

Aquaculture – necessary priorities for the animals

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1. Summary

There is significant political interest in promoting aquaculture, including fish farming. Efforts are being made to reduce the regulatory burden and increase production, but animal welfare legislation and improved animal welfare are not given the same priority. There is a lack of discussion and guidelines regarding what kind of aquaculture can truly be considered sustainable, and what sustainability actually entails.

Fish and other aquatic animals consumed by humans come partly from fish farms and partly from fishing. This report focuses on fish from fish farms, that is, fish factories.

The salmonid family includes several different species, such as Atlantic salmon, rainbow trout, and char. Atlantic salmon (*Salmo salar*) is the species commonly referred to as salmon, including in this report. Despite Salmon being the farmed fish species that Swedes consume the most, there is a serious animal welfare insufficiency in salmon farming. Moreover, there is an alarming trend toward investments in new, large-scale, land-based salmon farms. Salmon is the species that this report focuses on most.

Project 1882 believes that the following measures are necessary to strengthen fish and other aquatic animal welfare:

- Species-specific animal welfare legislation for fish and other aquatic animals, in Sweden and at EU level:
 - Legislation on animal welfare at slaughter, including a ban on carbon dioxide stunning
 - Legislation on animal welfare at transport
 - Legislation on the farming of aquatic animals, covering the entire life of the animals
 - A ban on the rearing of predatory fish such as salmon
 - A ban on the rearing of cephalopods
- An end to financial support for and the establishment of RAS factories
- Consideration of animal welfare in all visions, strategies and action plans relating to aquaculture and fisheries
- A strategy for transitioning to a sustainable food system with a focus on plant-based options

2. Fish are sentient Individuals

It is now well established that fish can feel pain and suffer.¹⁻⁵ Yet they are often treated as if they were emotionless objects. Perhaps it is because they lack soft fur and the facial expressions we are accustomed to. It could be that we find it harder to understand and empathise with fish because we rarely see or hear them, as they live beneath the water's surface. There is also a misconception that fish are 'lower' animals, which is incorrect. Evolution is not a ladder. No species or group of animals is superior or inferior to another. There are more known species of fish – over 30,000 – than of all other vertebrates combined. The various fish species share both common and species-specific behaviours and needs, as well as amazing abilities. One of the fish's most important senses is the *lateral line*, which detects currents in the water. The lateral line is perhaps to fish what the eyes are to us humans. A 2019 study showed that blue tangs pass the so-called mirror test.⁶ The mirror test is used to assess whether an animal is self-aware. A coloured dot was placed on the tang, which was then shown its reflection in a mirror. The fish then examined the spot on its own body rather than the one in the mirror, which is seen as a sign that it understood that it was the fish itself that was reflected in the mirror. Examples of other animals that have passed the mirror test include primates, elephants, killer whales, dolphins and magpies.

3. Legislation

Currently, farmed fish are covered by Swedish animal welfare legislation and by general animal welfare legislation at EU level.⁷ However, there is a lack of more detailed, species-specific provisions, which is a major shortcoming. Fish caught in the wild are not covered by any animal welfare legislation, neither in Sweden nor at EU level.

The Animal Welfare Act states that animals must be treated well and protected from unnecessary suffering and disease. Animals must be kept and cared for in a suitable environment and in such a way as to promote their welfare, to enable them to engage in behaviours that they have a strong natural inclination for, and which are important for their wellbeing (natural behaviour), and to prevent behavioural disorders. Those who keep animals or otherwise care for them must have adequate expertise to meet the animals' needs. Breeding that is likely to cause suffering to the animals is prohibited.⁷

The Swedish Board of Agriculture has established regulations governing the farming of fish in aquaculture.⁸ These regulations are important but need to be updated to make sure they are species-specific and stricter from an animal welfare perspective. Some examples of provisions are:

