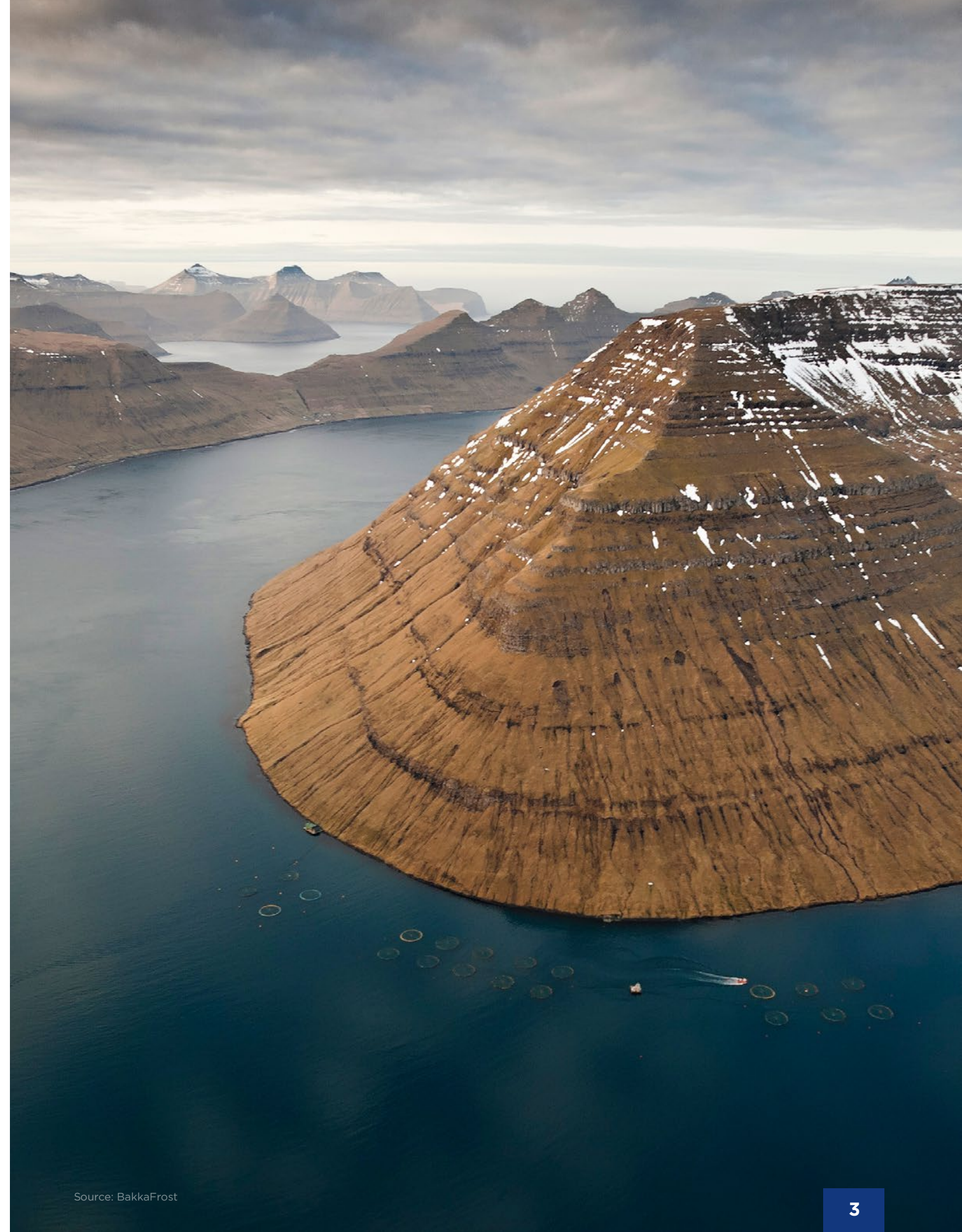


**SUSTAINABLE  
SALMON FARMING:**  
THE FUTURE OF FOOD



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# INTRODUCTION

## A constantly evolving world

Every industry has been experiencing rapid, extensive, and sometimes devastating change over the past few years, and the food industry is no exception.

Our world is changing—populations are growing, our climate is changing, and there is more pressure than ever on our food systems. The demand for food is set to increase by 50%, and demand for animal-based foods by nearly 70%.

However, we cannot continue to produce more food on land to meet this growing demand. Animal agriculture has a vast environmental footprint, and is responsible for more greenhouse gases than all the world's transportation systems combined.

In order to feed almost 10 billion people by 2050, we need to rethink current food systems and find a new approach, which supports greater food security globally, positively contributes to human health, and reduces pressures on the environment.<sup>1</sup> It is not simply a case of producing more food, we need a more sustainable and efficient food system.

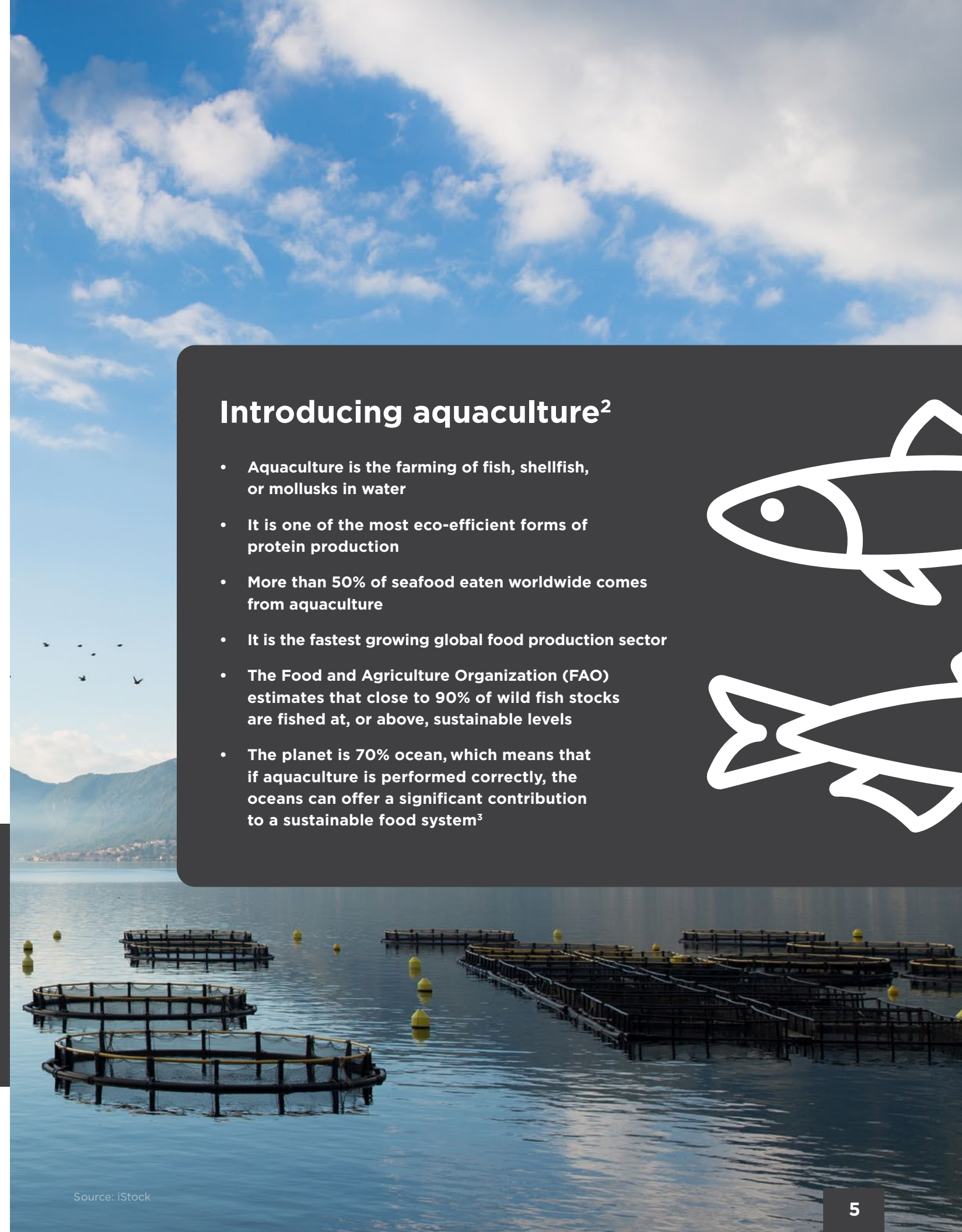
In this resource, we take a deeper look into the role farmed salmon can play in future food systems and the work we, as the Global Salmon Initiative (GSI), are doing to ensure our industry is adapting and improving at the speed and scale the world needs.

