

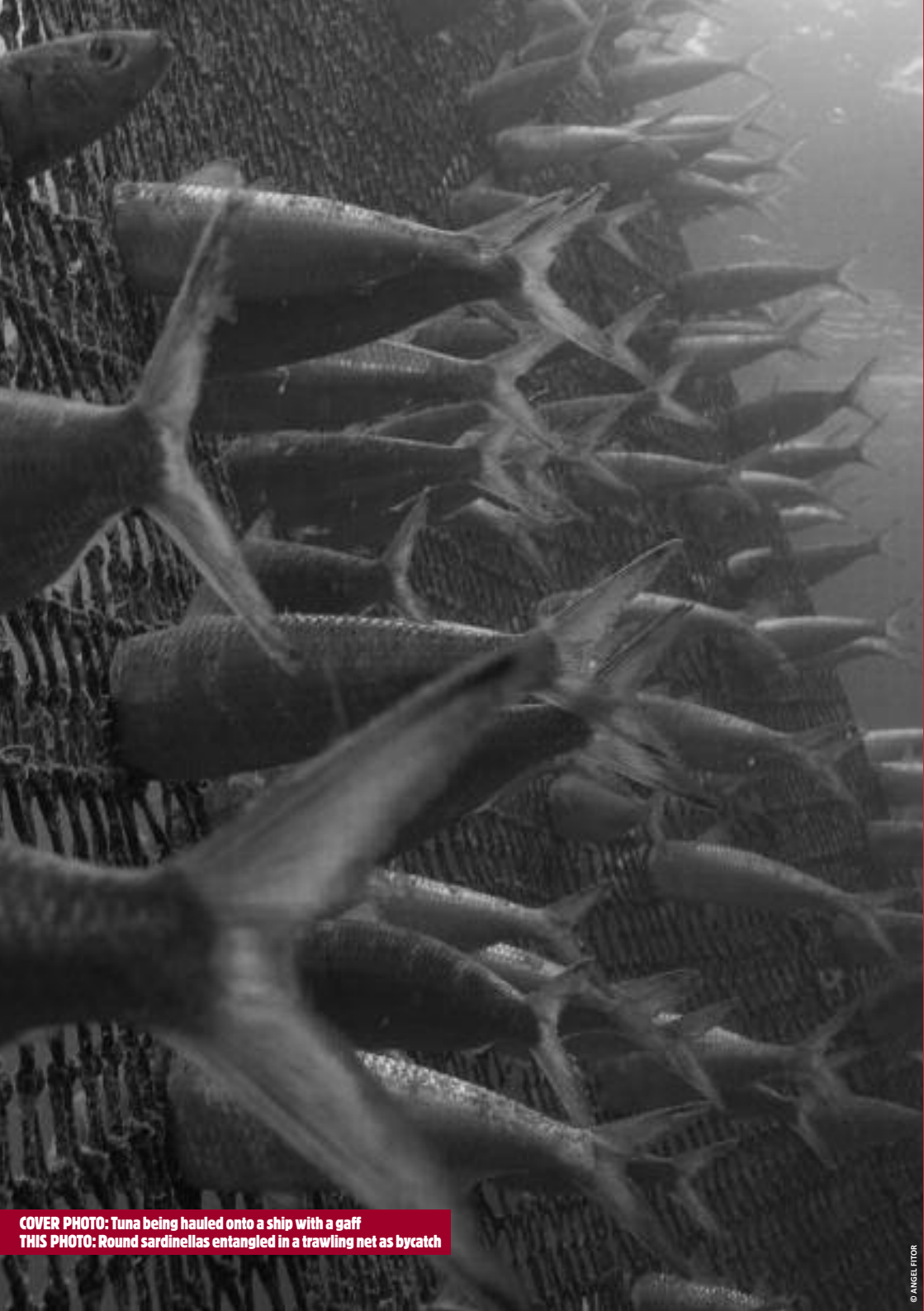


www.animalaid.org.uk



DARK WATERS

An Animal Aid report examining the impact of eating fish on animal welfare, human health and the environment



COVER PHOTO: Tuna being hauled onto a ship with a gaff
THIS PHOTO: Round sardinellas entangled in a trawling net as bycatch

The warnings related to the ocean and farmed fishing industries are coming faster and harder...

Species that were once plentiful are being eliminated.

Mechanised fishing technologies are also taking their toll on vast numbers of bystander marine animals who are hooked, netted and dredged from the ocean floor as 'accidental victims'.

We treat the world's oceans as dumping grounds for our toxic effluent, and imagine that the waste is out of harm's way because it is out of sight.

Can fish taken from this environment be the supremely healthy and wholesome 'brain food' portrayed in official nutritional guides? Or is fish meat fundamentally compromised by the presence of chemicals linked to cancer and birth defects?

Then there are the salmon and trout factory farms with their enfeebled, lice-infested inmates swimming in the murk in endless circles.

Do the lives of fish not matter?



© ANIMAL EQUALITY

DARK WATERS

This Animal Aid report ...

brings together – in succinct, bullet-point style – key data and observations about the environmental, human health and animal welfare dimensions of the fish meat industry. It is the plight of the fish themselves that, until now, has received precious little attention. The first thing to note is that there is now a scientific consensus recognising that fish are sentient creatures. The government's own advisory body on farming, the Farm Animal Welfare Council, now called the Farm Animal Welfare Committee (FAWC), stated in a 1996 report on fish farming that fish have all the nerve chemicals and cell receptors necessary to experience pain and stress. FAWC based this finding on a comprehensive review of the scientific literature. A great deal of additional evidence for fish sentience has come forward since then.

Scientific studies show that crabs, lobsters, squids, octopuses and other marine creatures can also feel pain, yet on farms, shrimps and prawns have their eyestalks cut off with razorblades, to speed up their reproduction process, and lobsters are often boiled alive.

Given the methods used to catch, haul in and kill ocean fish – all of them ungoverned by any welfare code – the question can reasonably be posed:

Does ocean fishing represent the greatest animal welfare scandal of our time?



Farmed fish fare no better

Welfare protocols have been committed to paper but these still allow thousands of fish to be confined in crowded cages, swimming in water that is filthy from their own waste. They are killed by a variety of brutal methods, such as being clubbed, gassed or asphyxiated. Some are gutted alive. Others have their gills cut and bleed to death.