- A fish farm must be situated and designed so that the farming conditions throughout the year meet the species-specific and age-related requirements of the fish in terms of water temperature, water flow, water quality and space.
- Injury to the fish and unnecessary stress must be prevented.
- The fish must be managed in a way that prevents disease outbreaks, mortality, stress, aggression and behavioural disorders.
- Stocking density, i.e. how crowded the fish are kept, must be adapted to the species, farming conditions, feeding techniques, the ability to maintain good water quality, and must not cause health or behavioural disorders in the fish.
- All handling and transfer of fish shall be limited and carried out as gently as possible; if possible, this should take place in water and at a water temperature suitable for the species.
- All handling and transfer of fish shall be limited as much as possible and carried out as gently as possible; if possible, this should take place in water and at a water temperature suitable for the species.
- Before transportation, the health of the fish must be checked. Sick fish and other fish that are unfit for transport may only be moved for the purpose of medical treatment.
- If a breeding selection is made to improve production, at least equal consideration must be given to improving the health of the offspring and maintaining disease resistance.
- If the fish show signs of stress, abnormally high levels of aggression or other behavioural disorders, measures must be taken to improve the situation.
- Water quality must be monitored as often as necessary to safeguard the health of the fish, and to gain an understanding of how water quality varies throughout the year.

There are currently no detailed animal welfare rules governing the slaughter of fish. However, fish are covered by the general provisions of the Animal Welfare Act and the Animal Welfare Ordinance. Under the Animal Welfare Act, animals must be spared unnecessary suffering and distress when being transported for slaughter or when being slaughtered, and animals that are slaughtered or otherwise killed by bleeding must be stunned, i.e. rendered unconscious.⁷ Under the Animal Welfare Ordinance, stunning prior to slaughter must be administered in such a way that the animal quickly becomes unconscious and does not regain consciousness.⁹

Fish in aquaculture are covered by animal welfare legislation at the EU level, but there are no

detailed rules, only general statements. In 2023, the European Commission put forward proposals to include species-specific provisions for the slaughter of fish. Despite this, fish are not covered by the scope of the European Commission's proposal for updated animal welfare legislation on animal farming, for which a public consultation was launched in 2025. To date, the European Commission has not announced any plans to update EU legislation on the welfare of animals at the time of slaughter. Although there are no species-specific provisions at EU level, fish are covered by the more general provisions. Fish are covered by Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing, but only by the more general provision stating that animals shall be spared any avoidable pain, distress or suffering at the time of killing and during related operations.¹⁰ Examples of countries that have introduced detailed legislation on the welfare of fish at the time of slaughter include Austria, Germany, Italy, the Netherlands, New Zealand, Norway and Switzerland.

Legislation on the farming, transport and slaughter of fish needs to be expanded to include detailed provisions and tailored to the specific species and the various life stages of the fish. The Swedish Board of Agriculture has begun updating the regulations on fish farming⁸ and the regulations on slaughter.¹¹ However, it is still unclear when that work will be completed and what it will entail.

A prerequisite for the introduction of new animal species into aquaculture, and for the continued farming of established species, should be that there are sufficient knowledge and conditions for keeping and handling the animals throughout their lives in a manner that meets their needs. It should not be possible to approve farming without such knowledge and without animal welfare legislation being in place.

4. Consumption and production

4.1 Consumption

Fish consumption among Swedes has fallen. The Swedish Food Agency recommends eating 2–3 portions of fish a week. Since 2015, the proportion of Swedes who follow the Swedish Food Agency's recommendation has fallen from 43 per cent to less than 30 per cent.¹² According to the latest available statistics from 2023, consumption of so-called seafood (animals and plants living in water that are edible to humans) stood at 10 kilograms per person per year, or 1.6 portions per person per week. In 2019, the corresponding figures were 12 kilograms per person per year and 1.9 portions per person per week. The majority, 77 percent, of total seafood consumption in 2023 consisted of 10 animal species or species groups. Salmon, herring and prawns (in that order) are the aquatic species that Swedes consume the most.¹²

A survey by the Norwegian Seafood Council, which tracks seafood consumption among Swedish consumers on an annual basis, suggests that the decline in consumption may be due to a decreasing availability of seafood –which has been affected by geopolitical tensions and conflicts– as well as

greater economic uncertainty and rising living costs resulting in higher interest rates, energy and food prices.¹³ In connection with the COVID-19 pandemic, demand for seafood in the hospitality sector fell, but households consumed more seafood during the pandemic due to a general increase in home cooking.¹³ Households with the highest incomes eat more seafood than others.¹³

