



**SALMON FARMING
SUSTAINING COMMUNITIES
AND FEEDING THE WORLD**

INTERNATIONAL SALMON FARMERS ASSOCIATION



SALMON FARMING: CONTINUED EVOLUTION AND SUSTAINABLE GROWTH

17.5 billion healthy meals every year.

132,600 jobs around the world.

\$15.4 Billion (USD) global annual production.

That's what the salmon farming industry contributes to the world.

In 2015, to celebrate the 25th anniversary of the International Salmon Farmer's Association (ISFA), we released a report entitled *Salmon Farming: Sustaining Communities and Feeding the World*. That report demonstrated - for the first time - the socio-economic impact that salmon farming has in countries and coastal communities around the globe.

This new report shows that the global salmon farming industry has continued to evolve sustainably. Our salmon farming companies are growing even more healthy meals with a minimal environmental footprint, while increasing annual production and creating more jobs in coastal communities around the world.

Today the world's salmon farmers produce 2.5 million tonnes of salmon annually. Whether you are eating fresh salmon sushi, a grilled salmon fillet or smoked salmon, the odds are it has been farmed by a member of ISFA. Farmed salmon has become a staple of healthy and affordable diets around the world. No wonder, really. Farmed salmon is delicious and consumers can feel good about eating it.

As one of the most energy efficient proteins to produce, the growth of salmon farming has brought opportunity and prosperity to many of the world's coastal and remote areas. It employs thousands of people in many countries and generates billions of dollars in revenue in local economies. Our sector continues to provide leadership and training opportunities for young people, so they can work and raise families in their home communities. Salmon farming's role in these communities cannot be understated. New schools are opening; stores are busy; families are building new houses; and, local organizations are supported with resources and volunteers.

Our salmon farmers have always faced challenges head-on by using science-based approaches to continue to improve. Companies operating around the world have made great strides in developing best practices as well as pioneering and adopting the latest innovations and technologies in farming and fish health. The technological advances our industry continues to see will create even more socio-economic benefits around the world including jobs, training and innovation.

With land and fresh water resources shrinking, the global salmon farming industry represents one of the best ways to feed the world's growing population with a minimal environmental footprint. Our farmers are proud of the tremendous sector they have developed, and we know that salmon farming will continue to make even greater contributions.

We remain honoured to represent this global industry.

A warm salmon regards

Trond Davidsen
President, ISFA



FOOD FOR OUR FUTURE

A profound change of the global food and agriculture system is needed to nourish today's 765 million hungry and the additional 2 billion people expected by 2050.

— UN Sustainable Development Goal #2

FARMED SALMON

A SUSTAINABLE HEALTHY FOOD FOR A GROWING POPULATION

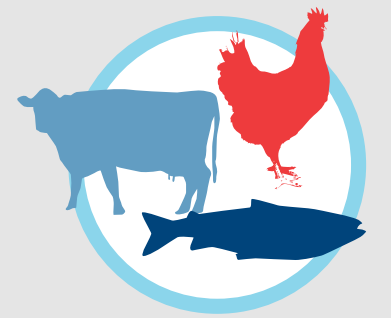
World population is outstripping food production

GLOBAL POPULATION EXPECTED TO RISE BY 2 BILLION BY 2050

United Nations

By 2050, worldwide animal protein consumption will rise nearly **73%**

Global Salmon Initiative



THE AMOUNT OF FOOD THAT WILL BE CONSUMED IN THE WORLD IN THE NEXT 50 YEARS **WILL EXCEED** ALL THE FOOD EATEN IN THE REST OF HUMAN HISTORY

The United Nations Food and Agriculture Organization forecasts a global seafood shortage of

50 – 80 MILLION TONNES by 2030

United Nations

FARMED FISH

BEEF

FARMED FISH HAS NOW SURPASSED BEEF IN WORLD-WIDE CONSUMPTION

Earth Policy Institute

World food supply needs to double by **2050**

(FAO PREDICTION)

MORE THAN 50% of all fish and seafood consumed already originates from aquaculture.

ONE IN FIVE PERSONS worldwide relies on fish for their primary source of protein

World fisheries are currently **50%** over exploited and natural fisheries will reach full depletion by 2056

Global Salmon Initiative

"One of the most consistent of all realities is that no matter who you are, or where you are, you need safe, nutritious, affordable food—every day."

