ENGLISH VERSION

GOLDEN MILES

ROBUST MANAGEMENT FOR COASTAL FISHING



DMA
DÉFENSE DES MILIEUX AQUATIQUES

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Golden Miles
A robust management for coastal fishing

Protecting rivers, estuaries, and oceans through the law

Established in 2017, DMA uses the law as a lever to defend aquatic ecosystems (rivers, lakes, estuaries, coastal zones, and marine environments) as well as the species that depend on them. DMA is highly active in French administrative courts.

This document presents the **Golden Miles** project, the Association's flagship proposal.

Thank you to our supporters, our members and our patrons thanks to whom our actions and the publication of this brochure are possible.

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ABOUT

This booklet is the result of years of research and document analysis conducted by the association *Défense des Milieux Aquatiques* (DMA), which has been working since 2017 to protect oceans, rivers, and estuaries through legal action.
We designed this document to serve as a tool for shared dialogue, offering an accessible read for citizens, industry professionals, and experts alike. Our aim is to provide policymakers with concrete, rigorous insights to inform public debate.
This work seeks to highlight the "Golden Miles" project—a flagship initiative championed by DMA for several years. It is rooted in nature and based on proven solutions that are commensurate with the scale of current and future challenges.
In the face of the ecological and social crisis, it has become clear that these two struggles can no longer be viewed in isolation. Ecosystem degradation directly undermines our societies, jobs, communities, and traditional expertise. Conversely, social injustice fuels short-term exploitation models that are particularly destructive to the natural world, distancing us from the vital connection to nature upon which our future depends.
Protecting oceans, restoring aquatic environments, and preserving essential biological functions does not mean pitting environmental concerns against social ones; on the contrary, it means creating the conditions for viable fisheries, sustainable jobs, and a shared future.

What divides us today must not prevent us from acting together for a better tomorrow. For the sake of our children and future generations, uniting around fair solutions grounded in science and experience is now a collective responsibility.

Philippe Garcia
President of Défense des Milieux Aquatiques

INTRODUCTION

Understanding the fisheries crisis to resolve it.

Coastal marine fishing is currently facing a profound, structural, and largely misunderstood crisis. It stems from neither an isolated incident nor a bad year, nor is it merely a matter of economic adjustment. This crisis has become entrenched over time—to the point where it is rarely discussed.

For decades, fish have been growing scarcer and smaller, and are being caught at an increasingly young age, while fishermen must work harder for less pay.

At the same time, coastal ecosystems are deteriorating, migratory species are disappearing, and the bycatch of protected species is on the rise.

This booklet aims to return to the facts and the economic and ecological mechanisms at play. It draws on extensive scientific literature, field observations, and concrete international examples.

The goal is not to assign blame, but to seek solutions. It is about understanding why the current system produces these effects—and, above all, how to move beyond it.

For solutions do exist. They are known, proven, and already being successfully implemented elsewhere. They involve spatial planning that permits only those fishing techniques capable of respecting existing biological functions.

1. General situation

In a nutshell :

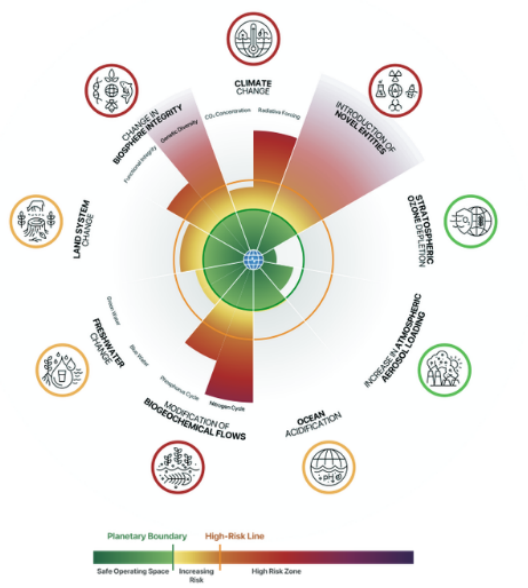
The climate is destabilizing and biodiversity is collapsing, including in our oceans. We have exceeded seven of the nine identified ecological boundaries. A great many species are in rapid decline. Scientific assessments show widespread degradation. The ocean is in crisis.

Global warming and the collapse of biodiversity are manifesting themselves every year, with increasing frequency and intensity. We have crossed both of these planetary boundaries.

In fact, we have breached seven of the nine identified boundaries—the most recent being ocean acidification[1].

We are hurtling toward climate chaos[2].

Inevitably, each generation is unaware of what the previous generation experienced. This generational amnesia[3] leads to a failure to perceive the degradation of marine biodiversity, particularly since it often remains hidden.



Planetary Boundaries Science (PBScience). 2025. Planetary Health Check 2025.
Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

Yet, a multitude of documents, reports, statistics, and assessments bear witness to the dwindling of marine life. Lists of endangered species keep growing : the IUCN[4] reported 1,143 threatened

[1]Planetary Boundaries Science (PBScience). 2025. Planetary Health Check 2025. Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany. https://doi.org/10.1093/biosci/biaf149
[2]W. J. Ripple et al., « The 2025 state of the climate report: a planet on the brink », BioScience, 2025, biaf149,
[3]Pauly, D. (1995). Anecdotes and the shifting baseline syndrome of fisheries. Trends in ecology and evolution, 10(10), 430.
[4]International Union for Conservation of Nature

species in French territory in 2016, compared to 1,742 in 2021.

With few exceptions, conservation statuses are worsening. For example, the European sturgeon, Allis shad, European eel, and angelshark are critically endangered according to the IUCN—or in an "unfavourable-bad" state under the Habitats Directive—and their status continues to deteriorate[5].

Major commercial species are under pressure, such as turbot, sole, hake, mackerel, and cod. The International Council for the Exploration of the Sea (ICES)[6] assesses the conservation status of just under a hundred species—only 74 in mainland France—whereas four to five times that number were being exploited in 2023[7].

IFREMER reports that in 2024, 50% of the volume caught in mainland France came from sustainably exploited populations—meaning the harvest rate aligned with "Maximum Sustainable Yield."
The improvement observed since the 2000s is slowing down and remains highly uneven.
Since 2018, the percentage of well-managed volume has ceased to grow. 20% of stocks remain unassessed and will likely stay that way for a long time, as assessment is both uncertain and costly.
Furthermore, while 8% of landed volumes come from stocks with
increasing renewal rates, 53% come from stocks with unknown renewal trends, and 39% from stocks with declining renewal rates.

2.The decline of marine fishing

In a nutshell :

Fish catches are declining across France. Fish auctions are emptying out, and small vessels are disappearing. The profession no longer attracts new recruits, and the number of commercial fishermen is falling. France is importing increasing amounts of fish. The decline of the fishing industry directly reflects the depletion of our waters and the failure of the management system.

Today, the French maritime fishing industry mirrors the state of marine waters: all socio-economic indicators are in the red. This crisis is not merely environmental; it is also economic and social.

The most striking indicator is the gradual and steady decline in fish landings. Auction sales tracked by FranceAgriMer are eroding year after year across all French coastal regions[8].

The situation is particularly critical in the Mediterranean, where auction sales have fallen to one-third of their previous levels in the span of a single generation.

More broadly, at the national level, sales at fish auctions have halved in just twenty years. However, since direct sales bypassing the auction also take place, it is more accurate to look at the overall trend in landings.

[5]https://nature-art17.eionet.europa.eu/article17/species/report/
[6]https://www.ices.dk/Pages/default.aspx
[7]Vermard, Y et al.(2026).Bilan2025 du statut des ressources halieutiques débarquées par la pêche française en 2024-Hexagone et Outre-mer
[8]https://visionet.franceagrimer.fr/Pages/Statistiques.aspx?sousmenu=productions%20animales

According to IFREMER[9], landings in mainland France fell by approximately 30% between 2000 and 2023 (from 457,000 to 323,000 tonnes). The same trend is observed across the European Union.

This decline marks the failure of the Common Fisheries Policy, the goal of which is to stabilize landings at a sustainable level—in line with the well-known principle of Maximum Sustainable Yield. In reality, however, such sustainability has clearly not been achieved.

The drop in landings is driving a continuous decline in the number of smaller vessels, particularly those under 12 meters[10].

Conversely, the number of vessels over 24 meters remains stable. It is small-scale coastal fishing that is disappearing, just as small farms once did. Gradually, ports are emptying of their fishing boats.
The number of commercial fishermen is also falling every year. From nearly 60,000 after the Second World War, the figure had dropped to just 20,000 by the mid-1990s. This decline occurred very rapidly during the *Trente Glorieuses* (the post-war economic boom), even as the combined power of the vessels continued to rise steadily.

The two curves cross, forming a dramatic X shape[11]. Much like in agriculture, where the number of farmers is shrinking while the size of farms keeps growing. The industrialization of the French fishing industry—initiated after the war alongside rural land consolidation and hedgerow removal—was accompanied by the increasing motorization of vessels, the adoption of new technologies, and a gradual loss of jobs. The profession no longer attracts young people. MP Annaïg Le Meur[12] reports "serious recruitment difficulties that pose a threat to the long-term viability of the sector."

The “exit rate” from the profession—which is exceptionally high—is very revealing. A majority of those who entered the profession in 2013 had left it five years later, often within the first two years.

The report highlights a "deep pessimism" among professionals, with only 44% saying they would encourage a child or loved one to pursue this career, and 60% expressing absolutely no confidence in their future.

Successive parliamentary reports acknowledge a lack of understanding regarding the ongoing decline, given the "significant efforts" fishermen have reportedly made.
Recommendations invariably focus on facilitating operations—particularly through the use of new vessels—yet there is never any mention of restoring resources or considering lessons from abroad. Scientists are puzzled[13] by the stagnation or continued decline in landings, despite a reduction in fishing effort.

To avert bankruptcy, operating subsidies have had to increase fivefold since 2020.

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[9]Vermard, Y et Ulrich, C. (2025). Bilan 2024 du statut des ressources halieutiques débarquées par la pêche française hexagonale en 2023. Rapport RBE/25-004

[10]https://www.franceagrimer.fr/content/download/72218/document/20231027_CC_p%C3%AAche_aqua_FR.pdf

[11]Public-aided crises in the French fishing sector, Benoît Mesnil, Ifremer, Département EMH, Nantes, France, Ocean and Coastal Management, Volume 51, issue 10, 2008, Pages 689-700, figure

[12]Rapport n° 2293 d’information déposé par la commission des affaires économiques sur la pêche. Mme Annaïg LE MEUR, Députée, enregistré le 9 octobre 2019

[13]Ulrich. et al. (2026). Impact du changement climatique sur les ressources halieutiques. Réponse à une demande d’expertise DGAMPA. Ref.DG 2025-1708/P9 25-048-Saisine DGAMPA 21/07/2025

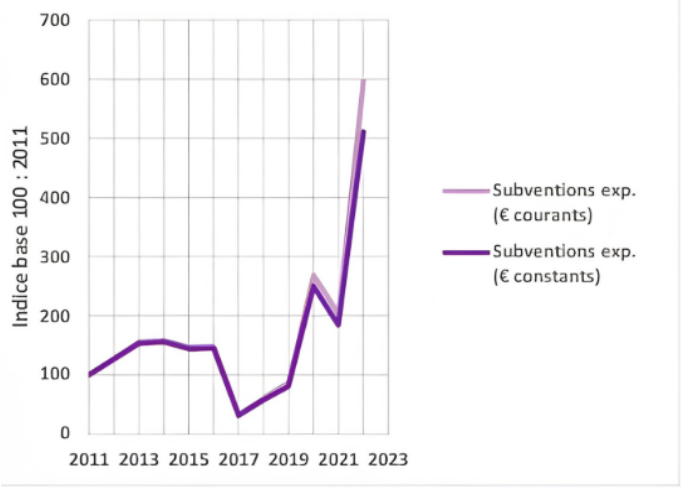


Figure 20: Indices des subventions d'exploitation en € courant et constants. base 100 : 2011 Est (Source : Capacité-DCF, Insee)

Fig. 20 Indices for operating subsidies in constant and current euros. Base 100: 2011 (est.)

3. Fisheries policy and a litany of crises

In a nutshell :

For over 50 years, the French fishing industry has been rocked by recurring crises. Subsidies have sustained a model that is too costly and too powerful, without addressing its flaws. The result : crises keep recurring, marine ecosystems are weakening, and the industry is sinking into a major crisis.

Since the 1970s, the profession has been regularly shaken by crises and riots—analyzed by Benoît Mesnil in 2008[14]—that are almost always triggered by rising diesel prices or falling fish prices.

Among the most significant episodes

• Port blockades in February 1975 following the April 1974 oil shock, which drove up the price of nets and quadrupled fuel costs,
• Merchant Navy intervention in 1980 following crew reductions on large vessels,
• Three weeks of riots at Rungis, on highways, and in ports and supermarkets in February 1993, triggered by a reduction in the number of vessels (the Mellick Plan) and falling fish prices,
• Further riots at Rungis in February 1994 and the burning of the Rennes parliament building[15],
• Renewed port blockades in the 2000s in response to rising diesel prices,

Benoît Mesnil concludes that the French maritime fishing industry has been swamped by subsidies intended to keep it afloat. With few exceptions, this aid was distributed without conditions, failing to resolve the sector's numerous structural problems or to foster more responsible practices.