Salmon (Atlantic salmon, *Salmo salar*) is the most widely consumed species of aquatic animal in Sweden. Swedish consumption of salmon has fallen by 19 percent between 2019 and 2023.¹² Salmon has seen the greatest price change within the seafood category, which may have contributed to the decline in consumption.¹² Despite this decline, Sweden remains one of the countries with the highest salmon consumption per capita.¹² According to the Norwegian Seafood Council, in 2023 Sweden ranked second on a list of countries importing the most frozen salmon from Norway, after the United States.¹⁴

4.2 Production

As fish in the industry and in statistics are counted in tonnes rather than as individual fish, we do not know exactly how many fish are farmed and slaughtered each year. Globally, the figure is estimated at around 124 billion fish per year,¹⁵ which can be compared with the approximately 80 billion chickens, pigs and other land animals slaughtered worldwide each year.¹⁵

In Sweden, an estimated five million fish are farmed and slaughtered each year for human consumption.¹⁶ The most common species farmed in Sweden is rainbow trout. In 2024, about 7,700 tonnes of rainbow trout were farmed and slaughtered¹⁷, corresponding to around 3 million individuals, based on an average slaughter weight of 2.5–3 kg.¹⁸ The second most common species is char. In 2024, 813 tonnes of char were farmed and slaughtered¹⁷, corresponding to around one million fish, based on a slaughter weight of 0.5–1 kg.¹⁸ Other fish species farmed in Sweden for human consumption include tilapia, clarias, sturgeon and eel.

Farming in open net pens is most common, but fish are also farmed in ponds, basins or tanks on land.

Salmon is the farmed fish species most consumed by Swedes. Yet, animal welfare shortcomings in salmon farming are serious, and we are seeing an alarming trend with the establishment of new, large-scale, land-based salmon farms.

5. The behaviour and needs of salmon

From an animal welfare perspective, it is very important to base our approach on an understanding of the animals' natural behaviours and needs. How does the species or animal group live in its natural environments or in environments similar to the natural ones?

Salmon reproduce in freshwater but grow up in the sea. In the wild, the eggs are laid and fertilised in pits on gravel beds in flowing water in the autumn and hatch in the spring. When the fry hatch, they have a yolk sac, which acts as a food supply. They live in the gravel, feeding on the nutrients in the yolk sac, for 1–2 months. The young salmon then begin to eat plankton, insects, molluscs and crustaceans. The young fish live together in family groups within specific territories.

After hatching, a salmon spends 1–1.5 years in freshwater before undergoing a process known as smoltification. During this process, the salmon's physical characteristics and behaviour change so that it can live in saltwater instead. In the wild, the salmon swim in shoals to better protect themselves from being eaten by other fish, travelling up to 30 kilometres a day out to sea where there is a plentiful supply of food, which at that stage consists of fish.

Out in nature, salmon live alone for parts of their life cycle and swim long distances. Salmon are what are known as migratory fish. After 1–4 years at sea, following smoltification, the salmon return to the freshwater where they began their lives, to reproduce. They use their highly developed sense of smell to find their way back to the exact same spot, but also use other senses such as sight, taste, lateral line and skin receptors. The lateral line is what help fish to sense currents and movements in the water.

Some salmon die shortly after spawning. Those that survive swim back out to sea and can spawn up to four times. A salmon in the wild can live for around 15 years.

6. Salmon factories

6.1 Salmon factories in the sea

The most common method of farming salmon is in so-called net pens in the sea, following their early life as eggs and fry in onshore facilities. Norway is the world's leading producer of farmed salmon and, as we have previously noted, it is primarily from there that the salmon consumed in Sweden originates. This section therefore focuses largely on salmon factories in Norway.

In salmon factories, sexually mature breeding salmon are kept in special facilities. The eggs are laid there and then transported to hatcheries, where the fry hatch in indoor freshwater tanks.

After 8–18 months, when the young salmon have completed smoltification and weigh about 80–100 grams¹⁹, they are transferred to fish factories where they are kept in so-called net pens. It is very important that this transfer takes place at the right time. In salmon factories, light and temperature are regulated to speed up smoltification. Mortality rates among salmon in Norway are high, for example immediately after the young salmon have been moved to the net pens.²⁰ This may be partly because the salmon are moved before they are adapted to survive in the sea. A study from 2026 showed, among other things, that high production intensity contributes to high mortality rates.²⁰

The salmon are kept in net pens until they reach slaughter weight. There can be up to 200,000 salmon in each pen.²¹ In Norway, the permitted stocking density is 25 kilograms of salmon per cubic metre. More research is needed on stocking densities in salmon farming, but it is likely that 25 kilograms per cubic metre is too high. In the pens, the fish are also confined to available water; they cannot move to other waters when they wish or need to do so. Nor can they escape from other individuals or swim and live in a manner consistent with their natural behaviour.