Fish suffering

The Dutch seem to be leading the way in examining the question of fish suffering and how to minimise it. Killing experiments – carried out on behalf of the government, the fish industry and an animal welfare body – found that after being gutted, 25-65 minutes elapsed before fish were ‘insensible’ – that is to say, incapable of feeling pain. In the case of asphyxiation, the time interval was 55-250 minutes.¹

Sustainability

Sustainability is an increasingly important issue. Within the European Union, three quarters of all fish ‘stocks’ (subpopulations of species) are overexploited, and Europe now relies on imports for two-thirds of its

fish.² Despite this, nearly half of the quotas set in December 2012 were in excess of the best scientific advice.³

Yet whenever action is proposed to curtail these practices, those who make their living from catching fish claim their position will be dangerously compromised, even though present practices are themselves leading the industry to oblivion. Equally, the public is being persuaded that fish can remain on the chip shop menu and on supermarket counters and nothing very much need change.

Health

Champions of fish meat regard, as their strongest suit, the product’s alleged health benefits. In particular, there is the omega-3 issue – this being an important polyunsaturated fat found in oily fish such as herring, mackerel and fresh tuna. However, not only is up to 30 per cent of the fat present in oily fish of the unhealthy, saturated variety, but – according to experts in the field – vegetarians and vegans can meet all their omega-3 requirements from non-animal sources, such as soybeans (including soya milk and tofu), walnuts, rapeseed oil, flaxseed and dark green vegetables such as spinach. (See pages 13 and 14.)

This report demonstrates that the ocean and farmed fishing industries endanger species, pollute waters, are nutritionally dubious and represent an animal welfare nightmare.

The impact of eating fish on

ANIMAL WELFARE

Fish CAN suffer

- All animals possessing a nervous system and pain receptors are capable of suffering the effects of pain. This includes fish.
- Although defining welfare in farmed fish is seen as more challenging than in terrestrial farmed animals,⁴ a growing number of studies show that fish can feel pain and fear.⁵
- As far back as 1980, a report commissioned by the RSPCA concluded that 'all vertebrate animals (i.e. mammals, birds, reptiles, amphibians and fish) should be regarded as equally capable of suffering to some degree or another, without distinction between 'warm-blooded' and 'cold-blooded' members'.⁶
- At around the same time, Dutch researchers showed that fish hooked by anglers could experience pain. They found that carp hooked on a tight line were prepared to starve themselves of food for quite some time afterwards to avoid the painful experience.⁷
- Since then, there has been much more supporting research. For example, in pain sensitivity experiments performed at Edinburgh's Roslin Institute, fish had a toxin and acid injected into their lips. They exhibited a 'rocking' motion, similar to the way higher vertebrates



- e.g. humans – rock to comfort themselves. They also rubbed their lips against the tank walls and gravel, and took three times longer than normal to resume feeding.⁸
- In tests at Oxford University, Mexican cave fish – genetically blind – built a mental map of their surroundings by memorising the position of objects in their tank. They quickly reacted to changes in the set-up. This task defeats some small mammals.⁹
 - At the University of Edinburgh, spotted rainbowfish remembered how to escape from a net in their tank 11 months after initially working it out.¹⁰
 - Various studies over many years have found that crabs exhibit a defensive reaction to electric shocks, and that this reaction can be reduced by administering morphine.¹¹
 - In studies on glass prawns at Queen's University School of Biological Sciences, the animals were found to groom their antennae substantially more when noxious substances were applied to them or when they were pinched with forceps, than when they were treated solely with sea water. The researchers found that the application of a local anaesthetic reduced the grooming following the chemical being applied.¹²
 - The government's advisory body the Farm Animal Welfare Council (now, the Farm Animal Welfare Committee), acknowledges that fish experience fear, stress and pain when removed from water, and that the physiological mechanisms in fish for experiencing pain are very similar to those in mammals.¹³
 - Prolonged periods of stress can cause negative changes in the immune system, making fish more vulnerable to disease.¹⁴
 - Victoria Braithwaite, Professor of Fisheries and Biology at Penn State University, writes: 'Many of the responses fish have to aversive stimuli are similar to those found in mammals and birds and, given that fish brains have the capacity to remember and anticipate, such findings indicate that fish potentially have the capacity for long-term suffering.'¹⁵ In her book *Do Fish Feel Pain?* she writes: 'I have argued that there is as much evidence that fish feel pain and suffer as there is for birds and mammals – and more than there is for human neonates and pre-term babies.'¹⁶
 - According to Stephanie Yue Cottee, of the Department of Animal and Poultry Science at the University of Guelph, 'We now have logical reason and scientific evidence to start treating fish as sentient creatures.'¹⁷
- ### Octopus, squid, lobster and crab suffer, too
- Millions of cephalopods (marine animals including squid and octopus) are caught and killed each year for human consumption, and for use as bait to catch fish.¹⁸ Research increasingly demonstrates that cephalopods 'are actually highly intelligent, sentient beings, capable of suffering and many other complex emotions'.¹⁹



- In 2013, the EU law on animal experimentation was amended to extend protection to all live cephalopods used in research, 'as there is scientific evidence of their ability to experience pain, suffering, distress and lasting harm'.²⁰
- Crabs, lobsters and prawns (decapod crustaceans) are often boiled alive, and many seafood suppliers rip off the legs or abdomens of live animals to sell. During live boiling, lobsters struggle violently and even shed limbs, which is their normal stress behaviour in order to escape capture or to prevent injury to a limb from affecting the rest of the body.²¹
- Research from Queen's University Belfast concluded: 'Evidence from behavioural studies is entirely consistent with the idea that some invertebrates, particularly crustaceans and molluscs, experience pain.'²²
- Professor Donald Broom, emeritus professor of animal welfare at Cambridge University, says: 'There is evidence from some species of fish, cephalopods and

decapod crustaceans of substantial perceptual ability, pain and adrenal systems, emotional responses, long- and short-term memory, complex cognition, individual differences, deception, tool use and social learning.’²³

Shrimps have their eyes cut open with razorblades

- More than half of all shrimps consumed globally are farmed,²⁴ but breeding marine shrimps in captivity often prevents females from developing mature ovaries.²⁵ To induce ovarian maturation, almost every marine shrimp facility in the world carries out ‘unilateral eyestalk ablation’ – the removal of an eyestalk – to partially destroy a hormone that inhibits ovarian maturation.²⁶
- The Food and Agriculture Organisation of the United Nations describes one method used: ‘Ablation is done by using a razor blade to cut/open the eye, then squeezing out the eyestalk from the base to the tip with the thumb and forefinger or using the fingers alone to break and squeeze the eye.’²⁷
- Even in conditions where shrimps will develop ovaries and spawn in captivity, eyestalk ablation is still conducted, as it increases both the total egg production per female, and the percentage of females who will reproduce.²⁸
- Eyestalk ablation has been labelled as ‘cruel’ and ‘traumatic’ by numerous scientists²⁹ but is also seen as ‘currently unavoidable’ to maximise the reproductive potential of ‘economically important’ black tiger shrimps.³⁰
- Eyestalk ablation is traumatic not only because of the surgical treatment itself, but also ‘due to the subsequent discomfort and hormonal changes that are not necessarily related to pain’. Pain and discomfort-related behaviours include tail flicking as a reflex response to allow escape, rubbing the affected area, disorientation, recoil and stooping.³¹
- Eyestalk ablation also ‘jeopardizes growth, shortens molting cycle, increases energetic demands, resulting in... high mortality.’³²