[14]Public-aided crises in the French fishing sector, Benoît Mesnil, Ifremer, Département EMH, Nantes, France, Ocan and Coastal Management, Volume 51, issue 10, 2008, Pages 689-700, figure 2
[15]https://www.sapeurs-pompiers35.fr/incendie-du-parlement-de-bretagne-30-ans-deja/

The scale of this aid is immense—comparable to the sector's total economic output—much like a public agency that generates no wealth. Whether in terms of trade balance, competitiveness, profitability, employment, or safety, the results of these subsidies are the exact opposite of what was intended.

A parliamentary audit implicitly acknowledges that vessels that are too large—and thus too costly, burdened by excessive investment debt—are unable to adapt to economic fluctuations (such as fuel or fish prices) or changes in fish stocks (declining resources).

This fundamental issue has been consistently ignored for twenty-five years and will continue to be so. The costs associated with this operational policy are simply too high.

By granting this aid without any guarantee of commitment—and by stripping it of the incentive effect it ought to have—policymakers allow the same flawed patterns to persist, the very ones that have invariably led to the same crises for the past thirty years.

For just as long, policymakers of all stripes have applied the same misguided logic seen in agriculture, for instance : ever more machinery driving ever higher production, resulting in greater environmental impact and fewer jobs. It is a headlong rush into a dead end.

Benoît Mesnil believes that our policymakers are trapped in the model of excessive industrialization established after the war, as well as in the cronyism cemented by such a long period of handouts. Their half-hearted attempts to break free have been swept aside by fierce opposition from the industry, which is delighted with this permanent life-support system.

French fishermen—often singled out by their European counterparts as "subsidy junkies"—are also the primary victims of a collective refusal to take a different path; a path that, admittedly, no public policy has yet managed to offer them.

No lessons have been learned from this succession of crises. The rhetoric of politicians and the administration regarding the fishing industry remains unchanged.

It is the same story of self-serving, biased analyses, continued subsidies, and ongoing exemptions allowing trawling within the three-mile limit at the expense of coastal nursery grounds—all while avoiding truly relevant solutions due to short-term costs that subsidies could, in fact, offset.

There persists the belief—completely erroneous when it comes to fishing—that ever-increasing inputs and machinery are required to boost production.

Yet fish are not manufactured goods; they are the product of complex biological cycles and living ecosystems. In short, an obsessive strategy worthy of the manufacturing industry's leading figures.

According to FranceAgriMer[16], the foreign trade deficit in fishery products has been steadily worsening since the early 1980s. It has doubled, rising from 400,000 to 800,000 tonnes—a figure equivalent to €4.45 billion in constant 2018 prices.

The latest economic report from the Scientific, Technical and Economic Committee for Fisheries (STECF) for 2023–2024[17] is unequivocal : ***"The French fishing sector is currently facing a major crisis."***

[16]Commerce extérieur des produits de la pêche et de l'aquaculture 2018_Données et bilans de FranceAgriMer BIL-MER commerce_extérieur-A18.pdf

[17]STECF, (Scientific Technical and Economis Committee for Fischeries) The 2024 Annual Economic Report on the EU Fishing Fleet (STECF 24-03 & 24-07), JRC Publications Repository.

4. Oceans in danger: disrupted food chains

In a nutshell :

Excessive fishing pressure means fish are being caught at increasingly younger ages, before they have time to grow or reproduce. Large species and large individuals are becoming scarce, replaced by smaller fish and species lower down the food chain. This selection process favors fish that reproduce earlier but less efficiently, thereby lastingly undermining population renewal and potentially leading to irreversible genetic changes.
Ultimately, the entire marine balance deteriorates: food chains shorten, iconic species disappear from markets, and the ecosystems' capacity for renewal is severely compromised.

SMALLER FISH

Under fishing pressure, the fish caught are becoming increasingly small, as they lack the time to grow. In 2008, 95% of the fish caught in the Bay of Biscay were less than 23 centimeters long[18].

In 2012, S. Guénette and Didier Gascuel[19] observed that fish lengths had decreased significantly.

The average maximum length was around one meter in 1950. It was halved by the late 1970s. After a more erratic trend subsequently, it rose back to 66 cm in the 2000s. According to the authors, this decline reflects a significant shift in the composition of the species caught, with a higher proportion of small species such as blue whiting, wedge sole, and megrim.

With large species decimated, the focus has now shifted to smaller ones.

FISH THAT REPRODUCE EARLIER

Fishing primarily targets the largest breeding fish—that is, the oldest ones—thereby relatively sparing the younger breeders. Because of this human-induced selection, these young fish are able to pass on their own genes to a much greater extent than the large fish, which have become scarce.

This is the case for around forty species, such as cod, mackerel, horse mackerel, eel, and a species of Pacific salmon.

From one generation to the next, the overrepresentation of these younger spawners is reflected in the biomass of their offspring—and amplified. Consequently, the spawning population effectively matures at an increasingly early age, meaning the fish are progressively smaller.

This is not good news. In the marine world—unlike with most land mammals—the best breeders are the oldest and largest individuals. For example, regarding the female European sea bass (*Dicentrarchus labrax*), the English acronym BOFF ("Big Old Fat Female") highlights the prolific reproductive capacity of these valuable large females—weighing six to eight kilograms or more—which outperform younger females by producing millions of highly fertile eggs.

Reproduction by young adult fish is therefore less efficient, both in terms of quantity and quality.

[18]Une mer sans poissons, Philippe Cury et Yves Miserey, Éditions Calmann-Lévy, dépôt légal avril 2008, page 198.

[19]S. Guénette et D. Gascuel, « Shifting baselines in European fisheries », Ocean & Coastal Management, vol. 70, 2012, p. 10-21.

This trend towards a younger spawning population may be irreversible—a particularly serious issue, as it involves permanent genetic changes.

FOOD CHAINS SHORTENED FROM THE TOP

After depleting predatory species situated at the upper levels of food chains—such as cod, sea bass, pollack, and many others—fishing now targets what remains : species located progressively lower down the chain, often to the point of exhaustion.
One recalls the market stalls of the 1970s, featuring turbot "as big as trash can lids," sea bass weighing 5 to 6 kilos, or soles weighing one and a half kilos.

Today's stalls display wrasse, mullet, and triggerfish, along with many aquaculture products—starting with farmed salmon.



1



2

(1) The fish being caught are becoming increasingly small—in this case, juvenile turbot, sole, and hake. One also notices greater weavers and triggerfish, appearing in the absence of more highly prized species.
(2) Unable to disentangle the ten legs and two claws of brown crabs caught in the countless coastal nets, the crab's body is smashed to pieces with a single blow from a mallet. Only the claws are offered for sale, making it impossible to verify whether the crab met the minimum legal size for capture. This practice is, however, permitted under European regulations. Unsurprisingly, the brown crab population in the English Channel, the Celtic Sea, and the Bay of Biscay is overfished and in a degraded state.

5. Scientific warning signs

In a nutshell :

Scientific data show that the marine environment is becoming depleted. Fishing is increasingly targeting species lower down the food chain because larger species are disappearing.
Contrary to popular belief, stable or high catch levels do not prove that fish populations are healthy.
Even when landing volumes appear satisfactory, a collapse may be imminent.
The sharp decline in catch per unit of fishing effort—despite increasingly efficient fishing techniques—points to a worrying scarcity of fish.

WHEN FISHING LOWER AND LOWER DOWN THE FOOD CHAIN

A species' trophic index is a figure that places it within the food chain to which it belongs.

By definition, a score of 1 is assigned to the bottom of the scale : in the oceans, this corresponds to "phytoplankton" (microscopic marine algae)—the equivalent of pasture and green land plants. The score then increases by one unit, with a score of 2 assigned to the next level: "zooplankton," which feeds on "phytoplankton."

A score of 3 is assigned to small fish (sprat, anchovies, sardines) that feed on "zooplankton," and so on. Finally, a score of 4 is reserved for the predators of these small fish.

Since many organisms have varied diets, the reality is more complex : the index is far from being a whole number, and specific tables have been published. Cod, monkfish, and hake—which occupy the highest trophic levels—are true omnivores and apex predators.

The key value of these scores is that they reveal underlying trends.

Guénette and Gascuel[20] establish that the mean trophic level of all landings declined by 3% per decade, falling from 3.75 to 3.52 between 1950 and 1970. This ongoing trend reflects the fact that fishing—having depleted species at higher levels, namely those classified as predators—is now targeting species lower and lower down the food web, to the point of exhausting entire food chains.

This means that fewer and fewer large predators are being caught, while an increasing number of species lower down the food chain are being harvested.

Catch figures are the worst imaginable indicator of fish abundance. French authorities have long underestimated this reality. It is a mistake to believe that stable year-on-year catch levels—or, even more so, an increase in catches—guarantee the maintenance of fish population numbers.

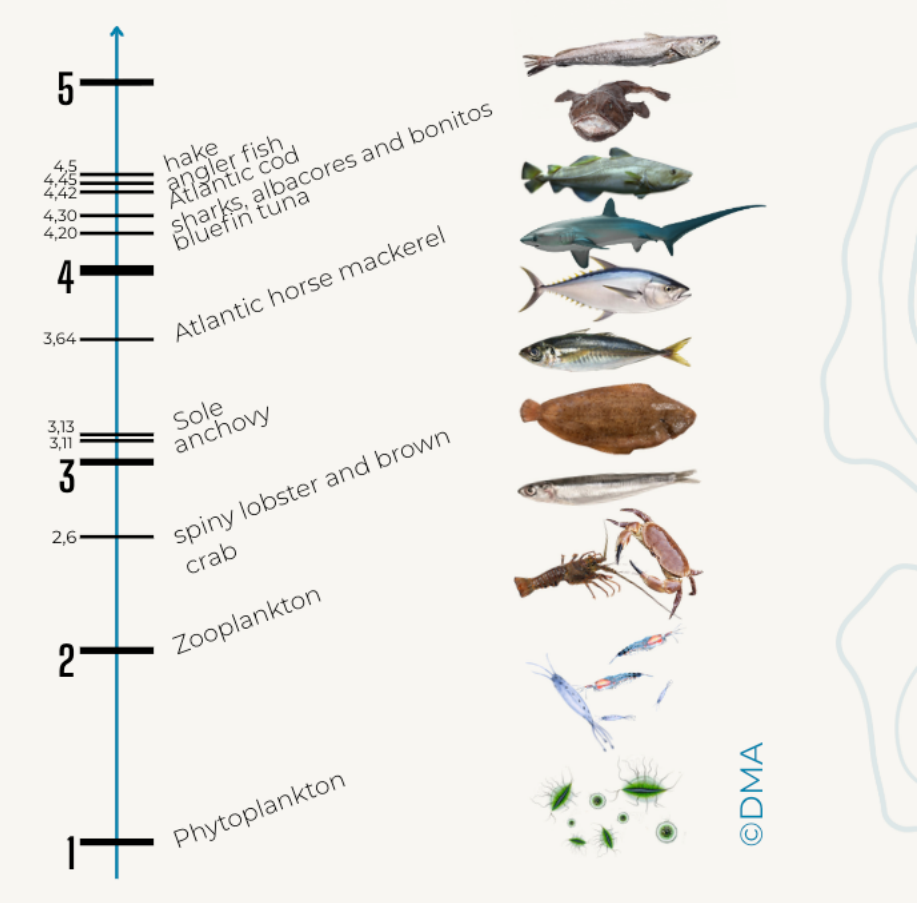
No trend in catch figures, however reassuring it may seem, can guarantee that conditions underwater are healthy. And this is easy to understand, since catch data reveal nothing about the quantity of live fish remaining in the water!

[20]S. Guénette et D. Gascuel, « Shifting baselines in European fisheries », Ocean & Coastal Management, vol. 70, 2012, p. 10-21.

The most famous example is the collapse of the Newfoundland cod stock, which happened overnight. While remaining deaf to repeated warnings from scientists, Canadian managers kept congratulating themselves on the very high catch levels.

Landings in 1991 had still exceeded 250,000 tonnes. The fishery had to be closed in early July 1992...due to a lack of fish. The cod never returned, and the region never recovered.

The fact is that fishing effort was excessive, resulting in the capture of virtually every last cod...



Classification of species according to their trophic level, from the base to the top. The higher the trophic index, the more vulnerable the species is to overfishing and disruptions in the food chain.

DECLINE IN CATCH PER UNIT OF EFFORT

To avoid this pitfall, scientists developed an indicator known as Catch per Unit of Effort (CPUE). In this case, catches are compared against fishing effort.

For marine fisheries, fishing effort was “reduced” to a single parameter (!) : engine power (expressed in kilowatts). This highly simplistic metric significantly inflates the indicator.
The results established by Guénette and Gascuel are therefore all the more telling. These authors demonstrate that, for a given engine power, **a vessel today catches ten times less fish than in the post-war era**, despite an explosion of technology across the board. This finding is arguably the most telling indicator of what has actually occurred.

In other words, as technical capabilities increase, marine life becomes scarcer.

