Pole-and-Line Foundation*.[60] **Our results are indisputable. With a carbon footprint of between 1.5 and 2.1 kgCO_2/kg of tuna produced, pole-and-line tuna production contributes almost three times less to climate change (table 1).** On average, 101,000 tonnes of CO_2 are emitted every year to produce pole-and-line tuna in the Maldives. The carbon footprint of this product can be broken down as follows:

- 62% of emissions are associated with fuel consumption, with almost 24 million liters of diesel used by fishing vessels;
- 16% to the extraction by fishing of marine biomass that would otherwise have been trapped in the depths of the ocean;
- 14% for tuna canning;
- 7% to the transport of goods by sea freight.

This low environmental impact is due partly to the greater efficiency of the vessels — Maldivian pole-and-line vessels fish more for the same amount of greenhouse gas emissions — and due partly to a shorter supply chain. Nearly 50% of the tuna caught by bait boats is consumed fresh directly by local populations, which greatly reduces the carbon footprint associated with canning.

However, in a hypothetical scenario where all the tuna caught using pole-and-line was canned and then exported to Europe, the carbon footprint of this fishery would rise significantly, as well as threatening the Maldives' food security. A massive shift by European consumers towards this type of product is therefore not advisable. Reducing the carbon footprint associated with food is possible by changing our consumption habits. As far as tuna is concerned, it seems necessary to reduce consumption, which currently exceeds 70,000 tonnes per year in France[61] — and, above all, by buying fresh fish caught locally using fishing methods that emit fewer greenhouse gases and have less impact on biodiversity. In this respect, the example

→ Table 1. Carbon footprint of different sources of proteins, expressed in kilograms of carbon dioxide equivalent per kilogram of final product. For comparison, the carbon footprints of tofu and beef, the products with one of the lowest and one of the highest environmental footprints respectively, are shown.

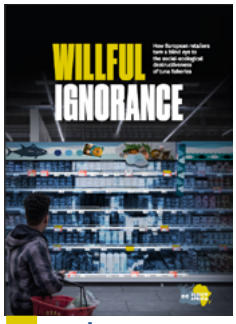
Type of food	Carbon footprint (kgCO_2/kg of product)	Source
Tofu	0.7	Agribalyse
Net-caught fish (Boulogne-sur-Mer, France)	1.4	This study
Pole-and-line-caught tuna (Maldives) *The range of values represents variability between years over the 2009-2020 period*	1.5 — 2.1	This study
Seine-caught tuna (Spain + France) *The range of values represents variability between years over the 2009-2020 period*	4.5 — 6.4	This study
Beef	27	Agribalyse

These values are taken from the Agribalyse database — produced by the Agence de l'environnement et de la maîtrise de l'énergie (French Environment and Energy Management Agency) — which references the environmental impact of agricultural products using the life cycle analysis method.

61 FranceAgriMer (2020). Consommation des produits de la pêche et de l'aquaculture.
62 The carbon footprint of netters was calculated using data on fuel consumption and landed volumes collected from artisanal fishers in Boulogne-sur-Mer in 2013. These vessels (with an average size of 12m) caught a total of 58.7 tonnes of fish, consuming 20,398 litres of fuel. See related news on our website.

of the netters in the port of Boulogne-sur-Mer, alongside whom we fought against electric fishing, is enlightening. For every kilo of fresh fish sold within a 500-kilometer radius of the port of landing, these fishers emit 1.4 kg of CO_2,[62] i.e. slightly less than Maldivian pole-and-line tuna, and up to four times less than the French or Spanish industrial tuna found in Petit Navire, Saupiquet and other cans. However, this is still around twice as much as a plant-based source of protein such as tofu.

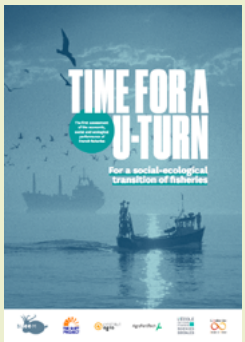
Finally, it is worth remembering that the mass retailers are the main culprits in this situation, by choosing to stock their supermarkets with products from these destructive fisheries and by adopting supply policies that are often opaque, as we showed in our ranking of the major retailers.