Much of the fish on sale at the supermarket has been factory farmed

- Aquaculture is the fastest growing animal-production sector in the world,³³ supplying 43 per cent of fish consumed by people.³⁴
- Global farmed-salmon production has exceeded total wild salmon catches since 1998. Farmed Atlantic salmon constitutes more than 50 per cent of the global salmon market. The biggest salmon producers are Norway, Chile, the UK and Canada, supplying more than 90 per cent of world production of farmed salmon.³⁵
- Salmon production in Scotland is set to increase by 50 per cent by 2020 to meet import demands from China.³⁶
- 89 per cent of aquaculture production takes place in Asian countries.³⁷
- Increasingly, even species we presume are wild – such as bass,³⁸ halibut³⁹ and cod⁴⁰ – are being farmed.

Fish on farms are caged in cruel and unhealthy conditions

- Intensively farmed fish suffer from a range of welfare problems including physical injuries such as fin erosion, eye cataracts, skeletal deformities, soft tissue damage, increased susceptibility to disease, sea lice infestation in the case of Atlantic salmon, and high premature mortality rates.⁴¹
- The European Food Safety Authority states that common aquaculture practices can lead to injury, stress and increased disease susceptibility,⁴² and that ‘the intensification of fish farming has inevitably resulted’ in the emergence of infectious diseases.⁴³ It further states that more diseases are likely to evolve due to the factory farming of fish.⁴⁴
- Overcrowding and the unnatural environment found in many fish farms greatly increase the likelihood of endemic disease.⁴⁵ In 2012, 8.5 million salmon – that’s ten per cent of all those bred – were killed by diseases on Scottish fish farms.⁴⁶
- Salmon suffer from a number of parasites and other debilitating conditions. The most notable of these include sea lice, furunculosis (which can cause haemorrhages in muscles, necrosis of the kidneys and intestinal inflammations⁴⁷) and pancreas disease. Lice infestation is a devastating condition that flourishes in farm cages, literally eating the fish alive.



Fish farms are often overcrowded

- A 2012 study found that Scottish salmon farms are spreading these flesh-eating sea lice to wild populations, with more than a third of the wild salmon in the north-east Atlantic being killed by the parasites.⁴⁸ Wild salmon captured near salmon farms in Scotland, Ireland and Norway carried an average of 100 lice per fish. Salmon captured away from farms carried an average of 13 lice.⁴⁹
- Antifoulant chemicals are used in fish farms to prevent microorganisms and algae attaching to the cage and increasing disease-susceptibility in the fish. However, these chemicals can cause significant build up of copper and zinc in the sediments, with toxic effects leading to the destruction of vulnerable species and a changing of the ecological balance.⁵⁰

Farmed fish are artificially bred

- Female fish are anaesthetised and their eggs extracted. First, though, their abdomen is palpated to see if the egg mass is free. This is highly stressful and can occur several times before extraction.
- The eggs are either stripped by hand or compressed air is introduced into the body cavity with a needle. Sometimes the ovaries may be removed surgically.
- Most females are killed after their eggs have been stripped, as waiting for them to regain body condition is uneconomic. The breeding females are treated as production machines, as with other farmed female animals.
- The male fish are also 'milked' several times for their semen before being slaughtered.

Fish are genetically modified

- Researchers are developing genetic engineering techniques in an attempt to produce fish who grow larger and faster, convert feed into flesh more efficiently, are resistant to disease, tolerant of low levels of oxygen in the water and can stand freezing temperatures. As with all such GM animal procedures, these techniques are highly experimental and will result in lots of failures, and suffering for the fish involved.
- Triploidy (adding an extra set of chromosomes) is often used in conjunction with sex-reversal to produce sterile all-female fish who show increased feed efficiency and will not interbreed with wild populations if they escape.⁵¹

These genetic manipulation techniques have serious effects on the health and welfare of the fish.

- Triploid fish have increased lower-jaw deformity, cataracts and a reduced ability to transport oxygen in the blood, which makes them less able to cope in stressful situations.⁵² Triploid fish have been found with higher levels of spinal deformities and breathing difficulties and higher mortality rates.⁵³
- Should GM fish escape or be deliberately released, several studies conclude that they could cause the extinction of entire wild populations.⁵⁴
- Such genetic manipulations are driven by profit. Bringing salmon to a marketable size within 18 months instead of three years,⁵⁵ for example, saves production costs, with little thought given to the welfare or environmental costs.

Fish are transported alive

- Juvenile salmon and trout are transported live from hatcheries to rearing farms, and on to slaughter. They are transferred to and from their transport containers by vacuum pumps, or by hand with the use of nets. Damaged nets, or rough handling, injure the fish.
- Transport is either in a purpose-designed tank slung below a helicopter, by road, or by sea in specially designed wellboats.
- Before transport, it is current practice to deprive fish of food for 48 hours or more. This reduces faecal contamination of the water and reduces oxygen consumption, since starving fish slows down their metabolism.
- Species such as pangasius, carp, tilapia and eel are routinely transported by land without water. Writing in *Fish Physiology and Biochemistry*, researchers stated: 'Any fish transported without water are likely to be extremely stressed by the lack of water, lack of oxygen, physical vibration, pressure and temperature. The fact that many of these fish can survive for long periods out of water is not an indication that it is a stress-free experience.'⁵⁶
- Even when transported in water, the movement and transfer can be a frightening experience for fish and has been described as causing 'considerable' stress.⁵⁷

The slaughter of farmed fish causes suffering

- While European legislation covers in some detail the stunning and slaughter of

most farmed animals, the only stipulation relating to fish is that they be 'spared any avoidable pain, distress or suffering during their killing or related operations'.⁵⁸ The use of the word 'avoidable' gets round the fact that the entire process of handling and killing the fish in itself causes pain and suffering.

