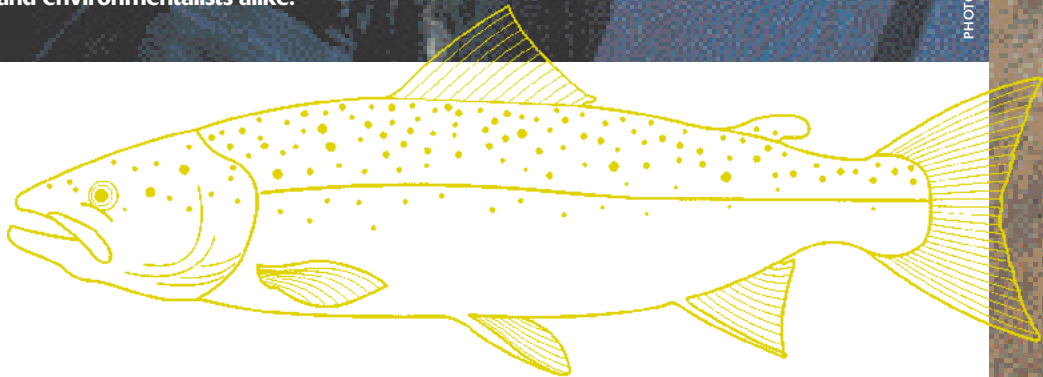


Salmon farming is big business, but it

Pictured: A fish farm in Morsvikfjord, Norway. Escaped farmed salmon are a constant source of consternation for farmers and environmentalists alike.

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FISHY BUSINESS

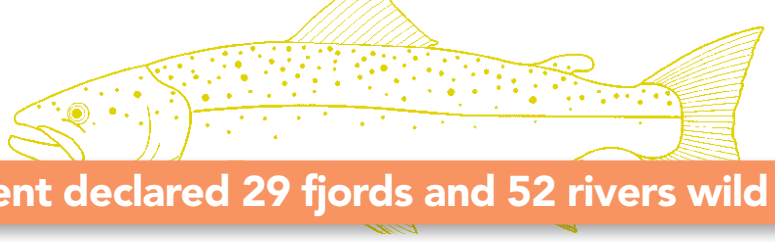


needs to contend with a few ecological realities to continue to thrive.

BY AMANDA SCHUPAK

When overfishing in the 1980s and '90s threatened to wipe out salmon populations around the globe, aquaculture—the selective breeding and rearing of marine animals—rose to the task of feeding the world's yen for the tasty, fleshy fish. These days consumers seeking to buy Atlantic salmon would be hard-pressed to find anything that didn't come from a farm. In Norway, the rapid expansion of salmon farms over the last few decades represents a sea change in the industry, as the traditional fisherman lifestyle begins to fade into the annals of Nordic lore. Raising salmon in a controlled environment, though good for supply, has raised new questions about everything from ecological damage to consumer health risks, specifically the harmful commingling of wild and farm-raised fish. Lately it seems salmon have become as divisive as they are delicious.

In 2007 the Storting—Norway's parliament—took action by closing 29 fjords and 52 rivers to salmon farming and declaring them wild salmon sanc-



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tuaries. Activists and the media praised the decision, heralding a war on salmon farms. John Fredriksen, Norway's richest man and a major shareholder in Marine Harvest, the world's largest producer of farmed salmon, spoke strongly in favor of the Storting's decision, garnering applause from environmentalists—and a few raised eyebrows for the seeming conflict of interest. (Marine Harvest distanced itself from Fredriksen's endorsement in a statement to the UK's *Telegraph* newspaper.)

"The Norwegian system, with designated wild salmon fjords, is a good system," Fredriksen, an avid fly fisher and active preservationist, says. "It can assure us that both wild salmon and farmed salmon have a place." (See chart for the difference between wild-caught and farm-raised salmon.)

The Storting's decision represents an important step to ensure that farming's encroachment on natural habitats does not continue unchecked. And the time is ripe. Farming sales and profits are at an all-time high, and the global market shows no immediate signs of losing its taste for Norway's *laks*. In demand and under scrutiny, salmon farmers find their business teetering on a fulcrum of sustainability as they strain to find a balance between the growth of industry and the vulnerability of Mother Nature. According to Fredriksen, "The world's demand for seafood will increase by more than 40 percent in the next 20 years, and the answer to that is aquaculture. As long as we can preserve designated areas and the most important wild salmon rivers, I am confident that both will remain very popular."

Responsible Aquaculture

Norway was among the first countries to begin farming salmon commercially in the late 1960s. Norwegians pioneered the science of efficiently breeding the best, meatiest fish, by developing a system of large net cages where salmon are raised in open waters. By 1972 the country's fledgling farms were yielding 46 metric tons of fish annually. By 1980, production was up nearly 95-fold. Today as then, salmon is the principle driver of the country's aquacultural success. Farms churn out about 10 times as much salmon as trout, the country's number two farmed fish. Of the \$3.34 billion worth of fish raised in 2006 (the latest figure available), just over \$3 billion came from nearly 630,000 tons of salmon, a 26 percent increase over 2005.