➔ **Read our report entitled 'Willful ignorance'**

MINIMIZING THE IMPACT OF OUR MARINE ANIMAL DIET MEANS CHOOSING FISH CAUGHT WITH PASSIVE GEARS

The bottom trawl, criticized for its destructive impact on the seabed and the very large quantities of by-catch associated with it, is paradoxically still the most widely used gear in France, accounting for almost 27% of catches in 2021! Apart from the fact that it leaves no chance for marine ecosystems as it scrapes the ocean floor, it is also the least efficient gear in terms of fuel consumption. A bottom trawler between 12 and 18 meters long, fishing in the Northeast Atlantic, consumes between 1,235 and 1,422 liters of fuel to catch a ton of fish, whereas small inshore fishing vessels — those under 12 meters using passive fishing gear — consume between 549 L and 606 L for trolling boats, between 329 L and 552 L for netters, and between 283 L and 349 L for vessels fishing with traps; this is two to four times less fuel than a bottom trawl to land the same volume of fish (STECF data for 2019 and 2020). This inefficiency is due to the considerable energy required to deploy and tow the nets that scrape the seabed.



➔ See our report entitled Time for a U-turn, in which we carried out a multi-criteria assessment of the economic, social and ecological performance of French fisheries

63 Le Manach *et al.* (2013) European Union's public fishing access agreements in developing countries.
64 Directive 2003/96/CE.

A SYSTEM SUBSIDIZED BY PUBLIC MONEY AND BENEFITING FROM A WEALTH OF TAX ADVANTAGES

The European fishing industry, like the agricultural sector, relies heavily on European aid under common policies. In addition to these direct subsidies, there are so-called indirect subsidies such as exemption from the fuel tax (the domestic consumption tax on petroleum products or TIPP), and in the case of tropical tuna fishing, exemption from import tax for tuna canned in Seychelles or Mauritius and destined for Europe. Lastly, astronomical sums are spent every year by the EU to conclude so-called 'sustainable fisheries partnership agreements' with Global South countries,[63] a Newspeak which in reality designates the organized plundering of these countries' resources by a handful of European industrialists, including those involved in tuna fishing.

SUPERFICIAL PROFITABILITY FOR MANUFACTURERS THANKS TO TAX RELIEF ON FUEL

EU rules on the taxation of energy products used as motor fuel, heating fuel and electricity are set out in the European Energy Tax Directive (ETD), which was implemented in 2003 to standardize and impose 'minimum rates of excise duty for the taxation of energy products'.[64] The directive also provides for exemptions for a number of economic sectors. In particular, article 14.1c of the directive establishes a tax exemption on '*energy products supplied for use as fuel for the purposes of navigation within Community waters (including fishing), other than private pleasure craft, and electricity produced on board a craft*'. In addition, this exemption is extended to international waters on the basis of international agreements, partly based on the International Maritime Organisation's FAL Convention on Facilitation of International Maritime Traffic and therefore also applies to European tuna vessels operating outside Community waters.[65]

As part of the Green Deal for Europe adopted by the European Commission on 11 December 2019, the EU has set itself the target of reducing its net greenhouse gas emissions by 55% by 2030 compared to 1990 levels, and to become completely carbon neutral by 2050.[66] However, the ETD is currently totally disconnected from these climate and energy efficiency objectives by favoring the use of fossil fuels via a wide range of tax exemptions and reductions and by discriminating against new, less carbon-intensive fuels via a volume-based taxation model (i.e. rates are expressed in €/liter). For this reason, on 14 July 2021, the European Commission presented a proposal for the revision of this directive, which includes a new structure for tax rates based on energy content and environmental performance (i.e. rates would be expressed in €/gigajoule),[67] an extension of the products subject to taxation, and the abolition of the mandatory fuel tax exemption for the aviation, inland waterway navigation and fisheries sectors.[68] The minimum tax rates for fuel used for fishing would nonetheless be much lower than those applicable to the general use of fuel, with a proposed rate of €0.9/gigajoule (i.e. €0.036/liter).

65 European Parliament (2013) Fuel subsidies in the EU fisheries sector.
66 European Commission (2021). Revision of the Energy Taxation Directive (ETD): Questions and Answers.
67 Biofuels are disadvantaged by volume-based taxation because a litre of biofuel generally has a lower energy content than a litre of competing fossil fuel, even though the same rate of tax applies.
68 European Commission (2021). Proposal for a COUNCIL DIRECTIVE restructuring the Union framework for the taxation of energy products and electricity (recast).

Despite the low level of ambition of the text, the industrial fishing lobbies did not take long to react.[69] In its response to the impact assessment on the revision of the ETD, the European Europêche lobby, the most powerful and damaging in Europe, which includes the tuna fishing industry, is unsurprisingly opposed to any fuel tax, claiming in its usual cynical way that such measures would increase the price of fish exported to Africa, threatening the food security of the continent's populations, while the industrialists who make up this lobby are simultaneously participating in the plundering of these countries' food resources under fishing agreements.

