

# Executive Summary

## 1 Introduction

There is increasing scientific acceptance that fish are able to feel fear, pain and distress. There is correspondingly a growing concern for the welfare of these animals, largely focused on the rapidly developing area of fish farming. This report looks at the welfare of fish in commercial fishing.

Considerable suffering is caused to wild-caught fish during capture, landing and subsequent processing. Fish are likely to experience fear, pain and distress as they are, for example:

- pursued to exhaustion by nets
- crushed under the weight of other fish in trawl nets
- raised from deep water and suffer decompression effects e.g. burst swim bladders
- snared in gill nets
- confined in constricted seine nets
- spiked with hooks (gaffed) to bring them aboard
- caught on hooks, often for hours or days
- thrown live to tuna as bait
- impaled live on hooks as bait

In many types of fishing the duration of capture can be very long, lasting hours or even days. Fish often die, or are fatally injured, during this process.

Once landed, most fish are either left to asphyxiate, or die during further processing which may include gutting, filleting and/or freezing while alive and conscious. Some fish may be slaughtered by “spiking” the brain or by a blow to the head, potentially humane methods of killing fish, but these are the exception rather than the rule.

Perhaps the most inhumane practice of all is the use of small bait fish that are impaled alive on hooks, as bait for fish such as tuna.

The number of animals affected is very high. It is estimated that in the order of 1 trillion fish are caught each year.

The combination of the severity of suffering, its duration and the huge numbers of animals involved, make commercial fishing a major animal welfare issue that needs to be addressed urgently. This report proposes measures and strategies for reducing the suffering in fisheries.

### Key welfare issues in commercial fishing

Suffering is caused to wild-caught fish throughout the process of capture until death, which may be considered as three parts: capture, landing and the treatment they receive between landing and death. The welfare impact of some major fishing methods is briefly discussed below. What happens to fish once they have been landed is discussed subsequently.

## 2 Major fish capture methods and their impact on animal welfare

### Trawling

Fish caught by trawling are chased to exhaustion by a bag-shaped net towed through the water. Once exhausted, the fish become overrun and swallowed by the net. Then they will start to panic and thrash their tails in attempts to escape. Collisions with the sides of the net and with other fish may cause scale damage. As the fish collect in the narrow end of the net (cod end), they may be suffocated in the crush of other fish, or die from circulatory failure. Fish may experience decompression injuries, such as a burst swim bladder, when raised from deep water. The trawl tow may last for many hours.

Trawling, especially shrimp trawling, results in high levels of bycatch. Trawls towed along the sea bottom can be highly damaging to the seabed, destroying fish habitat.

### Purse seining

In purse seining a school of fish is gradually surrounded by a long wall of netting, hanging in the water and towed into a circle. Once the loop is complete, the net is drawn together like a draw-string bag, constraining the fish. Fish are likely to experience fear during this encirclement. The eventual crowding and confinement has been shown to be very stressful. Panicking fish are liable to incur injury and scale loss from collisions with other fish and with the net walls. Fish released at this stage (sometimes deliberately to avoid excess catch) often die, probably as a result of these injuries. Fish can also receive further injury as they are transferred to the fishing vessel. The duration of the whole fishing operation is probably generally shorter than in trawling.

Setting nets around dolphin pods can harm these cetaceans. The dolphin-friendly method of setting nets on fish aggregating devices (FADs) results in high numbers of bycatch animals such as sea turtles, sharks and juvenile fish.

### Gill nets, tangle nets and trammel nets

A gill net is a wall of netting, hanging in the sea, which is invisible to fish. Fish of a certain size, swimming into a gill net, will pass through it only as far as their head and become snared by the gills as they try to reverse. As the fish struggles to free itself, it may become yet more entangled, and is likely to experience fear and panic. Constriction of the gills by the netting can stop the fish being able to breathe properly. Struggling results in cuts to the skin and scales. Sometimes snared fish are attacked by predators, such as seals, leaving them wounded. Fish sometimes remain like this for many hours or even days, and some die before they are landed. Further injury can be caused during landing e.g. when fish are gaffed (i.e. their bodies spiked with a hand held hook) to bring them on board.

Sometimes marine turtles, birds, and mammals are tangled in gill nets and drown. Lost gill nets may continue to catch fish (“ghost fishing”) for several months or even years.