When salmon is around 2–3 years old and weighs 3–6 kilograms, they reach what is known as slaughter weight and are ready for slaughter. They are then transported to a slaughter facility. The journey is stressful and many die during transport.²² There are also mobile slaughter facilities, where, instead of being transported, the fish are slaughtered on vessels at the fish farms.

Around one-sixth of the salmon in Norwegian salmon factories die during the rearing phase.²³ High mortality rates in salmon farming are a result of poor animal welfare.²⁴ According to the Norwegian Veterinary Institute, 54.8 million salmon died in net pens in 2025. Additionally, 43.3 million salmon fry (weighing over 3 grams) died earlier in the production phase, in the so-called hatcheries.²³ In addition to the nearly 100 million dead salmon, around ten million salmon were reported in the 'losses due to other causes' category that same year, which also primarily represents mortality. This means that around 110 million salmon died during the rearing period in 2025.²⁵ This does not conclude the high mortality rate among the very smallest and youngest salmon, those weighing less than 3 grams.²⁶

Common causes of high mortality rates among salmon in net pens are the consequences of treatment for sea lice, gill disease and bacterial infections.²³ Gill disease causes breathing difficulties in the fish and may be due to infectious agents or poor water quality.²³

Another significant cause of mortality among adult salmon is infection with and treatment for the salmon louse parasite.²³ The salmon louse has become highly resistant to chemical delousing agents. Consequently, alternative control methods have been developed, such as flushing and treatment in warm water. This process is extremely stressful and strenuous, which results in the death of many salmon.²³ Another common method of trying to combat sea lice is to use so-called cleaner fish, which eat the lice off the salmon. There are a few species of wrasse that are used as cleaner fish. The problem is that the cleaner fish also suffer greatly in the salmon farms, which are not at all suited to their needs. Their welfare is poor, and a large proportion of the cleaner fish, sometimes as many as 100 percent, die.²⁷ Every year, several hundred thousand cleaner fish are caught in the wild in Sweden²⁸ and transported to salmon farms in Norway.

Temperature is a key factor in the development and reproduction of salmon lice. Infestation levels are therefore expected to rise in the future as a result of rising temperatures. Warmer water leads to a shorter generational cycle and faster development of both larvae and lice.²³

As with other animal species, salmon breeding and rearing focus on rapid and high growth.²¹ At the fry stage, the salmon are exposed to high temperatures and continuous light to accelerate their growth. Rapid growth at this stage has been shown to contribute to the salmon developing abnormal heart shapes, which in turn is associated with disease and impaired heart function later in life. Many salmon die from circulatory failure following handling and stressful procedures.²⁹

6.2 Salmon factories in land-based recirculating aquaculture systems (RAS)

In response to the growing criticism of the negative environmental impact of salmon factories, high mortality rates, and the risk of escapes, large land-based salmon factories have been established. They are already found in several countries, such as Denmark and the Netherlands, while others are planned or in the start-up phase in Sweden. When we refer to RAS here, we mean the factories where the fish are kept in RAS facilities for their entire lives, including the final, and usually longest, so-called growth or 'grow-out' period.

In these farming systems, known as RAS, which stands for recirculating aquaculture systems, the fish are kept in tanks on land and the water is reused. It is pumped around the system and passes through mechanical and biological filters where particles and nutrients are trapped. It is also oxygenated and most of it can be reused in the tanks where the fish are kept.