An estimate of the amounts saved thanks to the tax exemption on fuel prices gives a better understanding of why the tuna fishing industry is so keen to maintain this privilege. Tropical tuna seiners consume colossal quantities of fuel because of their size and spatial coverage. **Although these vessels represent only 0.3% of the French and Spanish fleets in terms of units, they consume on average 16% and 19% of all the fuel used for fishing in these two countries, i.e. 53 and 124 million liters of diesel each year.**[70] As a result, they are the main beneficiaries of the fuel tax exemption. **BLOOM has looked into the matter, and, by comparing the costs of taxed and zero-rated fuel, we estimate that the French and Spanish tuna fishing industries save an average €27.8 million and €43.5 million a year on fuel prices, compared with a scenario in which they would not be exempt and would be subject to the same rate of tax as that applicable to the general use of fuel (figure 7). This represents a tax relief for the European tuna fleet of more than €71 million, a sum that is therefore not collected by the EU.** These subsidies are particularly harmful to the environment and biodiversity, as they encourage excessive consumption of fossil fuels and increase the fishing capacity of fleets.[71] Furthermore, without the tax exemption on fuel prices, the French fleet of tropical tuna seiners would be in serious deficit (figure 8) ; an observation that has already been highlighted in scientific literature more widely for European industrial and remote fleets.[72, 73] **While this fleet segment is struggling to keep its head above water with an operating margin in surplus of just +6.8% over the period 2009-2020, it becomes unprofitable with a margin of -14.4% in a scenario where fuel is taxed**. Our analysis also reveals that operating margins vary considerably from one year to the next, ranging from -31% to +21% before the removal of tax relief and from -62% to +6% after the removal of tax relief, demonstrating on the one hand the instability of the business model of these companies and on the other their dependence on a wide range of tax benefits without which they could not survive. Similar trends, although less marked, are observed for the Spanish fleet, whose operating margin falls from +22% to +9% in a scenario where fuel is taxed. As a premise for a probable end, two of France's three tropical tuna fishing companies are currently undergoing an unprecedented crisis: since 2021, Sapmer has sold six of the nine tuna seiners it owned[74, 75, 76] and the fishing company Via océan (formerly Saupiquet) is on the verge of liquidation, threatening the jobs of around fifty sailors.[77]

One could argue, as Marc Ghiglia, spokesperson of the industrial lobby of the *Union des armements à la pêche de France* (UAPF), did, that such taxation of European vessels operating outside EU waters would be a 'headache' to implement.[78] Nevertheless, the possibility of taxing distant fleets is taken seriously by the European Commission, which states in its proposal for revision of the ETD: *"As regards [...] navigation by extra-EU waterways, including fishing, Member States may apply exemptions or the same levels of intra-EU taxation, depending on the type of activity"*. European tropical tuna vessels also pay no fuel taxes in the countries in which they operate, like in Seychelles, where they can buy tax-free fuel directly from Port Victoria.[79] Finally, in addition to tax-free fuel, European tuna vessels benefit from a discount of 20 US dollars for each ton of fuel purchased from