- Around 35 million farmed fish are slaughtered in the UK every year,⁵⁹ almost as many as all cattle, sheep and pigs combined.
- In some units, the fish are killed by having their gill arches torn or cut so that they bleed to death. Fish bled this way, without prior stunning, struggle intensely for an average of four minutes. Catfish can respond to noxious stimuli for a minimum of 15 minutes after gill-cutting. This method has been used commercially in the UK and Norway but the Scientific Panel of Animal Health and Welfare of the European Food Safety Authority considers it inhumane and says that it should not be used for slaughter.⁶⁰
- Some fish are stunned before slaughter. Stunning methods include percussive stunning (a blow to the head), electrical stunning,⁶¹ the use of carbon dioxide, and immersion in ice or cold water before being killed by cutting their gill arches.
- Carbon dioxide does not fully stun fish and they therefore 'might experience distress or pain during subsequent processing steps, namely bleeding and gutting'.⁶² It is banned in some countries.
- Some stunned fish regain consciousness before death when not all gill arches are

effectively cut. Fish are often not inspected for a long period of time between slaughter and further processing, so their consciousness is not noticed.⁶³

- For some fish (for example, sea bass and bream) death is by asphyxiation. They are removed from water, which causes their gills to collapse, and they suffocate to death. Fish often show violent escape behaviours and maximum stress responses during this time. Rainbow trout, for example, may take up to 10 minutes to die.⁶⁴

- Fish farmers themselves have admitted that 'letting tens of millions of fish die of suffocation each year is unacceptable'.⁶⁵

- Tuna are killed by shooting or by hoisting them out of the water by stabbing them with a hook, known as a gaff. They are then killed with a spike forced directly into their brains, and then bled.⁶⁶

- Eels are transported without water to the killing facility and are commonly immobilised in ice or killed by placing them in salt or an ammonia solution prior to evisceration (disembowelling).⁶⁷ A dry salt bath gradually penetrates and desiccates their bodies; an estimated 80 per cent of them are still alive when gutted and a significant proportion are still alive after 30 minutes.⁶⁸

- Asphyxiation, bleeding, live evisceration and the use of salt or ammonia baths without prior stunning are not considered humane 'due to the extended duration of suffering before the fish lose consciousness'.⁶⁹ Decapitation without prior stunning, as used on some fish, 'is unlikely to be a humane killing method [...] because the brain continues to function for an appreciable time' – up to 13 minutes for eels.⁷⁰



- Cold shock involves immersion in ice or iced water and is used widely for a range of farmed fish (e.g. trout and tilapia), but paralyses rather than stuns. While a fish's physical reactions may stop or slow relatively quickly, the brain is still active. Trials showed that turbot remained alive and capable of full recovery after 90 minutes in chilled seawater.⁷¹ Research has revealed some fish writhing and thrashing while being bled following gill-cutting. Researchers concluded that live chilling followed by exsanguination (bleeding) of fish appears to be highly stressful and should not be practised as the animals are not properly stunned.⁷²
- Turbot and sole are transported in ice and usually bled to death or disembowelled without further stunning.⁷³
- Many carp farmed in the EU and beyond are sold alive and killed by the end-user in homes or restaurants. This involves periods out of water or being held in small quantities of poor quality water and the fish are in particular danger of physical injury. They are usually stunned by beatings to the head before bleeding to death.⁷⁴
- Newly hatched farmed fish who are killed because they are diseased are sometimes even macerated by a mechanical device with rotating blades.⁷⁵

Wild caught fish also suffer greatly

- Vast drift nets, some over 2km long,⁷⁶ are used to trawl the seas. Fish can be dragged along the ocean bed for hours within these nets, trapped alongside rocks, debris and other sea life that has fallen in the net's path.
- When hauled up from the deep, fish undergo excruciating decompression. Frequently, the intense internal pressure ruptures their swimbladders, pops out their eyes, and pushes their oesophaguses and stomachs out through their mouths.
- Some caught fish are sorted using small, spiked rods called pickers. Factory ships slaughter and process the fish at sea. Most fish are gutted whilst still alive or are left to suffocate.
- A Dutch study on fish industry slaughter methods found that after gutting 25-65 minutes elapsed before fish were insensible (failed to show co-ordinated swimming or responded to stimuli but showed brain stem responses like breathing). In the case of asphyxiation, 55 - 250 minutes elapsed before fish were insensible.⁷⁷
- Interviews with retail buyers of fish suggest that animal welfare is considered less of an issue with wild-caught fish than with farmed fish because the animals live in their natural habitat, and less consideration is given to the suffering experienced during capture and slaughter.⁷⁸



The impact of eating fish on

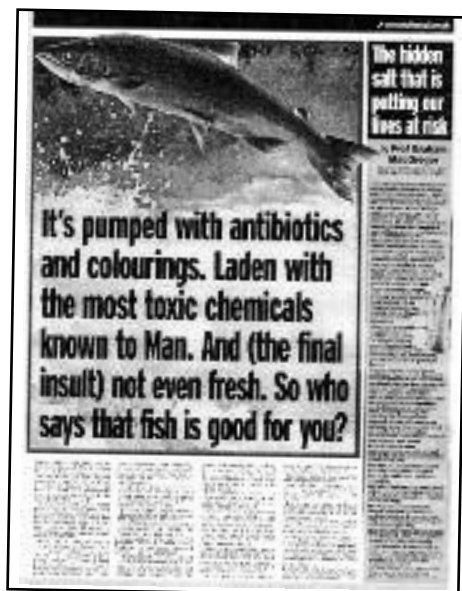
HUMAN HEALTH

Fish contain unhealthy saturated fats

- 30 per cent of the fat in fish can be saturated.⁷⁹ This is a risk factor for heart disease.
- There are two types of polyunsaturated fat that our bodies need. These are in the form of essential fatty acids (EFAs) – omega-6 and omega-3. Necessary polyunsaturated fats found in oily fish – such as herring, mackerel and sardines – can also be found in foods such as green leafy vegetables, pulses, seeds and nuts.⁸⁰
- Most diets are well supplied with omega-6 fats, as these are found in sunflower, corn and vegetable oils.
- Oily fish is not the only source of omega-3 fats. Seeds, nuts, beans and their oils – especially linseeds (flax), soya oil, rapeseed oil and walnuts – are all very rich in the essential omega-3 fats.⁸¹ They can also be found in green leafy vegetables.

Omega-3 fats from plants are healthier than those from oily fish

- A 2013 study found that omega-3 fatty acids from fish are linked to an increased incidence of aggressive prostate cancer. Researchers found that eating just over two portions of salmon per week could raise the risk by as much as 71 per cent.⁸²



- Plants are much less likely than fish to be contaminated with pollutants such as mercury.
- Plant sources of omega-3 fats additionally contain vitamin E, which is vital in stopping the omega-3 fats going rancid. Fish is a poor source of vitamin E.
- There is now a considerable body of scientific evidence to show that people who are at low risk of heart disease are those with a healthy lifestyle, who eat a diet low in saturated fat and rich in pulses, beans, wholegrains, fruits and vegetables – along with plant-derived oils from seeds and nuts.
- A study found that heart attack victims who ate a Mediterranean-type diet (high in fresh fruit and vegetables and low in meat), consuming plant oils instead of fish, reduced their risk of having a fatal second heart attack by 70 per cent.⁸³
- According to the Physicians Committee for Responsible Medicine: 'Plant-based

diets offer greater cardiovascular protection than the Mediterranean diet, without the toxic fish and saturated fat... Fish oil has no effect in heart-related death, heart attack, or stroke, according to a review of 20 studies in *JAMA* [Journal of American Medical Association].⁸⁴