RAS is often marketed as a more environmentally friendly and sustainable system because the land-based farms do not have contact with the surrounding water, unlike farms in pens in lakes and the sea. But how sustainable is it really to farm salmon in land-based recirculating systems? It is nowhere near as sustainable as the companies would have us believe. From an animal welfare perspective, which is an important part of sustainability³⁰, the shortcomings and challenges are serious and significant:

- High stocking density

In RAS farming, stocking density is generally very high. In RAS salmon farming, it is not uncommon to have stocking densities as high as around 75 kilograms of salmon per cubic metre, but densities of up to 100 kilograms per cubic metre also occur, which corresponds to 20–25 fish weighing four kilograms – a typical slaughter weight at 1.5–2 years of age. A tank at the end of the production cycle can hold around 25,000–30,000 fish. It is very expensive to build and set up a large RAS factory. Running it involves high costs linked to high energy consumption. Combined, these factors fuel the drive to rear as many fish as possible in the shortest possible time.³¹ It is incorrectly claimed that, in RAS factories, keeping fish at high stocking densities poses no problems because water quality is so strictly controlled. This overlooks the fact that stocking density affects fish welfare in ways other than by influencing water quality.³² Ensuring that animals have sufficient space, both in total and per

individual, is a fundamental factor for good animal welfare. The animals need to be able to choose to move away, which they cannot do when confined to a limited space. Currently, there is a lack of precise, science-based recommendations that take animal welfare into account regarding stocking densities for salmon at different stages of life. A study has shown that negative effects on salmon welfare occurred when stocking density exceeded 22 kilograms per cubic metre.³³ High stocking densities in fish farming are associated with risks such as stress, fin damage, aggression, and reduced opportunities for movement and other behaviours in line with the species' needs.^{32, 34} However, there can also be risks associated with excessively low stocking densities.³⁵

- Lack of environmental enrichment and opportunities for natural behaviour

Fish in RAS systems are usually kept under highly standardised, artificial conditions without natural stimuli such as varying light, weather or water currents. This, combined with the lack of environmental enrichment, limits the fish's ability to behave naturally and to experience and respond to a dynamic environment. The circular tanks typically used in RAS farming provide a very barren environment lacking in complexity,³² even though environmental enrichment is crucial for meeting the behavioural, cognitive and physiological needs of the fish.³⁶ In general, enriched environments significantly improve fish welfare compared with farming in barren tanks.³⁷ One example is that access to structural complexity and hiding places influences stress and behaviour in young salmon at hatcheries, including through reduced cortisol levels and increased use of cover.³⁸

- Long periods of starvation

Fish in RAS facilities are often subject to prolonged periods of starvation lasting one to two weeks, compared to the standard 24–72 hours prior to slaughter³⁹, in order to eliminate undesirable flavours. It is a problem in RAS farming that substances such as geosmin and 2-methylisoborneol cause a kind of 'off-flavour' in the fish meat, and to reduce this risk, the fish are moved to tanks where they are not fed for one to two weeks prior to slaughter. Some consider long periods of starvation to be acceptable, as certain fish species naturally undergo them in the wild. However, just because a fish can withstand periods of starvation does not mean that it is thriving during starvation or even has an acceptable level of welfare. Furthermore, the salmon in salmon farms have been bred for high and rapid growth, which experience with other animal species has shown⁴⁰ can increase feelings of hunger.

- Invisible suffering

In the complex RAS system, there is a risk that some fish may end up in pipes or filters, for example. These so-called "pipe fish" are at risk of being deprived of food and care, which means they face

prolonged, severe suffering.⁴¹

- Risk of poor water quality

Water temperature, levels of dissolved substances, oxygen, carbon dioxide, ammonia, nitrite and nitrate are of crucial importance to the welfare of the animals. Water quality has a direct impact on the welfare of the fish. Although RAS facilities are marketed as having an exceptional ability to control water quality, there is a risk of the systems being overloaded by the extremely high stocking densities required for the facilities to be economically viable. This leads to large quantities of waste products accumulating rapidly. Maintaining good water quality can become difficult, posing serious threats to animal welfare.⁴²

- Risk of system failures with catastrophic consequences

A combination of human error such as inadequate staff training or shortcomings in supervision, and technical failures such as power cuts or faults in alarm systems, has led to a large number of incidents involving mass mortality in RAS fish factories.³² In a RAS facility in Japan in 2025, 170,000 salmon died because the circulation pumps stopped. The oxygen levels in two tanks fell below critical levels, causing the fish to die. An emergency oxygen system activated as it should, but it did not provide sufficient oxygen levels.⁴³ In 2023, nearly 500,000 young salmon died in Norway following problems with water quality.⁴⁴

When it comes to claims that RAS facilities are energy-efficient and good for the environment, there are several factors that contradict these claims.^{45,46} RAS is the most energy-intensive form of aquaculture, due to the high energy requirements for pumping, filtering and temperature control of the water.