**“Since 1961 the annual global growth in fish consumption has been twice as high as population growth, demonstrating that the fisheries and aquaculture sector is crucial in meeting FAO’s goal of a world without hunger and malnutrition”**

-José Graziano da Silva, FAO Director-General

## Introducing aquaculture<sup>2</sup>

- Aquaculture is the farming of fish, shellfish, or mollusks in water
- It is one of the most eco-efficient forms of protein production
- More than 50% of seafood eaten worldwide comes from aquaculture
- It is the fastest growing global food production sector
- The Food and Agriculture Organization (FAO) estimates that close to 90% of wild fish stocks are fished at, or above, sustainable levels
- The planet is 70% ocean, which means that if aquaculture is performed correctly, the oceans can offer a significant contribution to a sustainable food system<sup>3</sup>



**“We must plant the sea and herd its animals using the sea as farmers instead of hunters. That is what civilization is all about—farming replacing hunting”**

-Jaques-Yves Cousteau, Oceanographer

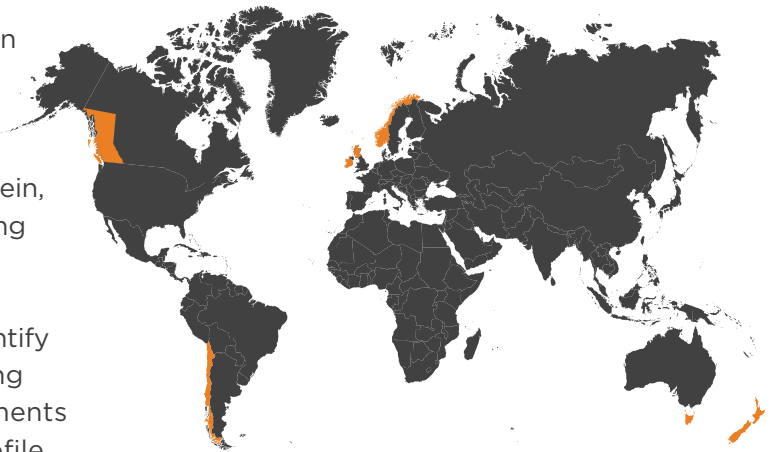


## The GSI

We believe that ambitious goals, greater collaboration and greater transparency are the drivers to a more sustainable food system. Uniting 50% of the global farmed salmon sector, we have set a clear objective of providing a healthy and sustainable source of protein, while minimizing environmental impact and continuing to improve our social and economic contributions. By combining global expertise, we have created a solution-focused knowledge-sharing platform to identify challenges, foster development of advanced farming approaches, and drive the environmental improvements the industry needs to enhance its sustainability profile.

**21** MEMBER COMPANIES

**8** OPERATING REGIONS



**13** PRODUCERS

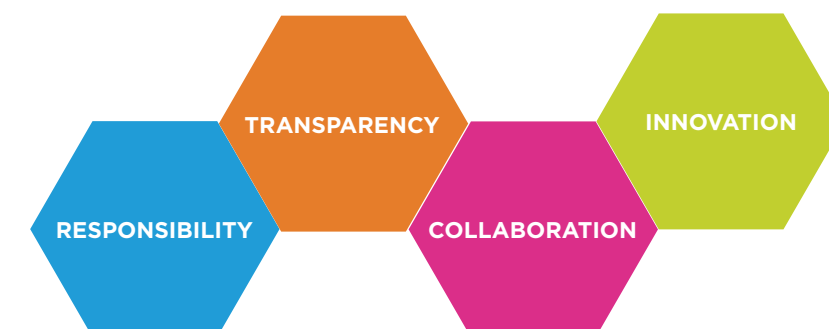
**8** SUPPLY CHAIN ASSOCIATES

## Our Priorities

Responsible Farming	Transparency	Feed	Fish Health and Welfare
Committed to 100% ASC certification	Annual Sustainability Report	Innovations for greater sustainability in feed ingredients	Knowledge sharing to drive continuous improvements in best practices

Basing our work on four key pathways to the future: responsibility, transparency, collaboration and innovation—we believe we can be the change drivers in ensuring salmon farming continues to be part of the solution of future food systems. Salmon aquaculture offers great potential in providing a healthy and sustainable protein, but like any industry, as we face new challenges daily, we must focus on continuous improvements to ensure a long-term sustainable future.

### GSI PATHWAYS TO THE FUTURE



# OCEAN STEWARDSHIP

## The ocean is the major regulating force in the earth's climate system and represents the largest carbon sink on the planet

The world's oceans are essential for life on our planet, but they are under threat from the effects of climate change, pollution, loss of biodiversity and unsustainable use. Safeguarding our oceans for future generations is a shared responsibility and a matter of global urgency.<sup>4</sup>

As ocean farmers, we understand that the future of salmon farming depends on clean and healthy oceans—where protection and production go hand in hand.<sup>3</sup> To have healthy salmon, we need healthy oceans.

### The Ocean Opportunity

Covers  
**70%**  
of the  
Earth's surface



Largest  
**biosphere**  
on the planet



Home to  
**50-80%**  
of **all life** on Earth



Absorbs  
**25%**  
of all CO<sub>2</sub>  
emissions



Generates  
**50%**  
of the Earth's  
oxygen

## The ocean currently provides the largest source of protein for humans<sup>5</sup>

Seafood is the primary source of protein for almost

**40%**

of the global population<sup>6</sup>

**~3 billion**

people rely on the ocean for vital nutrition<sup>6</sup>

## Oceans are the foundation for vibrant economies

**10–12%**

of the world's population relies on the fisheries and aquaculture sectors for their livelihoods<sup>7</sup>

**\$2.5 trillion**

is generated each year from goods and services from the ocean—an amount expected to double by 2030<sup>8</sup>

The ocean is the **7th largest** economy in the world today<sup>5</sup>



# SEAFOOD CONSUMPTION: A CHANGING LANDSCAPE

A population that is at an abundance level that produces the maximum sustainable yield is called “fully-exploited” or “fully-fished”.

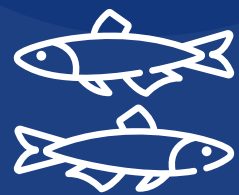
Currently, the United Nations (UN) FAO estimates that:<sup>3</sup>

**60%**  
of fisheries are  
**fully-fished**

**33%**  
of fisheries are  
**over-fished**

**7%**  
of fisheries are  
**under-fished**

However, consumption of seafood is increasing:<sup>3</sup>



Per capita consumption of seafood **more than doubled** between 1961 and 2015<sup>6</sup>



Climate change could reduce the productivity of fisheries in the world's exclusive economic zones by up to **12% by 2050**<sup>9</sup>

## A responsible blue revolution for healthy oceans and healthy people

Land-based agriculture will not be enough to meet future food demands. Our planet is 70% ocean, yet only 5% of our food comes from there. As the pressure grows to produce more food and the limits to traditional agriculture become more apparent, people will look to the oceans.

