

Supplementary Information – Text S1

Seafood and sustainability

Wild caught and farmed seafood represent important components of the global supply of protein (1, 2). Seafood is likely to increase its importance in the global food portfolio, in part due to the rapid increase of aquaculture (3), and in part due to sustainability challenges associated with the intensification of agriculture on land (4). Recent analyses have also shown substantial potential for increased wild capture fisheries with improved management (5). However, seafood as produced today, suffers from a number of sustainability challenges, including Illegal, Unreported and Unregulated (IUU) fishing (6), forced and bonded labor (7), limited transparency (8), bycatch and habitat destruction (9) as well as high levels of antibiotics use (10) and dependence on marine feeds ingredients in aquaculture (11). In addition, seafood is produced in ecosystems that also suffer from multiple human impacts originating from other sectors, including nutrient and toxic pollution, plastic contaminants, habitat destruction and climate change (9, 12, 13).

An increased demand for traceable and sustainable products has stimulated a rapid growth of certified wild capture fisheries and farmed seafood, e.g., through the Marine Stewardship Council (MSC), the Aquaculture Stewardship Council (ASC), and several other market-based initiatives focusing on consumers (14, 15), despite their sometimes criticized level of effectiveness (16). Retailers also play an important part in stimulating the growth of certified fisheries (17). Ambitious targets set by leading actors in the retail industry for their own share of certified products are thought to have cascaded and catalyzed other retailers (18) (SI Appendix, Fig. S1).

Policy makers are progressively addressing challenges associated with overfishing and unsustainable aquaculture, including by reducing harmful subsidies (19), reforming fisheries in Europe and in the USA (5), and establishing large-scale protected areas (20). Major international developments associated with policies to reduce IUU fishing include the Ports States Measures Agreement (PSMA), the EU IUU regulation, and substantial investments in enforcement and compliance (17). High profile convicting sentences have raised the profile of IUU fishing and contributed to making this a key priority for policy makers and the seafood industry (21-23).

Recent trends in e.g., consumer demands and policy developments, illustrate the growing need for companies to legitimately integrate sustainability into their operations (24). Emerging technologies for traceability and satellite-based monitoring systems are also rapidly changing the conditions for seafood production (22, 25). In that context, the seafood sector has not only reactively addressed these issues, but has also proactively engaged in sustainability initiatives (SI Appendix, Table S1).

Supplementary Information – Text S2 (1/2)



SESSION 1: SETTING THE SCENE *(Background briefs 1 and 5)*

- 09:00 to 09:15 Introductions
- 09:15 to 09:25 Expectations for the Dialogue
- 09:25 to 09:50 People and the planet – climate change, planetary boundaries and the United Nations Sustainable Development Goals
- 09:50 to 10:25 General discussion
- 10:25 to 10:30 Summary of principal conclusions

SESSION 2: LEADERSHIP PERSPECTIVES

- 11:00 to 12:00 Grand challenges for the seafood industry – perspectives from CEOs
Reflections from advisors
- 12:00 to 12:30 General discussion on industry priorities within the wider global context

SESSION 3: SUSTAINABILITY ISSUES IN THE SEAFOOD INDUSTRY *(Background briefs 2, 3 and 4)*

- 14:30 to 14:50 The global protein challenge
- 14:50 to 15:10 Status and trends of wild capture fisheries
- 15:10 to 15:30 Status and trends of aquaculture industry
- 15:30 to 16:30 Breakout groups for more detailed discussions

Supplementary Information – Text S2 (2/2)

DAY 2

SESSION 4: INDUSTRY RESPONSES

(Background briefs 6, 7 and 9)

09:00 to 09:45	Governance and regulations
09:45 to 10:30	Innovations and market dynamics
10:30 to 10:45	Ocean plastics
10:45 to 11:15	Break for refreshments

SESSION 5: CORPORATE LEADERSHIP IN A DISRUPTED WORLD

(Background brief 8)

