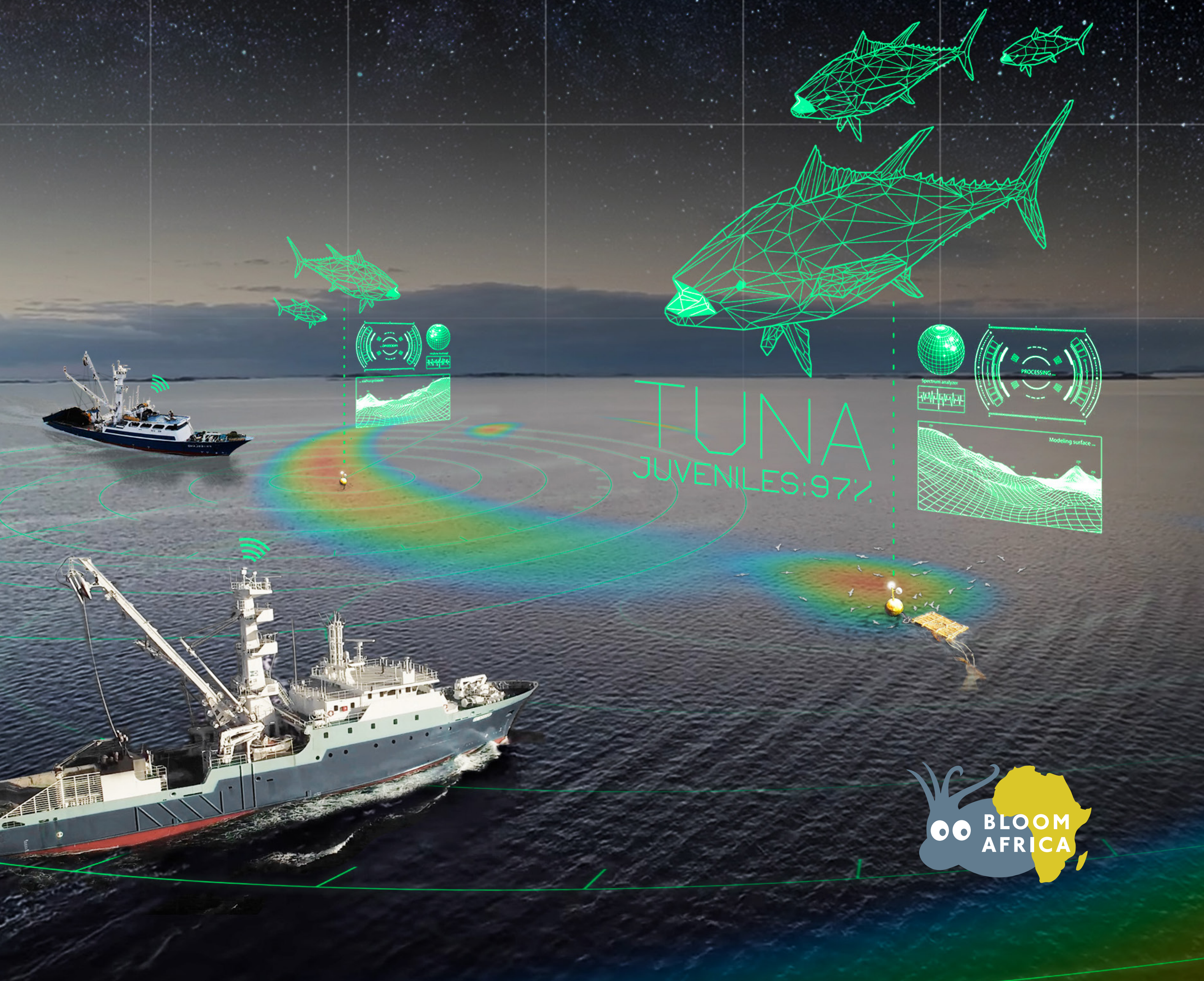
TUNA WAR GAMES

The story of a fatal technological race against tuna and marine life



BLOOM AFRICA

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BLOOM thanks the Clinique du droit de Sciences Po Paris *for their contribution to this report: Agathe BRUGUIER, Camille FROMENTIN, Celine LIU, Harriet KLEPPER, and Xiaoyue WANG.*

All 'fish aggregating devices' (or 'FADs') referred to in this report are, by default, drifting *FADs.* Anchored *'FADs' are therefore mentioned specifically as such, to avoid confusion.*

EXECUTIVE SUMMARY
FADS: A FATAL TRAP FOR BIODIVERSITY

→ 'Fish aggregating devices', known as 'FADs', are **simple yet highly technological rafts whose use and efficacy has spiralled out-of-control in recent years, despite their proven, severe impacts on marine ecosystems**.

→ FADs use the natural **tendency of tuna species to aggregate under floating, natural objects**. The first natural 'aggregators' of tuna that ancestral fishers used were wood logs or other diverse floating debris, including whale carcasses etc.

→ The artificial, man-made version of FADs appeared in the 1980s and became increasingly widespread in just three decades, **now overwhelmingly dominating the world's tuna catch**.

→ This technological revolution occurred in parallel with a spatial expansion, as French and Spanish fishers were drawn into the Indian Ocean by promising exploratory fisheries[01] and decreasing catches in their historical fishing grounds off West Africa,[02,03,04] where they had expanded their activities in the 1960s to start targeting skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), and bigeye tuna (*Thunnus obesus*), rather than albacore (*Thunnus alalunga*), which they used to target in mainland, more temperate waters.[05,06] The Spanish fleet also established a fleet in the eastern Pacific Ocean in the 1970s, gradually expanding towards western waters.[07]

→ Scarcely used to begin with, we estimate that **there are now around 120,000 FADs operated worldwide, at any one time**. European-owned industrial vessels are known to have used **over 1,000 FADs each, at any one time, to the extent that they now need 'support vessels' to carry, deploy, and retrieve them**.

→ The increasing use of FADs is a great example of 'technological creep', which allows industrial fisheries to **maintain and even increase their catch with the help of ever more efficient technology, while tuna fish populations become increasingly depleted**. As wild tuna populations have shrunk too much and demand for tuna continues to increase, **industrial fleets today can no longer fish without the technological aid provided by FADs**.

→ Year after year, the technology used on FADs continues to improve. Simply equipped with short-range radio emitters at the beginning, **FADs are now equipped with global coverage GPS trackers as well as multi-beam sonars, allowing fishers to identify the biomass of fish that has aggregated beneath them**.

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01 Marsac *et al.* (1983) Campagnes expérimentales de la pêche à la senne du thonier "Yves de Kerguelen" dans l'ouest de l'océan Indien tropical. Available at: https://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers11-11/15506.pdf.

02 Bayliff *et al.* (2005) Management of tuna fishing capacity: conservation and socio-economics. Available at: https://books.google.fr/books?hl=fr&lr=&id=teJUiXaYZ18C.

03 Campling (2012) The tuna 'commodity frontier': business strategies and environment in the industrial tuna fisheries of the Western Indian Ocean.

04 Fonteneau (1996) Panorama de l'exploitation des thonidés dans l'océan Indien.

05 Le Roy *et al.* (2008) Setting up an industry with its competitors: the development of the French tropical tuna fishery. Available at: https://bit.ly/40kd85d.

06 Báez *et al.* (2020) Monitoring of Spanish flagged purse seine fishery targeting tropical tuna in the Indian ocean: Timeline and history. Available at: https://doi.org/10.1016/j.marpol.2020.104094.

07 Morón *et al.* (2001) Statistics and technical information about the Spanish purse seine fleet in the Pacific. Available at: https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/72/726d75aa947654ea9956ef992e722633.pdf.

Buoy manufacturers praise the possibility of using satellite data and artificial intelligence to maximize catches, and **industry representatives have expressed their desire to equip FADs with propellers, to better control their drift and hence target productive areas**.

→ FADs are so numerous, widespread, and unmonitored, that they are present in every corner of the ocean, **illegally penetrating supposedly 'protected' marine areas or exclusive economic zones, where they aggregate fish before drifting away and being collected**. Propellers would dramatically increase that problem.