- Studies have shown that flaxseed oil (linolenic acid) can lead to a three per cent decrease in C-reactive protein in the blood – high levels of which are associated with heart disease.⁸⁵ This strongly suggests a unique role for flaxseed oil in reducing C-reactive protein – a benefit not afforded by fish oils.⁸⁶

Oily fish may be contaminated with toxic chemicals

- Our seas and rivers are increasingly contaminated with pollutants from industrial and agricultural wastes. Fish are literally swimming in our filth.
- Many toxins in the environment, such as PCBs (polychlorinated biphenyls) and dioxins, which have been linked to cancer and birth defects, build up in the fat of fish.
- Farmed fish also contain such toxins, largely due to their feed, which is made from wild fish.⁸⁷
- Even organic farmed fish contains deadly toxins. The Soil Association writes: 'The Soil Association is aware of the problems of farmed fish being contaminated with PCBs, dioxins and other toxins (flame-retardants and mercury) that may pose a quite unacceptable health risk to consumers.'⁸⁸

- Fears over possible toxin contamination in fish have led the FSA – for the first time ever – to advise on maximum levels of fish consumption. As from June 2004, it advises that girls under 16, women who might have a child one day and women who are pregnant or breastfeeding, should have no more than two portions of oily fish a week (one portion is 140g).⁸⁹

Fish may be contaminated with mercury

- Fish, and particularly shellfish, are the main sources of mercury in the diet.⁹⁰ Nearly all fish contain traces of mercury.⁹¹
- Mercury is a poison that can affect the central nervous system, kidneys and heart. Researchers have found that a high intake of mercury, specifically from eating non-fatty fish, is also associated with an increased risk of mortality from coronary heart disease.⁹²





- If pregnant women are exposed to sufficiently high levels, mercury can harm the developing nervous system of an unborn child.⁹³ As a result, pregnant women and those who may become pregnant, are advised by the Food Standards Agency to limit the amount of tinned tuna that they eat.⁹⁴
- The Food Standards Agency recommends that pregnant women or those wishing to become pregnant also avoid eating shark, swordfish and marlin. All other adults should also limit their consumption of these species.⁹⁵
- Vegetarians are much less likely to be exposed to mercury. A 2000 study of vegetarian diets detected no mercury in the foods eaten.⁹⁶
- **Farmed salmon is particularly unhealthy**
- Most salmon eaten today comes from factory farmed fish.
- Farmed salmon have been shown to have higher levels of PCBs and pesticides than wild salmon. The fish oil and fishmeal fed to salmon is likely to be contaminated – hence the higher levels of toxins in factory farmed salmon.⁹⁷
- Research reported in *Science* magazine found that levels of cancer-causing toxins in Scottish farmed salmon are so high that consumers are warned not to eat more than one portion (140g) every two months.⁹⁸
- Wild salmon get their pink hue from natural food sources such as algae and small crustaceans. Farmed fish are fed the pigment Canthaxanthin, which has been linked to eye defects.⁹⁹
- Farmed salmon are routinely fed chemicals such as emamectin benzoate in order to reduce sea lice infestation.¹⁰⁰ This compound is toxic to birds, mammals, fish and other aquatic organisms. According to the Scottish Environment Protection Agency, 'There is little evidence as to the full effects of exposure to emamectin benzoate on human health. However, exposure to emamectin benzoate may cause irritation of the respiratory tract, eyes and skin.'¹⁰¹
- Fish kept in confined areas can become susceptible to diseases, which are routinely treated with antibiotics. Organisms can develop resistance to these drugs, which makes the antibiotics ineffective when treating sick people. In



2013, the government's Chief Medical Officer described antibiotic resistance as 'as big a risk as terrorism'.¹⁰²

Infections from eating and handling fish

- Outbreaks of listeriosis in humans due to eating contaminated seafood, including shrimps, vacuum packed smoked salmon and fermented fish, can cause intra-uterine infection, meningitis, miscarriages and gastro-intestinal symptoms.¹⁰³
- The consumption of raw fish (e.g. sushi in Japan or 'groene herring' in the Netherlands) can cause gastro-intestinal problems.¹⁰⁴
- Allergies to fish, shellfish and mussels are common and may produce severe symptoms, including angio-oedema (swelling of skin tissues, most commonly of the eyelids and lips) and anaphylaxis.¹⁰⁵
- Workers in the fishing and processing industries are at risk from infections during handling of fish, particularly if injured by fins or through contamination of wounds exposed to water. This can lead to blood poisoning and can even be fatal. Erysipeloid, which causes swollen fingers, is known as 'fish handler's disease'. Fatal endocarditis has been described following the gutting of eels.¹⁰⁶

The stench at the fish counter is the smell of fish fats turning rancid

The impact of eating fish on

THE ENVIRONMENT

Our eating habits are driving many species of fish to the brink of extinction

- 'Three out of four fish stocks are overexploited in the European Union; catches are only a fraction of what they used to be in the nineties – and still dipping year after year. Today, Europe has to rely on imports for two-thirds of its fish. Somewhere we have gone wrong.' – Maria Damanaki, Commissioner for Maritime Affairs and Fisheries, 13 July 2011.¹⁰⁷
- Numbers of cod, plaice and sole have declined by 32 per cent in EU fisheries since 1993 and the fish catch in the North Sea has slumped from 3.5m tonnes in 1995 to 1.5m tonnes in 2007.¹⁰⁸
- Today, 63 per cent of the assessed 'stocks' in the Atlantic, 82 per cent of the assessed 'stocks' in the Mediterranean and two-thirds of the assessed 'stocks' in the Baltic are overfished. The European Commission recognised that, in a number of fisheries, fishing capacity is estimated to be two to three times the sustainable level.¹⁰⁹
- Tuna, cod, swordfish and marlin populations have declined by 90 per cent during the last century.¹¹⁰
- The North Sea cod population was once 7 million tonnes.* Today's spawning number is estimated to be a meagre 53,000 tonnes.¹¹¹ A 2013 Dalhousie University study on northern cod concluded that numbers may never recover.¹¹²
- Common skate populations in the North Sea have declined by 99 per cent in the last 200 years.¹¹³
- The North Sea mackerel population collapsed in the 1970s due to overfishing and has never recovered.¹¹⁴
- Plaice, sole and monkfish populations are also listed by ICES as 'outside of safe biological limits'.¹¹⁵
- Halibut is officially listed by the World Conservation Union as globally endangered and 'facing a very high risk of extinction in the near future'.¹¹⁶
- Bigeye tuna are as endangered as the Amazon river dolphin but thousands are still caught and canned along with yellowfin and skipjack tuna.¹¹⁷
- Modern fishing techniques are leading to the extinction of the bluefin tuna. Across the Mediterranean, aircraft with satellite detection scour the oceans for schools of bluefin tuna. Once detected, high-speed fishing fleets trap the entire school within a huge net. The animals are transferred into a cage and hauled towards shore where they are fattened until slaughter. The whole enterprise is heavily subsidised by the European Union.¹¹⁸
- 'High grading' – the practice of selectively harvesting fish and throwing others back – destroys fish, totalling a weight of up to a million pounds for every 400,000 pounds kept.*¹¹⁹