Current wild fish stocks are not able to fulfill the growing demand. We need to establish solutions to reverse trends of overfishing and restore wild stocks, without leaving a gap in demand for seafood. A sustainable supply of fish for consumption is therefore needed, and aquaculture can play an important role here but only if the industry continues to invest in improving its sustainability performance.

By scaling up aquaculture, in a responsible manner, we can meet the growing demands for protein and fish, and alleviate pressure on wild fish stocks, allowing them to recover.

**50% of the seafood we eat is now farmed and this is projected to reach 62% by 2030.<sup>10</sup>**

**Wild fish stocks cannot be exploited to feed more people.**

**If responsibly managed, aquaculture can provide eco-friendly and nutritious food while alleviating pressure on marine life and protecting ocean biodiversity.**



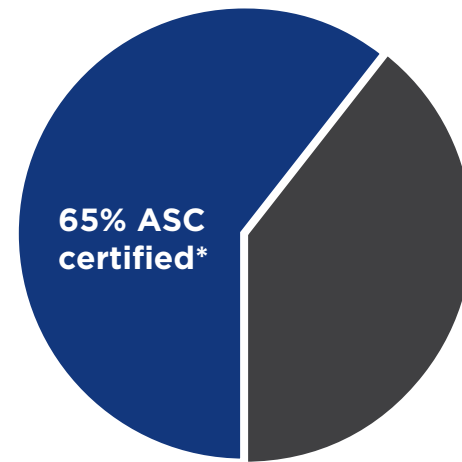
Like all farmers, salmon producers have a duty to rear their animals responsibly. Salmon farming is the most advanced form of aquaculture, but the industry recognizes that if it is to expand to meet demands in a sustainable manner, it must continue to improve its environmental performance. Farmed salmon is high in protein and omega-3 fatty acids, offering a suitable alternative to meat.

## Minimizing our impact through 100% ASC certification

GSI's core mission is to ensure that our salmon farming operations are sustainable and support healthy oceans, with the lowest possible impact. However, it is not enough to simply say that we are changing and improving the sustainability of the salmon farming industry; we need to demonstrate the change with third-party validation.

We chose the Aquaculture Stewardship Council (ASC) Salmon Standard because it is the most stringent certification that monitors and measures every aspect of a farm's environmental and social performance, and motivates farms to continually improve.

Certification is a timely and cost-intensive process that can take many months to complete and for this reason, is widely recognized as the leading certification for responsible aquaculture. GSI has committed to achieving 100% ASC certification across all member farms.



\* Figure as of end of 2019



**“ASC-certified salmon farms minimize impacts on the local ecosystem in a number of ways, such as the development and implementation of an impact assessment to protect birds, marine mammals and sensitive habitats, protection of the ecological quality of the seabed, ensuring farms are not sited in High Conservation Value Areas and minimizing fish escapes to an absolute minimum. All lethal incidents with wildlife must be made publicly available”<sup>11</sup>**

-The Aquaculture Stewardship Council

## Transparently sharing our performance through the GSI Sustainability Report

Like any food production sector, salmon farming has an impact. Our aim is to minimize this impact and operate in a way which responsibly uses natural resources, and to transparently report on our impact and our progress in doing better.

The GSI annual Sustainability Report is published on our website, and documents our progress across many of the industry's key sustainability metrics; openly sharing our environmental performance as a means of encouraging and accelerating improvements, as well as building trust with our stakeholders.

### GSI Sustainability Report



**6 years'**  
worth of data

All data for 2016, 2017 and 2018  
have been independently audited



**14** indicators based  
on ASC standard

► **9** environmental  + **5** social 

Data for 14 companies, across all 8 operating regions





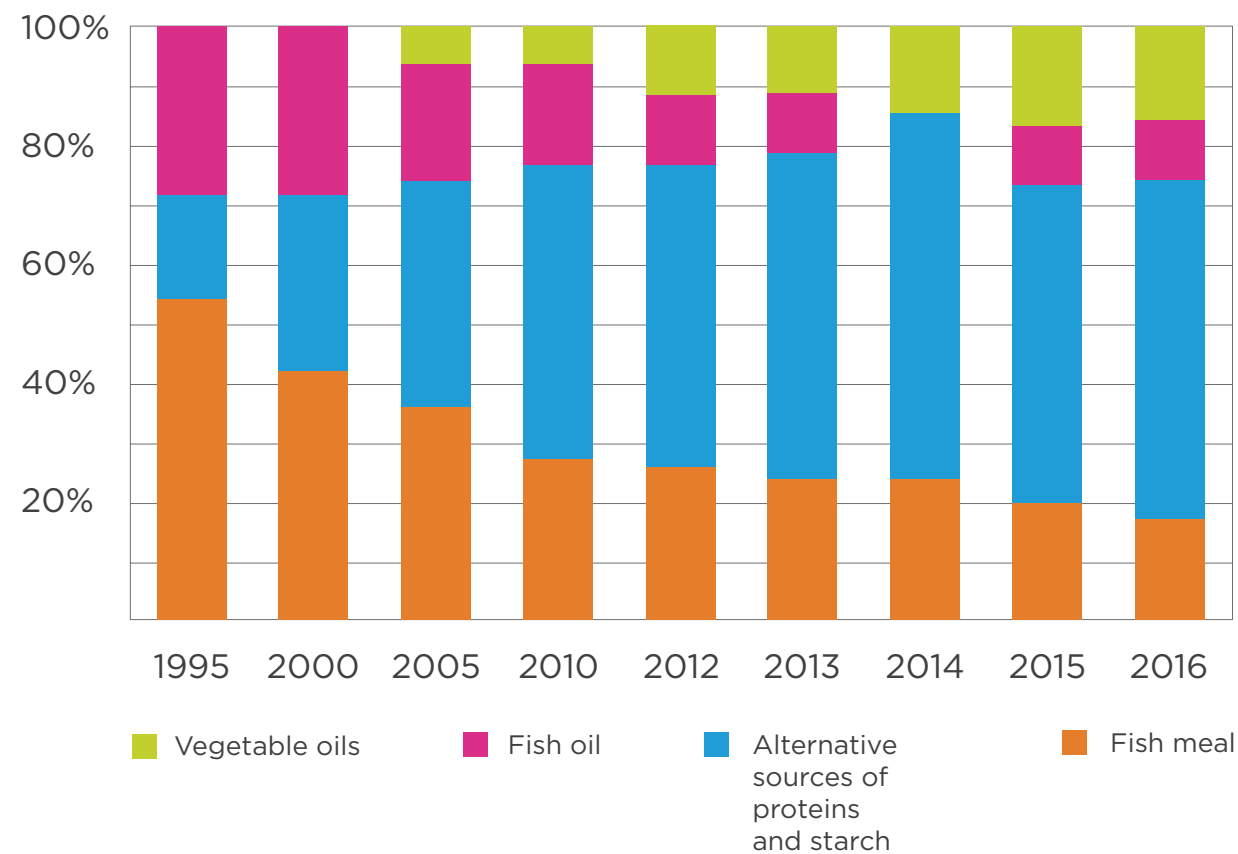
## Reducing the reliance on wild fish for fish feed

Feed ingredients play an important role in the efficiency of salmon farming, and provide the salmon with all the protein and essential nutrients required for optimal health and growth.

**We need to produce fish feed without putting undue pressure on wild fish stocks or natural resources.**

## INNOVATION IN FEED INGREDIENTS

Raw material evolution in fish feed production



The raw materials used in fish feed production have evolved greatly over the previous 20 years. In the 1990s, fish meal and fish oil dominated the feed recipes. Thanks to technological breakthroughs, innovative ingredients, and research and development (R&D) efforts of the aquaculture industry, feed recipes are now formulated without dependency on scarce marine stocks and without compromising the nutritional needs of the fish. Our work with feed companies has supported the dramatic reduction in the feed conversion ratio (FCR) of farmed salmon over the past two decades. This is now down to 1:2 on average, making farmed salmon one of the most efficient animal proteins available.