11:15 to 11:45	Corporate sustainability leadership – lessons from other sectors
11:45 to 12:45	Breakout groups
12:45 to 13:00	Feedback from breakout groups

SESSION 6: NEXT STEPS – BRINGING IT TOGETHER

14:30 to 15:15	Perspectives from CEOs and advisors on leadership opportunities
15:15 to 15:30	Potential for industry leadership – defining thematic groups
15:30 to 16:30	Thematic group sessions
16:30 to 17:00	Report back and next steps

List of background briefs

Background brief 1: People and the Planet
Background brief 2: The Global Protein Challenge
Background brief 3: Wild Capture Fisheries
Background brief 4: Aquaculture
Background brief 5: Climate Change
Background brief 6: Governance and Regulations
Background brief 7: Innovations and Markets Dynamics
Background brief 8: Corporate Sustainability Leadership
Background brief 9: Ocean Plastics

Supplementary Information – Text S3 (1/3)

Joint Statement from the 1st Keystone Dialogue

SEAFOOD BUSINESS FOR OCEAN STEWARDSHIP

PREAMBLE

We represent eight of the world's largest seafood companies, collectively operating in all segments of marine fisheries and aquaculture production, across the entire world. As leaders in the global seafood industry, we are concerned about the state of the ocean and the global environment.

We depend on a stable and resilient planet for human prosperity. However, science is already providing evidence that we have entered the Anthropocene, an epoch where humanity is now challenging the stability of Earth and its ocean.

We, as keystone actors in the global seafood industry¹, recognize that together we represent a global force, not only in the operation of the seafood industry, but also in contributing to a resilient planet with marine ecosystems continuing to produce food of high quality for present and future generations.

We already make a significant contribution to healthy and nutritious diets, as well as to employment all around the world, helping to provide food security for all. We are confident that an increased production of seafood – caught in a healthy ocean using sustainable fishing methods or farmed in sustainable production systems, by people employed in safe and fair working conditions – is both possible and critical for the future of humankind.

However, oceans are under enormous pressure. There is strong scientific evidence of growing impacts on marine ecosystems. Ocean temperatures and acidification are increasing; degradation of coastal mangroves and coral reefs is threatening critical life support systems; habitats are being destroyed; nutrient run-off and toxic substances are causing serious pollution; and the build-up of plastic waste in the oceans is a threat to many species and to human health.

Many of these challenges in the oceans are not caused by the seafood industry itself, but they all impact us directly and indirectly.

We acknowledge that the ocean is also directly affected by activities of wild capture fisheries, such as Illegal, Unreported and Unregulated (IUU) fishing, bycatch, overfishing and modern slavery.

In the face of a growing and wealthier world population, the reliance on aquaculture as a crucial contributor to sustainable food production will increase. However, badly managed, aquaculture can have detrimental social and environmental impacts.

¹ Keystone actors dominate global production revenues and volumes, control important segments of production, connect ecosystems globally through subsidiaries and influence critical governance processes and institutions, see: Österblom, H. et al. 2015. PLoS ONE 10(5): e0127533 <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0127533>

Supplementary Information – Text S3 (2/3)

THE WAY FORWARD

We are committed to playing a leading role in addressing these challenges. As keystone actors, we are resolved to set up a new global initiative – “*Seafood Business for Ocean Stewardship*” – that brings together, for the first time, leaders in science and business, the wild capture and aquaculture sectors of the seafood industry, and companies from Asia, Europe and North America, operating globally.

We fully support and endorse the UN Sustainable Development Goals (SDGs) as a new framework for economic and social development operating within the capacity of the biosphere and its ocean. Not only do we urge all governments to implement the SDGs, we also encourage businesses to integrate them in their strategies. For us, it is particularly important that governments should ensure the right conditions for sustainable fisheries, aquaculture and a healthy ocean. Measures aimed at implementing the Paris Agreement on climate, reducing pollution and halting the destruction of coastal habitats also need to be urgently implemented.