→ In the Indian Ocean, which is the most important tuna fishing ground for French and Spanish companies, 72% and 85% of these two fleets' catch was made around FADs, respectively. In 2018, this figure even rose to 98% for Spain! Altogether, **EU-based and EU-owned vessels currently account for around 95% of the tuna catch officially made around FADs in the Indian Ocean**.

→ FADs have a dramatic impact on the targeted populations of tuna, as the vast majority of the catch is made up of juveniles, which have not yet had a chance to reproduce. For instance, recent data show that **97% of yellowfin tuna (a species considered overfished since 2015) caught under FADs are juvenile, immature individuals**.[08]

→ Up to 10% of FAD-associated catches are made up of untargeted species, such as vulnerable and fragile species of sharks and turtles. **Observers often report catches of hundreds of sharks in a single fishing operation, virtually all of them dying before being released back into the ocean**.

→ Scientists have also shown that up to 200,000 silky sharks may die annually due to 'entangling' FADs,[09] and are therefore not accounted for as 'official bycatch'. Such **'entangling' FADs are supposed to be phased out, but surveys show that the vast majority of 'beached' FADs are non-compliant with 'non-entangling' policies**.

→ **It is estimated that 60%[10] to 90%[11] of FADs are abandoned or lost at sea, ending up beaching, generating a massive source of marine pollution** and representing a threat to marine life long after they have stopped being operated.

08 https://www.globaltunaalliance.com/wp-content/uploads/2022/03/Naunet-Fisheries.2021.V3-new.pdf.

09 Filmalter *et al.* (2013) Looking behind the curtain: quantifying massive shark mortality in fish aggregating devices. Available at: https://doi.org/10.1890/130045.

10 Imzilen *et al.* (2022) Recovery at sea of abandoned, lost or discarded drifting fish aggregating devices. Available at: https://doi.org/10.1038/s41893-022-00883-y.

11 Churchill (2021) Just a harmless fishing FAD — Or does the use of FADs contravene international marine pollution law? Available at: https://doi.org/10.1080/00908320.2021.1901342.

SETTING THE TONE ABOUT TUNA

"As few FADs as possible is the path of virtue". This could almost be a quote from BLOOM's ongoing campaign on tuna fisheries in the Indian Ocean, as it is close to summing up our key objective to implement a full and definitive ban on fish aggregating devices. Unfortunately, this quote is truncated, and the rest — *"But it is economic suicide"* — is much less aligned with our vision of what 'sustainable' fisheries are.

In its entirety, this quote[01] from Mr. Adrien de Chomereau, CEO of Sapmer — one of the three French companies that target tropical tuna — characterizes the destructive spiral in which French and Spanish tuna companies are engaged, with the full support of their States and the European Commission.

This quote is eye-opening and should be seen as a cry for help. Clearly, even for the industry, the destructiveness of FADs is a scientifically established, undisputable fact. Yet, their usage continues to increase, and the technology they use is ever more powerful to exploit shrinking populations of tuna.

The extensive use of FADs and the dramatic impacts they generate on the marine environment and coastal communities is a conscious anti-environmental choice made by the industry and decision makers.

This must stop!

01 « Le moins de DCP possible, c'est la voie de la vertu. Mais c'est un suicide économique ». https://lemarinblog.wordpress.com/2016/09/22/la-reunion-les-voyants-sont-au-vert/.

WHAT IS A 'FISH AGGREGATING DEVICE'?

A 'fish aggregating device' (or FAD) is a man-made object that is widely used across the world's ocean to facilitate the catch of large pelagic species of fish, such as tuna and billfish (e.g. marlin and swordfish). FADs are made of a floating part (the 'raft'), composed of various materials (e.g. bamboo, plastic, or metal), and an underwater part (the 'tail'), to which tarps, ribbons, and nets are attached, serving as a visual cue for fish to aggregate.

Depending on their use — either small-scale coastal fishing or industrial fishing — FADs can be of two types:

→ 'Anchored' FADs (or a-FADs), which are attached to the seabed and remain in the same place. They are most often found around tropical islands (e.g. La Réunion, the Maldives, etc.) and are used by small-scale coastal fishers. This report does *not* cover these anchored FADs, which have many beneficial roles, including:

- Allowing for a reduction of the fishing pressure along the coast (lagoons, etc.);
- Ensuring a certain level of catch of highly valued fish such as tuna, marlin, mahi mahi, etc.;
- Securing fishing activities outside the lagoon's protected waters;
- Ensuring food security and continued livelihood for coastal communities during monsoon rain and bad weather;
- Reducing the carbon footprint of fisheries as fishers do not have to travel far to harvest fish.

→ 'Drifting' FADs, which are floating objects that are left drifting with ocean currents in the open sea. The 'raft' part of FADs typically is a square of around 6m2, and the 'tail' part, which can be up to 100m long, plays of role in slowing down the natural drift of the raft. Drifting FADs are those used by industrial tuna purse seiners, and they are the ones we focus on and refer to simply as 'FADs' in this report. A 'purse seine' consists of a vertical net nearly 2km long and 300m high that is deployed around tuna schools with the help of a small support vessel. The seine is then closed from below with a sliding system, allowing the entire school and any associated bycatch such as sharks, turtles, mammals, and billfish species to be caught in the net.

When tuna are caught without the help of FADs, we are talking about 'free schools'.

Screenshot drawn from the film "La atraccion de peces a objectos flotantes en el mar: la pesca con FADs" made by The Pew Charitable Trusts on FADs in 2013 .

WHY WERE 'FISH AGGREGATING DEVICES' DEVELOPED?

Normally, tuna species aggregate in large schools only at times of spawning. However, it has been known for centuries that tuna species also naturally aggregate outside the spawning season under floating objects such as tree trunks or whale carcasses, or essentially, under anything that floats. The reasons why they do so have not been fully elucidated, but it has been hypothesized that tuna naturally use these objects as visual cues not only for mating but also for socialization. In addition, the presence of floating objects might be an indicator of productive habitats — meaning more food — since they often come from areas that are rich in nutrients (for example, river mouths) and then drift into the ocean with a higher productivity remaining associated to them.[02] Floating objects may also be food themselves, for instance when they are floating carcasses. Complex ecosystems, which are dense and rich in species, therefore form under these objects, in contrast with the 'open' ocean, which is very poor in animal life and remains almost uninhabited, except for a few transient individuals.

Fishers have long exploited this aggregating behavior as a strategy to optimize their search for fish. To date, even industrial fishers continue to look for natural floating 'objects' such as tree trunks, carcasses, and large animals like whale sharks, knowing they will likely make a good catch around them. In fact, it has been quantified that fishing on FADs increases the number of fish captured per fishing operation (or 'set'), and also reduces the fraction of unsuccessful sets (i.e. zero catch) to less than 10%, compared to 30% to 50% of unsuccessful sets when fishing on 'free schools'.[03] The economic benefits generated by dispersing FADs in large numbers are therefore enormous, as industrial fishers only have to 'collect' the tuna aggregated under them, rather than searching for them in vast swathes of the open seas, even outside of the reproductive season.[04]

But to optimize these economic gains for a handful of companies, the costs for marine ecosystems are unspeakable.

The capacity of any floating object to aggregate tuna is so high that, in the 1980s, fishers started to deploy their own man-made FADs. Rapidly, this concept has been taken to the extreme, and FADs are now deployed by the tens of thousands every year, in all tropical waters around the globe, and account for the majority of tuna caught by industrial fishers. Given that the main target of tropical tuna fisheries — skipjack tuna is the third most captured fish in the world in terms of landings,[05] and that 90% of skipjack are caught under FADs,[06] it is obvious that FADs have become a vital artifice for industrial fisheries worldwide. Yellowfin tuna and bigeye tuna, both overexploited in the Indian Ocean, are also caught by FADs on an enormous scale.