6.3 Slaughter

Regardless of how the fish have lived their lives; in fish farms, in net pens at sea or in tanks on land, they will be slaughtered. At slaughter, both in Sweden⁷ and Norway⁴⁷, the fish must be stunned (made unconscious) before throat cutting and bleeding. Using carbon dioxide is still practised and a legal method of fish stunning in Sweden. The method is inexpensive and allows many fish to be handled at the same time, but it has serious drawbacks as carbon dioxide causes the fish severe stress and discomfort.⁴⁸ The method can also render the fish immobile, making it appear as though they are unconscious when in fact they are fully conscious.^{49,50} As the method is ineffective, there is a risk that the fish will be subjected to bleeding and evisceration while fully conscious.⁵¹ According to the Scientific Council for Animal Welfare at the Swedish University of Agricultural Sciences, the use

of carbon dioxide gas is not an ethically acceptable method for the stunning or killing of fish.⁵² In Norway, carbon dioxide fish stunning has been banned since 2012.

A common method of stunning fish at slaughter, in both Sweden⁵³ and Norway, is electrical stunning. Electrical methods have long been regarded as effective and beneficial from an animal welfare perspective. However, research has shown that this is not always the case.⁵⁴ A serious risk is that the fish appears to be unconscious, when in fact it is merely paralysed.⁵¹ It is important that the fish loses consciousness quickly, within one second,⁵¹ following the stunning method. The fish must not regain consciousness, as it would then be conscious during the bleeding process. Visually checking whether the fish is conscious or not is not sufficient; the method must be validated by measuring the fish's brain activity.^{52, 55} It is also important that stunning and slaughter equipment, as well as the handling process, are scientifically validated and adapted to the species and size of the fish. For electrical stunning to be effective, precise electrical parameters – such as voltage, frequency and duration – must be applied in accordance with the requirements of the specific species.^{56, 57} As fish are slaughtered for human consumption, meat quality is taken into account during stunning. The aim is to strike a balance between ensuring that the electrical stunning is powerful enough to achieve an acceptable level of animal welfare, whilst ensuring that meat quality is not negatively affected.

In addition to the stunning and bleeding, other factors to which fish are exposed before or during slaughter also have a negative impact on animal welfare. Examples of these factors are periods of starvation, crowding (constricting fish by limiting the available space), sorting, removal from water, relocation, transport and physical handling.

7. Visions, strategies and action plans for sustainable aquaculture

There is considerable political interest in promoting aquaculture, including fish farming. Aquaculture is seen as an industry of the future, generating jobs and growth, and as a vital part of Sweden's food production.⁵⁸ There is much discussion about, and initiatives on, reducing regulatory burdens and increasing production, but initiatives regarding animal welfare legislation and improved animal welfare are not given the same priority. Aquaculture or fish farming is mentioned in general terms, but there is a lack of guidelines on what kind of aquaculture can truly be considered sustainable, and what sustainability entails.

Visions, strategies and action plans for aquaculture exist and are being developed both at EU level and nationally in Sweden. The current period for the Marine, Fisheries and Aquaculture Programme is 2021–2027, which means that a new programme for the period 2028–2034 is currently being drawn up by the Swedish Board of Agriculture, which has been tasked to do so by the government.

Maritime, fisheries and aquaculture programmes are drawn up by each EU Member State within the framework set out in the European Maritime, Fisheries and Aquaculture Regulation, adopted by the

European Commission. Funding for these programmes comes from both the European Maritime, Fisheries and Aquaculture Fund and national funds. For the current programme, Sweden has a budget of approximately SEK 2.15 billion, which is allocated to support measures aimed at “promoting sustainable fisheries and aquaculture”.

The National Food Strategy of Sweden also includes aquaculture. The strategy states that improving the conditions for starting and running aquaculture businesses, including through simplified permission procedures, is vital for increasing production, and that ensuring access to sustainable feed is also a key factor.⁵⁹ In early 2024, the government expanded the opportunities for agricultural businesses to receive support for investments in aquaculture, to “accelerate the development of sustainable aquaculture in Sweden”.⁵⁹ In June 2025, the Swedish Parliament approved the government’s proposal to streamline the permission process for aquaculture. This means that, from 1 June 2026, aquaculture will be exempt from the requirements of the Environmental Code for water activities. The Government has also introduced relaxations to the coastal protection regulations. Since 1 July 2025, aquaculture, including fish farming, has been exempt from coastal protection regulations.

