

Appendix B - Food choice chart (detailed version)

		Salmon				Other fish and shellfish				Plants				Omega 3 dietary supplements	
		Salmon (land farming)	Salmon (sea farming)	Organic salmon	French farmed smoked trout	Canned yellowfin tuna (caught)	Sardines, mackerel	Shellfish (mussels, oysters)	Algae	Linseed oil (organic)	Repressed oil (organic)	Smoked salmon imitation	DHA/EPA fish oil supplements	DHA/EPA plant-based dietary supplements	
Human health	Toxic elements	5- PCBs, PFAS and microplastic contamination. Main mode of propagation: oily fish and shellfish.	3- PCBs, PFAS and microplastic contamination. Main mode of propagation: oily fish and shellfish.	5- PCB and PFAS contamination possibly higher than non-organic farmed salmon due to feed composition containing more small pelagic fish.	5- PCB, PFAS and microplastic contamination	5- Tuna is the fish with the highest level of mercury contamination.	5- Oily fish are among the species most contaminated by persistent organic pollutants.	4- Shellfish are among the food choices that contribute most to heavy metal exposure.	2- Varies according to water quality.	1- Organic linseed oil: 0.2 g DHA / 1 g EPA - no toxic elements (PCBs, PFAS, microplastics).	1- Organic repressed oil contains no toxic elements (PCBs, PFAS, microplastics).	1- Smoked salmon imitation contains toxic elements (PCBs, PFAS, microplastics).	5- PCB contamination	1- A plant based dietary supplement contains toxic elements (PCBs, PFAS, microplastics).	
	Daily coverage in omega 3, percentage per 100g of product - Woman	2- Eating 100g of smoked salmon daily covers 72.6% of daily omega-3 requirements. DHA and EPA omega-3s	2- Eating 100g of smoked salmon daily covers 72.6% of daily omega-3 requirements. DHA and EPA omega-3s	2- Daily consumption of 100g of smoked salmon covers 72.6% of daily omega-3 requirements. Omega 3 of the DHA and EPA type. Limitation: this figure should be higher, given that organic salmon consumes more fish meal and less vegetable matter.	3- Consuming 100g of smoked trout daily covers 51.3% of daily omega-3 requirements. DHA and EPA omega-3s	5- Eating canned yellowfin tuna covers 26.6% of daily omega-3 requirements. DHA and EPA omega-3s	1- Eating 100g of sardines/mackerel daily covers 93% of daily omega-3 requirements. DHA and EPA omega-3s	5- Eating 100g of shellfish daily covers 16.5% of daily omega-3 requirements. DHA and EPA omega-3s	1- Seaweed does not contain omega 3	1- Consuming 100g of repressed oil daily covers 2317% of daily omega-3 requirements. 1 tablespoon a day provides 100% of daily intake. ALA-type Omega 3	1- A daily intake of 100g of repressed oil covers 223% of daily omega-3 requirements. 2 to 3 tablespoons a day provides 100% of daily intake. ALA-type Omega 3	2- Consuming 100g of smelt daily covers 74% of daily omega-3 requirements. Omega 3 DHA/EPA type	n/a	n/a	
	Daily coverage in omega 3, percentage per 100g of product - Men	3- Eating 100g of smoked salmon daily covers 55.6% of daily omega-3 requirements. DHA and EPA omega-3s	3- Eating 100g of smoked salmon daily covers 55.6% of daily omega-3 requirements. DHA and EPA omega-3s	3- Eating 100g of smoked salmon daily covers 55.6% of daily omega-3 requirements. DHA and EPA omega-3s	3- Eating 100g of smoked salmon daily covers 55.6% of daily omega-3 requirements. DHA and EPA omega-3s	5- Eating canned yellowfin tuna covers 22% of daily omega-3 requirements. DHA and EPA omega-3s	2- Eating 100g of smoked salmon daily covers 71.4% of daily omega-3 requirements. DHA and EPA omega-3s	8- Eating 100g of shellfish daily covers 12.2% of daily omega-3 requirements. DHA and EPA omega-3s	n/a	1- Consuming 100g of repressed oil daily covers 1777% of daily omega-3 requirements. 2 tablespoons a day provide 100% of daily intake. ALA-type Omega 3	1- Daily consumption of 100g of repressed oil covers 251% of daily omega-3 requirements. 3 to 5 tablespoons a day provides 100% of daily intake. ALA-type Omega 3	1- Daily consumption of 100g of smelt daily covers 56.0% of daily omega-3 requirements. Omega 3 DHA/EPA type	n/a	n/a	
Environment	Financial cost for 31 days	n/a	5- 1.0€	n/a	n/a	5- 55.49€	n/a	n/a	1- 2.65€	n/a	n/a	3- 17.80€	2- 13.30€		