To further support a reduction in the use of marine ingredients, the farmed salmon sector has been supporting R&D into non-marine sources rich in omega-3 fatty acids, such as algae, canola crops and insects. In 2015, GSI and our associated feed companies launched a global tender to help identify commercially viable, non-marine alternative sources of omega-3 fatty acids. The tender was highly successful in highlighting the growing industry need for novel, non-marine alternatives and prompted a significant increase in the variety and number of options available to the industry. Industry feed companies are now working with multiple providers, incorporating these fish-free ingredients into industry feeds.

## OPTIMIZATION OF FISH BY-PRODUCTS

An important part of sustainability, and ocean conservation, is ensuring the highest utilization of all ocean resources. This is why in 2015, GSI partnered with the FAO and the University of Stirling, Stirling, UK, to map global resources of fisheries and aquaculture by-products (the fish parts not sold or used). This mapping project identified where there were available by-product resources, and allowed the FAO to promote greater utilization.



### Finding alternative sources of omega-3 fatty acids

Omega-3 fatty acids, usually obtained from the fish oil in salmon feed, can also be found in non-marine sources such as algae or from crops like canola

**GSI members have reduced the amount of fish oil in feed from 24% to 11%**



### Improvements in the forage fish dependency ratio (FFDR)

FFDR is the amount of wild fish needed in feed to produce 1 kg of farmed salmon. The lower the FFDR, the lower the inclusion percentage of wild fish

**GSI members have reduced the amount of fish meal in feed from 65% to 18%**



### Optimization of fish by-products research

Following this research, new approaches were initiated to harness these fish by-products and redirect them

**Redirect fish by-products to become a feed resource instead of going to waste**

**“One of the biggest innovations to have taken place in salmon farming in the past decade is the significant reduction in the use of wild fish as part of the farmed fish’s diet. Through innovation and improvements in feeding techniques, we have not only been able to reduce the amount of marine resources needed, but also been able to identify new novel resources to replace the marine oils we required before”**

-Tor Eirik Homme, Director Feed and Nutrition at Grieg Seafood ASA

## GSI’s public commitment to Sustainable Development Goal 14

Responsible aquaculture has the ability to support many of the UN’s Sustainable Development Goals (SDGs) and can directly affect and impact seven of the 17 SDGs, but SDG 14 “Life below water” is our number 1 priority. Here is how we are using our efforts within GSI to reinforce our work as ocean stewards.



### In terms of our commitment to being responsible ocean stewards, here is how the GSI supports SDG 14 to make this possible

- Utilize GSI’s model of pre-competitive collaboration to promote accelerated improvements in responsible aquaculture
- Transparently report on environmental and social performance via GSI’s annual industry-wide Sustainability Report
- Drive industry innovation through continued partnerships and sharing of expertise
- Share knowledge and insights from salmon farming to developing aquaculture sectors to accelerate improvements and support aquaculture as a sustainable food source, and positive contributor to local communities and economies

## REDUCING MARINE POLLUTION

Approximately 8 million tonnes of plastic enters the sea every year; if it continues at this rate, we face a possibility of having more plastic in the ocean than fish by 2050.

We see it as part of our role to reduce and remove plastic from the ocean, and there are three ways we are doing this:



Reducing plastic use



Beach clean-ups



Recycling

We also have an opportunity to lead the way within our local communities by supporting greater awareness of environmental conservation and demonstrating our clear commitment to ending plastic pollution.



Ventisqueros, Chile



BakkaFrost, Faroe Islands

**As salmon farmers, we believe that the oceans can provide a healthy food source for millions of people around the world, but this will only be possible if we each take our role as ocean stewards.**

# CLIMATE CHANGE

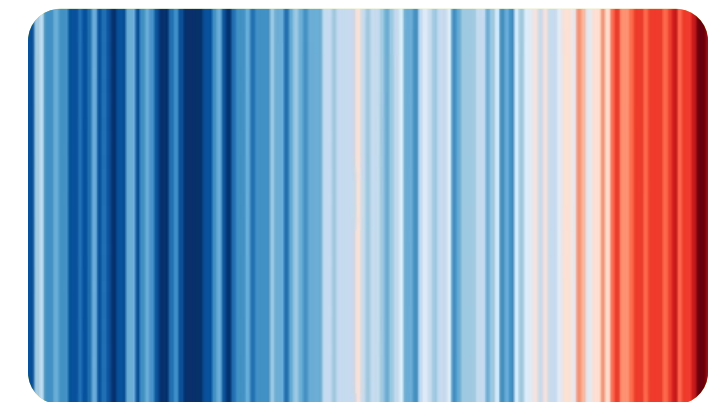
## Climate change will affect how and where we produce food

### Climate change

The world's leading climate scientists have warned that we only have 12 years remaining for global warming to be kept to a maximum of 1.5°C. After this point, even half a degree will significantly increase the risks of drought, floods, extreme heat and poverty for hundreds of millions of people. Climate change also has a direct impact on the oceans, dramatically altering ocean ecosystems, including rising sea levels and temperatures, acidification, and oxygen loss.

Keeping global warming to less than 1.5°C will only be achieved by reducing CO<sub>2</sub> and other greenhouse gas emissions from all sectors, including food production.

### ANNUAL GLOBAL TEMPERATURES FROM 1850 TO 2017



Warming Stripes, Professor Ed Hawkins (University of Reading)

### Key impacts of climate change<sup>12</sup>

- Rising temperatures
- Melting sea ice—sea-level rise
- Ocean acidification
- Changing climate—increasing precipitation and increasing droughts
- Reduction in availability of freshwater
- More extreme weather events affecting livestock and crops
- Reduced crop yields

# “The single biggest threat of climate change is the collapse of food systems”

-Jerry Hatfield, the director of the U.S. Department of Agriculture's National Laboratory for Agriculture and the Environment<sup>13</sup>

## The impact of foods on climate change

- Agriculture contributes 17% of greenhouse gas emissions, and an additional 7-14% through changes in land use<sup>14</sup>
- Raising livestock for meat, eggs and milk:<sup>15</sup>
  - Generates 14.5% of greenhouse gas emissions
  - Is the second highest emitter of greenhouse gases
  - Contributes more greenhouse gas emissions than all global transportation

## The impact of climate change on food production

There is a direct risk that a changing climate will reduce production and productivity of many agriculture products:



Land currently used for agriculture or livestock farming will be required for climate change mitigation, i.e. reforestation to capture CO<sub>2</sub> and growing energy crops to reduce reliance on fossil fuels



It is expected that impacts on stock productivity and fish migration patterns will decrease productivity in half of all fisheries worldwide<sup>16</sup>

Rapid and large-scale changes, which do not damage natural resources or add to climate change, are needed to provide nutritious food to a burgeoning global population.