** Fish are not counted as multiples of individuals but by weight*



Fishing quotas

- The European Union's Common Fisheries Policy (CFP) sets fishing quotas to restrict the maximum quantities of fish that can be caught.¹²⁰ Ministers set annual and multi-annual catch limits on 'quota' stocks but the CFP is reformed just once every decade (the latest in 2013). Under new proposals, the EU moved from bargaining over quotas to fishing based on 'maximum sustainable yield', reliant on more scientific data about fish numbers.¹²¹
- Often decisions about quotas are influenced by politics rather than ecology and conservation. Nearly half of the quotas set in December 2012 were in excess of the best scientific advice. There were particular warnings that fishing of herring, sole and haddock around the UK seas should be reduced.¹²² For 2012, the quota for cod in the North Irish Sea and herring in the North Sea were set 100 per cent above the scientific advice.¹²³
- During EU fishing negotiations in 2013, the UK government successfully lobbied to prevent a 20 per cent cut in the North Sea cod quota, and also obtained catch increases of 11-18 per cent in other North Sea species, such as haddock, herring and plaice.¹²⁴
- Fish quotas are often ignored. In 2010, the amount of eastern Atlantic bluefin tuna traded on the global market was 141 per cent larger than the legal quota. More than 2 billion euros worth of tuna was caught and traded above the quota between 1998 and 2010.¹²⁵
- And in 2005, 90 per cent of the fishing fleet in Whitby, North Yorkshire, were fined £122,800 for fiddling their books to hide the fact that they were exceeding fishing quotas imposed by the European Commission to protect the North Sea's dwindling fish populations.¹²⁶
- Astonishingly, lucrative quotas are traded and those who control Britain's rights to land fish are kept secret. In March 2013 *The Times* reported that the Marine Management Organisation said the release of the information would be too sensitive. The paper said: 'It has led to speculation that investment funds, football clubs and even celebrities now possess quotas in their portfolios.'¹²⁷
- Five of the eight producer organisations making up the backbone of the National Federation of Fishermen's Organisations' membership were found by a Greenpeace investigation to have between 75 and 100 per cent of their fishing capacity controlled by foreign interests.¹²⁸

Commercial fishing boats dump millions of fish back into the sea

- The European Commission estimates that almost a quarter of the fish caught by EU vessels is thrown back dead into the sea – the highest rate in the world. This is done because crews want to make sure that they fill their catch quotas with fish of the desired species or those that will get a good price.¹²⁹ Others have put the rate as high as two-thirds of the fish caught being thrown back in the water, with about 1 million tonnes estimated to

be thrown back each year in the North Sea alone.¹³⁰

- During 1992–2001, an average of 7.3 million tonnes of fish were discarded each year.¹³¹
- Discards are so high that they have changed population dynamics (such as movement patterns and breeding success) of seabirds who scavenge on the discarded fish. These discards now represent a significant source of food for the birds and reforms to the practice will affect food available to these birds.¹³²
- 22 per cent of the discards of English and Welsh fishing boats are caused by incidental fishing of species for which they have already exhausted their quota: 24 per cent of estimated discards are quota species below the Minimum Landing Size (i.e. they are too small and have to be discarded), while 54 per cent of discards are of species not popular to eat and so unlikely to sell in fish markets.¹³³
- European Union fisheries ministers agreed in 2013 to reduce discards but stopped short of a full ban due to pressure by some fishing countries such as Spain, France and Portugal. Fishermen will be able to discard up to 9 per cent of certain species in 2014, falling to 7 per cent in 2019.¹³⁴

Sustainability labels are inadequate, misleading and unreliable

- Some retailers and campaign organisations promote fishing that they claim is more ‘sustainable’, and a number

of labelling schemes are used to promote these fish products to consumers. But the definition of what makes fish ‘sustainable’ varies.

- Greenpeace says that ‘a particular seafood is sustainable if it comes from a fishery with practices that can be maintained indefinitely without reducing the target species’ ability to maintain its population and without adversely impacting on other species within the ecosystem by removing their food source, accidentally killing them, or damaging their physical environment.’¹³⁵
- Under the Marine Conservation Society’s definition, certain species should be avoided altogether, while high seas drift netting, bottom trawling and the use of dynamite are also considered ‘unsustainable’.¹³⁶
- However, many retailers – including some of the major supermarkets – instead support the Marine Stewardship Council’s (MSC) definition, and sell fish endorsed under that scheme. Greenpeace, however, is critical of this scheme, ‘because under its rules, fisheries that are still unsustainable (even though they are working to improve) can be awarded the MSC logo’.¹³⁷
- Greenpeace admits that ‘identifying which fish come from sustainable sources is extremely difficult. Because of the difficulties in accurately assessing fish populations and because it is very difficult to trace the supply of fish from the ocean to the shop there is no one, truly effective “green label” that consumers can look for on fish products.’¹³⁸

- This view is supported by the 2013 study, which found that British consumers were regularly buying fish labelled incorrectly, with seven per cent of cod and haddock actually turning out to be cheaper fish species.¹³⁹ If even the species bought cannot be guaranteed, how much more complicated to ensure the method of capture, or the source of that animal?
- Researchers looking at ethical dilemmas of fish buying concluded that labels are of limited use, because many focus only on a single element of sustainability, rather than an overarching definition. The message, therefore, remains unclear and untrustworthy.¹⁴⁰

Commercial fishing is also killing millions of other animals

- 'Bycatch' is the term used for the animals caught unintentionally while fishing for a certain species. The weight of fish and other species caught as bycatch each year is estimated to be more than 20 million tonnes – equivalent to 23 per cent of all marine species landed.¹⁴¹
- An estimated 300,000 cetaceans (whales, dolphins and porpoises) die in fishing nets every year, with an undocumented number escaping but with resultant stress or injuries.¹⁴² Approximately 800 common dolphins are caught in EU trawl