At EU level, work is currently underway on the development of Vision 2040.⁶⁰ The vision is intended to establish the overall policy framework for a “competitive, resilient and sustainable fisheries and aquaculture sector”.

8. More knowledge and animal welfare legislation

These programmes, visions, strategies and action plans guide and influence, amongst other things, where public funds are allocated in the aquaculture sector. Project 1882 believes that the use of public funds should reflect the views of EU citizens on the welfare of aquatic animals and sustainability. A survey conducted in 2024 showed that residents in nine EU countries, including Sweden, expect public funding for aquaculture to be allocated in a transparent manner (88 percent) and that farms which uphold high animal welfare standards (86 percent) and sustainability standards (79 percent) are given priority.⁶¹ As many as 91 percent of those surveyed believed that fish welfare should be protected to the same or a greater extent than that of other animals.⁶¹

Animal welfare for fish is lagging behind. More knowledge and legislation are needed. Priorities in future visions, programmes, strategies and action plans must reflect these needs. Research and development required to close the gaps in animal welfare legislation for fish and other aquatic animals should be prioritised. As emphasised in the Multi-annual National Strategic Plan for aquaculture in Sweden 2021–2030,⁶² more species-specific knowledge about animals in aquaculture is needed. From the strategic plan: “Different animal species differ in terms of the needs that must be met to achieve good health and welfare. Species-specific knowledge of animal needs is therefore

essential to ensure sustainable production. Fish health and welfare are topical and important areas of research in Sweden and internationally, and it is of great importance that this research continues and develops.”

The need for greater knowledge and legislation applies to every stage of a fish’s life, including transport, stunning and slaughter. Fish slaughter welfare –at various levels such as research, development and initiatives focusing on handling and technology that minimise suffering– must be a priority area.

A prerequisite for the introduction of new species and farming systems, and for the continued farming and using of established ones, should be the existence of sufficient knowledge and the necessary conditions for husbandry and handling practices that are in line with the needs of the fish. Approval for farming should not be granted until there is species-specific knowledge and animal welfare legislation in place for the species in question. When there are questions as to whether a particular form of rearing, method or handling causes the animals suffering, we believe that the precautionary principle should be applied in the best interests of the animals.

Cephalopods are not fish, but they are aquatic animals, and there are plans to launch the world’s first commercial cephalopod factory in Spain.⁶³ These factory farms must be stopped through legislation before they are established. Cephalopods are solitary animals with highly complex behaviour. The farming environments do not meet their needs.^{64, 65} A ban is needed, in Sweden and at EU level, on the farming of cephalopods.

9. Aquaculture at lower trophic levels for greater sustainability

Globally, around half of all fish consumed comes from fish farms.⁶⁶ One reason for the growth in fish farming is that the oceans are becoming increasingly overfished. However, fish farming also contributes to the overfishing of the oceans, as most farmed fish are fed a diet that is partly made up of wild-caught fish. Fishing and fish farming are therefore closely interlinked. Farming fish that are fed on wild-caught fish contributes not only to animal suffering on the fish farms, but also to the suffering and death of the fish caught in the wild for use as feed. The numbers are staggering and the suffering is immense. The methods used to catch fish, and the way they are handled after capture and during slaughter, cause the fish great suffering. Catching fish with hooks, nets, trawls and other gear injures and stresses them, and often results in a very prolonged death.^{67, 68} Even for those fish that survive the catch itself, death is prolonged and agonising. The fish suffocate in the air after being hauled in, or die whilst being throat-cut or gutted, whilst still conscious.^{69–71}

A fundamental problem in the farming of predatory fish, such as salmon, is that these fish are dependent on feed that consists, at least in part, of other fish. The issue of feed is often cited as one of the greatest challenges to sustainability in fish farming. Estimates suggest that between half a

trillion and one trillion fish caught in the wild each year are used for the production of fishmeal and fish oil, which corresponds to almost 20 percent of all wild-caught fish.⁷² Demand for raw materials for fishmeal and fish oil is very high.⁷³ Most of the fish caught in Swedish fisheries are used to produce fishmeal and fish oil for animal feed. The fish used for feed are primarily of the species sand eel, sprat and herring. In 2024, the so-called feed fish accounted for approximately 68 percent of the total catch, measured by weight, in Swedish commercial fisheries.⁷³ In 2023, the corresponding figure was 76 percent.⁷³