## How does salmon farming fit into the picture?



Farmed salmon is a healthy source of protein, with a low environmental impact and one of the lowest greenhouse gas profiles of all animal protein sources, offering an eco-friendly alternative to meat



With only 5% of oceans currently being used for food production, there is an opportunity for oceans to contribute to filling the protein gap—particularly as land sources are under pressure from a changing climate

**Aquaculture is the fastest-growing food industry in the world and already produces more biomass than either wild seafood or beef, making it a fundamental part of future food production.<sup>17</sup>**

# Role of salmon farming as a climate-friendly food

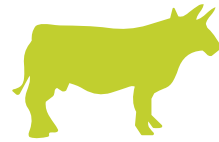
Studies show that aquaculture supports climate-friendly diets because it:<sup>17</sup>



Requires **less fresh water**



Utilizes **fewer crops and less land** (even if over one-third of protein production comes from aquaculture by 2050)



Has a **lower carbon footprint** than non-marine proteins (chicken, pork, beef)

## When deciding which protein to eat, we should consider what is good for the planet and our health

**COMPARED WITH BEEF, CHICKEN AND PORK, FARMED SALMON IS THE MOST PLANET-FRIENDLY CHOICE IN TERMS OF:**

- CARBON FOOTPRINT
- LAND & WATER USE
- FEED RESOURCES

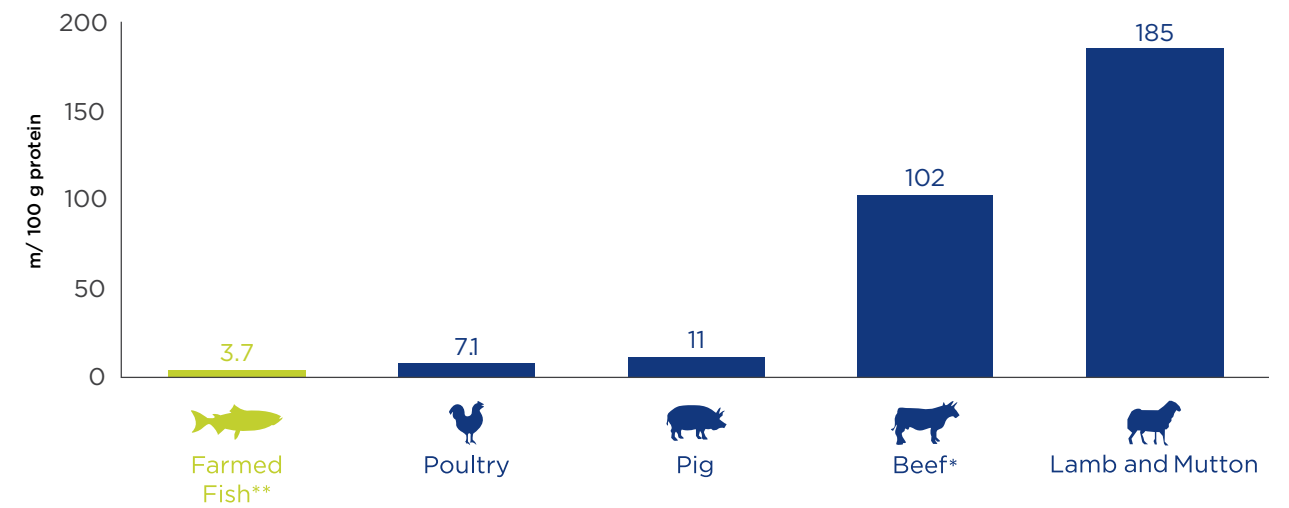
**FARMED SALMON IS HIGHLY NUTRITIOUS:**

- HIGH IN OMEGA-3S FOR HEALTHY HEART AND BRAIN
- HIGH IN PROTEIN
- RICH IN VITAMINS AND MINERALS

1. HILBORN ET AL., 2018. THE ENVIRONMENTAL COST OF ANIMAL SOURCE FOODS  
 2. POORE & NEMECEK, 2018. REDUCING FOOD'S ENVIRONMENTAL IMPACTS THROUGH PRODUCERS AND CONSUMERS  
 3. FRY ET AL., 2017. FEED CONVERSION EFFICIENCY IN AQUACULTURE: DO WE MEASURE IT CORRECTLY?  
 4. MOWI, 2019. SALMON FARMING INDUSTRY HANDBOOK

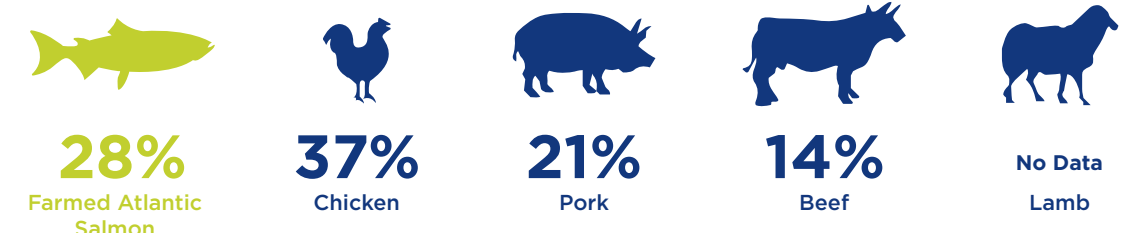
## Land Use

The amount of land needed to produce 100 g of edible protein.



## Protein Retention

Protein retention describes the gain in edible protein as a percentage of the protein intake from food. It is calculated as a percentage (grams protein in edible portion / grams protein in feed).



## Farmed salmon is one of the most eco-efficient and sustainable forms of protein

	Farmed Atlantic Salmon	Chicken	Pork	Beef
Feed Conversion Ratio <sup>1</sup>	1.2-1.5*	1.7-2	2.7-5	6-10
Water Consumption <sup>2</sup> (liter / kg edible meat)	2,000**	4,300	6,000	15,400
Carbon Footprint <sup>1</sup> (grams CO <sub>2</sub> -equivalent / typical serving of 40 g edible protein)	0.6*	0.9	1.3	5.9

<sup>1</sup> Global Salmon Initiative (GSI) Sustainability Report. Available at: <https://globalsalmoninitiative.org/en/sustainability-report/>. Last accessed October 2019.  
<sup>2</sup> Mowi. Salmon Farming Industry Handbook 2019. Available at: <http://hugin.info/2019/R/2246047/887370.pdf>. Last accessed October 2019.  
 \* Figures reflect feed conversion ratio and carbon footprint of farmed Atlantic salmon.  
 \*\* Total water footprint for farmed salmon fillets in Scotland, in relation to weight and content of calories, protein and fat.

The Intergovernmental Panel on Climate Change has projected the impact of predicted global rising temperatures of 1.5°C.

## Dramatic action is needed to decelerate global warming and mitigate climate change

All foods we eat have a climate impact. But when it comes to those impacts, not all foods are created equal. From plants and grains, to dairy and meat, the effects of our diets on global greenhouse gas emissions depend on the types of food we consume. Sustainable seafood is part of the solution to more climate-friendly diets.<sup>18</sup>

## How GSI is speeding up improvements to further reduce the industry's carbon footprint

Salmon farming is already an eco-efficient food production sector; however, with the current climate change issues, it is important that we continue to look for ways to improve our performance and reduce our carbon footprint.

Here are two examples of ways our members are improving their carbon footprint using the GSI model of collaboration and innovation to accelerate improvements.

# Case Studies

Cargill and Skretting are two established fish feed suppliers, working together to minimize the carbon footprint of feed delivery services for salmon farmers in Norway. Previously, cargo ships with Cargill's feed would sail to farms along the Norwegian coast at the same time as other ships with Skretting feed. The companies realized that despite being business competitors, there was a way to optimize logistics, remove inefficiencies in the transport chain, and drastically improve the environmental footprint of transporting feed. It is estimated that the efficiency improvement will reduce emissions of greenhouse gases by one-fifth per ton of fish feed transported. This equates to 15–20 million kg of CO<sub>2</sub> per year, which is equivalent to removing 7,500 cars from the roads every year.



Grieg Seafood ASA has become the first salmon farmer to install solar panels and a wind turbine at a salmon farm to reduce the use of a diesel generator. The renewable energy technology is being used at its Nordeimsøyna site in the Finnøy municipality, Norway, and was the idea of Helleik Syse, a master's student from the University of Stavanger, Stavanger, Norway. The project will reduce the site's emissions of CO<sub>2</sub> by 98 tons, as well as enable the plant to save about 36,000 liters of diesel a year.



## Ensuring responsible aquaculture

Like any growing industry, we will need to manage our carbon footprint as we look to the future and continually look for ways to reduce it.

GSI member Salmones Camanchaca is leading the way with its commitment to being carbon-neutral by 2025.