Sharks are killed as bycatch



fisheries in the north-east Atlantic each year alone.¹⁴³

- Dolphins suffer prolonged and traumatic deaths when caught. Injuries include abrasions, amputations, penetrating wounds, broken mandibles or teeth, bruising, punctured or collapsed lungs and fractured bones. Non-lethal injuries can lead to health problems and may reduce survival or fertility.¹⁴⁴ Asphyxia (suffocation) is the main cause of death,¹⁴⁵ and can last from three minutes in harbour porpoises to potentially more than 60 minutes in sperm whales.¹⁴⁶
- The indirect effect of bycatch on dolphin families is likely to be very stressful in these highly social species. Loss of a mother is likely to result either in death as a direct result of starvation or reduced survival chances for dependent calves. The loss of key individuals who act as repositories of knowledge may also have serious detrimental effects on the social group.¹⁴⁷
- Large whales may suffer for long periods if they are strong enough to break away but remain entangled for months with ropes progressively cutting into their bodies and causing gradual and extremely painful debilitation until they eventually die.¹⁴⁸
- Entire species such as the tiny vaquita, Maui's dolphin and the North Atlantic right whale are being pushed to the brink of extinction by fisheries bycatch.¹⁴⁹
- Globally, millions of sharks are killed in fishing nets each year. Tuna fisheries, which in the past had high dolphin bycatch levels, are still responsible for the deaths of 1 million sharks annually.¹⁵⁰
- Recent research on blue sharks estimated an annual average of more than 20,000 metric tons of dead discards in the North Atlantic solely from pelagic longline fisheries.¹⁵¹
- Sharks, cetaceans and turtles have a very low capacity to recover from effects of fishing as they grow slowly, become sexually mature relatively late and produce few offspring. According to the International Union for Conservation of Nature, bycatch is one of the most devastating threats facing sharks.¹⁵²
- Bycatch mortality can be very high for air breathing aquatic species such as turtles, mammals and birds, trapped in underwater nets, especially if the nets are left for several days. Turtle populations can be devastated quickly.¹⁵³
- Pelagic longline fishing uses a line of up to 100km in length carrying several thousand baited hooks. In such fisheries, sharks often make up more than a quarter of the total catch (target and bycatch).¹⁵⁴ This method is also a major threat to seabirds who get caught on hooks and drown.
- Six of the seven marine turtle species are classed as threatened with extinction, and fisheries bycatch is recognised as a major threat to all species.¹⁵⁵
- Data compiled from on-board observer programmes show that more than 85,000 marine turtles were taken as bycatch in gillnets, longlines and trawls globally from 1990 to 2008. However, these



Albatross killed by long-line fishing

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observer programs cover only small proportions of the total fishing and reflects just one to five per cent of total marine turtle bycatch.¹⁵⁶

- Hundreds of thousands of seabirds, including tens of thousands of albatrosses, are now estimated to be caught annually in longline fisheries worldwide.¹⁵⁷ There are high levels of seabird mortality in other marine fisheries too, including trawl and gillnet.
- Research based on data collected from four regions over 15 years shows twice as many seabirds are killed than was previously thought. This is because bycatch is generally recorded when the lines are hauled onto the ship but seabirds are predominantly caught during line setting, many hours earlier.¹⁵⁸
- Of 61 species of seabirds affected by longline fisheries, 26 are threatened with extinction, including 18 of the 22 species of albatrosses, and these fisheries are a significant cause of the declines of many of these species.¹⁵⁹
- One of the most destructive trawling methods is 'pair trawling', where a huge net is towed between two boats. This method is practised in the sea bass fishery in southwest England. Although pair trawling began in Korea and China, it is now banned in both countries after decimating marine life there.¹⁶⁰
- The bycatch from just one Spanish tuna fleet examined by impartial observers included endangered species such as loggerhead, leatherback, ridleys and green sea turtles, as well as minke and humpback whales.¹⁶¹
- Prawn trawling regularly has a by-catch of 85 per cent, including cetaceans, turtles, birds and many species of fish.¹⁶²
- Bottom trawling is a destructive way of 'strip mining' the ocean floor. It destroys ancient deep-sea coral forests and other



Coral is damaged by the fishing industry

delicate ecosystems.¹⁶³ As well as the target fish species, this also results in the death of thousands of commercially unattractive animals like starfish and sponges.¹⁶⁴

- Many scientists believe the impact of fishing on bottom-dwelling animals is 100,000 times greater than seabed oil or gas extraction.¹⁶⁵
- Industrial fishing ships are destroying cold-water coral reefs growing around the world, including off the British coast. These reefs date back to the ice age. The nets plough through anything that is fragile and long-lived.¹⁶⁶
- More than 90 per cent of the world's fishermen are employed in small scale fisheries and these can have a cumulative impact on non-target species, which may be higher than those of industrialised fleets.¹⁶⁷
- Even though freshwater fisheries make up 11 per cent of the global commercial catch (most of it in non-industrialised countries), there has been little research into its bycatch compared with marine fisheries. River dolphins are threatened by fisheries in the Amazon River, as is the endangered Yangtze finless porpoise in China.¹⁶⁸ The Yangtze River dolphin of China is thought to have become extinct in 2002, primarily due to commercial fisheries.¹⁶⁹

One in three fish caught in the world's oceans goes for non-human consumption¹⁷⁰

- Industrial fisheries target small fish species for conversion to fishmeal, which is used in animal feeds.¹⁷¹
- Salmon farming consumes 40 per cent of world fish oil production.¹⁷²
- The farming of predator species, such as salmon, requires ten times more wild-caught fish than is needed to feed herbivore species such as tilapia, who are deliberately fed fishmeal to encourage faster growth.¹⁷³ For species such as halibut and cod, the ratio is more than five to one.¹⁷⁴
- An increase in EU aquaculture investment could lead to the increased use of fishmeal produced from species such as sardines and anchovies. Such species are caught for fishmeal production mainly by non-EU vessels in West Africa. This practice may compete with local fleets fishing the same stocks for local and regional food security, for example in Senegal.¹⁷⁵
- Removal of large numbers of these small fish leads to a shortage of food for their predators, including fish such as cod and haddock, as well as many seabirds, including kittiwakes.¹⁷⁶

Fish farming causes the decline of wild fish numbers

- Sea trout numbers in some rivers on the Scottish west coast have shrunk to a fraction of what they were a decade ago. This area has a large concentration of

salmon farms, to which the decline in trout numbers has been attributed.¹⁷⁷

- Up to two million salmon are thought to escape from farms around the North Atlantic each year,¹⁷⁸ spreading any diseases they may have among the wild populations. In 2013, a study funded by the Scottish Government found that one in four salmon sampled on the west coast of Scotland contain DNA from Norwegian fish, possibly due to escaped farmed fish interbreeding with wild fish.¹⁷⁹
- The threat of disease transfer between farmed and wild salmon is serious. Bacterial Kidney Disease and Infectious Hematopoietic Necrosis are common throughout the salmon farming industry.¹⁸⁰
- Sea lice infestations also flourish in salmon farms and these parasites are potentially deadly to wild fish.¹⁸¹ The decline of wild salmon is particularly marked on the UK's west coast, where the vast majority of Scotland's 400 salmon farms are located.¹⁸²
- Escapees from farms can also cause problems should they breed with wild salmon. This is because wild fish are genetically adapted to life in their local environment, while farmed fish have been selectively bred for fast weight gain – not longevity.¹⁸³ Research has found that inter-breeding of farmed with wild salmon can result in reduced lifetime success, and lowered fitness and production over at least two generations.¹⁸⁴
- Farmed salmon are often fed on krill, tiny crustaceans fished in Antarctica. Climate

change has already had a significant detrimental impact on krill, and yet 'suction' harvesting continues to meet an increased demand from fish farms. Whales, penguins, seals, albatrosses and petrels depend on krill for survival.¹⁸⁵