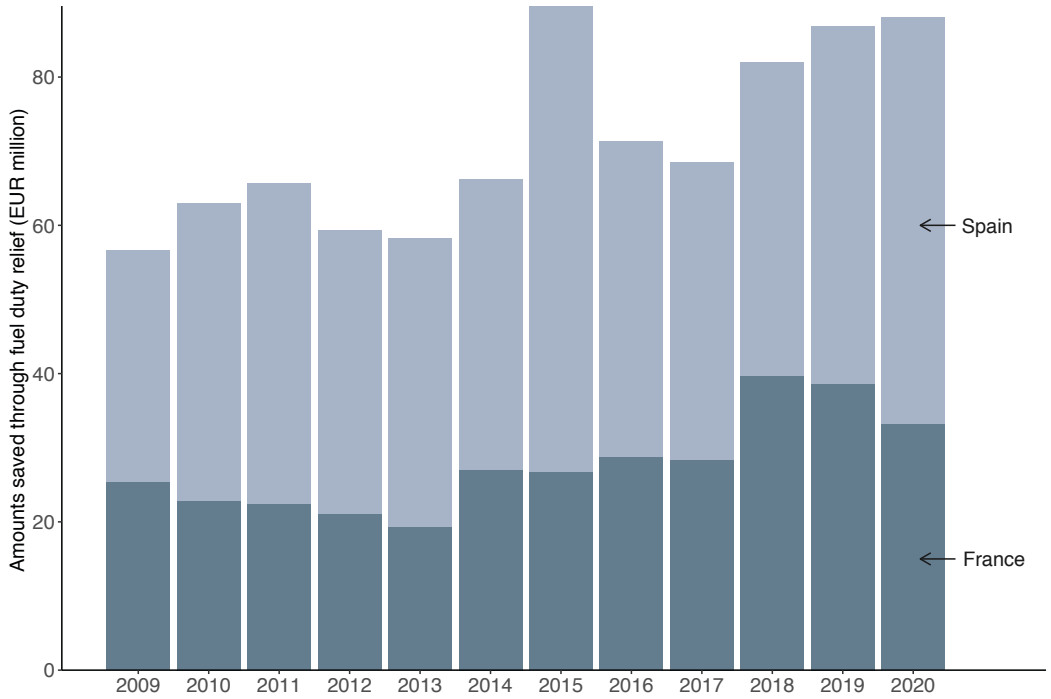
69 Europêche (2020) Fishing industry response to the Inception Impact Assessment on the revision of the Energy Taxation Directive.
70 STECF data averaged over the period 2009-2020.
71 Sumaila *et al.* (2019) Updated estimates and analysis of global fisheries subsidies.
72 Carvalho et Guillen (2021) Economic impact of eliminating the fuel tax exemption in the EU fishing fleet.
73 Vaughan *et al.* (2023) Revisiting fuel tax concessions (FTCs): The economic implications of fuel subsidies for the commercial fishing fleet of the United Kingdom.
74 Ouest France (2023) Pêche. La Sapmer cède trois thoniers senneurs.
75 Le Marin (2023) L'armement Sapmer trouve un acheteur pour le "Manapany".
76 Le Marin (2021) L'armement Sapmer se sépare de trois thoniers.
77 Ouest France (2024) À Concarneau, les marins de Via Océan se rassemblent mardi.
78 Le Marin (2021) Le carburant détaxé destiné à la pêche sur la sellette.
79 Seychelles' Report to the Fisheries Transparency Initiative (FiTI; 2021).

SEYPEC — the Seychelles oil company — which, given the colossal volumes consumed by these vessels, could represent a reduction of several million euros each year.

In comparison, the pole-and-line fishing sector in the Maldives is also subsidized, but on an entirely different scale. In 2020 and 2021, 1.3 million Maldivian rupees were paid out to all fishers (not just the pole-and-line tuna fishers) in the form of fuel subsidies, equivalent to around 80,000 euros.[80] In 2019, this amount was 167,000 rupees, or just over 10,000 euros.

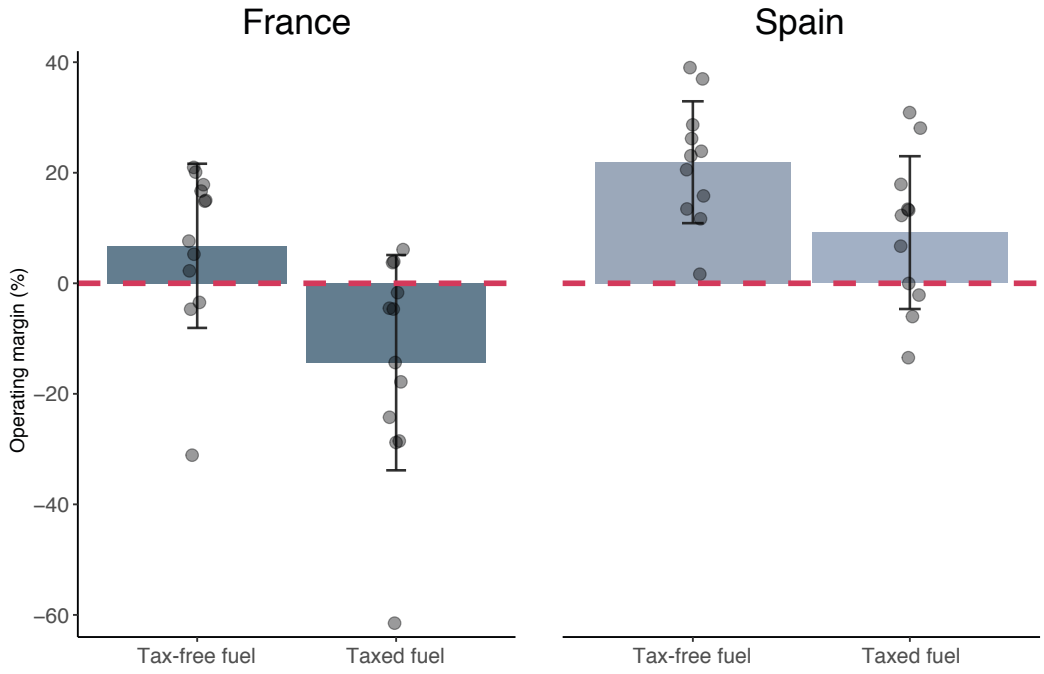
The differences between these amounts reveal an unfair and unjust distortion of competition between, on the one hand, the industrial and predatory European fleet piloted by a handful of players and, on the other, the local and more environmentally-friendly Maldivian fleet. **As part of the review of the ETD,[81] BLOOM supports the gradual end of the exemption from the Domestic Consumption Tax on Energy Products, which encourages excessive consumption of fossil fuels and mainly favors the most fuel-hungry industrial fleets, such as the tropical tuna fleet.** The low level of taxation proposed in the current draft revision of the ETD will do nothing to halt the ongoing climate crisis. The minimum rate of taxation planned for fuels used by fishing vessels must be in line with the sector's transitional challenges. The public money collected through these subsidies could also be reallocated to the sector's ecological transition and support for small-scale coastal fishing.[82]