Jeff Simmons, Elanco President



Farming THE Ocean

FARMING THE OCEAN FOR FINFISH, SHELLFISH AND AQUATIC PLANTS HAS BEEN A WAY OF LIFE FOR PEOPLE AROUND THE WORLD FOR CENTURIES.

Salmon farmers from small, coastal communities in four continents grow salmon in the best place possible – their natural, native ocean. They've farmed the ocean alongside traditional fishermen for nearly 40 years.

Terrestrial farming alone cannot feed the world as arable land and freshwater resources are shrinking. Aquaculture is a crucial and sustainable way to help supply the world's food needs.



0.00008%

{288 sq km}

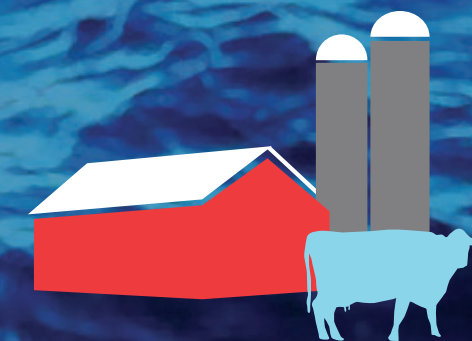
WORLD'S OCEANS produce

17.5 BILLION

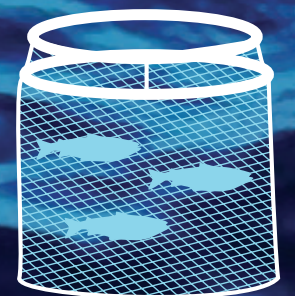


- OCEAN
- SALMON FARMS
- LAND

SPACE VS RESULT



1 M kg OF BEEF
3,573 ha OF PASTURE



1 M kg OF SALMON
1.6 ha OF OCEAN

Sustainable Salmon

Salmon farmers are committed to supplying sustainable seafood to consumers and continuing to be stewards of the world's oceans and aquaculture environments.

Salmon farmers have developed a modern and responsible industry that meets international and national regulations and industry codes of practice. Key elements of modern salmon farming include area management, integrated fish health management, and environmental monitoring programs. A growing number of companies also comply with third party certification programs.

SALMON IS ONE OF THE MOST ENERGY EFFICIENT FARMED ANIMALS.