OUR COMMITMENTS

Efforts by governments are critical, but the industry has an equally important role to play in developing and implementing solutions. Leadership in corporate sustainability is a priority for us. We believe this enhances our operations, helps make the industry more resilient, improves our access to markets and consumers, attracts new financial flows, and makes us more attractive as employers. We know better than anyone that the seafood industry depends on sustainable use of the ocean for long-term value creation.

Our companies have been in the seafood business for decades, some for more than a century. We take pride in what we already do, but acknowledge that we ourselves have further to go in improving our performance. For us, this is a strategic and long-term commitment.

Through “*Seafood Business for Ocean Stewardship*”, we intend to develop a common understanding and a common approach among the keystone actors globally, building on the many existing initiatives in which our companies are already engaged.

This is an initiative between science and business, with an ambition to engage with governments and other stakeholders for positive change. It is not only about supplying sustainable seafood to consumers; it is about becoming stewards of the world’s ocean and aquaculture environments.

We will act on the following:

- Improve transparency and traceability in our own operations, and work together to share information and best practice, building on existing industry partnerships and collaborations.
- Engage in concerted efforts to help reduce IUU fishing and seek to ensure that IUU products and endangered species are not present in our supply chains.
- Engage in science-based efforts to improve fisheries and aquaculture management and productivity, through collaboration with industry, regulators and civil society.
- Engage in concerted efforts to eliminate any form of modern slavery including forced, bonded and child labour in our supply chains.
- Work towards reducing the use of antibiotics in aquaculture.
- Reduce the use of plastics in seafood operations, and encourage global efforts to reduce plastic pollution.
- Reduce our own greenhouse gas emissions.

Supplementary Information – Text S3 (3/3)

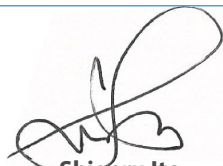
- Secure new growth in aquaculture, by deploying best practices in preventive health management, including improved regulatory regimes.
- Collaborate and invest in the development and deployment of emerging approaches and technologies for sustainable fisheries and aquaculture.
- Support novel initiatives and innovations for ocean stewardship.

The potential of the ocean to help provide healthy food for hundreds of millions of people is tremendous. But bold and firm action will be needed to make this happen. As the keystone actors in the international seafood industry, depending as we do on a healthy and resilient ocean, we know we can and must make a major contribution.

The seafood industry cannot thrive on an unsustainable planet, and we will not have a thriving planet with an unsustainable seafood industry. Now is the time to step up together as proactive leaders for ocean stewardship².

² Ocean stewardship is an adaptive and learning based, collaborative process, of responsibility and ethics, aimed to shepherd and safeguard the resilience and sustainability of ocean ecosystems for human well-being.

SIGNATORIES



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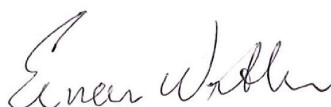
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Supplementary Information – Text S4 (1/2)

THE
**STOCKHOLM
DIALOGUE**

PROGRAM

Advancing the Seafood Business for Ocean Stewardship Initiative

Day 1

SESSION 1: SETTING THE SCENE

- 09:00 to 10:30
- Opening statement
 - Welcoming statement
 - Overview of the agenda and work flow
 - Summary of the "keystone actors" process
 - Industry progress in relation to SeaBOS – achievements and challenges

SESSION 2: SCIENTIFIC UPDATES (Background briefs 1 and 2)

- 11:00 to 12:30
- Trade, People and Ecosystems
 - Seafood for Human and Planetary Health
 - Ocean Stewardship – the grand challenge
 - Discussion

SESSION 3: MOVING THE COMMITMENTS FORWARD (1)

- 14:00 to 15:00
- Summary of bilateral conversations
 - Articulating the rationale for identified priorities – reflections

SESSION 4: MOVING THE COMMITMENTS FORWARD (2)