	Biodiversity	5- 79.6% Ozone depletion, resource depletion -- Strong environmental pressures linked to salmon feed: the supply of vegetable meal contributes to deforestation in the Amazon, and fishmeal exacerbates overfishing and the decline in wild fish populations. Numerous malfunctions have been documented in water treatment equipment, resulting in air and water pollution. This type of farming is extremely energy-intensive, both in terms of water and electricity.	3- 79.6% Marine eutrophication, ozone depletion, resource depletion -- Food-related environmental pressures + Severe degradation of marine water quality: nutrient and microplastic discharges, eutrophication and phytoplankton bloom, pesticide and microplastic discharges. Decline in wild trout and salmon populations due to wild salmon escapes (predation, genetic disruption and spread of disease). Threat to wild species in the vicinity of farms: degraded water quality, lethal predator control policies	5- 80% Ecotoxicity to freshwater aquatic ecosystems, ozone depletion	4- 84.5% -- The techniques used by tuna fisheries have negative effects on many non-target species (100,000 tonnes of by-catches and discards every year in the world's tuna fisheries).	4- 47.9% Terrestrial and freshwater acidification, depletion of energy and water resources, ecotoxicity for freshwater aquatic ecosystems	4- 47.3% Depletion of energy resources	5- 54.2% Acidification of land and fresh water, depletion of mineral resources	2- 13.4% Land use	1- 0 %	2- 10.6%	5- Studies suggest that limited availability of fish oil compromises the reproduction of female sea lions and gives sea otters less than other prey or the male longer foraging trips. Source: University of Barcelona (2021) How does the climate crisis affect the Antarctic fur seal? Phys Org. 2 December.	n/a	n/a	
	CO2	5- between 2 and 14kg eqCO2	5- between 7 and 10kg eqCO2	5- between 7 and 10kg eqCO2	4.6 - 9 eqCO2	3.4 - 39 eqCO2	4 - 7.26 eqCO2	4 - 5.7 eqCO2	4 - 6.69 eqCO2	2 - 3 - 54 eqCO2	2 - 2 - 28 eqCO2	1 - 1.6 eqCO2	4- Krill fishing affects the crucial role these crustaceans play in regulating and storing atmospheric carbon.	n/a	
Societal	Human rights, detour of food resources and food waste, employment	5- Strong detour of soy production and small pelagic fishing to feed salmon, to the detriment of human populations; 90% of the world's industrial fishing catches are made up of species directly edible by humans. High levels of waste in the production chain (fishing for farming, massive fish kills during fishing and farming, in the distribution and consumption chain). Decline in wild fish populations and imbalance in marine ecosystems. Loss of income for small-scale fishing, which no longer reaches the same fishing thresholds (provision in fish species and in the number of uncontrolled) species (reduction in the availability of migratory fish in West Africa and consequent reduction in animal protein intake, particularly in Senegal and the Gambia). Contribution to unregulated and undeclared illegal fishing.	5- Increasing the proportion of ingredients of marine origin - a requirement of organic specifications - exacerbates the problems linked to small pelagic fishing mentioned above.	4- 1 kg of trout (large trout) requires the harvest of 1.6 herrings or 40 anchovies. See on p.252 of the Wefarm report on welfare in salmon farming + page 283 (higher proportion of ingredients of marine origin for trout than for salmon in Norway in 2020).	4- Human rights violations, human trafficking, physical and verbal abuse, withholding of wages. Processing and carrying physical and sexual violence against women, underpayment of wages	4- Provenance in the North-East Atlantic Ocean (Mediterranean, Morocco and Mauritania) with purse seine and trawl nets	3- Large employment sector: around 17,000 people, family workforce.	1- A fast-growing industry, the development and consumption of seaweed is recommended for the transformation of the global food system (EAT Lancet Commission), the EU and for the SDG on sustainable/low tropical agriculture. France published its first roadmap for the industry in February 2024.	1- Fast-growing sector +133% from 2006 to 2010 2020. Employing 6,500 people	1- Job-creating sector, needs support for organic farming	1- No impact	5- Same problems linked to overfishing of small pelagics. Decline in wild fish populations and imbalance in marine ecosystems. Loss of income for small-scale fishing, which no longer reaches the same fishing thresholds. Increase in fish prices and in the number of underemployed people (reduced availability of migratory fish in West Africa leading to a reduction in animal protein intake, particularly in Senegal and the Gambia). Contribution to unregulated and undeclared illegal fishing.	1- No impact		
	Density	5- 70 kg to 150 kg salmon / m3	5- 25 kg / m3 (average based on adult salmon size). Welfare is degraded once a threshold of 22 Kg/m3 is exceeded in sea cages for Atlantic salmon.	3- 10 kg/m3 to 20kg/m3	6- Average of 60 Kg/m3	3- Not concerned. Most of the tuna consumed comes from the following fisheries	3- Not concerned. Prey* fish come from the following fisheries	n/a	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	5- Not concerned. Fish caught for processing into food supplements come from the following fisheries	1- No impact on animal welfare.	