“Our commitment to become carbon-neutral by 2025 is regarding our Scope 1 and Scope 2 emissions of The Greenhouse Gas Protocol, as well as those related to the disposal of waste (Scope 3). In other words, our commitment encompasses all operations and processes upon which we have control over decisions that influence greenhouse gas emissions. Simultaneously, we will begin working with our suppliers to further reduce Scope 3 emissions and the footprint of our final product,” said Alfredo Tello, Technical and Sustainability Manager, Salmones Camanchaca.

To become carbon-neutral, Salmones Camanchaca will prioritize reducing its main sources of carbon emissions: fossil fuels, electricity and refrigerants. To achieve this they will partner with suppliers to optimize processes and introduce new approaches to reduce emissions. The company will also balance its carbon emissions with 1,000 hectares of forest heritage.

**“The company’s forests have an estimated capacity to capture 14,000 tons of carbon annually. We will implement specific forest stewardship plans that could allow us to compensate as much as half of Salmones Camanchaca’s current footprint”**

-Alfredo Tello, Technical and Sustainability Manager, Salmones Camanchaca





# NUTRITION

**To ensure a healthy future for people and the planet, we need to closely consider both the amount and the types of food that we rely on.**

Our current dietary choices are not only putting enormous pressure on our food systems and the planet, but also on our quality of life, life expectancy and healthcare systems.<sup>19</sup> In recent decades our diets have shifted away from mainly whole foods and seasonal plants rich in fiber, to more processed convenience

foods higher in animal products, sugar, fat, and salt. This change in diet, combined with more sedentary lifestyles, is believed to be causing the ongoing increase in obesity and noncommunicable diseases (diabetes, cancer and cardiovascular disease) that are by far the leading cause of deaths worldwide.<sup>20</sup>

## **NUTRITIONAL BENEFITS OF SEAFOOD AND FARMED SALMON**

Fish is a low-fat, high-quality protein that is high in marine omega-3 fatty acids, vitamins such as D and B2 (riboflavin), and nutrients to maintain brain and heart health. Salmon provides an excellent source of healthy unsaturated fats, which have been shown to improve cholesterol levels.



# EATING SEAFOOD 2X PER WEEK:



Leads to improved **brain**  
and **eye** development



Helps to reduce risks  
of **heart disease**



Contributes to an  
**increase** in your  
**omega-3** level



Benefits **pregnant** and  
**nursing women** and  
their **babies**

Farmed salmon is a source of highly absorbable:

PROTEIN

MARINE OMEGA-3  
FATTY ACIDS

MANY VITAMINS  
AND MINERALS

Nutritional guidelines recommend eating at  
least 2 portions of fish per week<sup>21,22</sup>

## NUTRIENT-DENSE FOODS

Nutrient-dense foods contain vitamins, minerals, complex carbohydrates, lean protein, and healthy fats, and they play an important role in ensuring we meet our individual nutritional requirements, without exceeding energy intake.

The best way of including nutrient-dense foods in your diet is to create a balanced diet centered on vegetables and fruit, with the addition of healthy proteins and unsaturated fats.

Farmed salmon is a natural wholefood containing many nutrients, minerals, omega-3 fatty acids and protein, making it an excellent component in a nutrient-dense diet.

**The nutrients in farmed salmon support optimal health and protection from a range of diseases and disorders.**

Responsibly farmed salmon has a role to play as a positive sustainable food choice for both human health and the health of the planet.

## PROTEIN

Protein is an essential macronutrient and component of food that is critical for the structure, function, and regulation of human tissues and organs. Proteins are made up of amino acids; these are either essential or nonessential depending on whether they can be made by the human body. The protein quality of foods is then measured by the number of essential amino acids that the food contains.

Animal-based foods including fish are of the highest quality and are referred to as “complete” proteins, meaning that they provide the body with all the essential amino acids that it requires without additional supplementation from other protein sources.<sup>23</sup>

**100 g of farmed salmon provides ~20.5 g of protein, which is 44% of the daily required protein intake.**<sup>24,25</sup>

Farmed salmon is one of the most eco-efficient and sustainable forms of protein available. With a low carbon footprint, high protein retention and efficient feed conversion ratio, farmed salmon can contribute a healthy and climate-friendly protein source to the world’s food needs.

Source: iStock

## Omega-3 fatty acids

Omega-3 fatty acids are essential fats that cannot be made in the human body, so must be included in our diet.<sup>26,27</sup> Two omega-3 fatty acids—eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)—are found in high quantities in oily fish such as salmon<sup>28</sup> and salmon roe.<sup>29</sup>

### Consumption of omega-3 fatty acids (EPA and DHA) is associated with:



Helping maintain a **healthy heart** by lowering blood pressure and triglycerides, and **reducing the risk of sudden death, heart attack and stroke**<sup>26-28</sup>



Reducing the risk of **coronary heart disease**<sup>28,29</sup>



Supporting **brain function and development in infants**<sup>30</sup>



Possibly preventing **psychiatric diseases** particularly **cognitive decline** in the elderly<sup>31</sup>



Possibly **preventing inflammation** and **reducing the risk of arthritis**<sup>31,32</sup>

Aquaculture plays an important role in the efficient use of long-chain omega-3 fatty acids and their transfer to humans. GSI members are committed to ongoing efforts to ensure that the salmon we rear contain beneficial levels of marine omega-3 fatty acids, and we continue to source alternative sources of omega-3 fatty acids that provide consumers with the best nutritional benefits.

## Vitamins and minerals

Some of the positive nutritional benefits of fish and farmed salmon are also due to the high concentration of vitamins and minerals, including several B vitamins, vitamin D and minerals such as selenium, iodine and potassium.<sup>26</sup>

Vitamin D deficiency is a global concern, and dietary intake of vitamin D from food or supplements is necessary for ensuring individuals meet optimal intake.<sup>33</sup> **Animal products provide the best sources, and oily fish such as salmon contain the highest natural amounts of vitamin D.**

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## Healthy sustainable diets

Unhealthy diets are one of the major risk factors for a range of diseases, including cardiovascular diseases, cancer, diabetes and other conditions linked to obesity or being overweight. It is evident that the consumption of oily fish, which includes responsibly farmed salmon, is associated with several health benefits and it plays an important role in healthy sustainable diets. As a nutrient-rich, eco-efficient protein source, farmed salmon can help reduce our meat intake globally while maintaining the health benefits of consuming animal protein. Considering these two factors, farmed salmon should be considered as part of the solution to support the future health of people and the planet.

**The recommended nutrient intake of vitamin D proposed by the Scientific Advisory Committee on Nutrition is 10 µg/day.**

Consuming farmed salmon can play an important role in meeting our vitamin D requirements, and farmed salmon provides many other important vitamins and minerals essential for optimal health.



## Food Safety

We pride ourselves on producing high-quality farmed salmon, and as part of this we are committed to ensuring the highest levels of food safety. Working responsibly to meet and exceed regional food safety regulations, we also work with third-party certification schemes to validate the quality levels our customers expect.

# SOCIAL RESPONSIBILITY



Source: Los Fiordos, Chile

## Without social responsibility, sustainable development is not possible.

Three pillars underpin sustainable development:<sup>34</sup>



**ECONOMICS**  
Healthy profits



**ENVIRONMENT**  
Healthy planet



**SOCIAL**  
Healthy people

## What does social responsibility mean to the GSI?

For the GSI, social responsibility means businesses proactively managing the impacts of our operations and supporting employees, customers, local communities, and individuals within their value and supply chains.

Many factors make up social responsibility, and the GSI sees the following as most critical to ensuring inclusive social stability and growth within the salmon farming industry:



**Decent work for all**



**Good health and wellbeing**



**Access to quality education**



**Healthy environments**



**Thriving communities**

# GSI: SUPPORTING THRIVING COMMUNITIES

## DECENT WORK FOR ALL

Providing jobs and supporting the careers of thousands of people across the world.