- 15:30 to 16:30
- Organizing in task forces
 - Initial exploration of vision, targets and actions

Supplementary Information – Text S4 (2/2)

Day 2

SESSION 5: MOVING THE COMMITMENTS FORWARD (3)

09:00 to 10:30 Summary of day one and agreed priorities

Breakout discussions on task forces:

Formulating vision and targets

Identifying actions

Knowledge gaps

SESSION 6: MOVING THE COMMITMENTS FORWARD (4)

11:00 to 12:30 Group presentations and discussion

Exploring potential procedures for monitoring, reporting and adaptation

SESSION 7: OPERATIONAL PROCEDURES

14:00 to 15:30 Location of secretariat

Funding mechanisms

Terms of reference for operations

SESSION 8: NEXT STEPS

16:00 to 17:00 Communication opportunities: The Ocean Conference in New York , The Stockholm EAT Forum, Our Ocean Conference in Malta

Next meeting

Reflections and conclusions

List of background briefs

Background brief 1: Trade, People and Ecosystems

Background brief 2: Seafood for Human and Planetary Health

Supplementary Information – Text S5 (1/3)

Seafood Business for Ocean Stewardship (SeaBOS) OUR PLEDGE FOR OCEAN STEWARDSHIP – OUR PLEA TO GOVERNMENTS

PREAMBLE

Producing healthy food to feed more than nine billion people by 2050, while sustaining the biosphere, is one of the greatest challenges facing humanity. We are convinced that an expansion of global seafood production, including both from wild capture fisheries and aquaculture, represents a critical opportunity to achieve the UN Sustainable Development Goals (SDGs). Adequately regulated and managed seafood production, together with innovative technologies, will increase the supply of healthy food, which in turn can alleviate pressure on terrestrial food production systems.

Seafood already plays a central role in the global food portfolio, contributing 20 % of the global intake of animal protein. Capture fisheries – the only large-scale food production system based on harvest of a wild resource – provide half of global seafood. However, many improvements must be made for all wild-capture fisheries to be sustainable. While some regulated fisheries result in overfishing, the global community has so far failed to eliminate illegal, unreported and unregulated (IUU) fisheries, modern slavery on fishing vessels, and destructive impacts on habitats and non-target species. These problems could be addressed with better scientific information, more effective regulations and better mechanisms for monitoring and enforcing compliance. Governments also have much to learn from each other. Improved fishery management, sometimes including a reduction of fishing pressure over the short term, often corresponds to rebuilding of stocks and long-term benefits for both ecosystems and people. Global fisheries landings could increase substantially if stocks are managed properly.

Aquaculture has dramatically changed global seafood supply. The provision of healthy and sustainable seafood needs to increase further to meet future demand. However, the aquaculture sector is highly diverse in terms of environmental performance. To meet future needs, governance needs to address more comprehensively the challenges of feeds, pollution, spread of diseases and overuse of antibiotics.

Increasing the production of healthy and sustainable food from the ocean is not just about seafood production – it must rely on a foundation of ocean stewardship. Seafood producers from around the world, regardless of their scale of operations, have one thing in common: they all depend on healthy, functioning ecosystems. If the ocean is not managed in a sustainable way, fisheries and aquaculture will not be able to deliver its full potential.

Well managed fisheries and aquaculture, produced in resilient ecosystems, result in healthy and sustainable protein supplies. Adequate regulations and best practices are critical for sustaining and expanding future seafood production in ways that contribute to meeting the SDGs. There is no seafood industry in a dead ocean. And we believe there is no chance to meet the Global Goals without seafood.

Supplementary Information – Text S5 (2/3)

WHO WE ARE

We, members of the Seafood Business for Ocean Stewardship (SeaBOS) initiative, represent nine of the largest seafood producers in the world. We operate on every continent and in all segments of seafood production. We are the global industry leaders in fisheries and aquaculture.