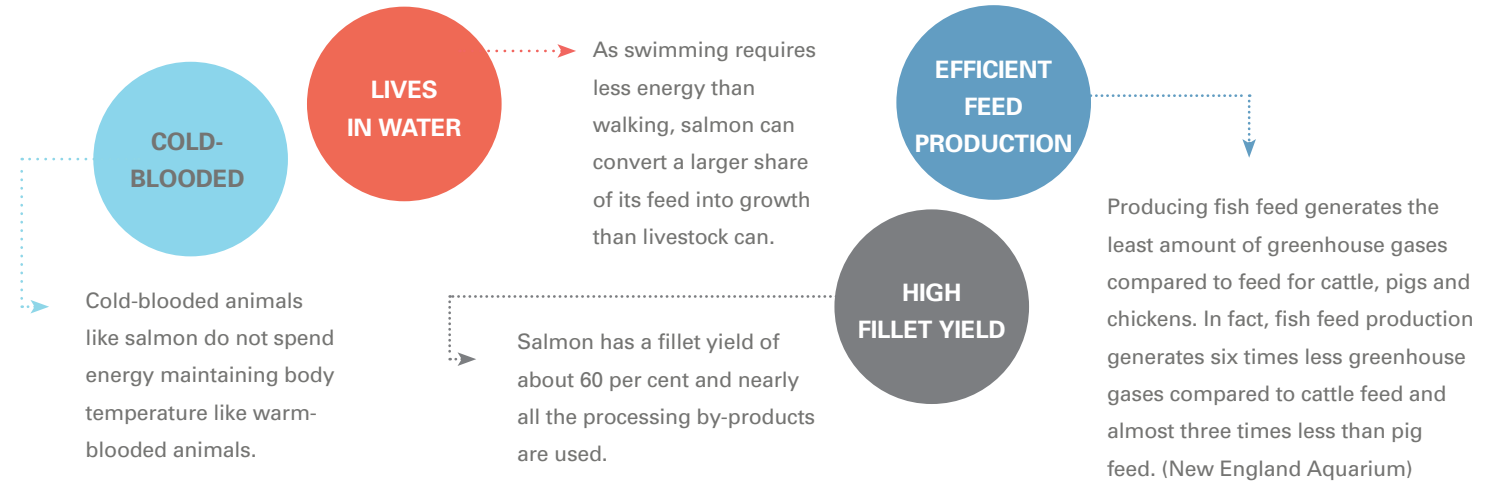
CARBON FOOTPRINT

Greenhouse Gas Emissions, kg,CO₂/kg edible product at wholesaler

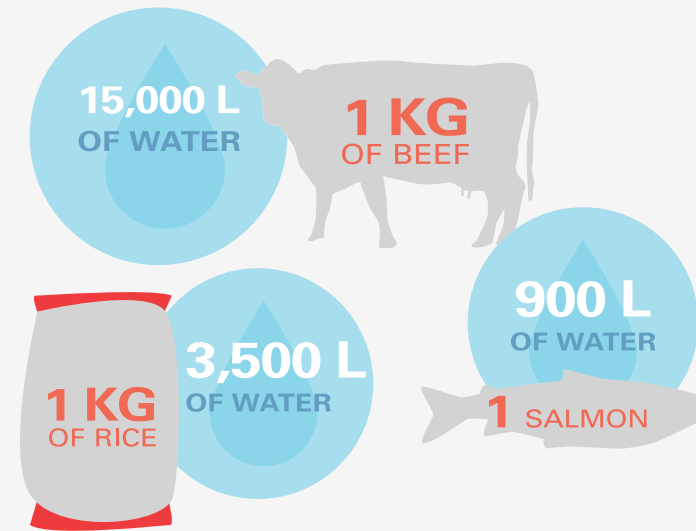
Herring	0.52
Mackerel	0.54
Chicken	2.7
Salmon	2.9
Cod	2.9
Haddock	3.3
Pork	5.9
Beef	30.0

The carbon footprint of farmed salmon is comparable to that of chicken, and only one tenth of the footprint of beef. (Source: SINTEF). This includes the fact that seafood is transported over longer distances to market than meat.

WHAT MAKES SALMON SO EFFICIENT?



LOW FRESH WATER USE

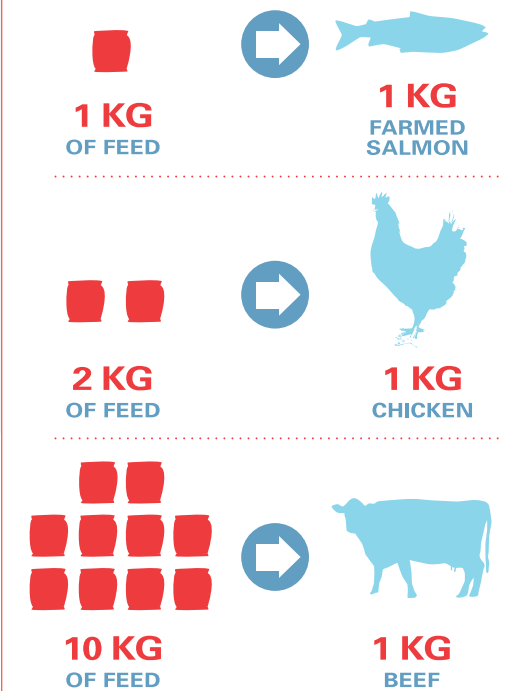


AVERAGE % OF WILD FISH INGREDIENTS IN FEED

1990: **80%** 2017: **20-30%**



SALMON ARE FEED CONVERSION CHAMPIONS



Nutritious and Delicious

Salmon is one of the healthiest foods you can eat and it's available fresh year-round.

Eating salmon can help prevent heart disease, lower cholesterol and blood pressure, boost brain function and reduce the risk of cancer, stroke, depression, Alzheimer's disease, arthritis, Crohn's disease and asthma.