Figure 7. Savings made by French and Spanish tropical tuna seiners through tax exemption on fuel prices over the period 2009-2020.



80 Maldives business review (2022). The State spends MVR 2.8 million on fuel subsidies to fishermen.
81 Euractiv (2023) Energy Taxation Directive: Europe's key climate law stuck in a quagmire. While the revision of the ETD was proposed in July 2021 by the European Commission, negotiations at Council level have been hindered due to the inability of Member States to reach the unanimity required to adopt the text.
82 Our Fish et ClientEarth (2023) Better use of public money: the end of fuel subsidies for the EU fishing industry.

Figure 8. Average and standard deviation of operating margins for the French and Spanish tuna fleets before and after the abolition of tax relief on fuel prices, calculated over the period 2009-2020. The dots represent raw annual data and reveal a significant variability in operating margins between years.



A company's operating margin is a performance indicator that shows the percentage of sales that is converted into wealth. The formula for calculating the operating margin is: (Operating profit / Sales) x 100. Operating profit is the difference between total income from landings (and other income) and total operating costs (purchase of fuel, repairs, maintenance, salaries, etc.).

The fuel mainly used by fishers is marine diesel. It is similar to that used for cars, but its blue coloring makes it easier to trace and prevent fraud. The amounts saved by manufacturers thanks to the tax exemption on fuel have been estimated by cross-referencing two sources of data:

1. The Scientific, Technical and Economic Committee for Fisheries (STECF) which includes data on the economic and energy performance of the different segments of the French and Spanish fleets. The data presented includes the number of liters of fuel consumed by the French and Spanish fleets of purse seiners over 40m operating outside the European Union, i.e. tropical tuna vessels.

2. Historical fuel prices since 2005 downloaded from the **Weekly Oil Bulletin.**[83] Weekly prices with/without tax and TIPP values for the various fuels are shown for each Member State. It should be noted that each Member State is free to set its own rates as long as the minimum rates set out in the ETD are respected. In France, the TICPE for automotive diesel is currently €0.6091/L, which can vary from year to year. Tax amounts have been adjusted for inflation using 2020 as the reference year.

The cost of the tax exemption is estimated by multiplying the fuel consumption of tuna seiners (in number of liters) by the value of the fuel tax.

EUROPEAN STRUCTURAL FUNDS TO THE RESCUE OF TROPICAL TUNA FISHING

The purpose of the European Structural and Investment Funds is to provide financial support for the implementation of the Common Fisheries Policy (CFP), the main objectives of which are, in principle, to reduce overcapacity and encourage the sustainable exploitation of fisheries resources. Since 1994, there have been four successive funds:

- The first and second iterations of the Financial Instrument for Fisheries Guidance (FIFG) between 1994 and 1999[84] and 2000-2006[85] respectively;
- The European Fisheries Fund (EFF) between 2007-2013;[86]
- The European Maritime Affairs and Fisheries Fund (EMFAF), initially programmed for the period 2014-2020 but extended to 2023 because the fund had not been fully exhausted.[87]

The operation of each fund is governed by a regulation which specifies the measures to be subsidized and the rules for publishing data on beneficiaries.

BLOOM has collected, cleaned, homogenized and enriched the lists of beneficiaries held by the French administration since 1994.[88] The data on subsidies allocated to Spanish vessels comes from the EU fisheries subsidies database produced by FishSubsidy.org, a project by the Pew Environment Group and EU Transparency. We have enhanced this database, which only covers the FIFG period (1994-2006), by including data from the list of Spanish beneficiaries of the EMFAF (2014-2020).[89] The Spanish data is therefore conservative as it does not cover the period of the European Fisheries Fund (EFF) (2007-2013).