### Rod & line fishing and trolling

In hand line and “rod and line” fishing, the fish is caught individually with a hook and line. In trolling, lines bearing baited hooks or lures are towed through the water by a slow moving vessel. Hooking is stressful to fish and causes an alarm response in which they will struggle to become free. This can lead to severe exhaustion. Hooking fish causes injury which is sometimes severe, especially when fish become hooked through the gills. Live fish are sometimes impaled on hooks as bait in all forms of hook and line fishing. Sometimes fish are gaffed to bring them aboard.

### Pole & line fishing

In “pole and line” fishing, the fishers create a feeding frenzy in a school of fish by scattering bait fish such as anchovies and sardine, usually alive, over the side of the vessel (a practice called “chumming”). In this feeding frenzy, the fish snap at barbless hooks attached to the fishers’ rod and lines. When a fish becomes hooked the fisher swings the rod, bringing the fish flying onto the deck behind and disengaging it from the lure. Sometimes live fish are impaled on hooks as bait. From the point of view of the target fish (as opposed to the bait fish) this may be one of the most humane methods of catching fish on account of the short duration of capture. The use of live bait fish greatly adds to the welfare cost of this fishing method.

### Long line fishing

Long line fishing, or long lining, is a commercial fishing method that uses hundreds or even thousands of baited hooks hanging from a single line which may be 50-100km long. Unlike the other hook and line fishing methods discussed, which catch fish quickly, fish caught on long lines are landed hours or days later when the gear is hauled up. In this method of fishing, it is common

for live fish to be impaled on hooks as bait. The target fish, once hooked, may themselves be subsequently attacked by predators. Many sharks that are caught on long lines are “finned”. Their fins are cut off and they are thrown back into the sea, often still alive.

Long lines kill sea birds, sea turtles, sharks and other non-target fish, which are attracted by the bait.

### **Use of live bait fish in fish capture**

The use of live fish as bait is likely to cause considerable suffering over and above that caused to the fish caught for food. These bait fish will have suffered fear and distress caused by capture and confinement, possibly for days or weeks, before they are impaled on hooks or scattered live amongst shoals of tuna. The suffering caused during fish capture could be greatly reduced by avoiding the use of live bait fish, preferably using artificial baits or fish off-cuts instead.

### **Summary of measures to reduce suffering during capture**

The following measures, combined with humane slaughter as soon as the fish is landed, would improve the welfare of fish in commercial fishing.

#### **I. Avoid the use of live fish as bait, especially when impaled on hooks**

The use of live fish as bait should be seen as contrary to any norms of civilised animal treatment and avoided, preferably using artificial baits or off-cuts instead.

#### **II. Reduce the duration of capture**

This could be achieved by, for example, reducing the time period between setting and retrieving nets and lines.

#### **III. Reduce injury and stress during capture**

Very little research has directly addressed the welfare of wild-caught fish. However, there have been some studies into how stress and injury could be reduced during capture. This research has been carried out for reasons of improving the

survival of fish released as bycatch (for conservation of fish stocks) and improving eating quality, but is also relevant to welfare.

The stress and injury caused to fish during capture, and the potential for these to be minimised, will greatly depend on the fishing method. For example, fast hook and line methods have more potential in this respect than trawling. In rod and line fishing, it is possible to catch and land fish quickly, handle carefully, and despatch humanely with a percussive stun or by spiking (see “3 Processing of wild-caught fish alive on landing”). In trawling, the capture duration is inevitably much greater, as are stress and injury from collisions with the net and crushing in the cod end.

Within a given fishing method, the type of gear used can also make a difference. One study compared the death rates in chinook salmon that were caught in gill nets and subsequently released as bycatch. Tangle nets (which entangle rather than snare the fish) killed proportionately fewer of these fish than conventional gill nets. In another study of gill net fishing, multifilament nets killed fewer fish than monofilament ones. In hook and line fishing, circle hooks can cause less injury than j-shaped hooks.

Modifying fishing practice, including careful handling of the fish, can help reduce the harm caused. For fish caught by hook and line, the means by which the hook is removed is important. Injury and death rates are lower if the hook is carefully removed by hand, rather than by machines that tear it out. The conditions in which fishing is carried out can have an impact. Fishing at greater depths can result in decompression injuries, and fishing at higher temperatures can be more stressful for fish.

#### **IV. Develop methods of landing fish that reduce stress and injury**

This would include careful handling and avoiding gaffing. Pumping systems which minimise stress and damage have been devised for farmed fish.