We work closely together with scientists to identify problems and solutions to achieve a healthy ocean and a planet where people from all parts of the world can eat healthy and sustainable seafood. Together, we represent a global force, with a unique ability to inspire business actors along the entire seafood value chain and support governments in achieving the SDGs. We are committed to use our combined power to lead by example, and to use our united voice to argue for change.

We will improve our own operations, and challenge the rest of the industry to follow. We will also offer our support to regulators, in order to ensure that fisheries, aquaculture, and the ocean at large, are managed in a sustainable way.

Our work started in November of 2016, when eight of us met for the first time in a global dialogue about the future of the ocean. This meeting, termed the Soneva Dialogue, resulted in a joint statement, published in December of 2016, where we expressed our intent to take on a leadership role for the ocean and when we announced the Seafood Business for Ocean Stewardship initiative. In May 2017, we met again, this time in Stockholm and with additional companies, in order to further develop this initiative.

OUR PLEDGE

We represent a young initiative, but are already able to make a number of strong commitments for ocean stewardship.

We pledge to work diligently to eliminate IUU products and any form of modern slavery in our supply chains. We will develop a code of conduct for our own operations and for our suppliers, in order to deliver on these commitments. We will also work towards full traceability and transparency throughout our supply chains.

We pledge to make efficient use of aquaculture feeds and to use fish feed resources from sustainably harvested stocks. We pledge to actively use and develop fish health management systems and health prevention methods before treatments. We will actively use and apply existing certification standards and prevent harmful discharges and habitat destruction. We call on the whole industry to do the same.

We also pledge to work actively together with governments to improve existing regulations for fisheries, for aquaculture, and for the ocean.

We will report on our progress with this work, one year from now, in June of 2018.

OUR PLEA

We strongly urge all governments to work together to address IUU fishing. In order for wild capture fisheries to further develop, we encourage governments to end overfishing and rebuild depleted stocks. This critically means respecting scientific advice on quotas and the sharing of best practices in regulations.

We urge all governments to work together to improve regulations in international waters. We call on all governments to sign up to the FAO Port States Measures Agreements (PSMA) and to develop a regulatory international treaty, analogous to the PSMA, which bans all landing of IUU fish, for UN members to ratify.

Supplementary Information – Text S5 (3/3)


We urge governments to develop a shared framework for sustainable aquaculture. Governments have an important role to play in developing regulations that improve resource usage and manage diseases. It is critical to take this responsibility seriously. We also urge governments to actively share experiences between countries to improve existing policies.

We welcome new technologies and innovation that contribute to improved fisheries and aquaculture management, regulations and policy, as well as the monitoring of compliance to such regulations.

Finally, we demand that governments of the world address the challenges currently facing our industry, originating from outside of our sector. We are unable to safeguard and much less expand our production of healthy and sustainable protein to meet the needs of a growing and wealthier world population if toxic pollutants or plastic particles contaminate fish, if there is no clean water for our aquaculture operations nor if climate change, ocean acidification, and low dissolved oxygen levels undermine our long-term operations.

We will support you in all these efforts to the best of our ability.

SIGNATORIES



Shigeru Ito
PRESIDENT
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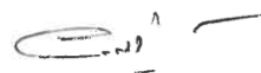
Einar Wathne
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Geir Molvik
CEO
Cermaq (subsidiary of Mitsubishi Corporation)



