

Greenpeace 'Red-Grade' Criteria for Unsustainable Aquaculture

Defining aquaculture practices that should be on a red list is a complex task. Every aquaculture practice on the Greenpeace International red list, and many others, was submitted through a methodology with very specific criteria. By evaluating them through this methodology, it is possible to identify the most unsustainable ones that Greenpeace considers should be avoided (graded red).

Uses of the criteria

1. The criteria can be used to advise fish buyers within the retail and catering industries to identify all aquaculture practices that should be avoided as part of a sustainable seafood procurement policy that aims to:
 - Avoid the worst
 - Support the best
 - Change the rest.
2. The criteria are used in the development of national Greenpeace red-lists of species that have a very high risk of being sourced from unsustainable fisheries or farms.

How does it work?

The procedure is based on answering a relatively simple set of 'worst practice' questions in various aspects of aquaculture for which an answer of 'yes' immediately grades an aquaculture practice as red. The questions are not presented in order of importance, rather they are ordered in a manner that allows the assessor to ask as few questions as possible, with the minimum detailed research required, to determine whether a particular aquaculture practice should be graded red.

Aquaculture practices are assessed by species, the country they are farmed in and the type of farming – for example, sea-cage salmon farming in Chile, or closed-system barramundi farming in the UK. Each criterion includes one or two key questions to ask of a practice along with supporting information and key references (these are expanded in the long version of the Greenpeace Aquaculture report ¹).

1. Sourcing eggs or juveniles from the wild
2. Introducing alien species
3. Transferring disease to the wild
4. Locating aquaculture facilities in sensitive areas
5. Using wild fish to feed farmed fish
6. Contributing to human rights abuse
7. Other general impacts on biodiversity
8. Unsustainable components used in feed

For the final criterion, the user will need to assess down the level of the farm.

Use of data

The assessment is only as good as the information used. Please use data published within the last five years, or provide good evidence that older data is relevant to the current situation.

Can I assess individual farms?

The methodology can be used to assess smaller areas and individual farms, but the many impacts that result of the cumulative impacts of multiple farms in an area need to be taken into account as well.

On what basis are fisheries/species then listed on Greenpeace red lists?

The key fisheries and farms supplying each of the most commonly sold species nationally are assessed. Where the majority of these fisheries or farms are red-graded, the species are then placed on the red list. These species should be the focus of immediate attention for retailers as they implement their new policies by shifting to the few sources that are not destructively fished or farmed, or by dropping the species altogether. The resulting national red lists vary as they focus on the key 15–20 red list species sold in the supermarkets in their country rather than on every species sold.

Why do we focus on a red list?

Sourcing seafood sustainably can be a complicated process – we need to consider the direct impacts on the marine environment, as well as the impacts on the wider environment (particularly with regard to climate change) and on local communities. For this reason we have developed a red list of seafood from fisheries or farming practices that are clearly the most damaging and in need of immediate attention – it separates the worst from the rest. Those fisheries or farming methods that do not appear on these red lists are not necessarily sustainable (indeed some may be graded red but rarely sold in a particular country), but seafood buyers need some flexibility to weigh up various ‘better’ options in order to reduce the impacts of their overall consumption practices, not just for seafood.

Criterion 1: Sourcing eggs or juveniles from the wild

Some aquaculture relies on juvenile fish or shellfish being taken from the wild to restock the culture ponds. This is unsustainable in cases where taking broodstock further depletes wild stocks, or where the catching method is destructive to other species or the ecosystem. Juveniles are taken from declining stocks of European eels² and Mediterranean blue fin tuna,³ for example, and then grown for aquaculture. Some natural stocks of shrimp are now overexploited as a result of seed collection from the wild^{4,5}, and the juvenile shrimp often represent a small fraction of each catch, with a large incidental catch and mortality of other species.^{6,7}

There are a few aquaculture practices that rely on taking a very small number of eggs, juveniles or adults to maintain genetic diversity in their breeding stock. Where these are insignificant numbers when considered in context of the fisheries in the area, the impact is considered minimal (e.g. 1–10 cod taken every 1–3 years when, in comparison, cod in the region are being caught at an average catch rate of 1–10 per hour.⁸)

1. Does the main production system rely on restocking with eggs or juveniles from the wild AND would this broodstock fishery be graded red by the wild-caught assessment?