The tremendous reliance of industrial tuna fisheries on FADs does not go without problems, and we have now reached a point where their future must be questioned. But industrial fisheries and their political allies have clarified their stance: they will fight against any constraint imposed upon FADs, as evidenced by the objections made by the European Union[07] and France[08] to the first annual, temporary ban that was voted by the IOTC in February 2023.

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02 Davies *et al.* (2014) The past, present and future use of drifting Fish Aggregating Devices (FADs) in the Indian Ocean. Available at: https://doi.org/10.1016/j.marpol.2013.12.014.

03 Hall and Marlon (2013) Bycatch and non-tuna catch in the tropical tuna purse seine fisheries of the world. Available at: https://pacific-data.sprep.org/system/files/HallRoman_FAO_No_568.pdf.

04 Fonteneau *et al.* (2013) Global spatio-temporal patterns in tropical tuna purse seine fisheries on drifting Fish Aggregating Devices (DFADs). Available at: https://www.alr-journal.org/articles/alr/pdf/2013/01/alr130046.pdf.

05 FAO (2022) The state of world fisheries and aquaculture. Available at: https://www.fao.org/publications/sofia/2022/en/.

06 Marsac *et al.* (2019) Data-derived fishery and stocks status indicators for skipjack tuna in the Indian Ocean Available at: https://www.researchgate.net/publication/320491194_Data-derived_fishery_and_stocks_status_indicators_for_skipjack_tuna_in_the_Indian_Ocean.

07 https://iotc.org/sites/default/files/documents/2023/04/Circular_2023-26_-_Communication_from_the_European_UnionE.pdf.

08 https://iotc.org/sites/default/files/documents/2023/04/Circular_2023-28_-_Communication_from_FranceOTE.pdf.

AN OUT-OF-CONTROL TECHNOLOGICAL RACE

FADs appeared in the early 1980s and have since undergone a major expansion as well as an impressive and rapid technological evolution.

FADs started out as simple rafts attached to a buoy, but a radio transmitter was quickly added to them to make them easier to track for purse seiners. By the end of the 1990s, radio transmitters were substituted for more efficient solar-powered GPS trackers. Around the same time, FADs were also equipped with echo-sounders, used to detect the presence of schools aggregating beneath them, allowing seiners to move to a specific FAD only when fish were in high-enough quantities to be captured. With time, echo-sounders evolved, and, from a single frequency, they started emitting multiple frequencies, becoming even more powerful and accurate. Light projectors have also been used, directly on FADs or from the vessels, to attract fish.[09] This use of light has been widely criticized, and it was formally banned by the IOTC in 2017.[10] Nevertheless, lighting devices are known to still be used by vessels, as sometimes denounced by smaller boat owners in the region,[11] to 'fix' tuna schools around support vessels and maximize their catch.

The pace of the technological evolution of FADs is far from slowing. Sonars continue to improve, and 'split' beam echo-sounders are expected to be used more and more used in the future,[12, 13] further facilitating fishing operations. As explained on Satlink's website, one of the main providers of FAD buoys, current technology such as the *"double echo-sounder system allows fleets to obtain accurate information on the tonnage of fish present under the [buoy] and the composition of the different commercial tuna species"*.[14]

Artificial intelligence and machine learning for the interpretation of echo-sounders data have also started being used for better detection of tuna beneath FADs.[15] Although the industry is greenwashing these technological advances as incredible opportunities for scientific research, they will certainly lead to further overexploitation and the erosion of biodiversity. Michel Goujon, the director of the French tropical tuna fishers' union Orthongel even once approached BLOOM, claiming that equipping (with public subsidies, of course) FADs with small propellors would allow the prevention of beaching… completely hiding the fact that this measure would probably be more useful to target high-productivity areas and sneak FADs into forbidden areas.

The technology used on FADs is paired with ever more efficient fishing vessels. The nets deployed by purse seiners are becoming progressively larger, allowing greater volumes of fish to be captured per set. Current nets are up to 2km wide, and 300m high. Similarly, boats have grown in size over time, increasing from an average of 600 gross tonnage in the 1980s, to well over 1,000 gross tonnage in the 2000s, with fish holds of up to 2,500 m^3 and carrying capacities of up to 2,800 tonnes of tuna. The largest European seiner operating in African waters is 116m long, ALBATUN DOS, which belongs to the Spanish company Albacora.

09 Chairunnisa *et al.* (2018) Study of AUTO-LION (Automatic Lighting Rumpon) on fisheries of stationary lift net in Semarang, Central Java. Available at: https://doi.org/10.1088/1755-1315/116/1/012052.

10 IOTC (2017) Resolution 16/07 on the use of artificial lights to attract fish.

11 Indian boat owners accuse industrial vessels of light fishing. Available at: https://atuna.com/pages/indian-boat-owners-accuse-industrial-vessels-of-light-fishing.

12 Moreno *et al.* (2019) *Ibid.*

13 https://www.seamanelectronics.com/2018/05/09/split-beam-myths-and-truths/.

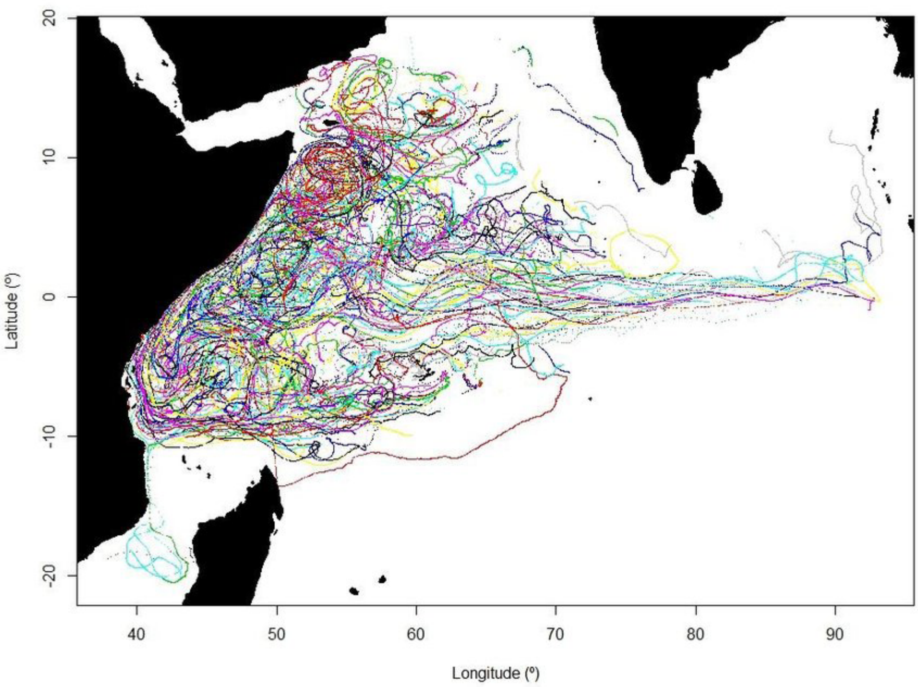
14 https://www.satlink.es/en/solutions/solutions-for-the-fishing-industry/dsf-inteligentes/isd

15 Baidai *et al.* (2020) Machine learning for characterizing tropical tuna aggregations under drifting Fish Aggregating Devices (DFADs) from commercial echosounder buoys data. Available at: https://doi.org/10.1016/j.fishres.2020.105613.