Fish farming pollutes the environment

- Intensive fish farming produces considerable amounts of nutrient waste such as ammonia, nitrates and phosphorus, which damage water quality.¹⁸⁶
- It has been estimated that the amount of pollution in Scotland due to the ammonia input from fish farming is comparable to sewage produced by 9.4 million people.¹⁸⁷
- In 2011, the European Commission wrote that 'New research from the Mediterranean suggests that marine ecosystems are disturbed by the organic food and faeces waste from fish farms, even when the pollutants themselves can no longer be detected.'¹⁸⁸
- Between 2005 and 2010, nearly 13 per cent of sea-bed residue samples from fish farms were in excess of environmental quality standards.¹⁸⁹
- The use of chemicals (therapeutants, vitamins and antifoulants) and the introduction of pathogens and new genetic strains have also raised environmental concerns.¹⁹⁰
- Drainage water from fish farms may contain residues of hormones, pesticides, herbicides and antibiotics, which can cause serious problems to the ecosystem and human health.¹⁹¹
- Fish farms can significantly and irreversibly degrade seagrass meadows (which produce enormous quantities of organic matter and constitute the basis of the food web). The impact can even continue to worsen after closure of a farm.¹⁹² A study of a bay in Spain found the area of meadow destroyed or degraded was seven times larger than the area occupied by the cages.¹⁹³

A typical trout farm





A seal shot to protect fishing profits

Seals killed to 'protect' fish

- The Scottish fish farming industry admits to shooting 500 seals a year to prevent them eating the fish, but campaigners believe the real figure could be as high as 5,000.¹⁹⁴
- In 2011-2012 the Scottish government licensed eight fish-farming firms to shoot more than 300 seals.¹⁹⁵
- Despite fish farms claiming that shooting seals is only carried out as a last resort, information obtained under the Freedom of Information Act in 2012 revealed that only 13 per cent of salmon farms in Scotland use anti-predator nets (to keep seals out) and another 7 per cent had them in storage but didn't use them.¹⁹⁶
- Seals have no serious impact on wild fish populations or on fish farms. In the North Sea, commercial fisheries consume 36 per cent of all wild fish, while all marine mammals together consume only 0.8 per cent of the total.¹⁹⁷
- The whitefish and flatfish eaten by seals in the North and Irish Seas are mostly juveniles, so of a size discarded by fishermen.¹⁹⁸

Your taxes are helping to fund these destructive practices, some of which are taking food from poor nations

- Fishing subsidies are public funds that help make the fishing sector more profitable than it otherwise would be. In Europe, subsidies are used to maintain fish market prices at artificially low levels.¹⁹⁹
- Only a handful of EU fleets are profitable without public support. Most are either running losses or returning low profits. According to the European Commission, despite subsidies, 30-40 per cent of the fishing sector suffered losses each year from 2002 to 2008.²⁰⁰
- Globally, the fishing industry is being subsidised each year by billions of euros to continue fishing: governments are therefore effectively funding over-exploitation of marine resources.²⁰¹ EU taxpayers have been paying around 1.9 billion euros in EU and national subsidies each year.²⁰²
- In several EU member states, it has been estimated that the cost of fishing to the public budgets exceeds the total value of the catches.²⁰³
- Historically, subsidies have boosted the EU's fleet capacity, by massively funding the construction of new vessels. As a consequence, the EU's fishing fleet is estimated to be two to three times larger than sustainable fisheries would allow, while 47 per cent of the assessed fish 'stocks' in the North East Atlantic and 80 per cent in the Mediterranean remain overfished.²⁰⁴

- The EU also spends £127 million a year buying access for EU fishermen to distant waters, including those of many poor countries, denying them access to fish in their own locales.²⁰⁵ According to the *New York Times*, 'Some 50 per cent of the fish sold in the European Union originates in developing nations, and much of it is laundered like contraband, caught and shipped illegally beyond the limits of government quotas or treaties.'²⁰⁶

People suffer too

- An undercover investigation onboard Indonesian boats supplying 'trash fish' for use in feed for farmed prawns discovered that trafficked labourers from Burma and Cambodia are forced to work 20 hours a day, seven days a week, on boats where they are often beaten, abused, even killed by unscrupulous skippers.²⁰⁷
- Ecologically important mangrove forests are chopped down to make way for prawn farms, leaving coastal communities increasingly vulnerable to rising sea levels and tsunamis.²⁰⁸
- Shrimp cultivation ponds are also blamed for poisoning the water supplies of local people with harmful pesticides and antibiotics, and polluting agricultural land with salt water and waste.²⁰⁹

Conclusion

The world's seas are being decimated by our appetite for fish. Species that were once plentiful are on the verge of collapse, whole ecosystems are being destroyed and the scale of suffering is both huge and beyond regulatory control. There is no doubt that fish feel pain, as do the millions of dolphins, whales, sharks, porpoises, seabirds, turtles and other animals caught 'accidentally'.

Fish farming methods – including genetic modification and eye stalk ablation in shrimps – also cause suffering, and aquatic animals have very little protection in law at the time of their slaughter. Killing methods are vicious – some fish are boiled alive, while others suffer asphyxiation or are bled to death without stunning. This would be completely unacceptable in any other kind of animal. Fish farming does not protect wild species.

Diseases and infestations escape from farms and affect wild populations, and huge quantities of wild fish must be caught in order to feed those who are farmed.

Animal Aid can provide advice and information for those wishing to eliminate fish from their diets.

Fish is often promoted as a healthy food, but fish flesh can contain significant quantities of pollutants and toxins, such as PCBs, dioxins and mercury, all of which can seriously damage human health.

The only sane response to the extensive suffering and devastation caused by the fishing industry is to stop eating fish. Essential omega-3 fats – long used as an argument for promoting fish consumption – can also be found in plant foods, which are much less likely to be contaminated with pollutants, and which contribute to a healthier diet overall. For those who miss the taste of fish, there are many faux products now on the market that can satisfy.

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