

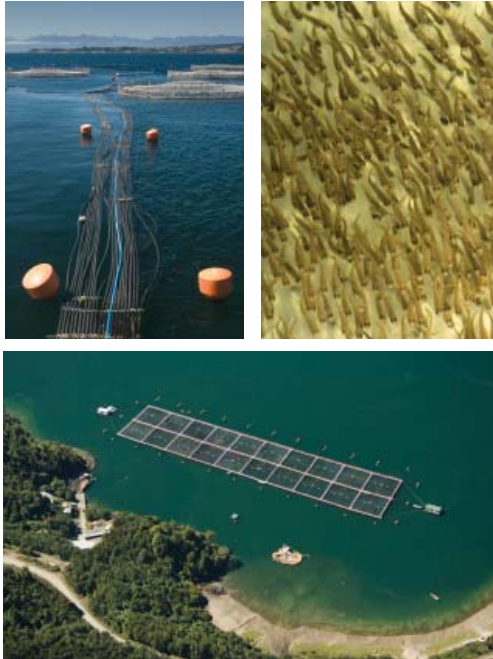


Farmed Salmon

Over the past 20 years, the salmon farming industry has rapidly expanded. Almost 60 percent of the world's salmon is now produced via aquaculture, creating a \$5.4 billion industry that generates almost 1.4 million metric tons of farmed salmon each year.

The Production Process

It takes approximately 2-3 years to grow a market-sized salmon. The process happens in two stages. During the fingerling production stage, young fish are produced in land-based recirculating freshwater tanks, flow-through systems parallel to rivers, or cages in freshwater rivers or lakes. Later, in the grow-out stage, they are moved to larger net pens and cages in sheltered areas of saltwater bays and inlets.



A farm can stock anywhere from 10kg/m³ to 100 kg/m³ of salmon. Selecting the right site for a farm is very important because factors such as water depth and flow can affect both the health of the fish and the operation's overall local environmental impact.

Vaccination of juvenile salmon against some diseases is standard in most countries. To maintain consistent and desirable flesh color, carotenoid pigments are added as a diet supplement throughout the salmon's life-cycle. Antibiotics and other chemicals often are used for disease management. Which chemicals and antibiotics are legal and available for use varies by country.

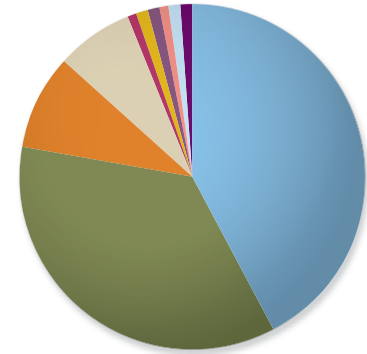
Salmon require a carefully planned diet high in protein and lipids. Feed composition varies depending on the life-cycle stage of the fish, but generally salmon feed is composed of 30-35 percent fishmeal and 20-25 percent fish oil.

Prior to harvest, salmon are not fed for five days in order to empty their guts, reduce fat and firm their flesh. They are then removed from their enclosures via baskets or pumps. Killing methods include tranquilizing and then killing with CO₂ or stunning, followed by bleeding and immediate chilling. The fish are then brought to processing plants to be sorted based on size, texture, and color. Salmon can be chilled and shipped as fresh, or processed further by filleting, flash freezing, or smoking. Value-added salmon products such as salmon burgers and breaded products require further processing. Salmon products are typically packaged in plastic or cardboard to be sent to market.

Production Statistics

Farmed Salmon by Country

Salmon is farmed in countries around the globe, but Norway, Chile and the UK are the main producers; together they account for 86 percent of all production.



*Data Source: FAO FishStat 2005

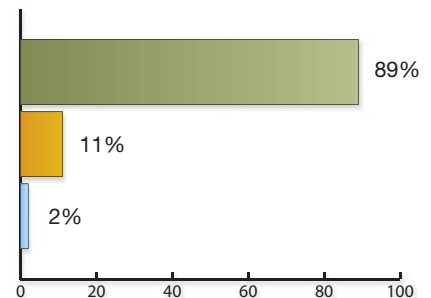
Norway - 42%	Faeroe Islands - 1%	United States - 1%
Chile - 35%	Australia - 1%	Other - 1%
United Kingdom - 9%	Ireland - 1%	
Canada - 7%	Japan - 1%	

Main Farmed Salmon Importers

The U.S., Japan, and EU are the primary importers of salmon.

Farmed Salmon by Species

There are several different salmon species, but the majority of farmed salmon (89 percent) is Atlantic salmon.



*Data Source: FAO FishStat 2005

Atlantic salmon - <i>Salmo salar</i> - 89%
Silver/Coho - <i>Oncorhynchus kitsutch</i> - 11%
King/Chinook - <i>Oncorhynchus tshawytscha</i> - 2%



Potential Environmental Impacts

- **Benthic impacts and siting:** Chemicals and excess nutrients from food and feces associated with salmon farms can disturb the flora and fauna on the ocean bottom (benthos).
- **Chemical inputs:** Excessive use of chemicals such as antibiotics, antifoulants and pesticides – or the use of banned chemicals – can have unintended consequences for marine organisms and human health.
- **Disease/parasites:** Viruses and parasites can transfer between farmed and wild fish, as well as among farms.
- **Escapes:** Escaped farmed salmon can compete with wild fish and interbreed with local wild stocks of the same population, altering the overall pool of genetic diversity.
- **Feed:** A growing salmon farming business must control and reduce its dependence on fishmeal and fish oil. Fish caught to make fishmeal and oil currently represent one-third of the global fish harvest.
- **Nutrient loading and carrying capacity:** Excess food and fish waste in the water have the potential to increase the levels of nutrients in the water. This can cause the growth of excess algae, which consumes oxygen that is needed by other plant and animal life.



Ways to Help Encourage Sustainable Farming

Use your purchasing power

Buy from farms that

- are located away from designated protected areas, important wild salmon rivers, and other threatened wildlife
- have a good history of preventing and minimizing the impacts of escapes
- have low levels of disease. Good fish health can be indicative of a well-managed farm and a cleaner environment. Fish raised in poor water quality or at excessive stocking densities can be more susceptible to disease.
- minimize the use of antifouling chemicals through the use of double nets and mechanical cleaning (followed by water treatment) or cleanerfish/wrasse
- fall under a traceability scheme
- don't use fish meal/fish oil feed ingredients from overexploited, depleted or recovering fish stocks
- use feed that maximizes the use of marine by-products, with overall compositions of fishmeal less than 35 percent, fish oil less than 27 percent, and a feed conversion ratio less than 1.15

Join the Salmon Aquaculture Dialogue

We encourage you to support the Salmon Aquaculture Dialogue to develop standards for minimizing or eliminating key environmental and social impacts associated with salmon farming. The standards will be measurable, science-based and created by the world's leading salmon farming industry stakeholders. Adoption of the standards will help ensure that farmed seafood is healthy for humans and the environment. We also encourage you to ask the seafood producers you work with to participate in the Dialogues.

To learn more about the Salmon Aquaculture Dialogue and other Dialogues initiated by WWF go to: worldwildlife.org/aquadialogues



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