Hisaki Tada
CHAIRMAN
Kyokuyo Co., Ltd



Adirek Sripratak
CHAIRMAN OF THE EXECUTIVE COMMITTEE
Chareon Pokphand Foods PCL

Supplementary Information – Fig. S1

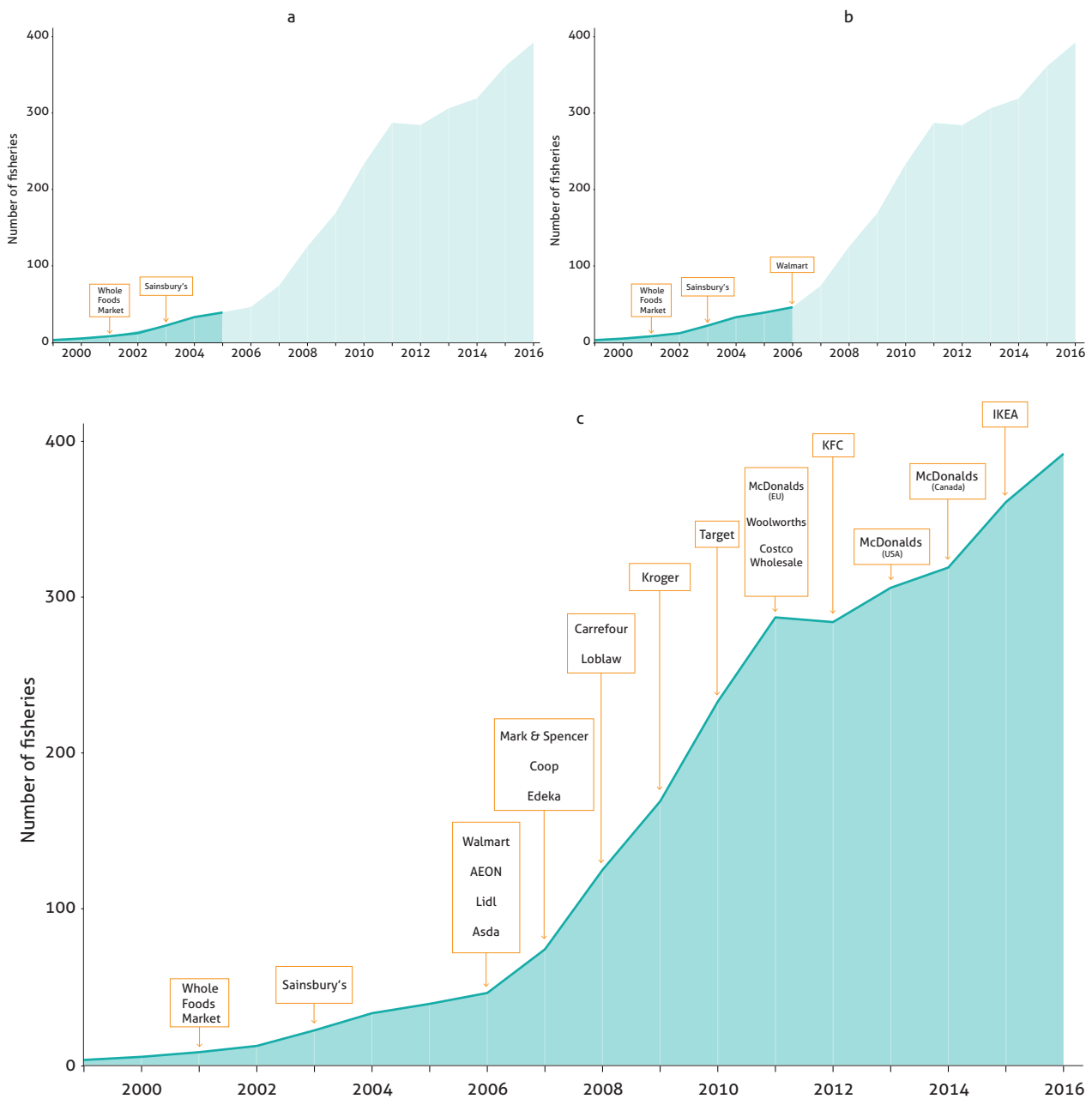


Fig. S1. Number of Marine Stewardship Council (MSC) certified fisheries (or in assessment) over time, together with examples of public commitments by large retailers to sell MSC certified seafood. Announcement by Walmart, the world's largest retailer, in January 2006, is thought to have cascaded through the whole industry and catalysed other retailers (18), thereby increasing the demand for more MSC certified products.