6. An ocean increasingly hostile to life

In a nutshell :

Global warming and pollution are profoundly disrupting the oceans. Warming waters disrupt the exchange between the surface and the depths, deplete the ocean's oxygen, and cause acidification. These phenomena directly threaten the foundation of all marine life : phytoplankton.
Less phytoplankton means less life throughout the food chain.
At the same time, pollution from land is severely degrading coastal areas, triggering algal blooms, creating dead zones, and giving rise to new phenomena that are still poorly understood.
These combined pressures are making the ocean increasingly hostile to life.

EFFETS OF GLOBAL WARNING[21]

Global warming affects ocean waters at all depths—including the abyssal zones—but surface waters are warming the fastest, becoming less dense in the process.

This density difference slows down the essential exchange between surface waters and the deep ocean. This dire phenomenon of stratification acts as a barrier hostile to life, inhibiting energy flows.

In practical terms, surface waters and deep waters mix less, preventing nutrients and oxygen from circulating properly.

Dissolved oxygen levels drop because warm water holds onto this precious gas much less effectively. Tropical waters are therefore the most affected. Levels have reportedly fallen by 0.5% to 3.3% in the top 1,000 meters of the water column. Even more concerning, this phenomenon of hypoxia is being amplified by numerous other processes.

The absorption of carbon dioxide produces carbonic acid, which is believed to be the primary cause of the ongoing acidification of ocean surface waters.

This phenomenon is thought to affect more than 95% of the total surface area of the world's oceans.

Acidification impairs the calcification of shells and skeletons (in mussels, oysters, corals, etc.) and makes survival and reproduction much more difficult for many organisms.

CONSEQUENCES OF GLOBAL WARMING ON FISH

No matter how much fish migrate in an attempt to adapt, they will no longer be able to thrive as they have for centuries.

Indeed, the physicochemical phenomena driven by global warming disrupt nutrient cycles, thereby reducing primary production—that is, the production of phytoplankton. Yet, phytoplankton is the first link in the food chain and the foundation of marine life, much like meadow grass on land, where plants form the basis of terrestrial life. Less grass, fewer herds. Less phytoplankton, fewer

[21] Selon le Groupe d'Experts Intergouvernemental sur l'Évolution du Climat (GIEC)

fish. The IPCC projects a decline in primary production of around 10% to 30% by the end of the century. This translates to a corresponding loss of life in the ocean[22].

The drop in primary production is twice as severe in coastal waters and even worse in estuaries, probably because of the pollution[23].

WORSENING COASTAL POLLUTION

Major rivers carry to the sea all the pollutants generated by human activities. The Bay of Seine and the Rhône estuary are thus significantly polluted by heavy metals and PCBs (Polychlorinated Biphenyls).

Of approximately one hundred pollutants, the Emergent'Sea study[24] found two-thirds in oysters and mussels and three-quarters in marine water samples from 34 sites distributed along the French coast.

Excess agricultural fertilizers reach the sea, where they fuel the proliferation and growth of "green algae," leading to spectacular explosions or "blooms"—phenomena exacerbated by ecosystem depletion and the degradation of the seabed. Hundreds of "dead zones" are thus multiplying along coastlines around the world.
Brittany, largely due to massive pig farming operations, has suffered from this for decades.

The Basque Country suffers from a problem that may be even worse. Excess agricultural fertilizers mix with wastewater discharges that exceed the capacity of treatment plants.

The result is the "Liga," a little-understood underwater monster, gelatinous, viscous, and foul-smelling mass moving along the seabed, driven by currents and swells, clumping like slime onto fishing nets and longlines, rendering them useless. The images are spectacular and rather repulsive.

[22]Ulrich. et al. (2026). Impact du changement climatique sur les ressources halieutiques. Réponse à une demande d'expertise DGAMPA. Ref.DG 2025-1708/P9 25-048-Saisine DGAMPA 21/07/2025
[23]Z. Hong et al., Declining ocean greenness, Sci. Adv. 11, eadx4857 (2025). DOI:10.1126/sciadv.adx4857
[24]Amouroux I., Gonzalez J.-L., Grouhel A., et al. (2025). Emergent'Sea. Recherche des substances d'intérêt émergent en milieu marin. Ifremer, 61 p. https://archimer.ifremer.fr/doc/00956/106772/

7. Atlantic salmon : a life of obstacles between river and ocean

In a nutshell :

The Atlantic salmon is a creature with extraordinary capabilities. It is born in rivers, grows in the open ocean, and then finds its way back to its native river with remarkable precision.
Its life cycle relies on a delicate balance : water quality, an abundance of marine life, and an exceptional sense of orientation and smell.This extreme dependence on its environment makes the salmon particularly vulnerable to human pressures today.

In the upper reaches of river basins, where the water is purest, the female Atlantic salmon (*Salmo salar*) deposits eggs in her gravel nest that are—with the sole exception of the coelacanth—far larger than those of any other marine species. Measuring 5 to 6 millimeters, salmon eggs offer the embryo a much better chance of survival thanks to their vastly superior yolk reserves.

Thus, the young Atlantic salmon is born in the upper reaches of rivers; it leaves a year or two later to mature in the open ocean—in the cold waters of the North Atlantic—where it will multiply its body weight by a factor of ten, twenty, or thirty in the span of just one, two, or three winters at sea.

The Atlantic salmon is capable of alternating between a hypotonic environment—such as fresh water—and a hypertonic one—such as seawater—and vice versa. It masters osmotic pressures : it can move between fresh water and seawater without disrupting its bodily functions.

Moreover, it does not simply wander aimlessly at sea.

For millions of years, it has located the richest areas—places where deep-water upwellings bring the nutrients that fuel an abundance of life, particularly the small crustaceans known as krill. Krill is naturally rich in astaxanthin, the pigment that gives the salmon’s flesh its orange color. This allows the fish to gain significant weight in a very short time—a feat few other cold-blooded species can match.

The salmon can navigate a course to reach its open-ocean feeding grounds and, upon returning, successfully locate the coast where its native river empties into the sea.

The compass system enabling it to accomplish this feat could well consist of the magnetite crystals found in minute quantities within each scale of its lateral line.

Magnetite is the most common iron mineral, abundant in river-borne sediments. The fact that the state of the magnetite crystal depends on the Earth’s magnetic field suggests that each fish—guided by two rows of hundreds of tiny electric dipoles along its flanks—knows the position of magnetic north at all times. It is able—likely thanks to information encoded in its genes—to use this data to swim on the correct heading. Such feats are beyond our comprehension, given that we require an electronic device to achieve the same result.

To find their way back to their native river without error, each individual is apparently capable of recognizing—or “sensing”—the water where it was born, as well as the scent of its immature counterparts present upstream. But how does it manage this?

Research indicates that it likely combines chemical perception with very specific swimming

behaviors. Since an initial study in 1979, scientific literature has amassed evidence[25] showing that salmonids at sea travel predominantly (90% of the time) within the uppermost layer of water (the top ten meters), and even closer to the surface at night. A study by Godfrey et al. (2014)[26] examined the behavior of thirty-four adult salmon fitted with satellite transmitters in Scottish coastal waters; all of these fish spent between 79% and 90% of their time within the top ten meters.

Davidsen et al. (2013)[27] tracked fifty-six adult salmon in northern Norway; they traveled along the coast moving at depths ranging from fifty centimeters to two and a half meters.

All studies also converge on the subject of "kelts"[28]—those rare salmon capable of spawning a second time in their native river, as revealed by their scales. These exceptional fish are most often females. In rare instances, fish may spawn a third time, while—within a dataset of 36,000 French catches—two fish reportedly achieved this feat four times!

This swimming behavior is easy to understand: salmon and trout are born in fresh water, in the oxygen-rich riffles at the tail-outs of pools in our most pristine rivers—that is, in shallow areas where the water flows rapidly, at depths of only a few tens of centimeters.

The young fish thus spent one or two years with the celestial bodies constantly overhead—the sun by day, and the stars and moon by night. Consequently, this juvenile imprinted the behavior of swimming just below the surface into its genes and early-life experience. It also retained the associated feeding habits, continuing to feed at the sea surface on insects carried offshore by land winds.

It is therefore not surprising that the adults maintain this behavior. However, as we shall see later, this reliance on the sea surface—exploited by certain fishing practices—poses a direct threat to them today.

8. Coastal waters,a vital corridor but a zone fraught with danger for salmon.

In a nutshell :

Salmon do not return directly to their river; they must travel along the coast to find their way back. This coastal corridor is a vital passage—but one fraught with danger. Dams, river degradation, pollution, and pressures at sea have turned this journeyn into an obstacle course.
Migratory fish populations are collapsing worldwide.

Another characteristic of salmon behavior has significant implications for their survival. It is tempting, yet incorrect, to believe that salmon converge on their estuary like a ship using perfect electronic guidance.

In reality, salmon appear to arrive at various points along the coast, as evidenced by the scattered locations where they are caught. Their navigation system—based on magnetite microcrystals and less precise than our GPS—leads them to make landfall at considerable distances from the estuary

[25]Hawkins, A.D. et al. (1979). Coastal movements of Atlantic salmon, Dept. Agric. Fish. Scotl., 789-791. Potter, E.C.E. (1985).
[26]Godfrey, J.D. et al. (2014). Depth & migration of Atlantic salmon, ICES J. Mar. Sci.
[27]Davidsen, J. et al. (2013). Homing of Atlantic Salmon, Can. J. Fish. Aquat. Sci., 70, 794-802.
[28]Hubley, P.B. et al. (2008). Survival & behaviour of Atlantic salmon kelts, ICES J. Mar. Sci., 65(9), 1626-1634.

of their native river. For example, regarding Ireland, tagging studies[29] have shown that fish reaching the west coast must indeed navigate around the island, when it comes to finding their native estuary on the East Coast.

They explore freshwater inflows and seek out the “scent” of their native river—which could be the mineral signature of those fresh waters, or even the pheromones of juveniles of their own species living upstream. This quest leads them to “skirt the coast in search of landmarks to locate their birthplaces and spawn.”[30] The coastal marine zone thus appears to be the natural path the salmon follows to recognize the marine extension of its native river.

In other words, salmon do not arrive directly at the “right place”: they must travel a long way along the coast to find their river again. Coastal waters serve as an essential migratory corridor as they approach their native estuary.

The lower density of fresh water causes it to “float” on the surface in coastal areas. What could be more logical for a spawner seeking its native fresh waters than to swim just below the surface, where the presence of fresh water is most likely, but also close to the shore, where dilution has not yet had time to take place?

That is likely why salmon have been swimming along the coast just below the surface for millions of years.

However, since the dawn of the industrial era, humans have appropriated salmon rivers—blocking them with dams and weirs, extracting gravel from spawning grounds to build our homes and roads, diverting water for irrigation or industry, or fouling them with pollution.

At the same time, across Europe, salmon stocks have been heavily depleted by fishing, while high-seas fisheries remove significant quantities of sand eels or krill—the species' primary marine food source—from the water.

The Atlantic salmon is undeniably an athlete, but it is no magician. A wealth of scientific literature[31]

[29]Independent Salmon Group, Report on Alignment with Scientific Advice for the Commercial Salmon Fishing Sector, octobre 2006.

[30]Prouzet P., 2001 - Rapport sur les prises de salmonidés en zone côtière du Pays Basque et du Sud des Landes en 2000. Rapport Ifremer/DRV/RH. Contrat DIREN-CG 64, 46 pages.

[31]Diercking & Wehrmann (1991). Protection des poissons et cyclostomes à Hambourg. Nat. & Paysage Hambourg 38, 126 p. / Meyer & Brunken (1997). Poissons migrateurs et cyclostomes du système Aller. Bruns. Naturhist. Schr. 5(2): 281-303. / Dußling & Berg (2001). Poissons du Bade-Wurtemberg (2e éd.). Ministère de l'Alim. et zones rurales, Stuttgart, 176 p. / De Groot (2002) / Anadromous fish in the Netherlands: Rhine restocking. Hydrobiologia 478: 205-218 / Jutila et al. (2003). Atlantic salmon in the Simojoki river. Fish. Res. 64(1): 5-17 / Fricke et al. (1995). Liste rouge des poissons marins (Wadden/Mer du Nord). In: Nordheim & Merck, Schr. Naturschutz 44: 101-113 / Berg et al. (IX). Red List of Lampreys and Marine Fishes (DK/DE/NL). Contrib: S. Berg, R. Fricke, W.J. Wolff / Elvira (1996). Poissons d'eau douce menacés d'Espagne / Witkowski (1992). Threats and protection of Poland fishes. Neth. J. Zool. 42(2/3): 243-259 / Maitland & Lyle (1991). Conservation of fish in British isles. Aquat. Conserv. 1(1): 25-54. / Garilao et al. (2012). Profils d'espèces. In: Narberhaus et al., Naturschutz & Biol. Vielfalt 116: 265-485 / Letaconnoux (1961). Captures d'esturgeons (Golfe de Gascogne). Rev. Trav. Inst. Pêches Marit. 25(3): 253-261. / Taverny (1990). Mortalité juvénile Alosa sp. (Gironde). In: Densen et al., Mgmt Freshw. Fish., Pudoc: 215-229 / Keith & Allardi (1996). Endangered fish in France. In: Kirchhofer & Hefti, Conserv. Europe, Basel: 35-54.

documents how—under the combined, relentless pressures of overfishing and habitat degradation—the species has vanished from major rivers where it once teemed in the early 20th century, such as the Rhine basin.