- Yes. RED
- Yes, but impacts are minimal because so few specimens are taken. Go to next question.
- No. Go to next question.

Criterion 2: Introducing alien species

The physical containment of non-native species, domestic breeds, or genetically engineered fish cannot be guaranteed under most commercial conditions and any escapes into the environment can have devastating effects on wild fish populations and biodiversity. Escaped fish threaten native species by eating their juveniles, competing for food or habitat, spreading disease, and/or posing a threat to the genetic diversity of wild populations.^{9, 10, 11, 12, 13, 14}

2a. Does the main production system produce genetically-engineered organisms?

- Yes. RED
- No. Go to the next question.

2b. Is the main production system associated with escapes of high numbers of non-native species, or domestic breeds that are, or likely to be, having a negative impact on wild species?

- Yes. RED
- No. Go to the next question.

Criterion 3: Transferring diseases to the wild

Bacterial, viral and parasitic diseases can be particularly problematic in fish farming where stocking densities are high. Wild populations of fish passing near to farms may also be affected. One notable example in salmon farming are the parasitic sea lice which feed on salmon skin, mucous and blood and can cause the death of the fish. There is evidence that wild salmon populations have been affected by lice spread from farms in British Columbia¹⁵,¹⁶ and Norway.¹⁷

3. Has the main production system been linked to increased levels of disease in wild species in the vicinity of the farms?

- Yes. RED
- No. Go to the next question.

Increased levels: published scientific data show a higher reported incidence of disease in wild species in the vicinity of the farms than in other areas and/or the appearance of diseases in wild species that were not previously reported in the area except on farms.

Criterion 4: Locating aquaculture facilities in ecologically sensitive areas

The siting of aquaculture facilities in ecologically sensitive areas can be a physical threat to the surrounding environment, especially when large-scale alterations are required to establish the farms (for other physical threats, see criterion 7). The most obvious example is the creation of ponds for shrimp aquaculture, which has led to the destruction of thousands of hectares of mangroves and coastal wetlands in many countries.^{18, 19, 20, 21, 22} Mangroves support numerous marine species (including commercial fish species^{23, 24}) as well as terrestrial species, protect coastlines from storms, and are important in the subsistence of many coastal communities.

4. Has the main production system required large-scale land or seabed alterations in areas of high ecological sensitivity?

- Yes. RED
- No. Go to next question.

Large-scale land alterations: including but not limited to clearing of trees and other flora; redirection or damming of water courses; restriction of movement of animals from one part of the area to another due to roads, fences and other structures.

Large-scale seabed alterations: including but not limited to dredging of seabed; building of structures which change the profile and/or movement of water of the seabed or coastline.

High ecological sensitivity: referring to ecosystems that can be adversely affected by an external factor arising from human activities or natural events (killed/destroyed, high intolerance) and are expected to recover only over a very long period of time, i.e. >10 or up to 25 years (low, if any, recoverability).²⁵ Key examples include coastal wetlands; mangroves and associated ecosystems; and any areas containing **threatened, endangered, critically endangered** or protected species featured on any domestic or international list.

Criterion 5: Using wild fish to feed farmed fish

Fishmeal and fish oil used in aquaculture feeds are largely derived from small oily forage fish such as anchovies, menhaden, herrings and sardines/pilchards, taken in industrial fisheries. The farming of carnivorous species, in particular, is highly dependent on the use of fishmeal and fish oil in synthetic diets. The input of wild-caught fish via feed can exceed the output of farmed fish and therefore result in a net loss rather than a net gain of fish protein. Carnivorous marine finfish and shrimp are particularly bad. On average, about 3 kg of wild fish are required to produce 1 kg of salmon or shrimp; about 5 kg to produce 1 kg marine finfish like cod,²⁶ and as high as 20 kg to produce 1 kg of tuna.²⁷ Instead of alleviating pressure on wild fish stocks, therefore, aquaculture of carnivorous species increases pressure on wild stocks of fish, albeit of different species.

5. Does the main production system use feed that requires more than 3 kg of wild fish, caught specifically to make fish meal and oil per 1 kg of aquacultured fish produced?