Supplementary Information – Fig. S2

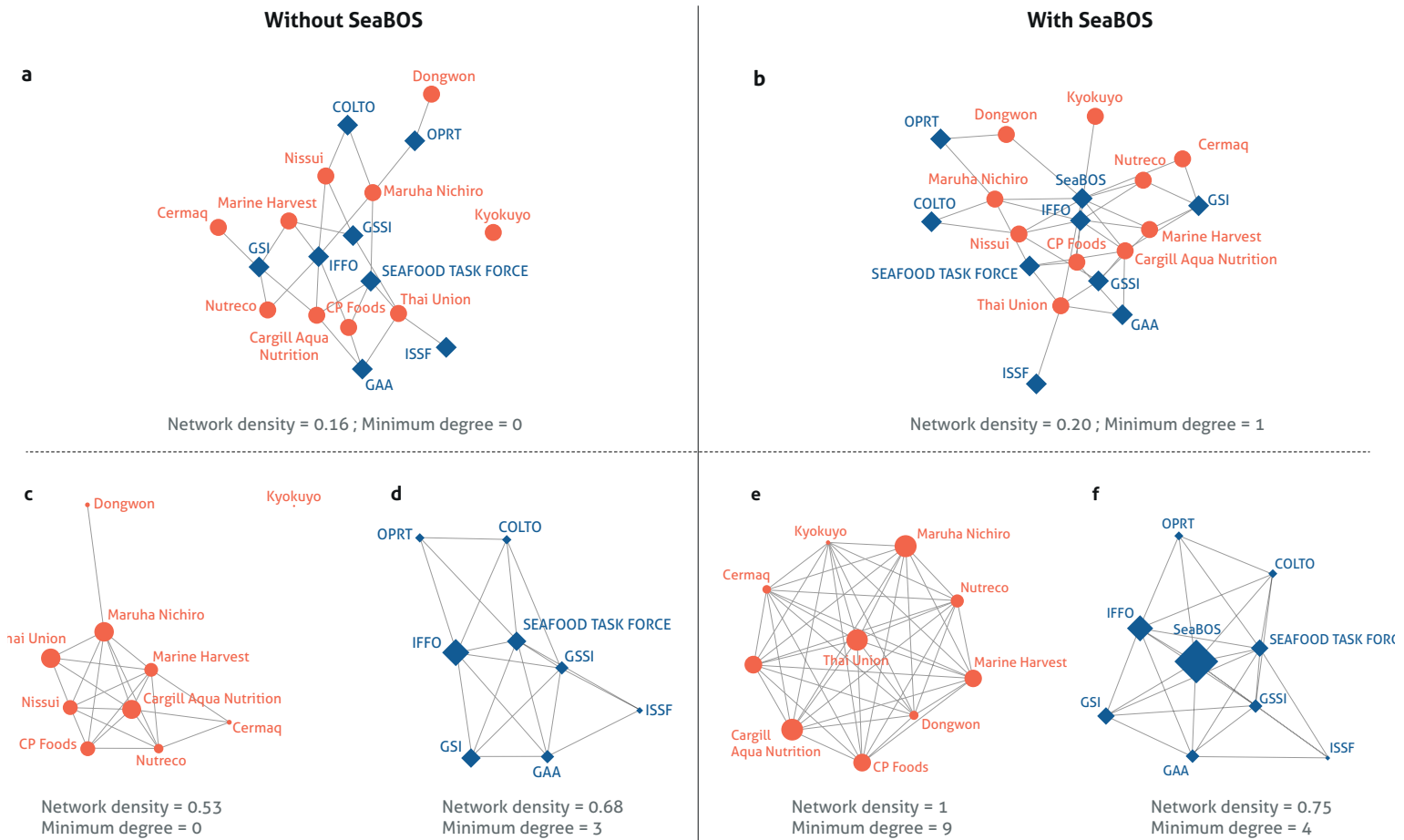


Fig. S2. Increasing global connectivity in the seafood industry. Bipartite networks of companies participating in the dialogues (red circles) and their membership in international seafood sustainability initiatives (blue diamonds), without (a), or with (b) SeaBOS. Data were collected from public membership lists and cross-checked during a collaborative exercise with all participating companies. Panels (c-f) represent one-mode network projections where node size corresponds to the node degree (number of initiatives the company is connected to (c and e), or number of company memberships in the initiative (d and f)). The network density (overall level of connectivity of the network) and the minimum degree (smallest number of connections of any node) consistently increased through the establishment of SeaBOS. COLTO = Coalition Of Legal Toothfish Operators, GAA = Global Aquaculture Alliance, GSI = Global Salmon Initiative, GSSI = Global Seafood Sustainability Initiative, IFFO = The Marine Ingredients Organization, ISSF = International Seafood Sustainability Foundation, OPRT = Organization for the Promotion of Responsible Tuna Fisheries, SeaBOS = Seafood Business for Ocean Stewardship.

Supplementary Information – Table S1

Table S1. Prominent international seafood sustainability initiatives with publicly available membership lists.

Initiative	Description
Coalition of Legal Toothfish Operators (COLTO) www.colto.org	The Coalition of Legal Toothfish Operators was founded in 2003 by legal industry members to eliminate Illegal, Unregulated and Unreported (IUU) fishing of toothfish (<i>Dissostichus sp.</i>) in order to ensure the long-term sustainability of toothfish resources and the rich and critical biodiversity of the southern oceans.
Global Aquaculture Alliance (GAA) www.aquaculturealliance.org	Founded in 1997, the Global Aquaculture Alliance is an international non-governmental organization dedicated to advocacy, education and leadership in responsible aquaculture.
Global Salmon Initiative (GSI) www.globalsalmoninitiative.org	The Global Salmon Initiative is a leadership initiative established in 2013 by global farmed salmon producers focused on making significant progress on industry sustainability. Today, GSI comprises 13 companies – representing approximately 50% of the global salmon production industry.