WILD-CAUGHT VS. FARM-RAISED SALMON

	WILD-CAUGHT	FARM-RAISED
Flavor & Texture	Strong flavor, silky texture, firm flesh.	Mild taste with soft flesh. Contains more fat because salmon are raised in close quarters with other fish.
Color	Deep pink due to a natural diet of krill and crustaceans that contain a coloring pigment called astaxanthin.	Pale pink. Farm-raised salmon have a natural gray color, but they turn pink when fed sources of astaxanthin and coloring agents.
Availability	The season usually lasts from May to September. Wild salmon can be hard to come by the rest of the year.	Available year-round.
Cost	\$13 to \$16 per pound. Price fluctuates according to availability, but wild salmon are usually three to four times more expensive than farm-raised salmon.	\$6 to \$9 per pound. Year-round availability makes farm-raised salmon less expensive than wild-caught salmon. — <i>Anya Britzius</i>



salmon sanctuaries to protect wild stocks.

The business of traditional fishing, meanwhile, is treading water. Sales of wild salmon are negligible when compared with farm-raised, says Frode Brunvoll of research firm Statistics Norway, which collects fishery and aquaculture data. Sea catches are largely for private consumption, and fishing in rivers nowadays is relegated to recreation. The shift is indicative of a widespread decline in fishing, which hit an all-time low in 1990, following government restrictions to protect Norwegian stocks from rampant overfishing. Business has nearly doubled since then, but the number of Norwegians who make a living as fishermen is down more than a third.

The Institute of Marine Research in Bergen reports that across all species, sales of farmed fish exported from Norway exceed that of fish caught in the wild. The consequences of aquaculture's ascendancy threaten not only the catch of wild fish, but the wild fish themselves.

Salmon farms are nestled in fjords and rivers. Until recently these were often the same fjords and rivers where wild salmon lay their eggs. Damage to cages—from bad weather or basic wear and tear—allows salmon to break free from their enclosures. Other times, smaller fish sneak out through the nets' mesh. Escaped farmed salmon

wreak havoc on native populations by competing for resources and spawning grounds, and diminishing genetic diversity. They also transmit diseases that flourish in the tightly packed quarters of their (former) cages. Chief among them is salmon lice, a potentially lethal parasite.

Statistics Norway tallies 920,000 escaped salmon in 2006, while other estimates cite between 1.2 and 3.6 million salmon escapes annually. A World Wildlife Fund study from 2005 showed that on average escaped fish accounted for nearly a quarter of coastal populations. In western Norway's Hardanger Fjord—where the Institute for Marine Research is working to control lice outbreaks—that number topped 80 percent. "Escape must be taken seriously," State Secretary Vidar Ulriksen stated in a 2006 speech. "Every escape is one too many." The Directorate of Fisheries has enacted a plan to address the problem of escaped fish from a variety of approaches, from proposing new regulation, to monitoring and oversight of farms and surrounding areas, to incentives for companies that pass muster under auditing. "We believe it's possible to make the fish pens technically more safe, and to make the companies more focused on security to avoid salmon escape," says Peter

Gullestad, the director general of Fisheries.

Last year Norway formed an International Organization for Standardization (ISO) committee to establish global guidelines for fisheries and fish farms. "In Norway, reduction of escapees from salmon farms is the greatest priority for the government and the industry," says Erik Sterud, secretary of the committee.

Statistics Norway's preliminary figures for 2007 show roughly a 68 percent drop in salmon escapes, though it is un-

clear if this reflects recent efforts, natural fluctuations or underreporting on the part of farms.

Until aquaculturists can figure out a way to prevent all escapes, the Storting's salmon sanctuaries provide a much-needed buffer between farmed fish and their wild counterparts, at least in so far as they will prevent future farms from shoehorning into vital native runs. The 2007 vote piggy-backed on a similar, preliminary move that closed 13 fjords to farming in 2002. At the time, it was dually criticized for not offering enough wildlife protection, and for imposing too much restriction on the fish-farming industry.

Striking that delicate balance is a challenge that presents no immediate resolution, but increased attention from all sides—the government, the industry and international consumers—will play a key role at a pivotal time. Fredriksen, for one, isn't worried that farmed fish and wild fish can peacefully coexist. "Norway has a very long coast," he says. "It is my belief that we will have room for both."

Amanda Schupak is a freelance writer in New York City. A former reporter for Forbes, she specializes in science and technology. She enjoys Norwegian salmon—on a good New York bagel.