These systems could potentially be adapted for use on fishing boats. Wild Salmon Direct, which claims to be the only wild salmon producer using humane slaughter technology, uses a pump specifically designed to pump live fish.

#### V. Reduce bycatch

Bycatch is the unintended capture of fish (and other animals) of the wrong species or size. Fishing should be avoided in conditions where bycatch levels are particularly high, by fishery closures. Some fishing practices result in high levels of bycatch and should also be avoided, such as fishing on FADs. Unintended capture of fish also happens when lost gears continue to fish (“ghost” fishing). Changes to fishing practice that reduce the incidence of lost or discarded gill nets are required. Initiatives that can help prevent gear loss include zoning fishing activities to prevent loss of nets caused by trawlers towing through gill nets.

Bycatch can also be reduced by modifying the fishing gear to make it more “selective”. In trawling, increasing the mesh size can allow smaller fish to escape but the main drawback is that the conventional diamond mesh of nets may close under tension. Trawl nets can be fitted with bycatch reduction devices (BRDs) that enable non-target species to escape through a hole in the net. These devices exploit the differences in size or swimming behaviour between the target and non-target species. For example, BRDs can enable fish to escape from shrimp trawl nets. Gear is only truly “selective” when these escapees can escape sufficiently unharmed to survive. Fish escaping from fishing gears may die immediately, or sometime later, from physical injury, exhaustion or increased vulnerability to disease or predation. For example, a study of survival rates for herring escaping trawl nets observed death rates ranging from 77-100% for escapee fish.

BRDs of a different kind can be used in gill netting. Acoustic BRDs called “pingers” reduce mammal and bird bycatch by alerting them to the presence of the gill net. Constructing gill nets from biodegradable materials that deteriorate

more quickly can help reduce “ghost” fishing. In hook and line fishing, bycatch can be affected by the size of hook and type of bait.

### 3 Processing of wild-caught fish alive on landing

Most commercially-caught wild fish that are alive when landed are not slaughtered but die either from being left to suffocate in air or by a combination of suffocation and live gutting. Sometimes fish are put onto ice as they suffocate, or into iced water, which may both increase and prolong their suffering.

According to a Dutch study, during observation of fisheries at sea, the majority of most fish species caught were still alive and conscious when landed. The time taken to lose consciousness was measured for several species of fish (herring, cod, whiting, sole, dab and plaice). Those left to asphyxiate took 55-250 minutes to become insensible. Those which were gutted first remained sensible for 25-65 minutes.

#### Introducing humane slaughter

To obtain any clear welfare benefit from reducing the injury and stress caused during capture, fish must be swiftly and humanely slaughtered on landing. Humane methods of killing animals are ones that cause immediate loss of consciousness which lasts until death (or if not immediate, where the method of inducing unconsciousness does not cause suffering). There are two traditional methods for killing fish that have the potential to be humane, namely percussive stunning and spiking. These methods kill fish individually, and so may not be practical for larger fishing operations with large numbers of smaller fish. For these cases, humane slaughter technology used on fish farms needs to be adapted for use on fishing vessels. More humane capture and killing are likely to result in improved eating quality.

Percussive stunning involves a blow to the head with a club or “priest”. This must be performed accurately and with sufficient force to be humane. Automatic percussive stunning devices

have been developed for some species in fish farming. They are used by Wild Salmon Direct on wild-caught salmon. To ensure that percussive stunning does kill humanely, it should be followed immediately by bleeding. In spiking (also called “ike jime”) a fish is killed by inserting a spike into the brain. If this is performed accurately, the fish can become unconscious immediately. Spiking has not yet been automated for fish farming.

Electrical stunning systems have been developed for en mass humane slaughter in fish farming. As with some automated percussive stunning, the fish are killed without taking them out of water. A current is passed though the water containing the fish. The fish are stunned immediately, and die without regaining consciousness, if the voltage and duration of the current are sufficient. It is believed by some animal welfare professionals that electrical stunning technology in fish farming has the potential to be adapted for use on wild-caught fish at sea. An important step for this will be the development of electrical stunning systems for salt water farmed species. Electrical stunning of salt water species is technically more challenging than for fresh water species, owing to the greater conductivity of salt water.

Other methods for the humane slaughter of farmed fish may also present the possibility of being adapted for use in some commercial fishing. One other method is the use of food grade anaesthetics added to the water. AQUI-S is the brand name of one such fish anaesthetic licensed for use on fish farms in New Zealand, though not in Europe or the USA. AQUI-S is used for “rested harvest” in which anaesthetised fish are then slaughtered by percussive stunning or spiking. Quality benefits are also obtained from this low-stress slaughter method.