EATING
OMEGA-3
RICH SEAFOOD LIKE SALMON CAN:

REDUCE THE RISK OF coronary death by **36%**

INCREASE life expectancy by **2.2** years

LOWER YOUR cholesterol

Prevent and slow the development of heart disease and help boost brain function



Contains no trans fat and has less saturated fat than beef or chicken



Salmon is one of the healthiest foods with a low calorie count



Needed to build and maintain every cell in the body



Helps in the formation and maintenance of bones and teeth, enhances calcium and phosphorus absorption and utilization



A factor in red blood cell formation



Helps energy metabolism and tissue formation



Phosphorus – Aids in the formation and maintenance of bones and teeth



Aids normal bone and tooth development and helps maintain the health of the skin and membranes



Helps energy metabolism and tissue formation

SALMON BY THE NUMBERS

17.5 BILLION MEALS PER YEAR

52,000
DIRECT JOBS

80,600
INDIRECT/
INDUCED JOBS

\$15.4
BILLION
(USD)
GLOBAL SALMON
PRODUCTION

360
MILLION
SQ KM
OCEAN IN
THE WORLD

**ONLY
288**
SQ KM
OCEAN USED
FOR
SALMON
FARMING

UNPRECEDENTED OPPORTUNITY

The growth of salmon farming has brought opportunity and prosperity to many of the world's coastal and remote areas, while producing one of the healthiest foods for a growing population.

Salmon farming is the world's fastest growing food producing sector, employing thousands of people in many countries and generating billions of dollars in revenue in local economies.

Our sector has made fresh, healthy salmon readily available all year round in markets around the world.

* Numbers based on 2016 data

STRENGTHENING COMMUNITIES

The global salmon farming industry is worth 15.4 billion (USD) but that does not include the significant spin-off jobs and economic prosperity the sector creates in coastal communities around the world.

The salmon farming sector helps drive rural economic diversification by directly and indirectly creating 132,600 jobs, further supporting small businesses and stimulating ongoing, transferrable research and development innovation.

Salmon farming may well represent the most promising approach to help revitalize our coastal communities and reverse the trend of young people leaving rural areas to work and live in larger urban centres. The majority of aquaculture jobs are full-time.



SALMON FARMING'S RIPPLE EFFECT





SALMON – A GLOBAL INDUSTRY

NORWAY

The development of an industry responsible for 29,000 Norwegian jobs and the delivery of fish to 100 vastly different countries creating 12 million meals a day, gives rise to a host of stories. The stories include portraits of brave pioneers, who in the shadow of the first Norwegian oil rigs, developed a second industrial fairy-tale: Norwegian aquaculture.

The industry also has a long history at the local level as the businesses it embraces form the cornerstone of many Norwegian coastal communities. Last, but not least, aquaculture is likely Norway's most important response to the challenge faced by the world today: to produce sufficient, healthy food for a rapidly growing population.

Today, each job in the core activity of the Norwegian aquaculture industry creates two more jobs in other Norwegian businesses or industry. Each krone created in the core activity of Norwegian aquaculture creates 1.48 krone in value creation in another areas of the Norwegian economy (Sintef, 2009).

Norway's long coastline includes islands and deep fjords, and extends for more than 83,000 kilometres - a distance twice as long as the Earth around the Equator. Norwegian waters are excellent for both fishing and aquaculture. Norway is a fishing nation with long traditions of harvesting the fruit of the sea. That harvest now includes farms.

Aquaculture makes it possible to offer seafood regardless of the seasonal variations that limit traditional fisheries. The industry and public authorities work together to manage these natural conditions, so aquaculture can be developed within a sustainable framework.

Just like the Vikings did 1000 years back, travelling around for new adventures, we've got our salmon today as the last Viking.

CHILE

Chile is the second largest salmon producer in the world. After copper and fruit, salmon is Chile's largest export.

Salmon has become one of the most important drivers in Chile's constant and successful national exporting growth over the past 20 years. In 2013, salmon represented 4.5 per cent of the total Chilean exports after copper, 80 per cent of the exporting total for the further south regions and more than 20 per cent of the total this country's food shipments.

The salmon farming industry supplies more than 70 international markets, fulfilling the most demanding International quality certifications with emphasis on security, occupational health, food and environment safety. In this way, Chile offers the world a sustainable and quality product that is one of the healthiest and most nourishing foods for human health.