Today, salmon have disappeared from 11% of French salmon rivers, and their disappearance is considered imminent in 61% of these rivers[32].

The decline is global and affects all migratory species capable of living alternately in fresh and salt water. According to a July 2020 report by the World Fish Migration Foundation, their populations have plummeted by 76% worldwide and by 93% in Europe since the 1970s[33].



Coastal net fishing poses a very direct threat to the migratory route of salmon toward their native rivers.

9. When dolphins die in nets

In a nutshell :

For over thirty years, hundreds of dolphins have washed up on French coasts each year. The majority died after becoming trapped in fishing gear. Strandings reveal only part of the reality many animals vanish at sea without ever being found.
Today, several types of nets are implicated, and the death toll continues to rise. It is a recurring mass die-off—one that is now officially acknowledged.

Since the late 1980s, significant strandings of small cetaceans—particularly common dolphins (*Delphinus delphis*)—have been monitored by the PELAGIS Observatory[34] in La Rochelle. Affiliated with the French National Centre for Scientific Research (CNRS), the observatory collects and publishes this stranding data.

The 2019 stranding report[35] from the PELAGIS Observatory notes that as early as 1989, nearly 700 small cetaceans were found stranded, primarily in the Landes and Gironde departments. Since then,

[32]https://nasco.int/nasco-wild-atlantic-salmon-atlas/
[33]einet, S. et al. (2020), The Living Planet Index (LPI) for migratory freshwater fish, World Fish Migration Foundation.
[34]https://www.observatoire-pelagis.cnrs.fr/
[35]Peltier, H. et al. (2019), Captures accidentelles de dauphins communs dans le golfe de Gascogne – Synthèse 2019, Observatoire PELAGIS / La Rochelle Université

mass stranding events have been observed almost every year, with some winters seeing particularly intense events.

External and internal examinations conducted by the National Stranding Network confirm, in most cases, death caused by fishing gear (60%—and up to 90% of animals during peak periods).

Based on stranding data, the observatory estimates total mortality by factoring in a median stranding probability that depends on weather conditions. It is therefore necessary to multiply the number of strandings by an appropriate coefficient—scientifically estimated—to gauge the actual mortality. In other words, themajority of dead dolphins are never found. From several hundred annually, strandings regularly exceeded a thousand individuals starting in 2011 and worsened further from 2016 onwards.

Historically, these strandings were initially identified as a consequence of pelagic trawling activity specifically targeting sea bass, rather than other species also sought by these pelagic trawlers (such as blackspot seabream, mackerel, horse mackerel, etc.).

The winter aggregations of spawning sea bass trigger a spectacular gathering of the fishing vessels that hunt them—a phenomenon visible on location maps generated by satellite systems. Spawning sea bass are highly exposed, and consequently so are cetaceans, as all these predators are pursuing the same small pelagic fish. The situation shows no signs of abating, as no effective measures are being taken.

Matters have worsened in subsequent years, and the issue of "accidental" dolphin catches has garnered significant media attention. In reality, these catches are anything but accidental; they must all be regarded as "intentional"—a stance the Court of Justice of the European Union has long recognized regarding a specific species of turtle[36].

Public opinion is reacting and becoming aware of a veritable mass die-off. The general public is discovering that hundreds of carcasses are washing up on our beaches, the vast majority bearing traces of fishing gear. Today, we know that pelagic gear is far from being the only type of fishing gear involved; other gear types are also implicated, as suggested, for instance, by the positive correlations published by PELAGIS regarding fixed nets[37] during the 2010s.

The situation is further complicated by recent summer strandings in Brittany involving coastal nets since 2016.

Indeed, fixed nets (i.e.,anchored to the seabed) are perfectly capable of intercepting diving dolphins—made all the more likely as the vertical extent of these nets in the water column continues to increase, stretching from the seabed toward the surface due to technological advances in nylon materials.

A handful of NGOs, including Défense des Milieux Aquatiques, petitioned the Council of State. In March 2023, the Council of State ordered the French government to implement effective measures within six months (CE, March 20, 2023, Nos. 449788, 449849, 453700, 459153).

The record number of strandings set that same year—involving nearly 2,000 dolphins—confirms the urgent need to control fishing-related mortality.

Pelagic trawls no longer account for the majority of dolphin catches. Data now indicate that fixed

[36]CJCE, 30 janv. 2002, Commission c/ Grèce, aff. C-103/00, ECLI:EU:C:2002:60. - CJCE, 18 mai 2006, Commission c/ Royaume-Uni, aff. C 221/04, ECLI:EU:C:2006:329.

[37]Les filets calés ou filets fixes sont des filets statiques dont la partie inférieure repose au fond de l'eau à l'aide de poids et/ou d'ancres

nets have become the leading cause of mortality.

This is due to intensified fishing in coastal waters, particularly the ongoing increase in net length and depth within the water column—parameters that are currently neither regulated nor even documented.

It is now officially established that fixed nets are responsible for at least half of all dolphin deaths linked to fishing practices.

10. The silent mass die-off of seabirds

In a nutshell :

Seabirds are disappearing at an alarming rate.
Nearly 70% of monitored populations have vanished since 1950, and one in three species is now threatened. Fishing is a major cause of this mass die-off : every year, hundreds of thousands of birds die after becoming trapped in fishing gear or being deprived of food.
This mortality remains largely invisible, yet it severely weakens marine ecosystems.

Palecsny et al. (2015)[38] estimate that monitored seabird populations declined by 69.7% between 1950 and 2010.

Of the 369 species recorded worldwide, 50% are in decline and 30% are currently threatened[39].

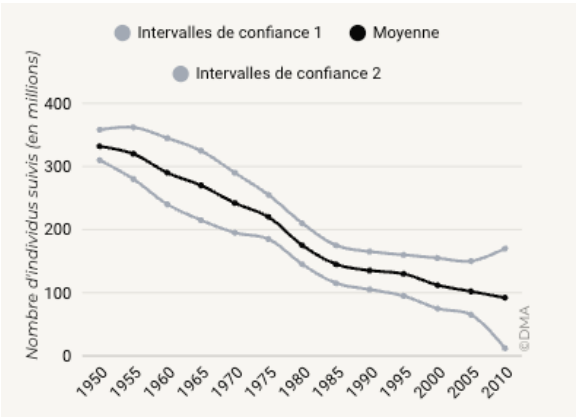
Fishing negatively impacts seabirds through incidental catch, competition for food (due to the fishing of forage species such as anchovies, sand eels, or krill), and discards[40].

Fishing-related catches remain one of the greatest threats to seabirds[41].

It is the second-largest threat in terms of species affected (around a hundred), and the greatest in terms of individual birds (millions).

Hundreds of thousands of seabirds die each year due to capture. Recent estimates suggest that 160,000 to 320,000 individuals are killed by longlines, 400,000 by gillnets, tens of thousands by trawls, and thousands by seine nets[42].

[38]Paleczny M, et al. (2015) Population Trend of the World's Monitored Seabirds, 1950-2010. PLoS ONE 10(6): e0129342.
[39]Ramírez I, et al. (2024) Seabird bycatch in European waters. Anim Conserv, 27: 737-752.
[40]Votier SC, et al. (2023) An overview of the impacts of fishing on seabirds... ICES J Mar Sci, 80(9): 2380–2392.
[41]O'Keefe CE, et al. (2021) Efficacy of Time-Area Fishing Restrictions... Rev Fish Sci Aquacult, 31(1): 29–46.
[42]Votier S. Et al. - An overview of the impacts of fishing on seabirds, including identifying future research directions_DO 10.1093/icesjms/fsad173_JO - ICES Journal of Marine Science







1 2 3

1-Trends in the population of monitored seabirds worldwide between 1950 and 2010.
The total population in 2010 represented approximately 30% of the 1950 population, amounting to a loss of nearly 70%. (The gray lines represent 95% confidence intervals.)
Source: Data adapted from Paleczny et al. (2015), Population Trend of the World's Monitored Seabirds, 1950–2010. PLoS ONE 10(6): e0129342.

2-Northern gannet

3-Balearic shearwater

The latest estimate for seabird bycatch in European fisheries is 195,000 individuals [130,000; 380,000].
France leads by a wide margin, with a minimum of 34,000 birds, half of which are guillemots.

Seabird bycatch in coastal gillnet fisheries (fixed nets) poses a persistent threat to several seabird species.

56% of seabird sightings in France occur within the first three nautical miles[43].

The Balearic Shearwater, a highly coastal species, is now critically endangered. The major role of fishing-related mortality in its decline has now been clearly demonstrated. It is considered Europe's most threatened seabird. Its ultimate extinction is predicted[44].

[43]Stéphanie Tachoires, Vincent Toison. Informations sur les captures accidentelles d'oiseaux marins dans les eaux françaises métropolitaines par les navires français. OFB. 2022, pp.32. hal-04412701
[44]Plan national d'actions 2021-2025 En faveur du Puffin des Baléares Puffinus mauretanicus_Office Français de la Biodiversité.

11. When the Common Fisheries Policy deprives fish of the chance to grow

In a nutshell :

European Union fisheries cap catch levels based on the Maximum Sustainable Yield (MSY) principle, which is intended to protect fish stocks. In practice, however, this principle allows for excessive fishing pressure : fish become scarcer and smaller, and their reproduction rates decline. Current regulations regarding minimum sizes and mesh dimensions are inadequate and fail to reflect biological realities. This system directly contributes to the decline of coastal fisheries and the depletion of marine biodiversity.

MAXIMUM SUSTAINABLE YIELD (MSY)

Marine fishing is regulated by the European Union. The Common Fisheries Policy (CFP)[45] is based on *Maximum Sustainable Yield* (MSY). This principle aims to harvest the greatest possible quantity without compromising the species' reproductive process.

MSY can only be calculated if there is a good understanding of the population of a given species in a specific fishing area—what is known in fisheries terminology as a "stock."

Essentially, one needs to know the biomass (the weight of adult fish of that species capable of reproducing within the area in question), the recruitment rate (juvenile fish reaching adulthood each year), and the maximum sustainable fishing mortality rate.

A great deal of knowledge is required,and this data must be constantly updated and refined—something that rarely happens for many species.

ICES (the International Council for the Exploration of the Sea) has existed since the early 20th century. Despite this long history, only 20% of fish "stocks" have been assessed. Many remain unassessed, such as the brown meagre and the gilthead seabream.

Regarding this MSY policy, Didier Gascuel—director of the fisheries science department at Institut Agro Rennes—explains[46] that only 33% to 40% of the original populations remain. This represents a reduction to between one-half and one-third of the initial levels.

FIRST CONSEQUENCE OF THE MSY : MUCH SMALLER FISH

Fish are scarcer but also smaller. MSY threatens recruitment. Too few young fish reach adulthood.

According to IFREMER[47], recruitment refers to the number of young individuals that have survived the larval stage and reached a size large enough to be caught by fishing gear.

[45]Règlement (UE) n°1380/2013 du Parlement et du Conseil du 11 décembre 2013 relatif à la politique commune de la pêche

[46]Pour une révolution dans la mer, de la surpêche à la résilience" Didier Gascuel, Éditions Domaine du Possible, Actes Sud

[47]Vermard, Y et Ulrich, C. (2025). Bilan 2024 du statut des ressources halieutiques débarquées par la pêche française hexagonale en 2023. Rapport RBE/25-004

MSY allows for such high fishing pressure that large fish disappear and small ones do not have time to grow. This is the definition of **growth overfishing**. This is the fundamental reason for the failure of the CFP, which overlooked the fact that fish need time to develop.

It is easier to understand why Philippe Cury and Yves Miserey announced in 2008 that 95% of the fish caught in the Bay of Biscay measure less than 23 cm. It is a massive waste to catch fish that have not reached even a tenth or a fifth of their adult weight and have never reproduced.

Do we harvest lettuces when they have only three leaves? Minimum catch sizes and mesh size regulations have certainly tried to prevent this waste, but have failed to stop it.

► First, regulations concerning mesh sizes and those governing minimum catch sizes for specific species are disconnected from one another. This is a direct consequence of the fact that nets cannot select the species they catch.

They select only the size of the fish caught, sparing those below a certain size—determined by the mesh size—regardless of the species.

Consequently, while a specific mesh size might spare the young of one species, it would fail to spare the juveniles of another, larger species. This is a problem inherent to most net-based fisheries, as they catch multiple different species—known as *multispecies* fisheries.

Increasing mesh sizes—an ideal solution that is desirable but perhaps still utopian—is therefore viewed unfavorably by the majority of fishermen, who would see the smaller species escape.

►Furthermore, minimum catch sizes in the European Union apply to only about thirty species, whereas hundreds are landed.

Moreover, these minimum sizes are all far below the size at sexual maturity; consequently, even for these species, fish are sold that have never reproduced !

The most shocking case is that of the meagre (*Argyrosomus regius*). It easily reaches 1.50 m and 40 kg, and can exceed 80 kg. Its growth is exceptionally rapid. Despite this potential, no minimum catch size was set for a long time ! Then, two very low minimum sizes were established : 30 cm for commercial fishermen and 45 cm for recreational anglers.