An analysis of this data reveals that between 1994 and 2020, French tuna seiners received almost €9.2 million to build and modernize their fleet[90] (figure 9). Two industrial vessels, for example, were built with taxpayers' money: the

83 European Commission (2023) Weekly oil bulletin.
84 Règlement (CEE) N° 2080/93 du Conseil, du 20 juillet 1993, portant dispositions d'application du règlement (CEE) n° 2052/88 en ce qui concerne l'instrument financier d'orientation de la pêche.
85 Règlement (CE) N° 1263/1999 du Conseil du 21 juin 1999 relatif à l'Instrument financier d'orientation de la pêche.
86 Règlement (CE) N° 498/2007 de la Commission du 26 mars 2007 portant modalités d'exécution du règlement (CE) n o 1198/2006 du Conseil relatif au Fonds européen pour la pêche.
87 Règlement (UE) N° 508/2014 du Parlement européen et du Conseil du 15 mai 2014 relatif au Fonds européen pour les affaires maritimes et la pêche et abrogeant les règlements du Conseil (CE) n ° 2328/2003, (CE) n ° 861/2006, (CE) n ° 1198/2006 et (CE) n ° 791/2007 et le règlement (UE) n ° 1255/2011 du Parlement européen et du Conseil.
88 The lists of EMFAF beneficiaries in France can be downloaded from the *l'Europe s'engage en France* platform. The lists of previous funds were obtained directly from the administration.
89 The list of Spanish EMFAF beneficiaries can be downloaded from the following platform: https://www.mapa.gob.es/es/pesca/temas/fondos-europeos/femp/default.aspx.
90 This figure was calculated by filtering our database of French subsidies, covering the period 1994-2020, with the registration numbers of French tuna seiners registered under

THE OPACITY OF DATA ON SUBSIDIES FROM EUROPEAN FISHERIES FUNDS

This reconstruction of the lists of beneficiaries of European funds has shown that the most complete data covers the FIFG period (1994-2006), when the funds were managed entirely by the European Commission (EC). Since 2007, following the European Transparency Initiative, the EC no longer publishes data on the final beneficiaries of EU funds; this responsibility has been transferred to the Member States (MS). Paradoxically, this new system of co-management of funds between the EC and the Member States has led to a significant deterioration in data quality. For example, the registration numbers of subsidized vessels are not indicated in the EFF lists (2007-2013), and it is only possible to identify vessels by cross-referencing different data sources. Since 2014, the national authorities responsible for managing these funds — the Directorate-General for Maritime Affairs, Fisheries and Aquaculture (DGAMPA) in France — have been obliged to publish every six months, in electronic format and on a dedicated platform, the list of beneficiaries of European funds allocated to the fisheries sector. These lists must now include at least a series of data fields, including the name of the beneficiary, the description and date of the operation, the amount paid by the EU, the type of measure financed and the identification number of the vessel. Despite stricter regulations, the data provided by the administration is still very inadequate, and many vessel identification numbers are incorrect or missing. As well as placing the management authority for these funds in breach of European regulations, this prevents the identification and therefore access to the characteristics of certain vessels (size, engine power, fishing gear used, etc.). The difficulties encountered in accessing the data contribute to the opacity of the fishing industry and the public's distrust of the institutions.

AVEL VAD (67 m) and GLENAN (84 m) received €2.9 million and €3.0 million respectively in 1996 and 2002; subsidies for the construction of new vessels were banned in 2004. Over the period as a whole, almost €3 million was allocated to modernizing 15 French tropical tuna vessels. More recently, the SAPMER vessel Dolomieu (89m), based on Réunion, received €272,000 as part of a temporary cessation during the COVID-19 crisis, which corresponds to almost 25% of all subsidies received by vessels on Réunion under the EMFAF programme.[91]