Employing over  
**24,000**  
full-time employees<sup>35</sup>—and many more across the value chain



Providing opportunities and support for local entrepreneurs



Providing work experience, internships and mentoring to young people



Providing equipment, resources and training to local industries



Cermac, Canada



Australis Seafoods S.A., Chile



Multi-export Foods, Chile



Cermac, Norway

# ACCESS TO QUALITY EDUCATION

## IMPROVING AND CONTRIBUTING TO EDUCATIONAL INFRASTRUCTURE

Supporting the education of local children is a priority for many GSI members. The support provided by GSI members has substantial impacts because it is run in small and remote communities.



Running educational programs in schools



Providing transport, equipment, advice and resources for schools in need



Funding research and development



Developing skills and training adults and young adults



Offering educational scholarships and grants to local children



Cermaq, Canada



Tassal, Australia



Blumar Seafoods, Chile



AquaChile, Chile

# THRIVING COMMUNITIES

FOSTERING TRUSTED RELATIONSHIPS WITH COMMUNITIES



Opening our doors to local communities to learn about salmon farming



Engaging with and supporting indigenous communities



Organizing community events and projects



Holding community consultation sessions to answer and learn from community members



Implementing changes to business practice in response to community feedback



Salmones Camanchaca



Cermaq, Chile



Nova Sea, Norway

# GOOD HEALTH AND WELLBEING

PROMOTING HEALTHY COMMUNITIES AND PEOPLE



Bringing doctors and medical supplies to local communities in need



Conducting medical screenings in remote communities



Organizing community sports events and summer camps for children



Contributing time and resources to local causes and charities



Donating salmon and other food to local food banks and people in need



Tassal, Australia



Bakkafrost



New Zealand King Salmon, New Zealand

# HEALTHY ENVIRONMENTS

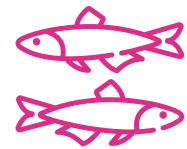
PROTECTING NATURE AND SUPPORTING ENVIRONMENTAL SUSTAINABILITY



Implementing environmental infrastructure within schools and communities, including recycling



Regular hosting and participation in beach clean-ups around the world



Monitoring impacts of salmon farming on local ecosystems



Initiating and collaborating on projects to enhance local biodiversity



Bakkafrost, Faroe Islands



Grieg Seafood ASA, Canada



Grieg Seafood, Shetland



## Trust as a cornerstone for social responsibility

Trust is vital in all aspects of social responsibility. Without trust, it would be impossible to support our employees, partners and community members. For GSI, responsibility is built through **trust, transparency and accountability**.

Transparency is one of the GSI's guiding principles: each GSI member transparently reports on social performance via the annual industry-wide GSI Sustainability Report. More details on the GSI Sustainability Report and environmental performance can be found on [page 15](#).

Within the annual GSI Sustainability Reports, members share details and data on a variety of social indicators. The GSI has chosen to use ASC certification as our reference point for progress in our sustainability performance. In the report we track the number of farms currently certified, those undergoing certification, and the number of tons certified.

# 1

### DIRECT LABOR

GSI member operations cover many regions, and their employees are a diverse group, in terms of both culture and areas of work. Nevertheless, all of our members share a common set of core values that promote fair treatment and safe working conditions for all employees across all their operations.

# 2

### COMPLIANCE

Salmon farming is a highly regulated industry and all companies must act in accordance with local laws and regulations. GSI members report on their adherence to these regulations.

# 3

### OCCUPATIONAL HEALTH AND SAFETY

Health and safety performance is a key measure of a company's duty of care, and GSI members aim to ensure the highest levels of occupational health and safety for all employees.

# 4

### R&D INVESTMENT

GSI members recognize the importance of investing in R&D as an opportunity to foster innovation and expand knowledge and tools to help to improve our farming operations, reduce possible operational risks and ensure continuous progress towards sustainable salmon farming.

# 5

### COMMUNITY ENGAGEMENT

GSI's local operations actively engage with local communities and stakeholders to ensure we act as responsible corporate citizens and support development of the communities in which we operate.



**“The work of the GSI is powered by the people within it. From our member’s leadership, to R&D teams, fish health experts, feed specialists, and of course the farmers; it is their work which is shaping the future of the industry. Social responsibility is therefore a priority to our members, who continue to respect the values, health and wellbeing, and the rights of their employees and the communities in which they operate.”**

-Sophie Ryan, Chief Executive Officer, GSI



# SUSTAINABLE BUSINESS PRACTICES

## To achieve a vision of providing a healthy protein with minimal environmental impact, collaboration is required to drive change.

Aquaculture is one of the fastest growing food-producing sectors on the planet, and although farmed fish is widely recognized as a healthy, resource-efficient protein, it must be managed responsibly as the industry grows to ensure it remains a sustainable option.

### GSI Model

#### PRE-COMPETITIVE COLLABORATION

Business as usual is no longer an option. Our food systems are under threat and need drastic change. Working independently or on a smaller scale may address some challenges but it will not deliver significant change or address the challenges at the speed our food system requires.

Within the GSI, we have identified several key areas where we believe we can have greater impact by working together—at scale, and at a faster rate—than working individually.



Achieving 100% ASC certification

Our main objective is to produce healthy fish in healthy waters and as farmers of the sea, we share our waters, which is why we believe it makes sense for us to cooperate and work together on biosecurity management.



Improving sustainable sourcing of feed ingredients



Biosecurity and fish welfare

We know that as an industry, we are not perfect and we face challenges, but by collaborating, we can bring together the shared expertise and experiences we have to problem-solve and innovate to improve the salmon farming industry's sustainability performance.



Transparency

**“The good news is that we can get change at speed and scale if we find out how to adopt a model of private sector-driven creative innovation, using pre-competitive collaboration and basing it on high ambition and transparency”**

-Avrim Lazar, GSI Convenor

### Transparency

One of the ways the GSI is ensuring responsible growth for the salmon farming industry is to improve the level of transparency. As part of the GSI's commitment to sustainability, we release our annual Sustainability Report, which provides key sustainability data across all GSI member companies in all regions. Transparency is not only crucial in demonstrating measurable progress in improving our environmental performance, but also in holding us as GSI members accountable to our sustainability commitments. Most importantly, it also highlights where further progress can be made. We use our report not to show our successes, but our work-in-progress.

### Innovation

Finding the solutions to solve the global food crisis is not beyond our capabilities. We know we are capable of finding solutions through innovation and collective problem-solving. The issue is not working out what to do, but how can we find the solutions that are going to create significant, long-term change with the critical mass of change that is needed. Moving beyond individual solutions or top performers is key. If the majority of food production does not change and operate in a sustainable way, then the “good projects” are just an exercise in vanity and will not deliver the results required.

### VALUE CHAIN COLLABORATION AND OUR ASSOCIATE MEMBERS

The environmental performance of the farmed salmon sector is highly dependent on collaboration with our supply chain. From feed ingredients to the medicines required to support optimal fish welfare—in order to really assess and improve our performance, it was critical we engaged the support and engagement of the two interconnected sectors: feed and pharmaceuticals.

For GSI Associate Member organizations, this means working together in ways that support the shared interest in the growth and prosperity of the salmon farming industry, as well as a shared commitment to improving the sustainability of the sector. With their engagement we are better positioned to address the challenges, and work together to find practical solutions, and invest in necessary R&D and new innovations.

### OUR ASSOCIATE MEMBER PARTNERS

Benchmark, BioMar Group, Cargill, Elanco, MSD, Pharmaq, Salmofood, Skretting





## Working collaboratively offers many benefits



**SCALE** More than half of the salmon produced globally is by companies enrolled in the GSI. This means 50% of global production is linked to our theory of change and belief in continuous improvements in environmental performance.



**AMBITION** With 50% of the industry engaged, we can set ambitious sustainability targets and create a significant shift in industry environmental performance, in which we are motivated to go further than if working individually.



**CAPACITY** The GSI is CEO-driven and each company has technical representation in each of our task forces. Once a decision is made, we have the power and capacity to implement it.