These sizes correspond to fish weighing 270 grams and 800 grams, respectively. This is a huge waste, given that the female only reaches maturity at a size exceeding 80–85 cm and a weight of 5–6 kg. The Association Défense des Milieux Aquatiques fought for five years just to secure a negligible 5 cm increase... These excessively low sizes sacrifice the species' growth potential and directly impact fishermen.

12. Maximum sustainale yield : fishing more to earn less

In a nutshell :

Maximum Sustainable Yield (MSY) does not merely deplete marine life; it also leaves fishers vulnerable.
By authorizing the catch of undersized fish, it forces them to fish more... to earn less! This model drives up costs, shrinks margins, and traps the coastal fishing sector in a cycle of subsidy dependency. Over time, it threatens both marine ecosystems and the economic future of fishers.

We have seen that MSY prevents fish from growing, as they are harvested too early and at too small a size. Consequently, fishermen are forced to work much harder to reach the tonnage targets calculated based on MSY (the notorious quotas), since the fish are much smaller. That is why MSY enslaves fishermen rather than protecting them.

SECOND CONSEQUENCE OF THE RMD : FISHING MORE TO EARN LESS

Indeed, this extra work generates excessive costs that prevent the generation of profit margins. Overall, the RMD prevents fishermen from making the profits they could realize with larger fish, within the context of less intensive exploitation. These limitations have long been known.

As early as 1930, Michael Graham[48] foresaw that the economic health of the fishing industry depends on limiting fishing effort.

In 1977, Professor Peter Larkin argued for abandoning MSY in a famous article[49] titled "An Epitaph for the Concept of Maximum Sustained Yield," in which he predicted the future failure of MSY.

MSY is a highly risky principle. It flirts with **recruitment overfishing**—a state that leads to the collapse of fish populations due to insufficient reproduction. Even if fishing is eventually halted, this collapse can persist indefinitely due to sometimes highly complex "depensatory" phenomena or "Allee effects." In other words, when populations become too small, their ability to recover is threatened or even permanently compromised.
Larkin warned: "Once reduced to a certain level, populations either vanish or persist at low levels, waiting for a fortuitous confluence of favorable factors to surge toward a higher equilibrium of abundance."

Consider the example of the Newfoundland cod fishery, which collapsed abruptly in July 1992 and never recovered, despite the fishing moratorium. The few surviving cod produce too few eggs, which are systematically devoured by their former prey—species that proliferated following the collapse of their predator.

This impasse is known as a "biological trap," and that most common "depensatory" mechanism explains the dismal recovery rates observed by Hutchings and Reynolds following a belated fishing moratorium (see next chapter).

[48]Michael Graham, Modern Theory of Exploiting a Fishery, and Application to North Sea Trawling, Journal du Conseil, Volume 10, Issue 3, December 1935, Pages 264–274, https://doi.org/10.1093/icesjms/10.3.264
[49]Larkin, Peter A. "An epitaph for the concept of maximum sustained yield."Transactions of the American fisheries society 106.1 (1977): 1-11.

MSY ignores the genetic variability that enables fish populations to adapt to the constantly changing conditions of their environment. Without us even realizing it, MSY can lead to the disappearance of small, low-productivity sub-populations—ones that are nevertheless essential to the species' survival precisely because of their unique genetic makeup.

MSY overlooks the fact that all species are interconnected through direct or indirect predator-prey relationships. When MSY plans not to interfere with reproduction, it forgets not only that fish need time to grow, but also that they play a vital role in ecosystems.

For example, small pelagic fish serve as food for large predators, such as marine mammals and seabirds. Consequently, they cannot be harvested from the ocean without taking this into account.

Finally, fishery catch statistics are more precise than they are accurate. They remain too vague; the true situation is poorly understood and consistently underestimated.

Larkin concluded that fisheries management requires much more nuanced and adaptive approaches. MSY is too crude and simplistic a concept, leading to :

- an excessive depletion of marine life, due to a failure to account for fish growth and ecosystem relationships between species.
- a severe socio-economic contraction, by seeking to maximize landed ntonnage rather than prioritizing the profitability of fishing enterprises.

In this context, MSY survives only thanks to a flood of subsidies.

13. the illusion of stability

In a nutshell :

Stable or even rising catch levels can mask an imminent collapse.
History shows that many fisheries have collapsed abruptly after years of seemingly reassuring production levels.
Once fish populations collapse, recovery is rare—and often impossible—even after fishing ceases.
Protection measures generally come too late to remedy the severe consequences for ecosystems and human communities.

STABLE OR EVEN RISING CATCHES CAN SIGNAL THE COLLAPSE OF A FISHERY

Science has shown that the sudden collapse of a fish species following a long period of stable or even steadily increasing production is a classic phenomenon well understood by fisheries scientists.

In June 2005, Christian Mullon et al.[50] showed that one-quarter of the 1,519 global fisheries studied had collapsed over the previous 50 years.

21% of these collapses were preceded by a deceptively reassuring production plateau, with catch

[50]C.Mullon, P.Fréon, P.Cury, « The dynamics of collapse in world fisheries » Fish and Fisheries, 2005, n°6, 111-120

volumes remaining roughly stable—or even rising— right before the sudden plummet in catches.

Statistics from Mullon et al. cover 80 different stocks worldwide with histories resembling that of the Newfoundland cod—the classic example of this type of collapse.

In 1991, cod production had still exceeded 250,000 tonnes : everything seemed fine! Yet on July 2, 1992, after centuries of exploitation, the fishery had to be urgently shut down by the Canadian government...due to a lack of catches.

Policymakers had turned a deaf ear to repeated warnings from scientists and, throughout those years, refused to carry out the necessary restructuring—measures that would inevitably have been painful in terms of jobs and forced career changes.

As expected, the aftermath brought about this inevitable transition—but in a far more brutal way for the people involved, and with far more dramatic consequences for the environment : **thirty thousand jobs lost, entire communities shaken—and still torn apart—and cod stocks that will never return, at least not within our lifetime**.

In their determination to preserve jobs at all costs, Canadian policymakers ended up losing both the jobs and the resource.

COLLAPSED FISH POPULATIONS STRUGGLE MIGHTILY TO RECOVER

The history of the fishing industry shows that **moratoriums are consistently implemented too late**.

This is the conclusion of the global study conducted by Hutchings and Reynolds in 2004[51], in which they analyzed the long-term fate—over periods of 10 to 25 years—of more than 230 fish populations that had experienced a median biomass collapse of 83%.

Eight percent of these collapsed populations showed improvement after five years, and 12% after fifteen years. After one generation, recovery was observed in only 7% of the populations.

The study's authors conclude: "*Failure to prevent population collapses, and to take the conservation biology of marine fishes seriously, will ensure that many severely depleted species remain* ***ecological and numerical shadows*** *in the ecosystems that they once dominated.* "
The term "ecological shadows" implies that many species never regain their original niche or abundance, and thus fail to fulfill their ecological role.

In France, we can cite—among others—three ecological "shadows," marked by the successive collapses of the sturgeon in the 1960s, the salmon in the 1970s, and the allis shad in the late 1990s.

For each species, the decision to ban fishing was made—on average—twenty years later; by that time, catches had plummeted so drastically that fishermen no longer opposed the ban : 1978 for the Garonne-Dordogne salmon, 1982 for the sturgeon, 1992 for the Loire salmon, and 2006 for the Garonne-Dordogne allis shad. A second key advantage for the State is that compensating fishermen

[51]Jeffrey A. Hutchings, John D. Reynolds, Marine Fish Population Collapses: Consequences for Recovery and Extinction Risk, BioScience, Volume 54, Issue 4, April 2004, Pages 297–309, https://doi.org/10.1641/0006 3568(2004)054[0297:MFPCCF]2.0.CO;2

becomes unnecessary, as their revenues had long since evaporated.

These species never recovered.

This delay in making the right decision—a common pattern among fisheries managers in France—reveals a profound ignorance of population dynamics and the classic concept of a population threshold, below which a population can no longer reproduce effectively.

14. The coastal strip, guaranteeing tomorrow's fisheries

In a nutshell :

The coastal marine zone is a key area for marine life.
It harbors the nursery grounds where young fish of many species grow.
However, these areas remain insufficiently protected and are heavily exploited.
The regular capture of juvenile fish there compromises population recovery and threatens coastal fishing.

The MSY policy[52] establishes quotas allocated among Member States, which in turn distribute them among producer organizations. The process of individual allocation to each fisherman is not public and remains opaque. It pits fishermen with vastly unequal resources against one another, leading over time to a concentration of production capacity in the hands of the most powerful players.

Small-scale coastal fishing is the primary victim of this system—a fact it frequently denounces, though it does not always grasp the underlying consequences of the "growth overfishing" associated with MSY and its repercussions.

Fishermen as a whole do not realize that they are the secondary victims of the overexploitation—following the depletion of fish stocks— since they invariably demand ever-higher quotas, believing this will boost their immediate income, when in fact it will inevitably intensify the cutthroat competition they face and benefit only the most powerful among them.

COASTAL NURSERY AREAS

However, while small-scale coastal fishing is hard hit by the Common Fisheries Policy, it also bears some responsibility for this overexploitation, as it operates in a highly valuable zone that calls for greater discernment on our part.

Coastal waters support several vital biological functions. We have already mentioned their role as a migratory corridor for salmon returning to the coast in search of their native rivers.

The fundamental biological function of coastal waters is that of a nursery. The nearshore marine zone and estuaries host the nursery grounds for around thirty commercial species ; in other words,

[52]MSY or Maximum Sustainable Yield. See Mural 11.

it is in these shallow coastal waters so that the juvenile fish of these species develop into tomorrow's large fish.

At our latitudes, gametes are released into open water—generally offshore—and surviving larvae are carried toward the coast by prevailing currents and winds. Coastal waters thus harbor a large number of important nursery areas. According to Seitz et al. (2014)[53], the primary ecosystem service provided by coastal habitats is this nursery function: 30% of the fifty-nine species monitored in 2012 by ICES use these habitats for feeding and development.

Many round fish are found there (sea bass, meager[54], cod, mackerel, herring, anchovy, red mullet, whiting, sprat, sand eel, eel, bronze croaker, sturgeon, shad), as well as all flatfish (sole, dab, plaice, flounder, turbot, brill, thickback sole, etc.), all sea bream, and all invertebrates (brown crab, Norway lobster, shrimp, lobster, octopus, cuttlefish, etc.).

This represents considerable biodiversity. It can account for up to two-thirds or three-quarters of commercial landings. This highlights the importance of coastal nurseries.

THE IMPACT OF FISHING NETS IN COASTAL NURSERY AREAS

However, contrary to popular belief, neither the European Union nor France mandates a minimum distance from the coast that fixed nets must observe. In fishing parlance, gillnetters can fish "on the ground"—that is, as close to the shoreline as they want. Even more concerning, there are dozens of exemptions allowing trawling right off our beaches. The issue is that the Common Fisheries Policy fails to take into account coastal nursery grounds, which it has completely neglected to protect.

Alternatively, it leaves the matter to each Member State—something France does not do. Far too many juveniles of numerous species (small turbots, small meagers, small edible crabs, small drums, small red mullets, small soles, and many others) are destroyed daily in coastal waters because nets fail to spare them; this directly impacts the functioning of marine ecosystems and jeopardizes future fisheries.

For instance, in the Popovsky report[55], onboard observers record sole and turbot catches with an average individual weight of 121 and 187 grams.

The turbot population in France has collapsed, and this comes as no surprise given the continued use of nets in coastal waters, where turbot are routinely caught before they even have a chance to reproduce—their body shape making it impossible for them to pass through the mesh sizes used.

Faced with dwindling fish stocks, instead of allowing them to grow, fishermen systematically ramp up their catching capacity (by using more nets), thereby exacerbating the situation. Consequently, the nets are becoming increasingly long and tall[56].

The quantities of fish killed needlessly and discarded at sea are so vast that, in 2013, they prompted

[53]Seitz, R.D., Wennhage, H., Bergström, U., Lipcius, R.N., Ysebaert, T., 2014. Ecological value of coastal habitats for commercially and eco logically important species. ICES J. Mar. Sci. J. Cons. 71, 648–665.

[54]The meager spawns in the Gironde estuary, not offshore.

[55]Popovsky J., 2002. Prises des salmonidés migrateurs en zone côtière du Pays Basque et du sud des Landes 2001, Rapport de campagne IMA, 36 p.

[56]Guide pratique "Les filets maillants" Gérard Deschamps, CEMAGREF, CIRAD, Ifremer, INRA, éditions QUAE, 2009, préface

the introduction of a landing obligation[57] to enable scientists to gauge the scale of the problem.

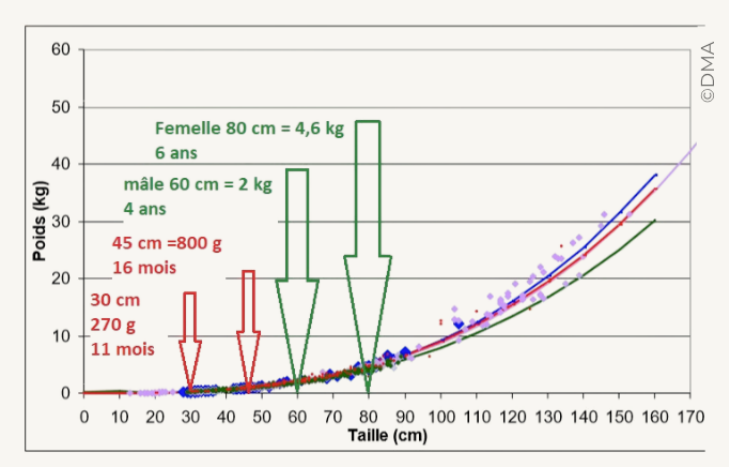
Ten years later, the European Commission has had to abandon enforcing this landing obligation, because fishermen generally reject it and continue to discard fish without reporting them. This refusal by the industry justifies, more than ever, the use of onboard cameras on vessels.