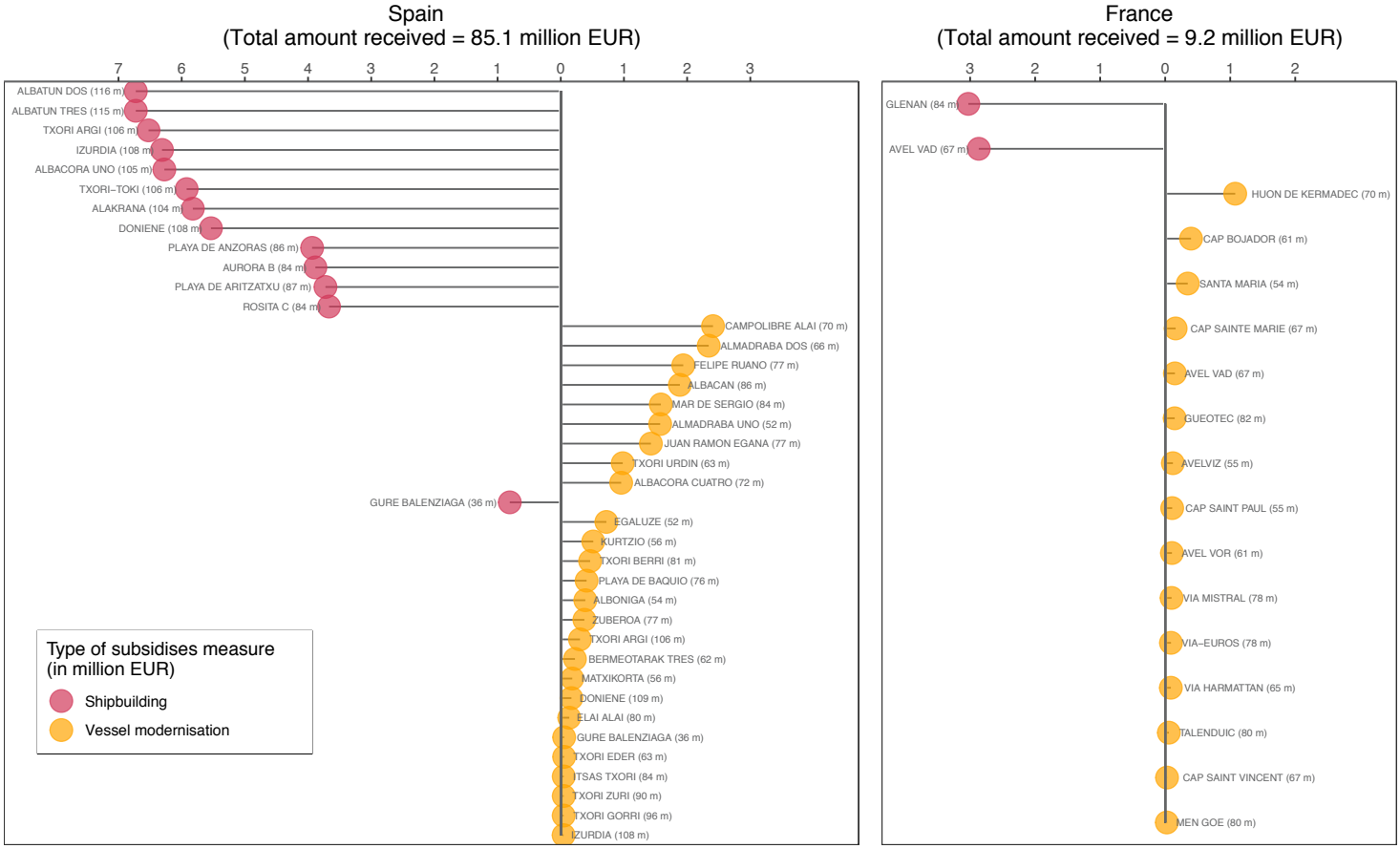
Spanish tuna seiners are not to be forgotten, having received the staggering sum of €85.1 million between 1994-2006 and 2014-2020 by way of European funds.[92] These subsidies enabled the construction of 13 giant purse seiners at a cost of €65.9 million, including 8 vessels over 100 meters long. The record is held by the ALBATUN DOS, the largest tuna vessel in the European fleet (116 meters long), which alone received €6.7 million in 2002 for its construction. Europe has also financed the modernization of 26 Spanish tuna boats to the tune of €19.2 million, with subsidies ranging from €12,000 to over €2 million. These grants can be used, for example, to replace engines, improve safety and living conditions on board vessels, purchase equipment, renovate certain parts of the vessel, etc. However, aid granted to Spanish tuna vessels has fallen sharply over the last period, from €49.6 million during the first iteration of the FIFG to €782,000 during the EMFAF, partly as a result of the cessation of construction aid.

fishing agreements with Southern countries since 2007.

91 Le Brenne *et al.* (2021) Sustainable objectives and commitments deceived by fisheries subsidies for 'temporary cessations' in times of COVID.

92 This figure was calculated by filtering the subsidy database produced by the Fishsubsidy.org project and the list of Spanish EMFAF beneficiaries with the registration numbers of Spanish tuna seiners registered under fishing agreements with southern countries since 2007. The data for the EFF (2007-2013) could not be included in the analysis because

Figure 9. List of French and Spanish tuna seiners that have received grants under the European Structural and Investment Funds for construction and modernization since 1994. The amounts have been adjusted for inflation using 2020 as the reference year.



