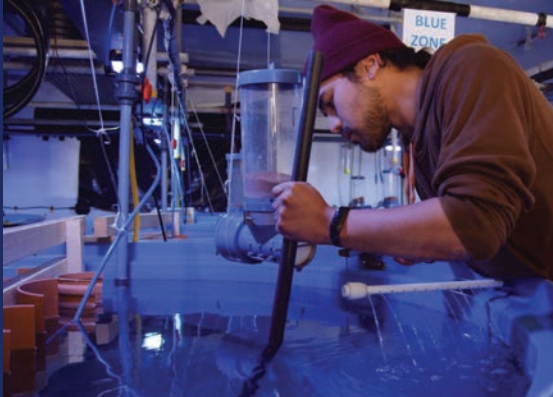


# English Aquaculture Strategy

SEAFOOD  
— 2040





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# Minister's foreword

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Aquaculture is a valued part of England's seafood industry. It supports local jobs and provides sustainable, low carbon produce for consumption at home and for export around the world. The sector's ability to co-exist with wild fisheries and other maritime uses, such as renewable energy, maximises the sustainable use of England's precious marine environment with exciting potential for growth in the future.

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The ongoing pandemic presents the sector with considerable challenges. I recognise these challenges and am pleased that the Government provided support to the sector earlier in the year as part of the £10 million Fisheries Response Fund. Eighty aquaculture businesses benefitted from grants of up to £10k and a 'virtual visit' has allowed me to see how this scheme helped one trout farm to survive. However, demand from the domestic hospitality trade and international export markets has made a slower than hoped for return to normal, and continues to affect production and business growth.

I welcome the English Aquaculture Strategy which sits within the context of these uncertainties while looking beyond them across the next two decades. The Strategy focuses on a combination of national and regional actions to achieve growth aspirations

for the sector. Working successfully alongside the regional marine planning process and aquaculture strategy initiatives, such as the Dorset Mariculture Strategy (2020), is key to realising these aspirations.

The Strategy comes at a time of very significant opportunity for our seafood industry as the end of the Transition Period means the UK will be an independent coastal State for the first time in 40 years. Opportunities for the aquaculture sector include the expansion of exports and the growing investment in Recirculating Aquaculture Systems (RAS) in England. Technology opportunities continue to develop particularly in the digitisation of the entire supply chain to ensure traceability, sustainability and accountability. Together, with the Strategy, these elements represent a watershed for English aquaculture.

I would like to thank the SF2040 Aquaculture Leadership Group, the SF2040 Industry Leadership Group, Seafish, and Poseidon Aquatic Resource Management Ltd. for their efforts in supporting England's aquaculture sector with this English Aquaculture Strategy.

**It is my sincere hope that it will help the sector take advantage of the opportunities that will result in a sustainable and thriving future.**

*Victoria Prentis*

**Victoria Prentis**  
**Minister for Farming,**  
**Fisheries and Food**



# Executive summary

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Welcome to the English Aquaculture Strategy (EAS). It was commissioned by the Seafood Industry Leadership Group (SILG) via the Sea Fish Authority Industry (Seafish) and developed by Poseidon Aquatic Resource Management Ltd.

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The Strategy brings England into alignment with the UK devolved administrations in having a forward-looking plan and direction for aquaculture development.

This Strategy and Delivery Plan is for the sustainable development of English aquaculture over the next twenty years. It is a foundation for building the industry and to support a realistic, ten-fold increase goal in production volume to approximately 90,000 tonnes by 2040. This can be achieved through a combination of expansion, innovation, integration and proportionate regulation.

The current situation, with aquaculture production stagnating over the last decade, and the industry facing the uncertainties of the ongoing COVID-19 pandemic and the exit from the European Union, means that delivering the Strategy will need clear leadership, and effective and sustained collaboration between the industry and regulators.





The EAS will be implemented through a combination of national and regional actions, capitalising both on the regional marine planning process and on provincial aquaculture strategy initiatives, such as the [Dorset Mariculture Strategy](#).

We are at a watershed for English seafood production with the opportunity for aquaculture to make a significant future contribution. Wild fisheries – which are mostly at or near maximum sustainable yield – have limited potential for expansion, but aquaculture is less constrained. Aquaculture can develop a greater role within the wider Blue Economy, working with capture fisheries and other maritime users such as offshore energy production. Growth is likely to be supported by the increasing scale and economic viability of land-based aquaculture, especially through the use of technological approaches such as in-pond raceways and recirculated aquaculture systems (RAS).