Global Seafood Sustainability Initiative (GSSI) www.ourgssi.org	Established in 2013, the Global Seafood Sustainability Initiative is a global platform and partnership of seafood companies, NGOs, experts, governmental and intergovernmental organizations working towards more sustainable seafood. It was set up to develop a global benchmark tool for seafood certification schemes.
The Marine Ingredients Organisation (IFFO) www.iffonet.net	Formed in 2001, IFFO is an international ‘not for profit’ organisation that represents and promotes the fishmeal, fish oil and wider marine ingredients industry worldwide, working to strengthen the global standing of the industry, while supporting responsible supply.
International Seafood Sustainability Foundation (ISSF) www.iss-foundation.org	Launched in 2009, ISSF is a global coalition of scientists, the tuna industry and World Wildlife Fund (WWF), promoting science-based initiatives for the long-term conservation and sustainable use of global tuna stocks, reducing bycatch and promoting tuna ecosystem health.
Organization for the Promotion of Responsible Tuna Fisheries (OPRT) www.oprt.or.jp/eng	The OPRT is an international non-governmental organization established in 2000 to ensure sustainable use of tuna resources. It represents tuna producers from various countries as well as traders, distributors and consumers in Japan.
Seafood Task Force www.seafoodtaskforce.global	Established in 2014 as the Shrimp Sustainable Supply Chain Task Force and renamed in 2016 to more accurately represent its broader scope, the Seafood Task Force is an industry-led initiative that focuses on supply chain oversight to tackle human right issues and marine conservation problems linked to IUU fishing.
Seafood Business for Ocean Stewardship (SeaBOS) www.keystonedialogues.earth	Launched in 2016, SeaBOS is an initiative between science and business that brings together the largest wild capture fisheries and aquaculture companies from Europe, North America and Asia, with the ambition to lead a global transformation towards sustainable seafood production and a healthy ocean.

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