

Dear Members of the Rural Affairs and Islands Committee,

I am writing to you to highlight the serious dangers of open pen salmon farming in advance of your deliberations on the topic.

Tony Chattaway, a fish farmer himself, was totally opposed to open sea cages when they began to appear in the 1980s as he foresaw the harm that they would do and he argued unequivocally against them at the time. In Norway, after salmon farms were constructed in their estuaries, 120 rivers, at least one in five, had lost all or most of their original salmon stocks by 2010. On the west coast of Scotland where most UK fish farms are located, the sea trout is now almost extinct, and salmon are not far behind. The impact of these farms is devastating in so many ways. Where do we start?

Over-crowding leads to vast quantities of excrement and excess feed polluting the sea floor and creating toxic algae blooms which kill off more or less anything in their path. The phosphorus from Scottish fish farms in 2000 equated to the amount discharged by nine million humans and the equivalent nitrogen sewage load of three million people. A 1989 Norwegian study equated the organic waste generated by the production of 150,000 tons of fish to 60% of Norway's human population. The toxic sludge of rotting feed, faeces and dead salmon beneath cages has been measured three feet deep. The biologist Allan Sefton has described Scotland's beautiful and remote west coast 'the most polluted aquatic environment in the UK'.

But the biggest threat to the wild salmon and sea trout from farming is the concentrated proliferation of parasites in cages; sea lice, which drop from the cages and latch on to migrating smolts and smother and kill them.

To counter sea lice and prevent the equally enormous mortality rate from diseases such as Infectious Salmon Anaemia (ISA) and Furunculosis amongst farmed fish, the farmers pour in huge quantities of chemicals and antibiotics, more in fact than the combined total being used by humans and in agriculture. They use 'baths' of antibiotics, pyrethroids, organophosphates and disinfectants including chlorine, hypochlorite, hydrogen peroxide, trichlorfon (Neguvon), deltamethrin, teflubenzuron, diflubenzuron, azamethipos, dichlorvos (Nuvan), emamectin benzoate, lufenuron, formalin, and, the most toxic insecticide on the planet, cypermethrin. Many of these have strict guidelines surrounding their use, so are often both procured and used illegally. The quantities used (140m litres of hydrogen peroxide alone in Norwegian and Scottish fjords and sea lochs every year) have led to deaths of vast numbers of crustaceans, including in Canada a single instance in which 60,000 lobsters were killed. Lobsters die when exposed to as little as ten parts per million of Neguvon or 0.1 parts per million of Nuvan, and farms use these chemicals in their tons. And of course they are impacting all other marine species too, from shrimp to cod, as well as everything they feed upon.

The US Environmental Protection Agency lists cypermethrin as a possible human carcinogen. Cadmium, a toxic chemical element – another carcinogen, with a thirty-year half-life in the human body which can lead to kidney, liver and heart problems – was even used in salmon feed in Norway. In 2005 Norway actually persuaded the EU to raise the limit of allowable cadmium in salmon to the point where Russia, in

2006, banned all imports of farmed salmon from Norway, having detected that Norwegian fish had been given feed containing up to 76 times the legal limit. Ethoxyquin is another dangerous carcinogenic and mutagenic chemical used in salmon feed.

The companies' PR people will tell you that they are reducing the use of antibiotics in farming, but they are only doing so where regulations have forced them to do so and this is not happening in Scotland, nor are the minimal regulations being adequately monitored.

The salmon produced is consequently unhealthy, nay dangerous, to eat. The presence of the above chemicals as well as high concentrations of dioxin, toxaphene, dieldrin and cancer-causing polychlorinated biphenyls (PCBs) absorbed via feed is so concerning that the WHO issued precautionary guidelines which advise limiting recommended portions to no more than two a week, and less for pregnant women, as research has shown that contaminants in farmed salmon could be contributing to autism and other health problems in children. Professors at Cornell University recommended limiting farmed salmon intake to as little as three portions a year! What other farmed produce other than tobacco comes with a health warning? Sadly, the warning is not printed on the salmon packaging as it is on cigarettes.

Each cage can hold up to 200,000 fish, meaning that a typical farm has a stock of around 800,000 to a million fish. On the west coast of Scotland, where many open pen farms are sited, the wild population is now estimated at just 20,000 fish, in comparison with 50,000 to 200,000 farm fish in each pen, and there are at least eight pens in each farm, and over 200 farms. In the whole of Norway there are about 400 million farmed fish and just 500,000 wild ones. The global farmed salmon count could be as high as 1.5 billion. When you consider that the total current wild Atlantic salmon population of the world is estimated to be as low as 1.5m, the ratio is terrifying – a thousand farmed salmon for every wild one.

Imagine the impact that escapes can have, if a single damaged cage can release 200,000 farmed fish to run the rivers, compete for habitat, spread new diseases, viruses and parasites and interbreed with the wild fish.

There are constant escapes. Sætre and Østli estimate that just in Norway there are between 1.2 and 3.6 million escapees a year. In 2005, a storm caused the escape of half a million farmed salmon from a single farm. That is equal to the entire population of wild salmon in Norway. In 2022 over 50,000 salmon escaped from Scottish farms. In 2020, almost 50,000 farm fish escaped into the Clyde system alone.

Scientists use the term 'extinction vortex' to describe the genetic risk from these escapees and have demonstrated that farmed fish contain far less data in their genetic 'fingerprints'. A NASCO report as long ago as April 1990 found that more than half the salmon spawning in Norwegian rivers even in 1990 were of farm origin. By 2019 30% of Norwegian rivers were deemed to have a salmon population which was 'beyond genetic repair' due to interbreeding with escapees. Some fish, unbelievably, have been released deliberately by Norwegian farm owners in protest at their government's decision to drop subsidies to fish farmers under pressure from the EU.