The report by Institut Agro Rennes[58] rightly describes the discards as an "absurd" practice.

Coastal nets are therefore implicated in the destruction of juvenile fish—whether they are towed nets authorized under a derogation or fixed nets.



1



2

(1) At one year of age, a 15 cm turbot weighing a few tens of grams is already at risk from the mesh of fishing nets, due to its diamond-like shape.

(2) LENGTH/WEIGHT RELATIONSHIP FOR THE MEAGRE (ARGYROSOMUS REGIUS) BY QUARTER
Source: Ecology, biology, and exploitation of the meagre in the Bay of Biscay. SMIDDEST-CNRS-IFREMER Agreement 2009 – SOURGET-BIAIS Study

The meagre (*Argyrosomus regius*) is one of the largest bony fish found along our Atlantic coasts. Although it can reach impressive sizes, its survival depends on a strict respect for its development. The facts: A meagre caught at the legal minimum size of 35 cm is still a juvenile. It has not yet had the opportunity to reproduce and ensure the renewal of the species. To reach sexual maturity, it still needs to grow by approximately 25 cm (2 years) if it is a male, and 50 cm (4 years) if it is a female.

[57]Article 15 du règlement (UE) n°1380/2013 du parlement et de conseil du 11 décembre 2013 relatif à la politique commune de la pêche

[58]QUEMPER F. et al. 2024.Évaluation des performances des flottilles de pêche françaises.Rapport TransiPêche, L'Institut Agron°55, 117 p.

15. Where do salmon disappear to at sea?

In a nutshell :

Despite river protection and the official ban on high-seas fishing, the Atlantic salmon continues to disappear.
Scientists are observing high mortality rates at sea, linked to a multitude of factors—such as food scarcity caused by global warming, incidental catches, and possibly illegal fishing beyond any jurisdiction.
A critical phase of the salmon's decline is now playing out far from the coast, in areas that are poorly monitored or entirely uncontrolled.

The list of threats facing the salmon is as long as its life cycle. Its life is a constant obstacle course. Despite efforts made within watersheds, the Atlantic salmon continues to decline.

Scientists have therefore turned their attention to what happens at sea. There is a consensus that salmon mortality at sea has doubled, despite the ban on fishing in North Atlantic waters beyond national jurisdiction—a measure implemented in 1983 by the North Atlantic Salmon Conservation Organization (NASCO).

Adult return rates are declining and often fall below 1%[59].

This excess marine mortality remains to be explained. Global warming is frequently cited as a cause, and several scientific papers explain how salmon are finding it increasingly difficult to feed on the high seas.

A study by Utne et al. (2021)[60] analyzing the diet of 2,546 young salmon (post-smolts)—collected over a twenty-five-year period across the region stretching from western Ireland to the northern Norwegian Sea—reveals a marked decline in the physical condition of young fish in the Norwegian Sea during the 2003–2012 decade. Their stomachs contained less food, both in terms of quantity and quality; there were fewer fish larvae and small crustaceans (amphipods)—high-energy prey that cannot be matched by substitute food sources such as zooplankton and insects.

In short, young salmon are consuming less food and food of lower quality.

Tyldesley et al. (2024)[61] find that the prey energy available to feed the fish that serve as prey for salmon at the start of their marine migration has decreased dramatically across much of the Northeast Atlantic—particularly in key salmon migration zones—over the past 60 years.

The northward expansion of mackerel during the 2010s may also have led to competition for food with young salmon.
Other causes of loss at sea exist, such as large marine predators and commercial fishing—whether targeting other species but incidentally catching salmon, or harvesting salmon prey and thereby depleting their food resources.

[59]Guirec André,et al.(2021)Synthèse sur l'état des populations du Saumon Atlantique en France.Rapport pôleOFB-INRAE (hal-03222495)
[60]Utne KR, et al. (2021) Poor feeding opportunities . for salmon post smolts in the NE Atlantic. ICES J Mar Sci, 78: 2844-2857.
[61]Tyldesley E, et al. (2024) Patterns of declining zooplankton energy... ICES J Mar Sci, fsae077. doi:10.1093/icesjms/fsae077

Based on a literature review of 350 articles, Dadswell et al. (2021)[62] question the prevailing emphasis placed on explanations linked to global warming, the damage caused by salmon farming (which promotes sea lice), or marine predation.

They propose a central hypothesis : t-hat the former authorized high-seas salmon fishermen—those who fished openly around Greenland, the FaroeIslands, and in the Norwegian Sea prior to the 1983 moratorium—are continuing to fish as usual, simply shifting to undeclared and unregulated fishing, taking advantage of the lack of satellite or aerial surveillance by NASCO.

Fishing is carried out using drifting gillnets or longlines in a banana-shaped area (the “banana box”)—located between Greenland, Iceland, Norway, and Svalbard—that lies beyond any Exclusive Economic Zones and thus falls outside national jurisdictions. The authors suspect the presence of a Japanese and Chinese fleet comprising approximately 120 vessels; these ships reportedly make regular stops to resupply in St. John’s, the capital of Newfoundland.

16. Coastal nets, the hurdle too many for Atlantic salmon

In a nutshell :

While the causes of salmon decline on the high seas are largely beyond human control, catches along our coasts represent a significant, documented, and avoidable pressure.
Coastal gillnets intercept large numbers of salmon before they even enter the estuary.
This coastal mortality seriously undermines river restoration efforts and plays a proven role in the disappearance of the Atlantic salmon.

On the high seas, the factors contributing to the decline of salmon are beyond our reach. In our rivers, the causes of this decline are already the subject of numerous initiatives. Yet, at the interface between sea and land, the authorities are failing to address a significant pressure—one where taking action is both urgent and feasible.

This concerns coastal gillnet fisheries, which are notorious for catching migratory fish—such as salmon—that spend their lives moving between fresh and salt water.

Several reports show that coastal net fishing intercepts a significant number of salmon and shad before they can even enter the estuaries to return to their natal rivers to spawn.

TWO ONBOARD OBSERVATION REPORTS REVEAL COASTAL SALMON CATCHES

Two reports based on onboard observations conducted in June and July of 2000[63] and 2001[64] detail the catches of large migratory salmonids by coastal gillnets between Biarritz and the Contis lighthouse.

[62]Dadswell M, et al. (2021) The decline and impending collapse of the Atlantic salmon... population in the North Atlantic Ocean
[63]Prouzet P., 2001 - Rapport sur les prises de salmonidés en zone côtière du Pays Basque et du Sud des Landes en 2000. Rapport Ifremer/DRV/RH.
[64]Popovsky J., Rapport de campagne, prise des salmonidés migrateurs en zone côtière du Pays Basque et du sud des Landes, Institut des Milieux Aquatiques, 2001

Twenty-five fish were caught during nine fishing trips in June and July 2000 (first campaign), and 21 fish during seven trips in June and July 2001 (second campaign). These 46 salmonids (85% of which were salmon) caught over 16 trips represent a catch rate of approximately three fish per trip per vessel.

Extrapolation[65] yields a figure of 1,320 salmon caught by vessels from Capbreton during the June–July period alone. Extrapolating to the entire Basque-Landes coast[66] results in a total of approximately 4,000 salmon for June and July.

This estimate is not exhaustive. It does not account for accidental catches from other types of nets, such as purse seines, trawls, or fixed nets on the foreshore.

This figure is substantial. It should be ompared with the total number of spawning fish counted annually by the MIGRADOUR Association at the dams in the Adour river basin (the Gaves, Saison, and Nive rivers)—which has averaged around 2,500–3,000 fish per year over the last decade.

Over time, fishing nets have benefited from technological advances, becoming increasingly efficient—a fact acknowledged as early as 2010 by the maritime fishing committee for the Landes and Pyrénées-Atlantiques departments[67] :

"Since 2009, a coastal salmon fishery has been established—primarily along the southern coast of the Landes region—operating at a level of fishing effort and over a timeframe far exceeding anything seen previously.

This fishery, involving dozens of vessels, has expanded due to the use of a new, highly effective type of net—noted for its vertical reach while fishing—which targets salmon and other species (such as meager and sea bream), as well as the high prices salmon command at first sale (ranking among the highest per-kilogram prices of all species caught in marine fisheries)."

A LETTER FROM CAPBRETON FISHERMEN CONFIRMS THE SCALE OF COASTAL SALMON CATCHES.

Eight commercial fishermen from Capbreton confirm these catch estimates in a confidential letter dated August 8, 2013, in which these coastal fishermen demand that the authorities authorize them to sell the salmon turning up in such large numbers in their nets:

"Three years ago, we would accidentally catch 10 salmon over the entire season and sell them for €40/kg... In 2013, bycatches have increased fifteenfold. There are salmon everywhere from the coast out to 2 miles, whether to the south (Labenne) or to the north (Messanges). Just think of how many we are destroying!"

The author of the letter states that he caught 150 salmon in 2013, a figure consistent with the

[65]Assumption of 22 tides per month and 10 ultra-coastal vessels at Capbreton.
[66]Hypothèse de 30 à 33 navires ultra-côtiers selon Morandeau Gilles, Caill-Milly Nathalie(2011).Note sur les captures de saumons atlantiques en mer au sud de Mimizan. Comité Local des Pêches Maritimes et des Élevages Marins,Bayonne,Ref.HGS/LRHA/2011-001, 8p.
[67]Minutes of the Adour COGEPOMI Salmon Technical Group meeting of October 28, 2010

estimate mentioned above of 132 specimens per coastal vessel from Capbreton.

The fishermen's anger stems from the price of salmon—by far the most expensive fish—meaning that while salmon accounts for a small share of the total catch weight, it represents a significant portion of revenue.

Lacking any long-term vision, the authorities refuse to allow the sale of salmon catches yet continue to authorize fishing in the exact locations, at the times, and using the methods that ensure these catches persist. The result? Catch declarations have abruptly dropped to zero. 100% of the salmon caught now feed the black market.
The problem remains unresolved, yet no one talks about it anymore.

The authorities never published the infamous Prouzet and Popovsky reports, effectively burying the matter. However, the scale of coastal catches was so massive that the truth finally came to light in 2014 within COGEPOMI[68], driven by pressure from estuary fishermen who saw so many salmon slipping past them before "their"fish even entered the Adour estuary.

During the COGEPOMI "salmon" technical group meeting on June 4, 2014—and again at the plenary session on July 9, 2014—the president of the Aquitaine regional fisheries committee was forced to admit that "more than 1,000 salmon" were being caught by commercial fishermen based in Capbreton.

A trivial measure was then adopted : from May to July, fixed nets were banned between Friday noon and Sunday noon within 0.3 miles of the coast, in the stretch between the Adour estuary and Capbreton to the north.

This obviously failed to solve the problem, especially given the steadily rising number of "ultra-coastal" fishing vessels—predominantly operating within the 3-mile coastal zone—in the Bay of Biscay : 71 in 2019, 107 in 2020, and 112 in 2021, accompanied by a parallel increase in fishing effort[69].

BASQUE-LANDES COASTAL WATERS LITERALLY BLOCKED BY GILLNETS

Due to increased coastal fishing effort, the coastline has become—at certain times of year—a veritable **maze of fishing nets**.

Advances in nylon technology allow for ever-increasing net heights; they can now span the entire water column, stretching from the seabed up to the surface, where they break the water.

These so-called "straight" gillnets—standing 14 to 16 meters high like walls—are designed to intercept salmon swimming just below the surface along our coasts.

They are deliberately set in a series perpendicular to the coastline—and thus to the salmon's swimming path—running from shore to open water (known in fishermen's jargon as "Land to off shore").

[68]Migratory Fish Management Committee—specifically for the Adour basin here.
[69]Demanèche S, et al. (2021) Caractérisation et typologie des engins et de l’effort de pêche dans le Golfe de Gascogne DPMA/Ifremer.Ref.DG2021-655.

Salmon, shad, and sturgeon are caught in these coastal nets far too frequently, undermining the immense efforts made to protect them in freshwater habitats. Dolphins, guillemots, and leatherback turtles also fall victim to them.

OTHER OBSERVATIONS SHOW THE CATCHING OF MIGRATORY FISH OFF THE COAST

In 2017, scientists estimated that bycatch in the Bay of Biscay had "confirmed" adverse effects on salmon and sturgeon, and "suspected" effects on shad[70].

In late 2022, a French multidisciplinary scientific paper[71] proposed restricting access to the coastal zone for fishing gear capable of catching anadromous migratory fish.