These results show that although the aid received by French and Spanish tuna vessels from European funds has greatly diminished, in the 1990s and 2000s **Europe contributed to the construction and modernization of this industrial fleet to the tune of several tens of millions of euros in subsidies**.

If the sum of direct subsidies (European funds) and indirect subsidies (fuel tax rebate and fishing agreements) is compared with the volume of catches, it can be calculated that fishing one ton of tropical tuna costs the European taxpayer around 299 euro.[93] In reality, this figure is an underestimate, since it does not take into account certain advantages enjoyed by European manufacturers, such as exemption from customs duties. In contrast to this model, selective fishing in the Maldives is at least 646 times less subsidized, with the government subsidizing a ton of tuna to the tune of 46 euro cents. This figure is a high estimate, since it is based on subsidies allocated to all Maldivian fishers, including bait boats. These differences in subsidy amounts highlight a glaring inequity between two radically different fishing models.

OUTRAGEOUS TAX ADVANTAGES COMPARED TO NEIGHBORING COUNTRIES

Tropical tuna caught in the Indian Ocean by European purse seiners benefits from another tax advantage, and one that is not entirely insignificant. Once the tuna has been landed by purse seiners in Seychelles (90% of landings are made in Port Victoria), Mauritius or Madagascar, it is canned and shipped mainly to Europe. As part of the economic partnership agreements between the European Union and these countries,[94] products from canning factories exported to European markets are exempt from the current customs duty of 24%. This advantage means that canneries in the Indian Ocean are mainly supplied with tuna caught by European purse seiners and purse seiners from countries included in these agreements (i.e. those from Seychelles and Mauritius). European shipowners thus benefit from an attractive market for their catches, as the catches of the domestic fleets of Seychelles and Mauritius are not enough to supply the canneries.

Neighboring countries excluded from these agreements, such as the Maldives, have little access to these canneries and do not benefit from preferential tariffs for their exports, further contributing to a system of unfair competition.

the vessel registration numbers were not provided by the administration, as publication of this information has only been compulsory since the EMFAF (2014-2020).

93 Average over the 2019-2021 period. The amounts of subsidies granted to European tuna vessels under fishing agreements have been estimated by cross-referencing the data on authorizations granted by the European Union to the various vessels with the amounts associated with the tuna agreements. The allocation was made in proportion to the tonnage of vessels operating in African waters. Between 2019 and 2021, European tuna vessels thus received an average of more than 11.9 million euros each year for fishing in African waters, and saved an average of 85.8 million euros via fuel tax exemption.

OUR TOP PRIORITIES

REQUEST NO. 1: A TOTAL AND DEFINITIVE BAN ON DRIFTING FADS

In February 2023, an ambitious resolution was adopted at a turbulent IOTC meeting in Mombasa, Kenya, which would have limited the number of FADs per seiner to 200 from 2026 and introduced a 72-day period during which the use of FADs would be prohibited. However, in the face of this much needed (but insufficient) progress, the European Commission and the French government, subject to the will of French and Spanish industrial lobbies, obtained the cancellation of this resolution on 18 August 2023. In view of this shameful denial of democracy and the impact of FADs on biodiversity (by-catches, capture of juveniles) and the marine environment (plastic and electronic pollution), it is essential to ban the use of drifting FADs completely and definitively.

REQUEST NO. 2: PHASE OUT FUEL SUBSIDIES

It is essential to gradually end the exemption from the domestic consumption tax on petroleum products (TIPP), which encourages excessive consumption of fossil fuels by the largest industrial vessels, such as European tuna seiners. The current revision of the Energy Taxation Directive (ETD) proposed by the European Commission is sorely lacking in ambition, proposing a level of taxation for fishing fuel that is far too low, and will do nothing to halt the ongoing climate crisis. The minimum tax rate must be in line with the sector's transitional challenges; it should increase according to the annual volume of fuel consumed per vessel, in order to favor coastal vessels over the most energy-hungry industrial vessels.

With IPCC and IPBES scientists[95] sounding the alarm, it is high time that institutions got back to what they were created for: defending the general interest, not the interests of a handful of industrialists whose **highly subsidized fishing fleets are destroying the climate, biodiversity, and jobs**.

94 European Commission (2020) EU-Eastern Southern Africa Economic Partnership Agreement Creating opportunities for EU and African businesses.
95 Intergovernmental science-policy platform on biodiversity and ecosystem services. This group of experts is the biodiversity equivalent of the IPCC.



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May 2024

Codes and data used to carry out this analysis are available at this address:
https://github.com/associationbloom/report-from-heaven-to-hell.git