In Washington State USA on the Pacific coast, a 2017 escape of around 250,000 farmed Atlantic salmon into Puget Sound caused the state to ban all non-native net pen salmon farming by 2025. Despite incontrovertible evidence, the farmer, Cooke Aquaculture, claimed that only 4,000 had escaped. Cooke was fined just \$332,000 and is still fighting even that. Argentina and California have also now banned open net salmon farms, and British Columbia is joining them. Denmark has put a halt on any future open-pen farms.

Some argue that the risk is the same with hatchery-reared fish, but it isn't. Farmed fish just don't look the same; they are weak, soft fleshed and often diseased or malformed. Hatchery-reared fish, in well-run river hatcheries, are first generation bred from wild fish taken from that same river and thus are naturally adapted for that environment. They are brought up in the water of that river, so imprinting the chemical make-up of that river in their DNA. Farmed fish, on the other hand, are often five or six generations away from wild parents, from a stock which could have originally come from a different country, and with each generation they become both physically and physiologically weaker. Sætre and Østli compare the farmed fish to 'overweight, stressed men' – couch potatoes, where their wild counterparts are fit and muscular athletes. Thus when a major escape takes place the fish which then run the river and interbreed with native stock are introducing severely weakened reproductive genes.

These escapes also encourage ever greater numbers of seals and porpoises to follow them into estuaries.

Mortality rates from diseases such as ISA, with so many fish packed so tightly together, are appalling. In Scotland in 2023 the reported number of caged salmon deaths was 17½ million. Every year, around 100 million salmon die in salmon farms around the world before harvest. 100 million! That is 270,000 every day. Most farms actually expect a 15-25% mortality rate, but in some it is much higher; one farm in the Hebrides recorded a mortality rate of 82.3% in 2023. It's not just the salmon that die. Wrasse, bred in huge quantities as 'cleaner fish' just to eat the lice off the salmon are also dying in their millions – in Norway alone at the rate of 50 million a year.

Divers paid to remove the casualties have reported finding up to 5,000 dead salmon in a single cage, in close proximity to those still alive. Sometimes whole pens sink due to the sheer weight of dead fish. The means of disposal for these 'morts' and the associated risks are stomach-churning. In some areas the carcasses are just bulldozed into the sand in adjacent beaches. A single 2019 die-off in Canada killed almost three million salmon and miles of beaches were covered with decomposing salmon carcasses. In other areas, certainly in the early days, they would be illegally dumped on tips, sometimes with severe risk to both human and fish life – one instance in Norway led to epidemics which wiped out huge numbers of wild fish. Such criminal activity demonstrates the disdain these commercial farmers have towards both authority and the environment in their pursuit of profit.

In Scotland there is a startling lack of regulations in comparison with any other form of farming, and the regulations that exist are regularly ignored with impunity. Imagine

a farmer with 70,000 cows who puts them in a field with no grass, 70 to 80% of them with fungal infections and open wounds, dead ones lying around everywhere, and others that are blind and malformed. This wouldn't be acceptable, would it? A farmer would be put in jail fast if he did this, but the fish farming industry is allowed to do this underwater.

In 2022 17.7% of farms in Scotland breached the aquaculture Code of Good Practice, and 10% had no recorded data at all. Five farms were in breach of government sea lice limits. Consents are currently granted with minimal guardrails and self-certification, and are never revoked even when discharge or chemical limits are exceeded or massive escapes take place. The farmers can do what they like without fear of penalty.

The politicians will frequently talk about all the jobs created by aquaculture, but according to Scottish Government's own 'Scottish Fish Farm Production Survey' from Marine Science Scotland, the industry only employs 1,900 people, and that number is declining each year due to increased automation. The fly fishing industry on the other hand, if you include tackle manufacture, lodge and hotel staff as well as gillies is estimated to employ as many as ten times more. The Scottish Gamekeepers Association alone represents some 5,000 gillies, gamekeepers, stalkers, wildlife managers and rangers.

99% of Scottish salmon farms are owned by Norwegian, Canadian and Faroese companies and only 5% of the gross value created, some £30m, remains in the communities that generate the income, while the Norwegian company Mowi alone is estimated to make \$225m profit in Oslo from its Scottish operations. The cost of clean-up operations when they are required far exceeds the revenue made from the farms. On the other hand, estimates of the value of angling to the Scottish economy vary from £300m to £500m. Is Scotland truly benefitting? And at what cost? When Marine Harvest, the world's largest salmon farming conglomerate, chose to change its name to Mowi, honouring their retired founder, Theodore Mowinckel, Mowinckel himself objected such was his disapproval for what the business had become and its disregard for the environment. Not in his name!

Where scientists and health organisations have recommended reducing the amount of salmon in diets, governments have actively supported the farmers with advice to increase it. Wild Fish magazine quoted one Norwegian politician as having said: "even if we lose all wild salmon, it will be worth it". In Norway politicians are boasting of a fivefold increase in salmon farming over the next few years, yet there is barely an estuary along the entire coast of Norway or the west coast of Scotland that isn't already clogged by salmon farms just as cholesterol clogs arteries.

These pens need to be moved either in-land, or much further off-shore, or else have closed cages. Scotland is the only country with a population of wild Atlantic salmon that is still welcoming more open sea pens. It has to stop!

Please do not allow any more of these farms to start in UK waters, and please start doing something meaningful to get the farms that are already here to clean up their act and stop polluting our waters and killing our marine environment.

Thank you

Julian Pullan