Fishing in protected areas

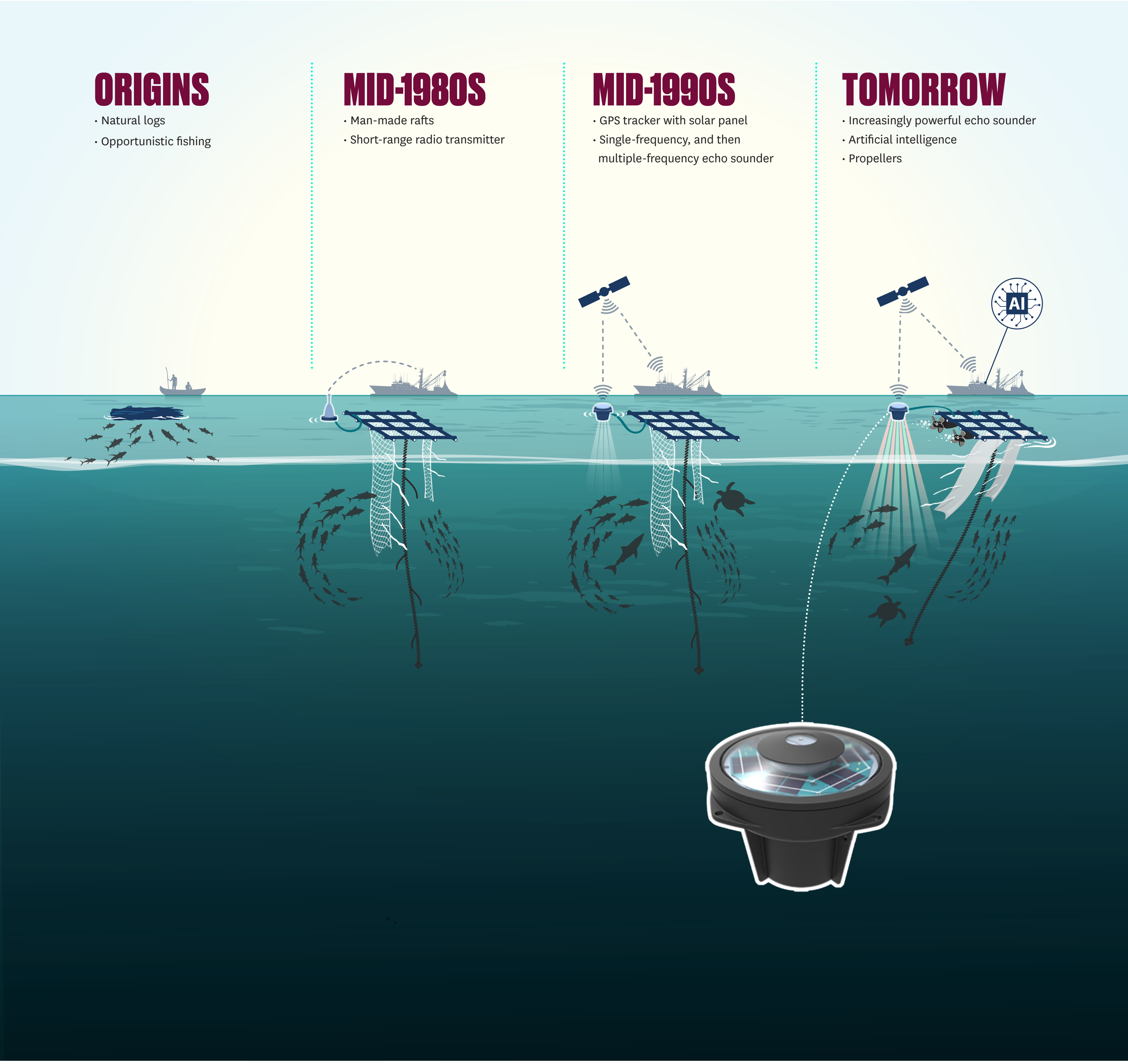
FADs are likely used by purse seiners to illegally fish in protected areas or in areas where they are not allowed to go (e.g. in the exclusive economic zones of countries with which no fishing agreement has been concluded). To do so, FADs are deployed upstream, left drifting into 'forbidden' areas with the help of surface currents. They then aggregate tuna while passing through, and are recovered downstream, once the fish are 'magnetized' out of the prohibited or protected area. Such behavior was identified and documented in the Pacific very recently (https://fiskerforum.com/reefer-refused-port-access-for-unlicensed-fishing-involvement/.), and it is thought to widely occur.

In the western Indian Ocean, in an experiment conducted with European purse seiners between April and December 2018, the deployment of 716 so-called 'BIOFADs' showed regular incursions into the EEZs of coastal states, in all likelihood without their permission. As the purpose of this experiment was to test the efficacy of 'BIOFADs' under real fishing conditions, it is highly likely that the practice of tuna being aggregated under FADs while passing through, and being recovered downstream from prohibited/protected areas and the EEZs of coastal states is a regular practice.



➔ Track data of FADs in the Indian Ocean, drifting into various EEZs and into the high seas.[27]

27 Zudaire *et al*. (2020) Preliminary results of BIOFAD project: testing designs and identify options to mitigate impacts of drifting fish aggregating devices on the ecosystem ICCAT SCRS. Available at: https://www.iccat.int/Documents/CVSP/CV076_2019/n_6/CV076060892.pdf.


ORIGINS
• Natural logs
• Opportunistic fishing
MID-1980S
• Man-made rafts
• Short-range radio transmitter
MID-1990S
• GPS tracker with solar panel
• Single-frequency, and then multiple-frequency echo sounder
TOMORROW
• Increasingly powerful echo sounder
• Artificial intelligence
• Propellers
AI

A COMPLETE SWITCH UP FROM 'FREE SCHOOLS' TO 'FAD-ASSOCIATED' CATCHES

Nowadays, most tuna caught worldwide is associated to fisheries using FADs, and the switch from 'free schools' to 'FAD-associated' fishing operations is considered as one of the major drivers of the boom in tuna catches, e.g. in the Indian Ocean, over the past decades.[17]

The number of FADs deployed in the global ocean is chilling: it is estimated that up to 121,000 of them are operated at any one time in the world,[18] including 27,000 and 18,000 in the Indian Ocean[19] and Atlantic Ocean,[20] respectively, i.e. the two regions where European purse seiners operate. In the last five years in the Indian Ocean, there have been more than 100,000 FADs deployed by purse seiners, overwhelmingly by Spanish and French companies.[21]

EU fleets are extremely reliant on FADs. Between 2012 and 2021 (i.e. the last year for which data was reported), **French and Spanish purse seiners respectively made 72% and 85% of their catch around FADs in the Indian Ocean. In 2018, this figure even rose to 98% for Spain! Spanish and French-owned vessels display similar patterns: in the last reported year, 2021, those registered in Mauritius (i.e. French owned) and in the Seychelles (i.e. Spanish owned) made 75% and 94% of their catch around FADs, respectively.**[22]

Altogether, EU-based and EU-owned vessels currently account for around 95% of the tuna catch made around FADs in the Indian Ocean.[23]

In particular, we note that the IOTC Scientific Committee has warned about the change in strategy by the EU and EU associated purse seiners with respect to the yellowfin tuna limits adopted in 2016. To avoid reaching these limits faster, the EU purse seiners increased their use of FADs, resulting in more juvenile yellowfin (which weigh less) being caught, compared to free schools.

17 Miyake *et al.* (2004) Historical trends of tuna catches in the world. Available at: https://www.fao.org/3/y5428e/y5428e.pdf.

18 Gersham *et al.* (2015) Estimating the use of FADs around the world. Available at: https://www.pewtrusts.org/-/media/assets/2015/11/global_fad_report.pdf.

19 IOTC (2020) Summary overview of buoy data submitted to the IOTC Secretariat for the period January–July 2020. IOTC-2020-WPDCS16-17. Available at: https://www.iotc.org/fr/documents/WPDCS/16/17.