Salmon farming production is concentrated on four south regions of the country: La Araucanía, Los Lagos, Aysén and Magallanes. In Los Lagos and Aysén, salmon farming has become the main developing activity of the regional economy and the most important source of employment for its inhabitants. It has also incorporated youth and women to the workforce.

Thanks to the production chain the sector creates, these areas have achieved significant improvements in infrastructure and connectivity, as well as an increase in educational opportunities for new generations and a significant improvement in the quality of life for its inhabitants.

CANADA

Farmed salmon is by far the most important finfish species grown by Canadian aquaculturists. Farmed salmon accounts for about 90 per cent of volume and value of total finfish produced by Canada's aquaculture industry.

British Columbia, on the west coast of Canada, produces 66 per cent of Canada's total farmed salmon production – while New Brunswick accounts for about 17 per cent, Newfoundland for 13 per cent and Nova Scotia for 4 per cent. Most farmers produce Atlantic salmon, although Coho and Chinook Pacific salmon is also farmed in British Columbia.

Canada's salmon farming industry provides more than 11,000 jobs, most which are in rural, coastal, and Aboriginal communities. The industry has proven to be a revitalizing social and economic force in many of these communities, providing meaningful year-round employment.

One of the unique aspects of the salmon farming sector in Canada is the close partnership opportunity it offers with Aboriginal peoples. First Nations in at least three provinces have taken a direct role in aquaculture development within their traditional territories. While British Columbia First Nations lead the way, Aboriginal participation in salmon farming is also occurring in Nova Scotia and Newfoundland.

Canada's farmers not only comply with rigorous federal, provincial, and local regulations, but all salmon farming companies in Canada have now achieved some form of independent third party aquaculture certification, including organic. Certification is a trusted "stamp of approval" demonstrating that Canadian farmed seafood products meet comprehensive food safety, environmental and social standards.

SCOTLAND

Since its pioneering beginnings in the seventies, production of Scottish farmed salmon has risen significantly from 28,000 tonnes in 1989 to an estimated 177,000 tonnes in 2016. Farm-gate value has increased from £98M to approximately £800M over the same period.

This growth is underpinned by a focus on scientific research and innovation to improve husbandry techniques and fish welfare, as well as seeking to preserve the pristine environment on which the industry depends.

Around 60 per cent of Scottish salmon is sold to the UK market where it is the consumers favourite fish. Exports of Scottish farmed salmon have soared from 8,700 tonnes in 1989 to 74,598 in 2016, reaching a value of £450M, making it Scotland's largest food export.

In addition to complying with stringent European Union and national regulation, Scottish producers subscribe voluntarily to many other standards - quality standards such as Label Rouge, the environmental standards of GlobalGap and fish welfare standards of RSPCA Assured - which apply rigorous criteria and are independently audited.

Almost all producers are approved under The Code of Good Practice for Scottish Finfish Aquaculture, a voluntary scheme with over 500 points of compliance and covering every stage of production. The Code helps to ensure Scottish salmon maintains its premium standards and allows its sustainable development.

It has been estimated that doubling the value of finfish production to £3.6 billion in 2030 could create a further 8,000 jobs across the wider supply chain in Scotland, equating to some 18,000 jobs in the sector. Ninety-one per cent of jobs in salmon farming are full time. Expenditure on suppliers and services to maintain production was over £587 million, with almost £381 million of that spent in Scotland. Total expenditure of this nature in the Highlands and Islands reached £158 million, a significant contribution to the local economy. This sustainable growth will be accompanied by substantial industry investment in farming systems and equipment designs, including new technology to allow farms to operate in more exposed areas.

UNITED STATES OF AMERICA

Salmon farming in the United States of America occurs on both the west and east coasts. While the combined production of these areas is modest by world standards, salmon farming has played a critical role in diversifying the economic base of traditional coastal communities and preserving endangered working waterfronts.

Growth of the U.S. salmon farming sector has been constrained by some of the strictest environmental regulations in the world, a limited number of biologically appropriate sites and extensive development of seasonal, recreational residences in coastal communities. Operating within this context, U.S. salmon farmers have developed sophisticated Best Management Programs designed to minimize environmental impacts and increase social acceptance.