The issue of feed is addressed in the Swedish strategic plan for aquaculture,⁶² along with the desirability of greater diversification of production systems and species, but there is a lack of discussion and a clear stance on the importance of moving away from the farming of species that are dependent on animal feed (fishmeal and fish oil), in favour of the farming of plants and herbivorous species. The Strategic guidelines for a more sustainable and competitive aquaculture sector in the EU for the period 2021–2030 state that diversification towards species at lower trophic levels, such as algae and herbivorous fish, should be encouraged.⁷⁴ It is clear that aquaculture that is to be considered sustainable cannot include the farming of predatory fish, as for example salmon and char.

Attempts are currently being made to replace fishmeal and fish oil in fish feed. However, this presents a challenge as the natural diet of predatory fish consists of other fish. Insect farming is a growing industry, and one area of application is fish feed.^{75, 76} One study showed that protein efficiency (weight gain per protein intake) decreased when the proportion of insects in rainbow trout feed was increased. Similarly, omega-3 fatty acids in the fish meat decreased, and the meat of rainbow trout fed a diet consisting solely of insects was perceived to have a slightly poorer taste.⁷⁶ Insect-based feed is also a comparatively expensive option.⁷⁷ Project 1882 believes that feeding fish with insect-based feed is the wrong approach to solving the challenges facing global food production. We need fewer factory farms, not more. Insects are sentient beings. According to the Scientific Council for Animal Welfare at the Swedish University of Agricultural Sciences (SLU), there is strong or significant evidence of pain perception in adult flies, cockroaches, bees, grasshoppers and butterflies, as well as some evidence that adult beetles feel pain.⁷⁸ The evidence is generally weaker for insects during the developmental stages, but there are studies showing pain experiences in juvenile flies, cockroaches, grasshoppers and butterflies. There are no scientific studies showing that insects do not have sensations or do not experience pain. Project 1882 agrees with SLU:s Scientific Council for Animal Welfare, which maintains that the precautionary principle should apply to animal species and developmental stages of arthropods where there is a lack of research or sufficient evidence to substantiate their ability to experience pain and suffering. The absence of evidence does not mean that these abilities do not exist.⁷⁸

The Swedish Board of Agriculture has estimated that aquaculture production could increase by 60–70 percent in weight by 2035 and has proposed a target of a 60 percent increase in the total weight of fish and aquaculture products by 2035.⁷⁹ They believe that there is great potential for expanding

the establishment of such facilities in the land-based aquaculture sector, that the industry is in an early stage of development, and that there are many initiatives currently underway. However, according to the Swedish Board of Agriculture, this requires significant capital investment and greater expertise in technology and operations. Project 1882 believes that Sweden needs to set targets for a substantial increase in the production and processing of plant-based food. This applies to both food production on land and in water. The targets need to cover the entire food chain and be linked to concrete measures for implementation. Support for food production needs to underpin the transition to a more plant-based diet, rather than, as is currently the case, almost exclusively favouring animal farming and animal feed production.

10. Proposed measures from Project 1882

Project 1882 believes the following measures are necessary to strengthen fish and other aquatic animal welfare:

- Animal protection legislation for fish and other aquatic animals, in Sweden and at EU level:
 - Legislation on animal protection at slaughter, including a ban on carbon dioxide stunning
 - Legislation on animal welfare at transport
 - Species-specific legislation on the farming of aquatic animals, covering the entire life of the animals
 - A ban on the farming of predatory fish such as for example salmon
 - A ban on cephalopod farming
- An end to financial support for and the establishment of RAS factories
- Consideration of animal welfare in all visions, strategies and action plans concerning aquaculture and fisheries
- A strategy for the transition to a sustainable food system with a focus on plant-based

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About Project 1882

Project 1882 works globally to make a difference for the animals that are the most exploited and suffer the worst. We have been doing this since 1882. With effective campaigns, we engage the public, highlight animal welfare problems, present solutions and bring about concrete changes. We shape public opinion and influence legislation. Project 1882 strives for a world where animals are respected as sentient beings with the right to their own lives.