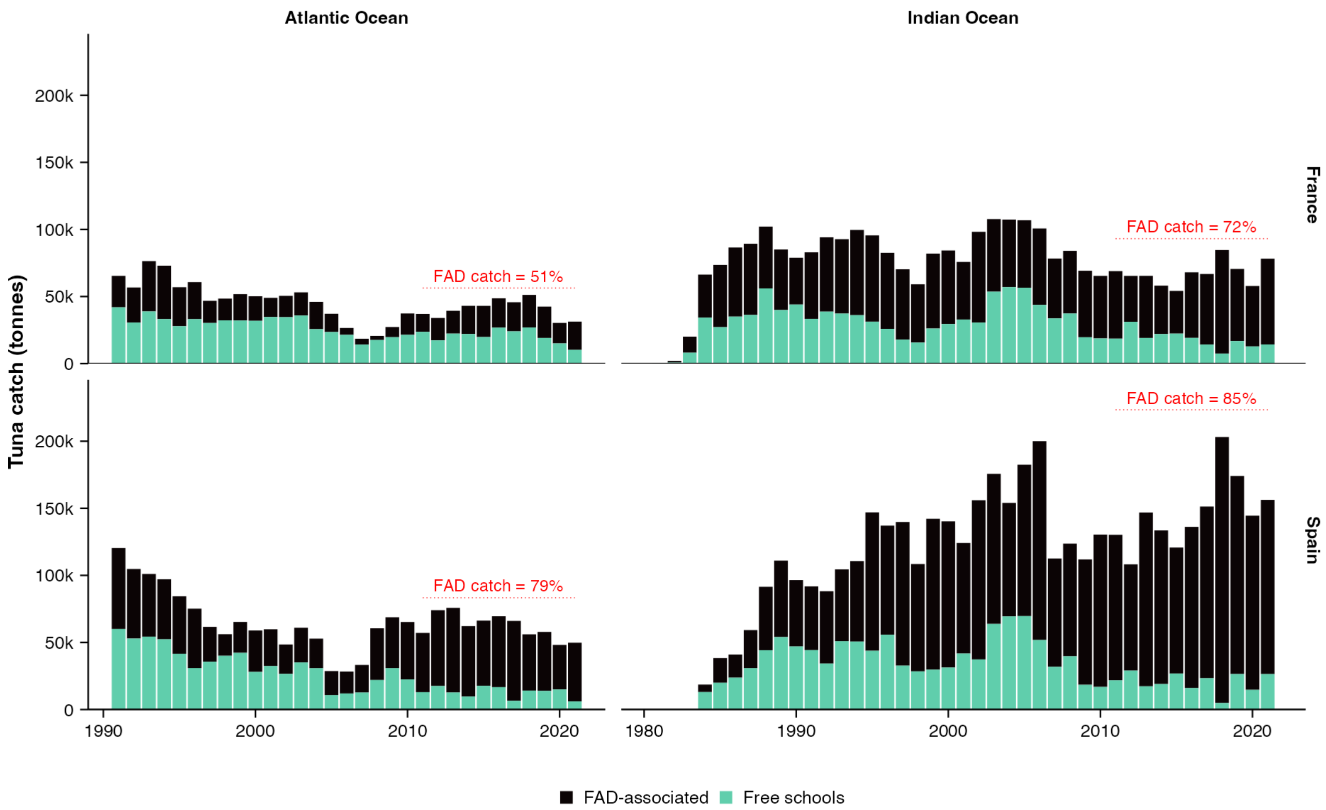
20 Greenpeace (2019) Ghost gear: the abandoned fishing nets haunting our oceans. Available at: https://www.greenpeace.org/static/planet4-aotearoa-stateless/2019/11/b97726c9-ghost_fishing_gear_report_en_single-page_051119.pdf.

21 The Pacific Ocean is, by far, the most important tuna fishing ground, and it is also where the most FADs are deployed. France does not have any fishing capacity in the Pacific Ocean, in contrast with Spain, which has a fleet of 20 vessels operating and deploying FADs in this vast ocean (but only three are registered in Spain, and thus subject to EU regulations).

22 Spanish-owned vessels registered in Tanzania and Oman do not appear yet in IOTC catch data.

23 https://bloomassociation.org/wp-content/uploads/2023/04/Lining-up-the-ducks_EN.pdf.

In the Atlantic Ocean, which is less significant in terms of catch, the reliance of EU vessels on FADs is slightly less dramatic, with France and Spain having respectively made 51% and 79% of their catch around FADs. Spanish-owned vessels registered in Curaçao, El Salvador, and Guatemala made 88%, 73%, and 80% of their catch around FADs in 2021.[24]



➔ Annual catch of tropical tuna, FAD-associated vs. free school, by France and Spain in the Indian Ocean and Atlantic Ocean. France's catch does not include that of its Italy-registered seiner TORRE GIULIA / TORRE ITALIA.

24 We cannot provide a figure for Panama, which, contrary to Curaçao, El Salvador, and Guatemala, also owns truly domestic purse seiners.

AN UNHINDERED DEPLOYMENT

Each purse seiner can operate several hundreds of FADs at any one time, and they are known to have sometimes deployed over a thousand of them. With one fishing operation around a FAD, catches above 40 tonnes are not uncommon, and sometimes reach over 100 tonnes.[25] In the main European tuna fishing ground, the Indian Ocean, FADs are currently officially limited to 300 per vessel with an active buoy.[26] The buoy is the piece of technology that allows FADs to be tracked by their owners, and which also embarks a sonar that is now able to estimate the biomass of fish below the FAD, as explained above.

The 'active buoy' specification in the regulation is important, as it creates a loophole for fishers to deploy FADs over the 300-limit, by using the on/off switch to only activate 300 of them at any one time. Vessels are also known to deploy FADs without any buoy attached to them, leaving it to chance to randomly find them in the open ocean.

Several coastal countries tabled a proposal in February 2023 to reduce the overall number of FADs to 150, each FAD having to be equipped with an active buoy. But a compromise had to be found, and IOTC members voted for a reduction of their number to 250 by 2024, and to 200 by 2026.[27] The same proposal also included the creation of a transparency register, so that the number, ownership, and localization of each FAD becomes known. However, as we explained in our latest report *Lining up the ducks*,[28] this recent resolution is now poised to be annulled due to the shameful pressure put upon coastal states by the European Commission and industrial lobbies. The latter have indeed immediately called for objections to be lodged against this resolution, due to the inception of a 72-day annual ban on FADs, which would have negatively impacted their businesses. **Such temporary bans are however implemented in all other tuna fishing grounds, where they have been put in place as a precautionary principle**.

We believe that full transparency in the fisheries sector is essential, should we want to rebuild productive ecosystems and re-balance our relationship with coastal countries in the Global South. This is why BLOOM is currently suing France for obtaining such data on FADs.[29]

➔ The Satlink ISD+ 'buoy', whose "double echo-sounder system allows fleets to obtain accurate information on the tonnage of fish present under the [buoy] and the composition of the different commercial tuna species" https://www.satlink.es/en/solutions/solutions-for-the-fishing-industry/dsf-inteligentes/isd

25 Ruiz *et al.* (2019) Comments on the assessment of catch by species in the tropical purse seine fishery. Available at: http://www.orthongel.fr/pages/tools/notes/declar/Catch_composition_assessment_forPS.pdf.

26 IOTC (2019) Resolution 19/02. Procedures on a fish aggregating devices (FADs) management plan. Available at: https://faolex.fao.org/docs/pdf/mul199458.pdf.

27 IOTC (2023) Resolution 23/02 On management of drifting Fish Aggregating Devices (dFADs) in the IOTC area of competence. Available at: https://iotc.org/sites/default/files/documents/2023/02/Resolution_23-02E_-_On_Management_of_Drifting_Fish_Aggregating_Devices_DFADs_in_the_IOTC_area_of_competence.pdf.

28 https://bloomassociation.org/wp-content/uploads/2023/04/Lining-up-the-ducks_EN.pdf.

29 http://go.bloomassociation.org/nl3/nPmEBiLxGnPufrO1PDm4dA?hl=fr.

WHY ARE 'FISH AGGREGATING DEVICES' PROBLEMATIC?

FADs have long been criticized by many scientists, NGOs, and coastal fishers for their adverse impacts on marine ecosystems.[30],[31] These impacts are diverse and range from biodiversity loss to marine pollution, via climate impact through significant fossil fuel consumption and greenhouse gas emissions of the purse seiners fishing on FADs.

Industrial tuna seiners consume an extremely high amount of fuel: according to data published by the Scientific, Technical and Economic Committee for Fisheries (STECF), the fleet of tuna purse seiners registered in France and Spain have consumed between 53 and 130 million liters of fuel every year, between 2013 and 2019! Scientists have also shown that FAD fishing is more fuel intensive than fishing for free schools. But because FAD-associated operations are more successful at catching tuna than around 'free schools', it is still worth it for industrial fishers to burn more fuel.