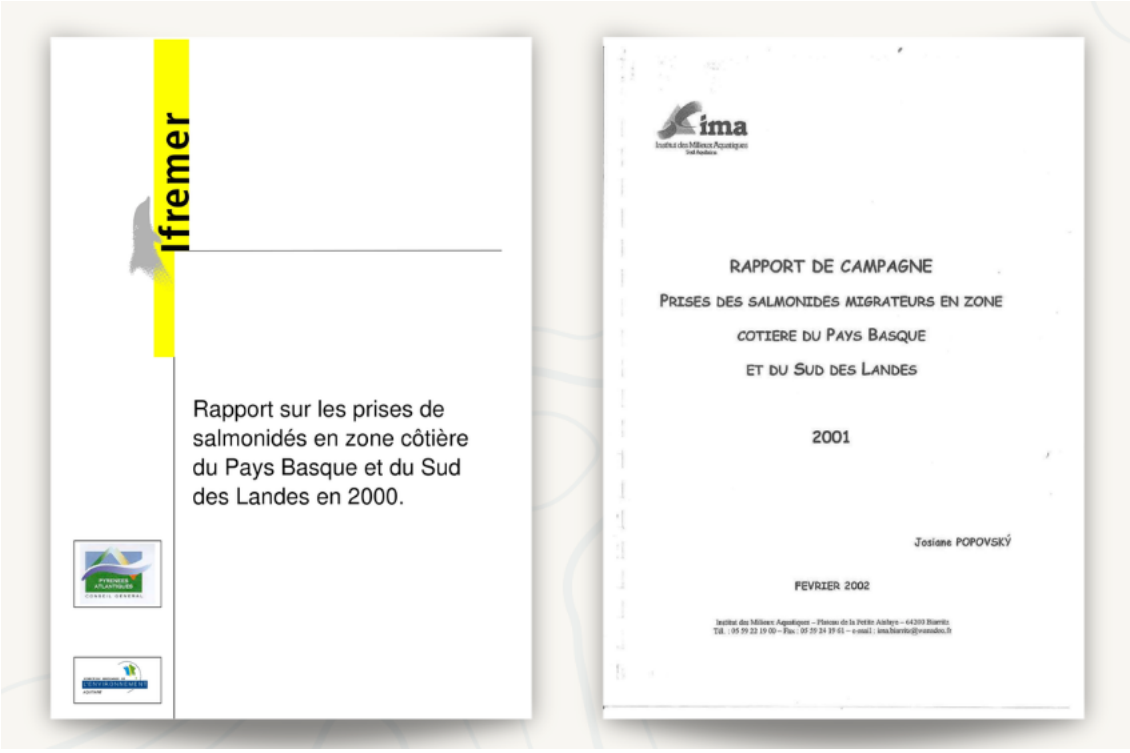
In 2023, the French Office for Biodiversity[72] underlined a "confirmed and likely high impact" on salmon off the Loire and Gironde estuaries, "given the significant number of catches observed along the coast relative to a small fraction of fishing effort, and the very low size of the populations concerned."

In 2024, the MigrenMer report[73]—based on 169,000 onboard observations dating back to the 1980s—concluded that salmon and allis shad are caught in coastal waters, predominantly by fixed nets.

While the challenges young salmon face regarding food availability at sea—linked to global warming—are largely beyond our control, coastal catches are a matter of human choice.

Preventing spawning salmon—after they have overcome so many ordeals—from perishing just a short distance from their estuaries in one of the countless nets lining our shores is one of the few opportunities for immediate, effective action still available to us.

[70]Thiriet P, et al. (2017) Évaluation DCSMM 2018 de l’état écologique des poissons et céphalopodes . Rapport PatriNat (AFB-CNRS MNHN).
[71]Elliott SAM, et al. (2022) Modelling the distribution of rare and data-poor diadromous fish . Prog Oceanogr, 210: 102924.
[72]OFB (2023). Risques de captures accidentelles et conservation. Rapport intermédiaire, 30 pp.
[73]DUBOST G. et al. (2023). Rapport du projet « MigrenMer » : Synthèse sur les migrateurs amphihalins en mer. Rapport scientifique du pôle MIAME, 81 p.



Reports on coastal salmon catches that were never published

17. Coastal nets, constant danger to protected species.

In a nutshell :

Coastal fishing nets frequently result in the capture of dolphins and seabirds, often in the immediate vicinity of the shore.
These deaths of protected species contribute significantly to their decline, yet the issue is neither adequately measured nor taken into account.
The coastal zone appears to be a very high-risk area for marine wildlife.

Dolphins, turtles, and seabirds die in coastal nets.

The role of coastal fishing nets in the bycatch of protected species—such as small cetaceans and seabirds—is clearly established. The DELMOGES report explains that the small pelagic fish on which dolphins feed move increasingly closer to the coast in winter.

The plight of seabirds is very poorly understood by the public.

For over 20 years, scientists have explained that seabird mortality is the primary cause of species decline—for example, that of the Balearic shearwater, which is critically endangered.

The April 2024 report by Institut Agro Rennes[74] estimates that coastal line-fishing vessels and

[74]Quemper, F. et al. (2024). Rapport TransiPêche : Scénarios de transition des pêches françaises. L'Institut Agro n° 55

coastal gillnetters have a very significant "protected species footprint"—meaning a high impact on protected species (birds in the case of the former, marine mammals for the latter).

Because coastal waters are shallow, the risk of interaction between nets and air-breathing marine animals is very high, especially given that nets are becoming increasingly large and now span the entire depth of the water column.

The OBSCAMe program[75], based on onboard camera monitoring, confirms that marine mammal bycatch does indeed occur—for example, along the Basque-Landes coast.
77
As part of the OBSMER onboard observation program, the French Office for Biodiversity analyzed 199 fishing operations between 2017 and 2021 involving at least one instance of seabird bycatch[76].

The common guillemot accounts for nearly 90% of victims of fishing gear (nets being the most frequently observed). 237 individuals were caught during a single operation.

Observations of seabird bycatch were primarily made within 3 nautical miles of the coast (56%) and in waters less than 50 meters deep (82%).

The DGAMPA[77] did not provide data on observed fishing effort, which prevents an estimate of the true scale of total bycatch.

Furthermore, sampling—which is declining year by year—remains very low (less than 1%), whereas the Commission sets a target of 10%, and experience shows that at least 20% of fishing operations need to be monitored to avoid overlooking "acute" multiple-capture events—i.e., the simultaneous capture of numerous individuals.

Each year, around fifteen adult leatherback turtles are found dead on the beaches of the Bay of Biscay; three-quarters are victims of fishing gear. These accidental captures likely occur near the coast, where the water is shallow and the density of fishing gear is very high[78]:

"Leatherback turtle occurrence peaks in coastal waters during the summer. They are found in fishing grounds where trawls, static nets, and various buoy lines pose constant dangers. These are estimated to be the leading cause of mortality during the summer season."

A coastal marine zone free of nets would help reduce this grim statistic—one of the specific measures proposed by the OSPAR Convention in 2013[79].

Coastal waters are therefore areas where specific action is required to reduce the bycatch of protected species.

[75]OFB. Projet OBSCAMe(+) : Captures accidentelles de mammifères marins (Gascogne). Portail technique.
[76]TACHOIRES S. & TOISON V. (2022). Captures accidentelles d'oiseaux marins dans les eaux françaises, OFB, 32 p.
[77]Directorate-General for Maritime Affairs, Fisheries and Aquaculture
[78]Duguy, R. et al.(1998),"Facteurs de mortalité chez les tortues marines dans le golfe de Gascogne", Oceanologica Acta, 21(2), p. 383-388.
[79]- OSPAR, 2013. Recommendation 2013/6 on the protection of the leatherback turtle. https://www.ospar.org/documents?d=32972





1 2

1- Stranded Common Murre
2-Stranded Leatherback Sea Turtle

18. Fishing less to earn more means prioritizing resilience over performance.

In a nutshell :

Seeking to maximize catches ends up undermining both the fish stocks and the fishermen. Beyond a certain level of intensity, fishing more costs more and yields less. The principle of Optimal Economic Yield proposes, conversely, fishing less but better: larger, higher-value fish, with lower costs and fishing practices that are more sustainable over time.

Under the Common Fisheries Policy[80], "Maximum Sustainable Yield" (MSY) is defined as "*the highest theoretical equilibrium yield that can be continuously taken on average from a stock under existing average environmental conditions without significantly affecting the reproduction process.*"

In other words, MSY aims to harvest the maximum possible amount without—theoretically—impacting the population's reproduction.

In a sea that has never been fished, the first vessels land heavy catches. Landed tonnages rise very rapidly.

However, each additional vessel slightly reduces fish abundance, meaning that landed tonnages increase at a slower and slower rate, as it becomes increasingly difficult to catch fish—which have become somewhat less abundant and slightly smaller.

Beyond the point known as OEY (Optimal Economic Yield), landed tonnages continue to rise but increase more slowly than operating costs. This is because the largest fishare becoming scarce. Vessels must work harder—going out more frequently, for longer periods, and further afield—to land the same tonnages as before, since they must catch more fish, which are smaller because they lack the time to grow.

Costs rise linearly—outpacing landed tonnages, the growth of which is slowing down. Profits—the difference between these costs and the landed tonnages—begin to decline

[80]Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy

once the OEY point is passed.

By attempting to fish even more intensively—beyond the MSY level—commercial fishing erodes its own profits, weakens populations of increasingly small fish, and paves the way for an even more difficult future. This is known as "**growth overfishing**."

Beyond the MSY, landed tonnages decline. There are so many vessels at sea that even small fish become scarce. Reproduction can no longer replenish the sea. Not only are spawning fish very rare, but small fish also become scarce in turn, because the breeding stock is insufficient. This is referred to as "**recruitment overfishing**" (or reproductive overfishing).

There is a risk of collapse.

The catch limit imposed by the MSY is far too high. Fishing must stop well before reaching this supposedly maximum MSY production level. The goal is to preserve economic returns by avoiding escalating costs that will become impossible to offset.

With the RMD, the situation is quite the opposite : this target lies within an economically incoherent zone where benefits have already been eroding since the OEY point. The RMD teeters on the brink of an economic crisis that is kept at bay only through massive, chronic direct and indirect subsidies.

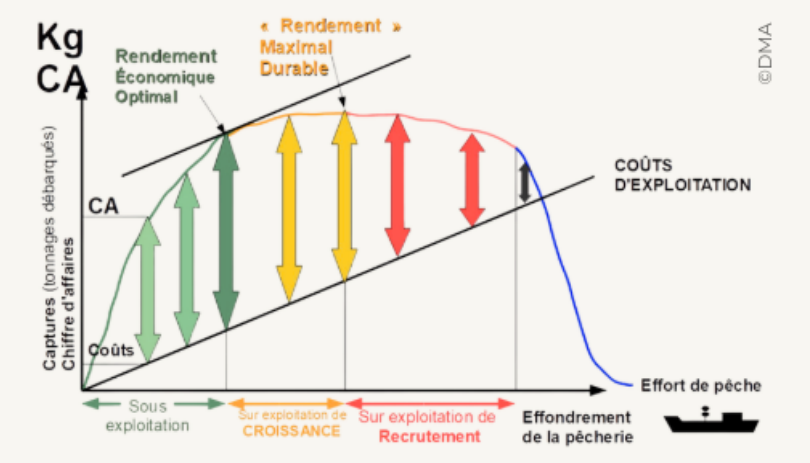
The concept of Optimal (or Maximal) Economic Yield is discussed in the July 2019 parliamentary report by Jean-Pierre Pont and Didier Quentin[81], who cite a 2011 OECD document[82] in this regard.

It is time to shift to Optimal Economic Yield, as Larkin[83] and others had explained—to no avail—half a century ago. This paradigm shift entails significantly higher minimum catch sizes and correspondingly larger mesh sizes.

It is expected to result in catching fewer but larger fish, leading to higher total tonnage, better market value, and, above all, much lower operating costs. It will thus enable a move away from non-selective fishing techniques in favor of selective methods such as line and trap fishing[84].

In short, we must abandon th performance goal of MSY (Maximum Sustainable Yield) in favor of the long-term resilience goal of OEY (Optimal Economic Yield). As early as 1975, economist Charles Goodhart warned that when a measure becomes a target, it ceases to be a good measure. Maximizing landings is doomed to failure.

[81]Pont J-P & Quentin D (2019) Rapport d'information sur une pêche durable pour l'UE. Assemblée nationale, n° 2175, p. 22.
[82]OCDE, Les études économiques de l'OCDE (Islande), chapitre 4 "Pour une pêche durable et efficiente ", 2011 (page 116).
[83]Larkin, Peter A. "An epitaph for the concept of maximum sustained yield."Transactions of the American fisheries society 106.1(1977):1-11.
[84]Quemper, F. et al. (2024). Rapport TransiPêche. L'Institut Agro n° 55



MAXIMUM SUSTAINABLE YIELD
THE WORST SOCIO-ECONOMIC CHOICE

19. The Golden Miles project : a nature-based solution already validated.

In a nutshell :

The Golden Miles project offers a simple, proven response to the failure of Maximum Sustainable Yield.
By protecting the three-mile coastal zone (extending approximately 5.5 km from the shore) and promoting selective fishing practices there, it allows fish to grow and reproduce, thereby ensuring the long-term restoration of coastal fisheries. This nature-based solution has already proven successful in several major countries, delivering significant ecological and economic benefits.