- Yes. RED
- No. Go to next question

Note: Use published estimates for commonly farmed species, preferably for the country being assessed, or calculate it yourself. To find the Fish Conversion Efficiency (FCE) first find an estimate of the conversion ratio of pelagic fish into fishmeal and oil. A generally accepted estimate is 4 or 5 kg fish to produce 1 kg of feed (4.5 used here), although it varies greatly for oils from species to species, so can be calculated differently if you know the fishmeal and oil source species.²⁸

FCE = Food conversion efficiency (kg wild fish used to produce 1 kg farmed fish)
FCR = Feed conversion ratio (kg fish feed to produce 1 kg farmed fish)

$FCE = [(FCR \times \% \text{fishmeal in feed}) + (FCR \times \% \text{fish oil in feed})] \times 4.5$
e.g. FCE for salmon (global average) = $[(1.3 \times .35) + (1.3 \times .25)] \times 4.5 = 3.51$

Criterion 6: Contributing to human rights abuses

A range of human rights abuses have been linked to aquaculture in developing countries, affecting both local communities and workers. Local communities are impacted by: losing access to traditional food sources and fishing grounds; forced land seizures without compensation; large scale displacement of communities; threats and intimidation; and violence including assault, abduction, rape, and murder.^{29, 30} Workers can face a combination of: poor or non-existent safety conditions in farms and in processing plants; low wages; long working hours; lack of respect for maternity rights; and persistent sexual harassment of women.^{31, 32, 33, 34, 35, 36}

6. Is the main production system associated with well-documented third-party evidence of human rights abuses and/or poor workers rights within the last five years?

- Yes. RED
- No. Go to the next question.

Criterion 7: Other general impacts on biodiversity

Other impacts in local biodiversity may stem from the reduction of foraging grounds; disrupting migration routes; disturbance of spawning areas; entanglements in nets or cages; and the use of acoustic deterrents or regular shooting of birds or mammals attempting to prey on aquaculture species.

In addition, there may be harmful discharges from aquaculture facilities. As well as causing a general reduction in both water and soil quality, discharges can have a wide range of detrimental impacts.^{37, 38, 39, 40, 31, 42} Chemicals such as growth stimulants, medicines, and anti-foulants can directly impact other organisms and nutrient pollution can reduce biodiversity around the cages. Organic waste and nutrients cause eutrophication and/or anoxia, or disrupt the benthic habitat within or near aquaculture sites. Wastes can also act as plant nutrients and, in areas where water circulation is restricted, these may also lead to the rapid growth of certain species of algae, some of which can kill a range of marine animals and also cause shellfish poisoning in humans.

7. Is the main production system associated with adverse impacts on populations of species in the area?

- Yes. RED
- No. Go to the next question.

Adverse impacts: causing further decline of species or displacing species from the area.

Criterion 8: Unsustainable components used in feed

This criterion refers to (a) plants in feeds and (b) wild-caught fish in feeds.

(a) Genetically modified crops are associated with a number of potential environmental impacts, genetic contamination of non-GE crops, and have sparked a number of food-safety concerns which also remain unresolved.⁴³ Soya is increasingly used in fish feeds as an alternative protein source to wild fish⁴⁴ and meal from oil palm kernels, left over after palm oil extraction, is also being investigated for use in aquaculture.⁴⁵ These may be a valuable solution to the wild-fish feed problem; however, vast areas of rainforest have been destroyed to make way for both soya⁴⁶ and oil palm crops.⁴⁷

(b) Many global marine fisheries are currently exploited in an unsustainable manner and this includes industrial fisheries.^{48, 49} Declines in species taken by industrial fisheries can also impact other marine species that prey on the fish as such as seabirds.^{51, 52}

Because this data ranges very widely from supplier to supplier and farm to farm, and is also quite difficult to get details for, this criterion needs to be assessed on a farm by farm basis.

8a. Does this farm's main production system use any plant components in the fish feed that are sourced from genetically modified crops, and/or crops associated forest destruction?

- Yes. RED
- No. Go to next question.

8b. Does this farm's main production system use feed known to contain any components sourced from fisheries that are ranked red in our wild-capture assessment?

- Yes. RED
- No. Species for aquaculture in that country/ farm not red graded.

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