[The rewards will be substantial, with English aquaculture providing a critical contribution to Seafood 2040's \(SF2040\) aspiration for a 75% increase in seafood consumption by 2040 as well as important jobs for coastal communities.](#)

**The vision: By 2040 English aquaculture is a significant contributor to seafood consumption and the Blue Economy, providing sustainable, healthy food and rewarding employment opportunities.**



# Setting the scene

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Aquaculture is the farming of fish, molluscs, crustaceans and aquatic plants. It differs from capture (wild) fisheries in that the stock is owned during most or all of its life-cycle and often subject to management through genetic selection, artificial feeding and other husbandry activities.

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English aquaculture has been dominated by inshore shellfish culture and trout in freshwater. This has mainly been driven by small- to medium- sized enterprises, with relatively little external investment. The sector currently produces around 8,000 metric tonnes (mt) of which around two-thirds (by volume) is freshwater finfish and one-third is shellfish worth approximately £26 million a year.

The sector employs around **1,080 persons, of which the full-time equivalent is around 740<sup>1</sup>** (*Hambrey & Evans, 2016; Pye & Tait, 2020*). The **c. 8,000 mt worth c. £26 million** produced by aquaculture in England compares to English wild landings of 104,000 mt of finfish and shellfish in 2019 (*MMO, 2020*) with a value of £209 million.

<sup>1</sup> Of this 531 (72%) is in finfish and 211 (28%) in shellfish aquaculture.



Although a tenth the size of capture fisheries, English aquaculture is an important component of the wider English seafood industry:

- It is mainly comprised of **small- to medium-sized enterprises** and an important livelihoods opportunity in depressed economic areas with limited alternative employment opportunities.
- It serves **niche markets** such as for freshwater trout that capture fisheries cannot meet.
- Wild fisheries are constrained by variable and finite stock levels and therefore unable to expand significantly in volume – although aquaculture has its own constraints, there is more **potential for increased production through sustainable growth**, especially over the long-term.
- Although current production levels are very small, aquaculture is **capable of producing warm-water species and other exotic species** (such as tilapia and shrimp) that are currently imported. Again this has the potential to grow, especially given changes in the trades and markets following the EU-Exit and COVID-19.
- Aquaculture does, and has the potential to further, **maintain and increase marine biodiversity and ecosystem health**, through the use of extractive aquaculture processes such as shellfish and seaweed farming.





# Why has English aquaculture not yet achieved its potential?

## A number of factors combine to inhibit growth and new investment into the sector:

- Competition for space and resources in a densely populated country with mostly exposed, shallow and heavily utilised sea areas
- The sometimes pervasive, negative public perception and understanding of larger-scale aquaculture development and farmed products versus wild-caught equivalents
- An opaque and sometimes highly precautionary approach to aquaculture authorisations
- Current poor linkages between industry and research, despite breadth and depth of experience and knowledge at UK / English universities
- Limited domestic consumer demand in traditionally farmed species
- The vulnerability of marine shellfish farming to poor water quality

An additional reason for the inconsistent and variable growth is the lack of strategic direction. Any sector needs to overcome emerging challenges and to take advantage of opportunities for sustainable growth. The hope is that this Strategy is the first-step in moving toward a thriving English aquaculture sector.





# The opportunities

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Looking at the English aquaculture sector now, one could be forgiven for being pessimistic. Production has not grown over the past decade and both the EU-Exit and COVID-19 pandemic have created considerable short-term uncertainties.

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This, combined with other issues such as the vulnerability of marine shellfish farming to poor water quality and the complexity of regulation for new and expanding aquaculture businesses on our busy seas, create a challenging environment for English aquaculture development.