Impact on the target species

Many indications show that FADs first and foremost threaten the populations of tuna that they target. In particular, it was shown that tuna individuals that aggregate under FADs are slimmer, less healthy, and with a higher frequency of empty stomachs than those captured in 'free schools'. In fact, FADs are thought to be artificial stimuli that alter the natural behavior of schools, making them drift in waters that are less rich in food, therefore altering their pasturing behavior.[32] FADs have also been shown to affect predation patterns by favoring reciprocal protection, but also by attracting more predators.[33,34] Moreover, FADs are thought to cause a fragmentation of schools and to reduce spawning potential, reducing the resilience of the population.[35] For these reasons, FADs have largely been branded 'ecological traps',[36] but one could also call them 'ecological disruptors', from the well-known 'endocrine disruptors'.

But that is not all. Almost all tuna caught under FADs are underaged and undersized. Based on data published by the Indian Ocean Tuna Commission,[37] we show that virtually all bigeye and yellowfin tuna captured around FADs in the Indian Ocean had not reached their adult size and were immature. This fact is not even disputed by the industry.[38] In other words, FADs prevent tuna from growing to an age that would allow them to reproduce, which clearly highlights the complete unsustainability of the fishery, bringing wild populations even closer to the brink of collapse. This is even more worrisome given that yellowfin and bigeye tuna are considered overexploited

30 Fonteneau *et al.* (2013) *Ibid.*

31 Fonteneau *et al.* (2015) Managing tropical tuna purse seine fisheries through limiting the number of drifting fish aggregating devices in the Atlantic: food for thought. Available at: https://www.iccat.int/Documents/CVSP/CV071_2015/n_1/CV071010460.pdf.

32 Hallier and Gaertner (2008) Drifting Fish Aggregation Devices could act as an ecological trap for tropical tuna species. Available at: https://doi.org/10.3354/meps07180.

33 Fonteneau *et al.* (2013) *Ibid.*

34 Davies *et al.* (2014) The past, present and future use of drifting Fish Aggregating Devices (FADs) in the Indian Ocean. Available at: https://doi.org/10.1016/j.marpol.2013.12.014.

35 Marsac *et al.* (2017) Data-derived fishery and stocks status indicators for skipjack tuna in the Indian Ocean. Available at: https://www.researchgate.net/profile/Jose-Baez-5/publication/320491194_Data-derived_fishery_and_stocks_status_indicators_for_skipjack_tuna_in_the_Indian_Ocean/links/59e89b5aa6fdccfe7f8e9100/Data-derived-fishery-and-stocks-status-indicators-for-skipjack-tuna-in-the-Indian-Ocean.pdf.

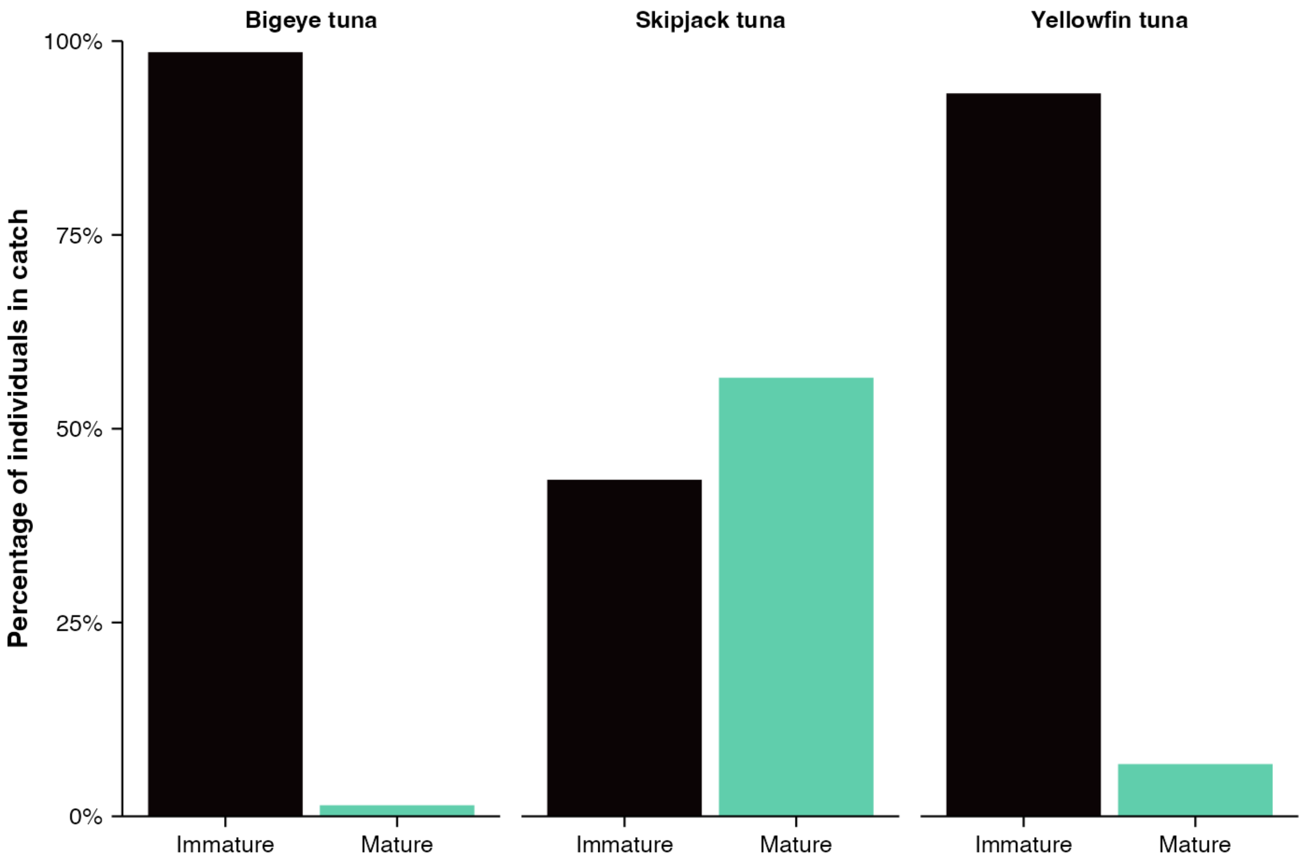
36 Hallier and Gaertner (2008) *Ibid.*

37 IOTC size frequency data. Available at: https://iotc.org/data/datasets.

38 Global Tuna Alliance (2021) Sustainability of yellowfin tuna (Thunnus albacares) fisheries in the Indian Ocean. Available at: https://www.globaltunaalliance.com/wp-content/uploads/2021/05/Naunet-Fisheries.2021.V2.pdf.

in the region,[39,40] and skipjack tuna are fished far beyond the catch limits agreed by the IOTC.[41] As highlighted above, **the IOTC Scientific Committee has warned about the change in strategy by the EU and EU associated purse seiners with respect to the yellowfin tuna limits adopted in 2016. To avoid reaching the limits faster, EU purse seiners increased their use of FADs, resulting in more juvenile yellowfin (which weigh less) being caught, compared to free schools. Data from the IOTC show that 93% of yellowfin tuna and 99% of bigeye tuna caught under FADs are juvenile, immature individuals.**

FADs are not the only responsible party causing juveniles[42] to be caught, as overall, 93% of yellowfin tuna and 94% of bigeye tuna caught in the Indian Ocean are juvenile.[43] However, 52% of juvenile yellowfin and 77% of juvenile bigeye are caught by purse seiners, and hence mostly by EU-owned fleets.



→ Proportion of immature and mature individuals in the catch of bigeye, skipjack, and yellowfin tuna in 2020-2021 by the French and Spanish fleets in the Indian Ocean (source: IOTC).

39 https://iotc.org/sites/default/files/documents/science/species_summaries/english/4_Yellowfin2021E.pdf.

40 https://iotc.org/sites/default/files/documents/2022/10/IOTC-2022-WPTT24-10.pdf.