Animal condition	Diseases	4- Infectious disease risks increase with increasing density (Yahmaradi et al. 2016, Westermeyer 1998, European Commission 2004 cited by Sirakov and Ivancheva 2008, Ellis et al. 2002, Mocaia et al. 2021, Turnbull et al. 2008, Escudero 2018). Reduced but not excluded risk of infection by sea lice, viruses, bacteria and fungi. As the water renewal rate is low in RAS farming, pathogens develop in the water, they rapidly accumulate in the system rather than being evacuated by water renewal.	5- Heavy infestation of sea lice (parasites present in the marine environment) (Spread of viruses, bacteria and fungi). Risk of ulcers and other diseases due to poor water quality	5- Heavy infestation of sea lice (parasites whose larvae are naturally present in the marine environment) (Spread of viruses, bacteria and fungi). Risk of ulcers and other diseases due to poor water quality	4- Infectious disease risks increase with increasing density (Yahmaradi et al. 2016, Westermeyer 1998, European Commission 2004 cited by Sirakov and Ivancheva 2008, Ellis et al. 2002, Mocaia et al. 2021, Turnbull et al. 2008, Escudero 2018). Reduced but not excluded risk of infection by sea lice, viruses, bacteria and fungi. As the water renewal rate is low in RAS breeding, if any pathogens develop in the water, they can	3- Not concerned. Most of the tuna consumed comes from the following fisheries	3- Not concerned. Prey* fish come from the following fisheries	2- Little impact on animal welfare	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	5- Not concerned. Fish caught for processing into food supplements come from the following fisheries	1- No impact on animal welfare.	
	Stress	4- Extreme densities lead to stress and aggressive behavior. Risks of technical incidents leading to mass mortality	n/a	n/a	n/a	n/a	n/a	2- Little impact on animal welfare	n/a	n/a	n/a	n/a	n/a	n/a	
	Farming and fishing techniques (fishing impact on fish caught and non-target species)	5- High densities leading to stress and aggressive behavior. Suffering and death caused by "non-medicinal" sea lice treatment practices (including cleaner fish, hot and cold water baths and high-pressure water jetting). Affects farmed salmon, cleaner fish and wild fish. No specific standards for the health, well-being or mortality of cleaner fish. Stress and mortality caused by predators, which farmed salmon cannot escape. In Scotland, 500,000 salmon die every year either directly from predators or indirectly from the stress they cause.	5- Major contribution to the suffering of the fish caught in the industrial fishery. Physical injuries caused by interactions with fishing gear (hooks, nets, traps, etc.). Compression of animals on top of each other when hauling active fishing gear and when rebarbering. Increased vulnerability to predation by other wild animals when caught by fishing gear prior to ascent (deprivation). Thermal shock caused by temperature differentials between deep and surface waters, or during immersion in ice slurry or asphyxiation on board ice.	5- French law does not lay down specific standards for fish welfare during the rearing phase. High densities are contrary to the natural behavior of trout: in the wild, when they live in rivers, trout are solitary and territorial for most of their lives, and live at very low densities.	5- Non-target species: 100,000 tonnes of non-target species are caught and discarded each year in the world's tuna fisheries (juvenile tuna or sharks, a figure that does not include whales, dolphins and turtles, also victims of FADs).	3- Stress and suffering linked to the agony of fish trapped in nets	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	1- No impact on animal welfare.	5- Competition between fishing vessels and kill predator species: targeted krill fishing, concentrated in specific areas and already under pressure, leads to a competition between fishing vessels and key species such as penguins, whales and seals in their foraging areas. Several metric tons of by-catch (other than krill, including marine mammals) per year and per fishing vessel. In 2021, three young humpback whales were caught in a net used by Aker BioMarine in the Antarctic Sea in the space of two months.	1- No impact on animal welfare.		