#### **4 Reducing suffering by reducing numbers of fish caught**

Even the most humane method of catching fish is likely to be stressful. Another approach for reducing suffering in commercial fishing would

be to reduce the numbers of fish caught each year. This could be achieved by some or all of the measures summarized below.

#### **Reducing numbers of fish caught wastefully or illegally**

Many fish are caught wastefully. Wasteful deaths include the fish caught unintentionally as bycatch (wrong species or size) and then thrown back into the sea, dead or dying. In addition, an uncalculated number of fish die following escape from trawl nets and when caught by lost or discarded fishing gear (“ghost fishing”).

Modifications to fishing practice and to fishing gears can help reduce the numbers of fish killed wastefully (see “2 Major fish capture methods and their impact on animal welfare” above). Better enforcement of fishing regulations is required to address the global problem of illegal and unregulated fishing.

#### **Catching fewer fish and letting fish grow larger**

If fish are allowed to grow larger before they are caught, then fewer fish are caught for the same amount of food. There are other good reasons for pursuing such a strategy besides those of animal welfare.

Overfishing is a serious problem in world fisheries. Overfishing reduces abundance of individuals in a fish stock, by removing fish faster than they can be replaced by breeding. If continued, it can lead to a collapse of the fishery, as happened with Newfoundland cod. Too many fish are being caught and they are being caught too young.

The means by which fishing can be made more “selective” in terms of reducing the numbers of undersized fish, and non-target species, caught as bycatch are discussed above in “2 Major fish capture methods and their impact on animal welfare”. The numbers of these bycatch fish that survive following release can also be improved by measures that reduce stress and injury during capture. Selective fishing gear is a means of

catching only those fish within the optimum size range in order to reduce overfishing. For a sustainable management of fisheries, reductions in fishing effort (e.g. by limits on catch and the number of days at sea fishing) and “no take” marine protected areas (MPAs) are also needed.

People in developed countries have been encouraged in recent years to increase their consumption of fish, despite the fact that current levels of fish consumption are unsustainable. According to a paper published in the Canadian Medical Association Journal, levels of fish consumption in developed countries are having a harmful effect on people in developing ones. Rather than advising people to eat more fish, alternative non-fish sources of omega-3 should be developed and evaluated.

### Reducing numbers of fish not directly caught for food

A large reduction in the suffering of wild-caught fish would be achieved by reducing the levels of fishing for feed. It is estimated that in the order of 1 trillion fish are caught each year. A substantial proportion of these are caught for feed and other non-food uses, either whole or (mostly) as fishmeal and fish oil.

Increasingly this fishmeal and fish oil is being used to feed farmed fish such as salmon. It takes 3-4kg of wild fish to produce 1kg of salmon. This means that each of these feed fish, which are usually small fish such as anchovy, suffers a stressful death to produce a miniscule amount of food. For example, a Peruvian anchovy, weighing 20g, is killed inhumanely to produce approximately 6g of salmon flesh. This amount of animal suffering for so little human gain seems totally disproportionate.

An uncalculated number of fish are also caught for use as bait, either dead or alive. Great suffering could be reduced by avoiding the use of live fish as bait. Instead, fish off-cuts could be used in chumming for tuna and artificial baits, or off-cuts, used in hook and line fishing.

## 5 Towards more humane commercial fishing

Various stakeholders (animal welfare scientists, animal protection NGOs, environmental NGOs, government and intergovernmental bodies, supermarkets and retailers, animal welfare certification schemes) have worked to address the welfare of farmed fish. A similar approach is needed to address the welfare of wild-caught fish.

Action to address this problem is now required in the EU since the EU Treaty recognises animals as sentient beings and states that full regard should be given to their welfare needs in fisheries.

Animal welfare groups can achieve much by persuading the public that this issue matters and by lobbying governments and intergovernmental agencies to develop and require levels and methods of fishing which minimise animal suffering.

Environmental groups could widen their support base by acknowledging that fish are sentient beings and that fish welfare matters. Many of the steps required to promote welfare would also help conservation.

Retailers need to incorporate wild fish welfare into their Corporate Social Responsibility policies and support more ethical fishing practices which aim to be humane as well as sustainable.

Animal welfare scientists will play a key role in establishing fish welfare science, developing humane practices and educating the next generation.

Better things could be happening at sea.