Maximum Sustainable Yield (MSY) is an inadequate principle. Larkin's prophecy is unfolding before our eyes : landings have been in steady decline for decades, the number of "sustainably managed" stocks has stagnated for nearly 10 years, and small-scale coastal fishing is dying out.

Under Article 19 of the relevant European regulation[85], individual Member States have the authority to take the initiative within their own territorial waters, thereby bypassing the shortcomings of the Common Fisheries Policy.

The Golden Miles project is part of the solution.

To understand why, we must first define what "selective" fishing is.

Selective fishing refers to any method that allows for the choice of which fish are caught—meaning that unwanted species or fish that are too small can be released with a high chance of survival. This includes hook-and-line fishing[86], trapping (using pots or creels), and spearfishing (diving), whether practiced by professionals or recreational anglers. Such methods do not result in waste—unlike non-selective fishing, which destroys vast quantities of fish for no purpose.
THE GOLDEN MILES PROJECT

[85]Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy.
[86]Single hooks for recreational anglers; measures to reduce bird bycatch for commercial fishers (using handlines and longlines); and
circle hooks for all longline fishing to improve the survival rate of released fish.

GOLDEN MILES is the first marine area that promotes selective fishing within a carefully chosen free-net zone. It covers the first 3 nautical miles[87] (approximately 5.5 km) along the coastline.

The selection of the three-nautical-mile coastal zone is justified by the presence, in these nearshore waters, of fundamental **biological functions** :

- **nursery areas**, where the juveniles of many species—including various round fish (such as European sea bass and meagre), all flatfish, all types of sea bream, and all invertebrates—develop;
- **migratory corridors** for anadromous fish, notably salmon and sturgeon;
- and **feeding grounds** for protected species (marine mammals, sea turtles, and seabirds).

The objective is to remove all nets in order to alleviate pressure on coastal nurseries, promote the recruitment of numerous commercially important fish species, clear the migratory corridors for salmon and sturgeon—a last-ditch effort to save these critically endangered species—and reduce the bycatch of protected species (small cetaceans, seabirds, and sea turtles).

The GOLDEN MILES project, based on simple and proven principles, is commensurate with the gravity of the situation. What is abnormal is the current state of affairs, in which the number of fishing nets in such precious areas continues to multiply. The time for ineffective measures has passed.

In 2019, French parliamentarians Jean-Pierre Pont and Didier Quentin[88] reported that "*The challenge lies in finding ways to catch fish much later in their development process, so as to capture fewer of them while simultaneously increasing profitability.*"

The GOLDEN MILES project makes it possible to spare a large proportion of juvenile fish from many commercial species—not by forcing fishermen to increase the mesh size of their nets, but by encouraging them to fish selectively within the three-mile zone.

Avoiding the capture of juveniles in nets will yield the same results as effectively increasing the minimum catch sizes. The potential gains—stemming from allowing fish to grow—offer great promise for all coastal fisheries. Small fish will be able to develop, reproduce, and contribute to the bountiful catches of tomorrow. It’s simply common sense !

Local artisanal fisheries will be the primary beneficiaries, as non-selective fishing techniques—some of which are also damaging to the seabed—are phased out. Through a "spillover" effect toward the open sea[89], coastal waters will fully regain their role in increasing both the abundance and the size of fish populations.

Improvements in fish populations, catch landings, yields, fecundity, larval export, and the size of fish and crustaceans[90]—taken together—will lead to increased profits[91] for local fisheries. The concepts of "Optimal Economic Yield" and the "Golden Mile" are both based on the idea of giving fish time to grow. Numerous studies[92] predict that, as a result, catch landings and the value derived from them will increase, while operating costs will decrease significantly.

In its latest report on climate change[93], IFREMER calls for management strategies that are “robust in the face of climate change impacts” and advocates for “prioritizing pragmatic approaches based on foundational data

[87] 1 MN = 1 852 mètres
[88] Rapport Assemblée nationale n° 2175 (2019) Pêche durable pour l'UE.
[89] UICN France (2021). Les zones de protection forte en mer (Partie 1). Montreuil, France.
[90] Costello MJ (2024) Evidence of economic benefits from marine protected areas. Sci Mar, 88(1): e080.
[91] Commission européenne (2018) Study on the economic benefits of marine protected areas – Task 5 case studies. Publications Office.
[92] World Bank (2017) The sunken billions revisited. Costello, et al. (2016) PNAS, 113, p. 5125. Andersen, et al. (2015) Ecol Appl, 25, p. 1390. Gascuel & Froese (2016) ICES Conf. Riga, Q:495.
[93] Ulrich C., Auber A., Blanchard F., et al. (2026). Impact du changement climatique sur les ressources halieutiques. Ifremer. https://doi.org/10.13155/111282

and precautionary principles.”

The Golden Miles project is a perfect example of this.

THE GOLDEN MILES PROJECT : ALREADY ENDORSED BY MAJOR ENGLISH-SPEAKING NATIONS

The Golden Miles project has been implemented by major English-speaking nations—a fact that serves as a full validation of the initiative.

A striking example of this is the United States.

In the late 1970s in Texas, management policies that exclusively favored the commercial fishing industry led to the collapse of red drum (*Sciaenops ocellatus*) and speckled trout (*Cynoscion nebulosus*) populations. A group of 14 recreational anglers developed an argument suggesting that increasing the abundance of these "trophy" fish—which they pursued with great passion—would generate significant economic benefits. This led to the founding of the Gulf Coast Conservation Association, which by 1981 had grown to include 5,000 individual members, 18,000 affiliated members, and three lobbyists.

Convinced by these arguments, Texas authorities banned the sale of both species in 1981. The expected results were immediate. The ban was renewed in 1983, and starting in 1988, the use of all fishing nets was permanently prohibited within nine miles of the Texas coast.

Like wildfire, similar regulations spread beyond the Gulf of Mexico—for instance, reaching California, Georgia and South Carolina, among other states, by 1990 while the neighboring Gulf states would soon react[94].

In Florida, at the initiative of Karl Wickstrom, publisher of Florida Sportsman magazine, a multi-million-dollar media campaign was launched by the coalition "Save Our Sealife," which maintained that it had no choice but to turn to the people of Florida.
The petition was so successful that it triggered a ballot initiative—a referendum—on whether fishing nets should be banned from Florida’s waters (extending out nine miles). On November 8, 1994, a 72% majority voted to permanently remove the nets from these waters. This ban was enshrined in Article X, Section 16 of the Florida Constitution and would later inspire a novel published in 1996[95].

Today, Florida ranks first in the United States for both commercial fishing employment and recreational fishing (see Fisheries Economics of the United States | NOAA Fisheries).

Alabama, Louisiana, and Mississippi have been compelled to take action, if only to curb the displacement of fishing activity. Net fishing in coastal waters—which, for these three states, extend only three miles offshore—was initially restricted to those already operating in these areas; subsequently, in the late 2000s, the issuance of such licenses was frozen, with the licenses set to expire whenever a fisherman ceased operations.

The outcome has been a dual success, both environmental and economic. Having received compensation, commercial fishermen have shifted to selective harvesting methods—such as using traps and longlines—within coastal waters, or have moved to offshore federal waters. Some have transitioned into the Gulf’s oil industry, while others have begun offering eco-friendly cruises.

Others thrive as charter captains, guiding those who were once their competitors—recreational anglers.
In Texas, catches have increased by 60%. The average weight of red drum catches has risen 2.5-fold. In

[94]DUFF J.A. (1997). Gillnet Restrictions in the Gulf of Mexico, 9 St. Thomas L. Rev. 389
[95]Captiva de Randy Wayne WHITE

Florida, there has been a spectacular comeback of large fish, such as snook. Speckled trout populations have reached their highest levels since the 1970s. The abundance of black drum has surged by 250%, and that of tarpon by 300%. In California, porpoise and seabird populations are recovering.

Today, the U.S. fishing industry—which maintains a trade surplus—continues to create jobs and keep landing volumes high across both the commercial and recreational sectors. More than 95% of assessed fish stocks are considered to be fished sustainably. In France, by contrast, landing volumes, the number of vessels, and the number of fishermen have been in steady decline for two generations, while the trade deficit continues to grow (see Home | FranceAgriMer). Only 50% of assessed fish stocks are considered to be fished sustainably.

Australia places such importance on keeping non-selective fishing gear out of the first three nautical miles from the coast that it highlights this policy right on the homepage of its official website (see: Home | Australian Fisheries Management Authority).

In New Zealand, set nets have been banned across three-quarters of coastal waters. Since October 1, 2020, these prohibitions have been extended to an average distance of 4 to 12 nautical miles (7 to 22 km) from the coast. The use of driftnets—for both commercial and recreational fishing—is now prohibited throughout all New Zealand waters[96].



1



2

(Sources: https://www.mpi.govt.nz/fishing-aquaculture)
(1) Coastal waters along only half of the west coast of New Zealand's North Island were previously protected by a ban on set nets extending up to 7 miles from the shore. Since October 1, 2020, the entire west coast has been protected by a ban on set-net fishing, which now extends to 4, 7, or 12 miles from the coast.

[96]MPI New Zealand, Managing the impact of fishing on protected species, www.mpi.govt.nz

(2) The coastal waters around the entire South Island of New Zealand are now almost entirely protected by a ban on set-net fishing :

- For only 3 months of the year, within 2 nautical miles of the shore between Farewell Spit and Awarua Point, on the West Coast.
- Year-round along the East Coast, extending at least 4 nautical miles offshore—and in some places, 10, 12, or even 19 nautical miles (such as in Pegasus Bay).

Since the end of 2022, 32,675 square kilometers of coastal waters have been closed to fixed-net fishing and reserved for selective fishing methods (hook-and-line, pots/traps, and diving).

Norway banned coastal fixed nets in 1979, followed by a ban on drift nets in 1989, in the interest of protecting salmon[97]. A similar measure was taken in 1984 along the coasts of Newfoundland and Labrador[98], followed by a further wave of net prohibitions during the collapse of the cod fisheries in July 1992.

The "Golden Miles" principle was established off the west coast of Ireland following a meeting in Dublin organized by the French ambassador, Frédéric Grasset, and his friend Jean-François Gaillard. Initiated by the Icelander Orri Vigfússon—founder of the North Atlantic Salmon Fund and recipient of the 2007 Goldman Environmental Prize—the meeting brought together ambassadors from all the coastal nations of the North Atlantic, including the United States[99].

20. The Golden Miles project : a solution in the hands of the general public.

In a nutshell :

Solutions exist, but they must be implemented.
Protecting the coastal zone and keeping fishing nets further offshore helps preserve essential biological functions, reduce unnecessary bycatch, and promote selective fishing practices.
In the absence of political will, this transition can only come about through the mobilization of citizens.

One should not expect anything significant from the proliferation of marine protected areas as long as they remain purely theoretical—little more than geometric shapes drawn on paper maps. We must look beyond merely sketching square kilometers on paper; what truly matters is protecting actual biological functions beneath the water’s surface.

In the United States, moving fishing nets further away from the coast yielded such positive results that the french national fisheries committee traveled there to observe them firsthand. Upon their return, however, the committee refrained from publishing any report whatsoever.

Moving fishing nets further away from the coast facilitates a transition toward selective fishing methods (such as hook-and-line, pots/traps, or diving). This removes the disproportionate competition posed by nets, while sparing juvenile and migratory fish and reducing the bycatch of protected species.

Fishermen themselves have demonstrated that by fishing less—but fishing better—they can earn significantly more. The scallop fishery, for instance, only became a spectacular socio-economic

[97]Jensen, A. J. et al. (1999), « Cessation of the Norwegian drift net fishery », ICES Journal of Marine Science, 56(1), p. 84-95.
[98]O'Connell,M. F. et al.(1992), « Impacts of major management changes in Atlantic salmon fisheries »ICES Journal of Marine Science, 49, p. 69-87.
[99]Rapport du Salmon Group (oct. 2006) : Alignement du secteur de la pêche au saumon – Collins, Malone & White.

success once fishing effort was drastically reduced and the reproductive cycles and growth of the scallops were respected.

The goal is to apply this same effective strategy to fish.

This is the "GOLDEN MILES" project : a marine area that safeguards selective fishing practices and the resources of the future, while offering a final chance for salmon. In doing so, it protects all forms of fishing.

What more could one ask for?

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Founded in 2017, Défense des Milieux Aquatiques is an officially recognized environmental protection association; it has challenged numerous administrative decisions, particularly regarding fishing, and spearheads the "Golden Miles" project, an initiative that has been observed and validated abroad.

The association has focused its efforts on limiting the fishing of migratory species (such as salmon, shad, and lamprey), a practice now banned almost everywhere in France, as well as bottom trawling (excluded from coastal Natura 2000 sites in the Gironde region) and dolphin mortality caused by fishing in the Bay of Biscay, ultimately leading to a one-month ban on maritime fishing during the winters of 2024, 2025, and 2026.

ADRESSE :
DMA
Maison de la Nature et de l'Environnement
2 quai de Brazza
33100 Bordeaux

EMAIL :
maigre42@gmail.com

SITE INTERNET :
https://defensedesmilieuxaquatiques.org

Crédits : DMA

Ecriture / Recherches documentaires
Philippe GARCIA
Président de Défense des Milieux Aquatiques
Graphisme / Maquette
HAPPY HARPIE COMMUNICATION

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