41 https://iotc.org/sites/default/files/documents/2022/10/IOTC-2022-WPTT24-03c_-_SKJ_data.pdf.

42 See e.g. Tolotti *et al*. (2022) Unintended effects of single-species fisheries management. Environment, Development and Sustainability. Available at: https://doi.org/10.1007/s10668-022-02432-1.

43 IOTC size frequency data. Available at: https://iotc.org/data/datasets.

Impact on other species

On top of being responsible for the killing of millions of immature tuna every year, FADs also have serious negative impacts on many other non-targeted species, unassumingly called 'bycatch'.

Compared to fishing operations on 'free schools', which generate virtually no catch of immature tuna or bycatch of non-targeted species, FADs prove to be blind death machines that also kill many other species without distinction, up to 10% of the total catch.[44,45,46] In other words, for every ten kilos of fish caught by European purse seiners using FADs, one kilo is thrown overboard, dead or badly damaged. **Given that each fishing operation often result in catches of 40 tonnes, sometimes up to 100 tonnes or even more, the amount of wasted biodiversity — killed just for the sake of maximizing tuna catch — is therefore immense and utterly unacceptable.**

Estimates are as high as 100,000 tonnes of bycatch and discards every single year for global tuna fisheries, but this figure, although impressive, 'only' accounts for discarded tuna (too small to be commercialized or belonging to species that are not of commercial interest), billfish and other bony fish, as well as sharks; it does not account for marine mammals and turtles for instance.[47] Still, small cetaceans and turtles are not uncommon in FAD catches, and although catches are low compared to that of tuna, they still pose a serious threat to the conservation of these endangered and fragile animals. [48,49]

On top of generating vast amounts of unwanted catch, FADs have also historically been responsible for a horrifyingly high number of animals that are indiscriminately killed and which are never retrieved on board of seiners. These deaths are largely due to the entanglement of animals in the submerged tail of the FADs, a phenomenon also known as ghost fishing, of which sharks are the main victim. Scientists have, for instance, shown that up to 200,000 silky sharks may die annually due to 'entangling' FADs.[50]

Moreover, given that FADs are incredibly difficult to monitor, it is impossible to accurately estimate how many entangling FADs are still in use, and who operate them. Recent surveys of 65 beached FADs and derelict FADs retrieved in the coastal zones of Kenya, Somalia and the Maldives show consistent non-compliance with existing FAD regulations in the Indian Ocean by EU and other purse seiners. The primary areas of non-compliance include the ongoing use of entangling FADs that uses netting and/or other meshed materials, low replacement of plastics with biodegradable components within FAD designs, and a lack of compliance with the requirement to have the deploying vessel's unique IOTC registration number clearly marked on each operational buoy.[51] The fact that non-entangling FADs have not been encountered in other surveys of beached FADs makes it highly unlikely that their adoption is widespread in the Indian Ocean.

This is why BLOOM has called on the European Union and Member States to support full transparency on the location and ownership of all FADs, in real time. As we highlighted in our latest report, *Lining up the ducks*,[52] the European Commission and industrial lobbies pretend that such real-time monitoring is not possible, despite the fact that FADs are precisely equipped for that purpose, so that vessels can track them and 'harvest' them when economically viable.

44 Dagorn *et al.* (2012) Is it good or bad to fish with FADs? What are the real impacts of the use of drifting FADs on pelagic marine ecosystems? Available at: https://doi.org:10.1111/j.1467-2979.2012.00478.x

45 Filmalter *et al.* (2013) *Ibid.*

46 Hall and Marlon (2013) *Ibid.*

47 Fonteneau *et al.* (2013) *Ibid.*

48 Escalle *et al.* (2015) Cetaceans and tuna purse seine fisheries in the Atlantic and Indian Oceans: interactions but few mortalities. Available at: https://doi.org/10.3354/meps11149.

49 Hall and Marlon (2013) *Ibid.*

50 Filmalter *et al.* (2013) *Ibid.*

51 IPNLF (2023) Systematic non-compliance of drifting fish aggregating devices (dFADs) with Resolution 19/02 'Procedures on a Fish Aggregating Devices (FADs) Management Plan' — Information paper to the 19th Session of the IOTC Compliance Committee. Available at: https://iotc.org/sites/default/files/documents/2022/05/IOTC-2022-CoC19-INF03_Rev2_-_Compliance_concerns_dFADs_and_CMM_1902.pdf.

52 https://bloomassociation.org/wp-content/uploads/2023/04/Lining-up-the-ducks_EN.pdf.

Marine pollution

FADs are also a massive source of marine pollution, as it is estimated that 60%[53] to 90%[54] of them are abandoned or lost at sea, ending up beaching — sometimes within marine protected areas — or getting entangled on fragile coastal reefs such as the ones in the Maldives.[55] In fact, the intense, conscient dispersal of FADs by industrial fishers should be considered to be in breach of the international convention on marine pollution.[56] Retrieving these lost FADs also generate substantial costs for civil society, marine park managers, etc.

Invasive species

FADs are also a vector of dispersal for invasive and alien species throughout the world's ocean. Fish, barnacles, and other living organisms can indeed hitchhike on FADs and be transported to waters far from their native habitats and into ecosystems where they are not supposed to be, provoking the disruption of habitats and biodiversity. FADs have already been shown to favor the propagation of fish species in the Mediterranean[57] outside of their natural habitats and to be a potential threat for the uncontrolled spread of barnacles in the Pacific Ocean.[58] The International Union for the Conservation of Nature (IUCN) — the most important international organization for the preservation of endangered species — affirms that invasive species are one of the biggest causes of biodiversity loss and the extinction of species, and that they are also a global threat to food production.[59] For this reason, international and European legislations have long tried to limit any practice that favors the propagation of alien species,[60] and one can only wonder why FADs continue to be deployed unhindered.

53 Imzilen *et al.* (2022) Recovery at sea of abandoned, lost or discarded drifting fish aggregating devices. Available at: https://doi.org/10.1038/s41893-022-00883-y.

54 Churchill (2021) Just a harmless fishing FAD — Or does the use of FADs contravene international marine pollution law? Available at: https://doi.org/10.1080/00908320.2021.1901342.

55 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. Available at: https://doi.org/10.1371/journal.pone.0128023.

56 Churchill (2021) *Ibid.*

57 Sinopoli *et al.* (2019) Extensive use of Fish Aggregating Devices together with environmental change influenced the spatial distribution of a tropical affinity fish. Available at: https://doi.org/10.1038/s41598-019-41421-9.

58 Shuto and Hayashi (2013) Floating castles in the ocean: the barnacles of two giant fish aggregating devices from Okinawa, Japan. Available at: https://doi.org/10.1007/s11355-012-0190-7.

59 IUCN (2021) Invasive alien species and climate change. Available at: https://www.iucn.org/resources/issues-brief/invasive-alien-species-and-climate-change.

60 Office français de la biodiversité (2015) invasive alien species in aquatic environments. Practical information and management insights — Vol. 1. Available at: https://professionnels.ofb.fr/en/node/726.

FISHERS AND STATES ARE CAUGHT UP IN THEIR OWN TRAP

In 1973, one of the fathers of fisheries economics, Colin W. Clark, explained in his seminal article 'The economics of overexploitation' that "*as technology improves and demand increases, so the pressure on renewable resources grows more severe*".[61] Fifty years later, Clark could unfortunately not be closer to the truth, as technology supplying a booming tuna market continues to improve, while many stocks are dwindling or bordering with overexploitation, particularly in the Indian Ocean.

Technology will not solve the issues caused by 'fish aggregating devices'

Data in hand, even the most stubborn supporter of FADs cannot deny their negative impacts on ecosystems and biodiversity. To quote once again Adrien de Chomereau, CEO of Sapmer, tuna companies know perfectly well that they are stuck in a vicious circle that will lead to the collapse of their businesses, but they keep going regardless. As Chomereau said: *"As little FADs as possible is the path of virtue. But it is economic suicide"*.[62] Yet, FAD use continues to increase year after year.