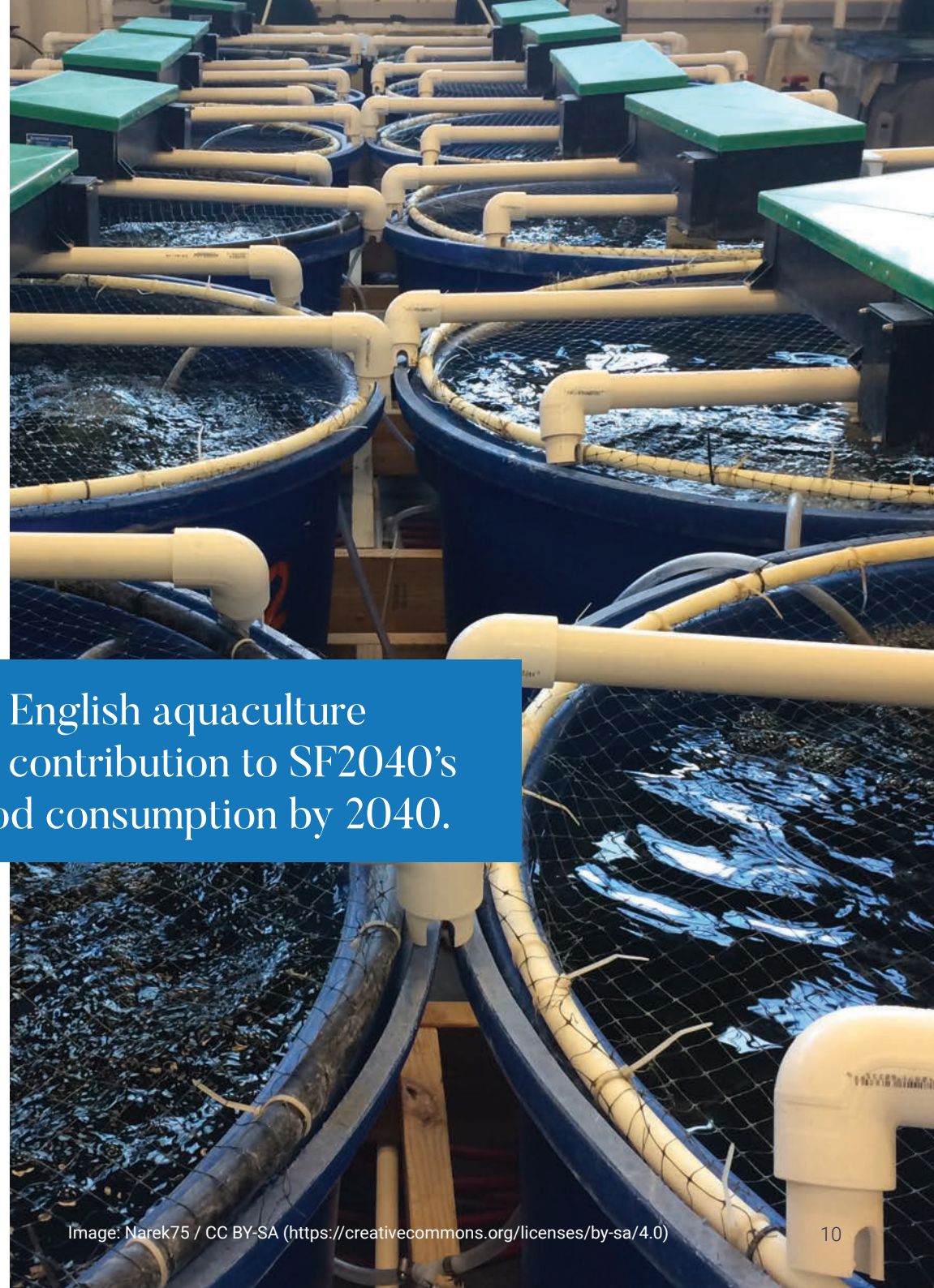
**But the longer-term prospects could be much brighter.**



Wild fisheries – which are mostly at or near maximum sustainable yield – have limited potential for expansion, but **aquaculture is less constrained**. There are prospects for transition to a more risk-based approach to shellfish production area testing in English waters. There is also the opportunity for increased recognition of aquaculture as an aspiring Maritime Economic Activity (MEA) in English waters, which will encourage both new entrants and successful current operators to grow and diversify the sector as a more integrated Blue Economy emerges. This is likely to be supported by the growing scale and economic viability of land-based aquaculture, **especially through improved RAS**. Finally, aquaculture has an important role to play in terms of both climate change adaptation via new seafood species and mitigation (reputationally as a low carbon food source).

The rewards could be substantial, with English aquaculture potentially providing the main national contribution to SF2040's aspiration for a 75% increase in seafood consumption by 2040.

This process will not be easy. In order to succeed, the Strategy will require considerable commitment from all parts of the sector to facilitate sustainable aquaculture growth and diversification as a key component of the Blue Economy, UK food security and preventative healthcare. If this fails to materialise, the ambitious growth aspirations within this Strategy ([page 14](#)) will simply not be possible and the sector will continue on its current static trajectory.





# The policy drivers

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Policies are the means by which governments translate their political vision into programmes and actions to deliver outcomes.