Beginning in 1981, U.S. salmon farmers in cooperation with regulators developed a standardized set of environmental monitoring protocols and methods designed to ensure farms were operating within the local carrying capacity. In 1992, U.S. salmon farmers pioneered the use of third party verification of BMPs and the development of cooperative agreements with the environmental community. These efforts continue today through the implementation of a continuous improvement program.

On the west coast, in addition to traditional salmon farming, significant levels of stock enhancement occur using aquaculture methods. A total of 181 hatcheries release over 3 billion Pacific salmonid juveniles annually. Aquaculture enhanced stocks form the basis for substantial commercial and recreational fisheries in California, Washington, Oregon and Alaska. Collectively these fisheries annually generate \$1.2 billion in first point of sale revenues. While percentages vary between states, river systems and over different years, on average 45 per cent of these fisheries are directly dependent on stock enhancement hatcheries using aquaculture methods.



FAROE ISLANDS

The Faroese aquaculture industry has a long and proud history, with roots dating back to 1967. This heritage, combined with ideal natural conditions and a commitment to sustainability and quality, is now recognized around the world, and salmon from these small islands in the middle of the North Atlantic are exported to six continents.

The high demand for farmed salmon from the Faroe Islands, combined with the relative small size of the archipelago and the country's historic commitment to long-term sustainability, means that Faroese producers have a hard time satisfying demand. Farmed salmon is a vital part of the Faroese economy, representing more than 30 per cent of the country's export and providing valuable jobs for rural communities.

The aquaculture industry in the Faroe Islands is well consolidated, both horizontally and vertically. Only three companies that produce and export farmed salmon from the Faroe Islands. The vertical integration allows producers to have full control over the quality of the salmon from roe to export. Although the Faroe Islands is located in the middle of the North Atlantic, fresh salmon from the Faroe Islands can reach the U.S. market within just 72 hours of harvesting.

ICELAND

The new revival of Icelandic aquaculture has progressed slower than was generally expected. In the year 2017 we expect to see a production of about 10 thousand tons of salmon; a slight increase from the previous year. The last couple of years may be characterized as having been years of slow growth, since only one license for production has been issued over a period of 30 months.

The framework of aquaculture in Iceland has been overhauled in the last few years. A revised legislation came into effect in the beginning of 2015. Late last year extensive work on the strategy for aquaculture was started and this work was finished in August of this year. Last July a risk assessment of aquaculture was completed by the Icelandic Marine Institute, paving the way for an overall production of some 70 thousand tonnes of salmon. Its main finding was that negative consequences for the wild salmon stock in Icelandic rivers are very limited and theoretically could affect only about three rivers out of some 60 that were included in the study.

Although in many ways disappointing, the risk assessment should facilitate more effective growth in aquaculture in Iceland. The Icelandic authorities are committed to further growth, as long as it does not have any harmful consequences for the wild salmon stocks. Those objectives are fully compatible with the views of the salmon industry in Iceland.

Although aquaculture in Iceland will be more and more characterized by a growing salmon production, it is important to note its other sectors. Favourable circumstances, due to the abundance of geothermal water, provides us with potential growth in land-based fish farming. New species, such as Senegal flounder, are emerging. Iceland has been, and will continue to be, a world leader when it comes to the production of arctic char. Its production will continue to grow gradually, guaranteeing its strong status in the international market.

IRELAND

Salmon have been farmed in Ireland since the early 1980s, taking advantage of the combination of fast flowing sites and adjacent sheltered bays on the west, south west and north west coasts.

Ireland specializes in offshore farming techniques with the move to more exposed sites in the 1990s, and has also pioneered organic production with the certification of the world's first organic salmon farm, Clare Island.

With a relatively small domestic population, Ireland's salmon industry has relied largely on export markets and a network of artisanal traditional salmon smoke-houses. It has moved almost all its production into organic production, having pioneered the concept of preventative husbandry methods to tackle sea lice problems using Single Bay Management.

All Irish farms are inspected 14 times a year under a national pest management plan which forms part of the production licence. Obtaining sufficient licences from a state system which historically and politically has refused to recognise the benefits or potential of its marine economy has been the main difficulty for the sector in Ireland. European Habitats regulations which were not properly implemented by successive governments left the industry vulnerable to the impacts of European Union court cases against the government by NGOs thereby slowing down the system of licencing to almost a complete halt in the last decade.