Behind the mask of economic pragmatism lies a destructive and short-sighted strategy, in which a foolish technological race and the exhaustion of wild animals — a mere commodity — are the only answer considered by industrials.

Caught in their own trap, industrial fishers seem to be desperately trying to greenwash the image of FADs to make them less controversial, so they can continue to exploit these death machines unhindered. For instance, the use of biodegradable materials such as bamboo for the construction of FADs has been proposed as a way to reduce the plastic pollution associated with the FADs lost at sea. Calls have also be made to remove entangling components (such as nets) from FADs. Yet, although removing plastic from FADs and making them unentangling is necessary, this will not change the intrinsic issues linked to FADs: whether made from bamboo or not, entangling or not, FADs will keep generating the catch of millions of immature tuna, as well as fragile species of sharks and turtles. In other words, despite all the industry's efforts, FADs will never be 'environmentally-friendly'.

On the whole, all these measures are nothing but a band-aid on a wooden leg. **FADs are the central piece of a destructive industry, and for this reason they must be banned. The only alternative exists and we already know it: 'free schools'.**

61 Clark (1973) The economics of overexploitation. Available at: https://www.researchgate.net/profile/Colin-Clark-9/publication/6103453_The_Economics_of_Overexploitation/links/54d90e0e0cf24647581d5ce4/The-Economics-of-Overexploitation.pdf.

62 « Le moins de DCP possible, c'est la voie de la vertu. Mais c'est un suicide économique ». https://lemarinblog.wordpress.com/2016/09/22/la-reunion-les-voyants-sont-au-vert/.

OUR CAMPAIGN SO FAR...

In November 2022, we initiated our *TunaGate* series with the shocking revelation of a key public servant of the French administration — Ms. Anne-France Mattlet — who was seconded to the French tuna lobby, Orthongel, and to the largest industrial fisheries lobby in Europe, Europêche.[63] We uncovered that this person was placed within these lobbies for a very strategic mission: to avoid a condemnation of France by the Court of Justice of the EU, and to whitewash years of illegal fishing by French industrial tuna fishers.
Since then, we have followed the track left by this scandal, and have uncovered many of the issues caused by European industrial tuna fleets that operate in Africa's rich waters. The two storylines that have monopolized our campaign and fed the industry's narrative are now coming together:

- The first storyline is that of the 'margin of tolerance', i.e. a margin of error that is allowed for all European fishers — no matter their target species, fishing gear, and zone of operation — between what they report having caught, and the actual, weighted catch, in case of inspection. This regulation provides that catches must be reported within a 10% margin of tolerance **by species** (Regulation 1224/2009, called 'Control Regulation'). Industrial tuna fishers argue that they cannot respect this regulation, and promote a 10% margin of tolerance **for the overall catch**;

- The second storyline relates to the limitation of drifting 'fish aggregating devices' (FADs), which are floating structures that are used intensely by European fishers, especially in the Indian Ocean, to catch tuna. On 5 February 2023, an annual 72-day ban on FADs was voted through during an Indian Ocean Tuna Commission (IOTC) meeting, which triggered the wrath of industrial lobbies.

These two issues are intricately linked, as the 'margin of tolerance' is an issue for European tuna fleets for one single reason: they rely on FADs for the overwhelming majority of their catch. As a result, they generate the catch of tremendous amounts of juvenile tuna, particularly of yellowfin and bigeye tuna. Because the juvenile individuals of these two species look alike, tuna companies cannot report their catch by species, hence their demand for a margin of tolerance for the overall catch, no matter the species. Although this might seem an innocent difference to non-experts, it bears massive consequences for the quality of the collected data, and hence threatens basic principles of the Common Fisheries Policy, such as quotas.[64] Due to intense lobbying by French and Spanish lobbies, supported by their two states, this demand has now become the official position of the Council of the EU, and is poised to become the new environmental standard as part of the Control Regulation's revision, which is currently being wrapped up.

France sued for illegal fishing

In June 2021, the European Commission opened an infringement procedure against France on two accounts:

- *France has so far completely failed to comply with its obligations to control its tuna fleets, as per the 2009 'Control Regulation'. In fact, we have shown in another* TunaGate *report — 'Eyes wide shut'[65] — that France had not set any control objectives for these fleets in 2022 and 2023.* ***On 6 March 2023, BLOOM sued France to obtain key data on the control of its fleets;***[66]
- *In 2015, France issued an illegal derogation to allow its tuna fleets to report their catches with a margin of tolerance of 10% of the overall catch.* ***On 6 March 2023, BLOOM also sued France, requesting that this illegal derogation be withdrawn.***[67]

If France and tuna lobbies do not manage to impose this new norm as part of the revision of the Control Regulation, France may soon be brought before the Court of Justice.

63 https://www.bloomassociation.org/en/wp-content/uploads/2022/11/The-wild-west-of-tuna-fisheries-in-Africa-BLOOM-November-2022.pdf
64 https://www.theguardian.com/environment/2023/mar/16/loophole-quotas-overfishing-endangered-species-eu-papers.
65 https://bloomassociation.org/wp-content/uploads/2023/03/eyes-wide-shut.pdf.
66 http://go.bloomassociation.org/nl3/nPmEBiLxGnPufrO1PDm4dA?hl=fr.
67 http://go.bloomassociation.org/nl3/nPmEBiLxGnPufrO1PDm4dA?hl=fr.

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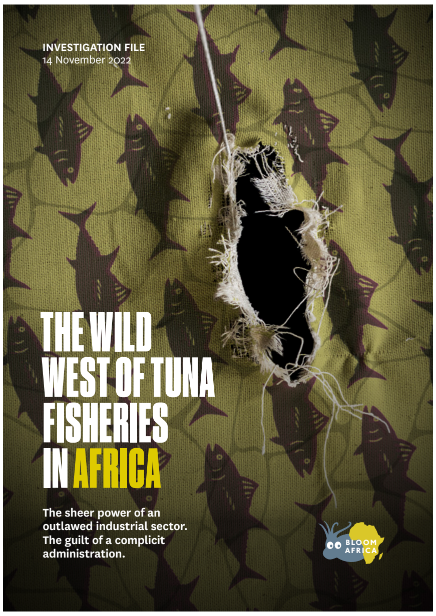

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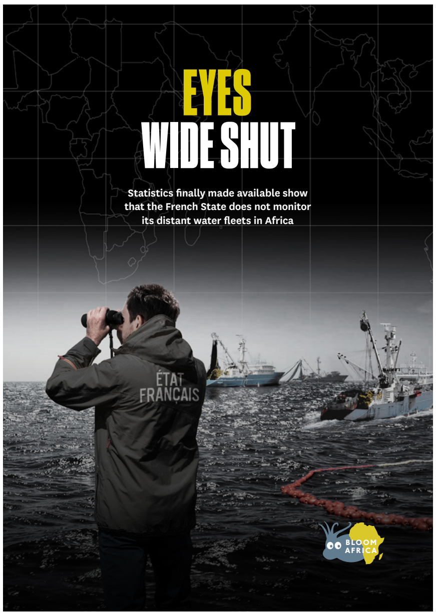

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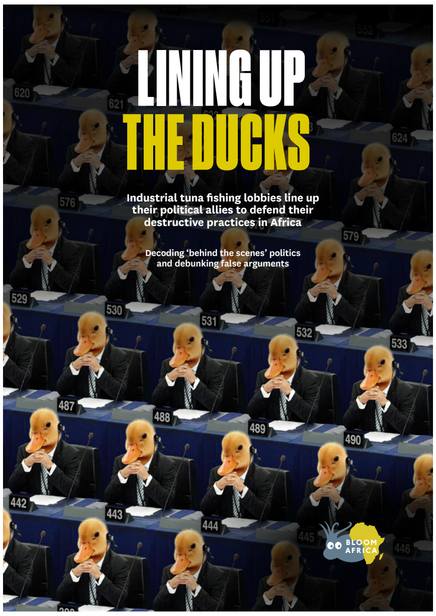

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