**COMMUNITY** The GSI works as a collective, and by working together as companies and with the wider value chain, we can inspire solutions and hold each other accountable. The pre-competitive sharing of technology allows us to not compete on environmental performance, but rather share and teach best practice, which enables sector-wide improvements.



**TRUTH** In order to facilitate real progress, we publish data for 14 key environmental and social indicators once a year through our Sustainability Report. Transparency holds us accountable to ourselves, each other and our stakeholders, and it allows us to benchmark our progress.



**RESULTS** By setting clear objectives and working on key issues as a collective, we are able to show real, measurable change. In 2013 there was no ASC-certified farmed salmon; now, 65%\* of GSI production is certified.

\* Figure as of end of 2019

## How responsible aquaculture targets seven of the SDGs

The SDGs are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity, established by the UN as part of its 2030 agenda for Sustainable Development.

Responsible aquaculture has the ability to support many of the UN's SDGs and can directly affect and impact seven of the 17 SDGs. We are committed to supporting the implementation of the following goals:

**GOAL 2** Zero Hunger: The GSI is part of a drive to accelerate improvements in industry sustainability and future food security.

**GOAL 8** Decent Work and Economic Growth: aquaculture and specifically salmon farming is a key contributor to sustainable economic growth, providing skilled employment in some of our most fragile and remote rural and coastal communities.

**GOAL 9** Industry, Innovation and Infrastructure: Through our commitment to achieving the ASC Salmon Standard, we can drive the transformative change needed to ensure aquaculture is, and continues to be, a responsible and sustainable production system with minimal environmental impact.

**GOAL 12** Responsible Consumption and Production: responsibility is at the heart of the GSI vision for the sustainable future of aquaculture.

**GOAL 13** Climate Action: aquaculture has many benefits over agriculture and meat production in terms of its environmental performance; for example, less demand on arable land, low emissions of CO<sub>2</sub>, low and efficient use of fresh water.

**GOAL 14** Life Below: the GSI is driving the farmed salmon sector towards continuous improvement in sustainability, implementing real and measurable change to support the future biodiversity of our oceans, and to help safeguard the planet.

**GOAL 17** Partnerships to achieve the goal: the GSI model of pre-competitive collaboration supports this SDG by driving innovation through continued partnerships and sharing of expertise and supporting knowledge transfer to other sectors.

# Partnering with like-minded organizations and initiatives

## HIGH LEVEL PANEL FOR A SUSTAINABLE OCEAN ECONOMY

The High Level Panel for a Sustainable Ocean Economy brings together world leaders who recognize that economic production and ocean protection must be mutually supporting if we are to “produce, protect and prosper.” It is an initiative of serving heads of government committed to catalyzing bold, pragmatic solutions for ocean health and wealth that support the SDGs and build a better future for people and the planet. It is the High Level Panel’s ambition that the innovative solutions and actions stemming from its work will drive the ocean agenda well beyond 2020.<sup>36</sup>

The Panel is supported by an Advisory Network that will act as advisors, reviewing the panel’s recommendations, informing and socializing stakeholders, catalyzing innovations and

solutions and scale actions through strategic alliances and partnerships. GSI is pleased to have been invited to join the Advisory Network to the High Level Panel, and be presented as a case study for industry models for change.

The mission of the High Level Panel is closely aligned with our GSI model and way of working. It is ingrained in our philosophy that, by working together, we can have a greater impact in improving our environmental performance and protecting the long-term sustainability of the oceans. By working with similar initiatives, we can bring together shared expertise and experiences to problem-solve and identify ways to innovate and improve.

## BLUE FOOD COALITION

The GSI is pleased to support the Friends of Ocean Action in their Blue Food Coalition, to mobilize action and advance progress on the role of the ocean and other aquatic sources in adequately, safely and sustainably feeding the planet.

## UN GLOBAL COMPACT FOR SUSTAINABLE OCEAN BUSINESS

The GSI is engaged in the Global Compact initiative, supporting the development of a ‘*framework for leadership for the Global Goals and the Ocean*’. Acknowledging that to achieve the ambitions outlined in the SDGs, there will be a need to expand the use of the oceans to produce food, energy and raw materials, and by doing so in a sustainable manner it will contribute to reduced global warming and environmental degradation. Through the Global Compact the aim is to establish the correct guidance to ensure the ocean can be used as a resource, while protecting ocean health.

## RESPONSIBLE SOURCING

The responsible sourcing of resources is incredibly important to GSI. Our members are at the forefront of ensuring responsible practices and are active in many working groups to support sustainable progress. Further examples of this include active participation in the Roundtable on Sustainable Palm Oil, setting up marine protected areas in the Antarctic, and supporting the acceleration of novel sources through our own tender for EPA&DHA rich non-marine sources, and the FeedX Project.

Responsible sourcing of soy—as an ingredient in salmon feed, it is part of our mandate to support and ensure the responsible sourcing of soy. GSI, and our members, work with a number of key stakeholders to improve soy sustainability, protect biodiversity and establish certified supply chains to meet demand for responsibly produced soy. These include—supporting the Amazon Soy Moratorium, Cerrado Manifesto, and the Cerrado Working Group.

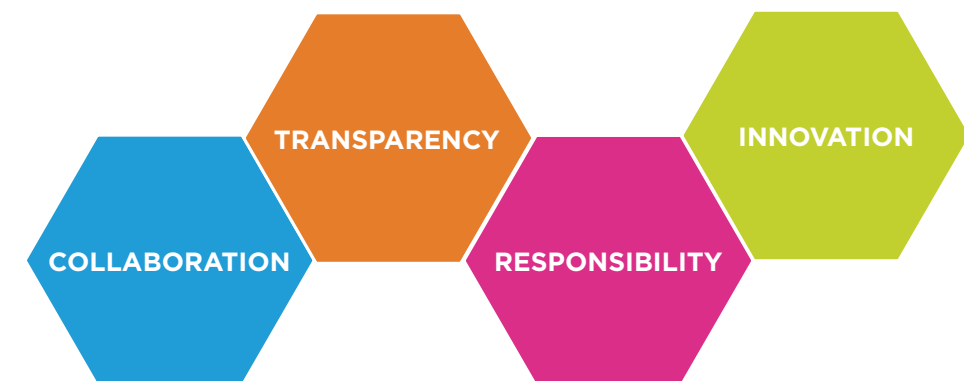


# GSI'S PLANS FOR THE FUTURE

## In 2018, the GSI established its vision for the future of aquaculture framework.

This vision sets out the four pathways we see as being integral to our success in ensuring the long-term sustainability of the industry, and supporting the sector in meeting its potential in providing a healthy and sustainable protein with low environmental impact.

### GSI Pathways to the Future



As salmon farmers, we know there are things that we cannot control, but what we can control is ensuring we make the most of the resources and expertise we have. This approach will best prepare us for the long term and set ourselves up to have the greatest chance of creating a future industry that is not only environmentally sustainable, but also socially and economically sustainable.

Our Pathways framework is a guide for our activities and ensures we continue to head in the right direction. By keeping these four principles—**collaboration, transparency, responsibility and innovation**—at the core of our operations, we hope to position ourselves in the best way to support significant sustainable growth for the long-term success of the aquaculture industry.

**It is possible to close the food gap and to minimize the stress added to the world's resources, but we must challenge ourselves to act responsibly, promote knowledge exchange to accelerate solutions, collaborate, and innovate.**



# GLOSSARY

**ASC** – Aquaculture Stewardship Council

**DHA** – Docosahexaenoic Acid

**EPA** – Eicosapentaenoic Acid

**FAO** – Food and Agriculture Organization

**FCR** – Food Conversion Ratio

**FFDR** – Forage Fish Dependency Ratio

**GSI** – Global Salmon Initiative

**R&D** – Research and Development

**SDG** – Sustainable Development Goal

**UN** – United Nations



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