Lack of political support and foresight threatens the potential of the entire aquaculture sector (also including shellfish) to respond to expanding markets or create badly needed employment in a country with 5,631 kilometres of coastline sitting in some of the richest waters in the world with ideal sites for fish farming.

NEW ZEALAND

New Zealand is the world's largest producer of Chinook (King) salmon, considered the champagne of salmon, with a 2013 harvest of 12,000 tonnes accounting for roughly 70 per cent of total global production.

The premium species of salmon, King Salmon is prized for its characteristic rich flavour, delicate soft texture and high Omega-3 content. King Salmon is more challenging to farm than Atlantic salmon, but yields a revered product that typically achieves a premium over the Atlantic variety in most markets.

Last year, the New Zealand salmon industry generated approximately US\$56 million in revenue and provided employment for over 500 hundred Kiwis.

Our King salmon are farmed in the pristine, colder waters off the South Island with the majority in sea pens in Marlborough, Canterbury and Southland regions and three small fresh water farms operating in the McKenzie Country hydroelectric-canals. The farms are located in areas selected for their isolation, water quality and flow.

Core to the industry is an uncompromising commitment to the responsible management of its resources. The country's Environmental Codes of Practise are independently recognized as world-leading while low stocking densities and world-class animal husbandry practices ensure the welfare of our fish and the quality of our product.

King Salmon were introduced as ova early in the 1900s from California to establish a recreational fishing run. A group of dedicated and innovative pioneers first began farming King Salmon in 1970s.

Over the decades, the industry has developed a proud history as a professional, specialized and quality food production sector focused on environmental sustainability, food safety and value added marketing.





TASMANIA

Salmon farming commenced in Tasmania in the mid-1980s after a report to the Tasmanian Fisheries Development Authority concluded that a salmon farming industry could be successfully developed in Tasmania.

As a result, in 1984, fertilised Atlantic salmon eggs were purchased from the Gaden Hatchery (Thredbo River, Jindabyne, New South Wales, Australia), which were from stock originally imported in the 1960s from Nova Scotia, Canada. A sea farm was established at Dover in the south of Tasmania and a hatchery was developed at Wayatinah in the central highlands.

The first commercial harvest of 53 tonnes was in the summer of 1986/87. The Tasmanian industry now produces almost 45,000 tonnes per annum. Of the eleven companies that began farming salmon in the mid 1980 s, four remain.

Tasmania's primary industries are the engine room of its economy and salmonid (Atlantic salmon and Ocean trout) aquaculture has the potential to significantly power Tasmania's economic growth. The Tasmanian salmonid industry has contributed to Tasmania's reputation as a quality producer of fine foods. Farmed salmonids have become the leading farming activity in Tasmania ahead of dairy, vegetables, poppies, pyrethrum, beef, fine wool, wine and the once iconic apple industry. It has become a standout Tasmanian brand icon.

The industry continues to experience strong sales momentum despite the current challenging economic environment. Approaching \$550 million at wholesale levels, sales are proving resilient. The salmon and trout farming industry currently create over 1,500 direct jobs and \$190 million to the Tasmanian Gross State Product.

Tasmanian Salmon growers employ world best practice in their farming techniques and their dedication to quality processes can be seen, and tasted in the fine texture and flavours of this exquisite seafood delicacy.

The following organizations contributed to the development of this report:

NORWEGIAN SEAFOOD FEDERATION
SALMON CHILE
SCOTTISH SALMON PRODUCERS ORGANIZATION
CANADIAN AQUACULTURE INDUSTRY ALLIANCE
ATLANTIC CANADA FISH FARMERS ASSOCIATION
NEWFOUNDLAND AQUACULTURE INDUSTRY ASSOCIATION
BRITISH COLUMBIA SALMON FARMERS ASSOCIATION
FAROE ISLAND SALMON FARMERS
TASMANIAN SALMONID GROWERS ASSOCIATION LTD (TSGA)
MAINE AQUACULTURE ASSOCIATION /USA
IRISH SALMON GROWERS ASSOCIATION
NEW ZEALAND SALMON FARMERS ASSOCIATION INC.
ICELANDIC AQUACULTURE ASSOCIATION

Photos for this report supplied by ISFA members



INTERNATIONAL SALMON FARMERS ASSOCIATION

www.salmonfarming.org