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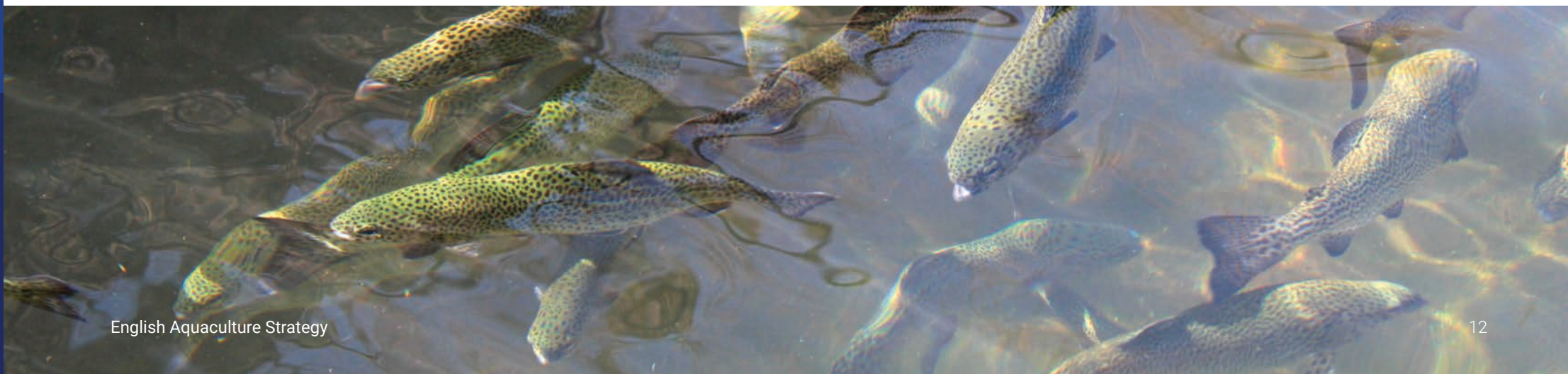
As with any strategy, the EAS will be underpinned by the prevailing policy framework, thus ensuring that the associated delivery plan is fully aligned with current government thinking. Importantly this will also provide a link between high-level policy intent and the practical needs of the English aquaculture sector.



## The main policy drivers for English aquaculture development are as follows:

- Growth will be **industry-led**, but subject to Government support where the wider enabling mechanisms are concerned;
  - Any growth must be conducive with **long-term sustainability** that provides environmental, economic and social (including employment) benefits;
  - The English Marine Plans and their more detailed local interpretation will be the primary mechanism for identifying areas for **potential sustainable growth** in marine aquaculture production – this will enable more focused investigation and the most suitable location(s) for a particular species and/or culture method to be identified;
  - Aquaculture development and permitting will be based on the best **scientific advice**. It is likely the onus will remain on the applicant to prove that aquaculture is the most appropriate use for a particular sea space, based upon environment, human health and other user considerations;
  - The use of alien species<sup>2</sup> is discouraged, especially in sensitive habitats, unless strong evidence can be provided of their **containment and biosecurity** (e.g. land-based systems);
  - The EU-Exit and COVID-19 have shown the vulnerability of both imports and exports of seafood, with implications for both food security and market-led production.
- The policy is therefore to encourage **increasing and diversified UK production**. In terms of seafood, this is more likely to come from aquaculture than wild capture production;
- There are strong health policy drivers to encourage **increased consumption** of aquaculture food products to contribute to the Government's target of two seafood portions per week; and
  - Aquaculture development will need to contribute to the UK's **Carbon Net Zero** objectives and provide opportunities for carbon mitigation, including sequestration.

<sup>2</sup> The case of Pacific oyster – an ordinarily resident non-native (alien) species is considered separately – see Box 3 in the full document.





# Objectives and principles

The objectives and principles developed for this Strategy outline the direction of travel and eventual outcomes that will contribute to achieving the vision of an English aquaculture sector that significantly contributes to seafood consumption and the Blue Economy.

## Objectives

- **Growth and diversification** of aquaculture in England over the next 20 years.
- Aquaculture is an innovative and integral component in the English **Blue Economy**.
- English farmed production contributes at least **15% of overall seafood consumption** in England by 2040.
- English aquaculture is **sustainably produced** and its products are regarded as being **safe and nutritious**.
- English aquaculture provides up to **5,000 jobs by 2040**, thus contributing to rural and coastal economies.

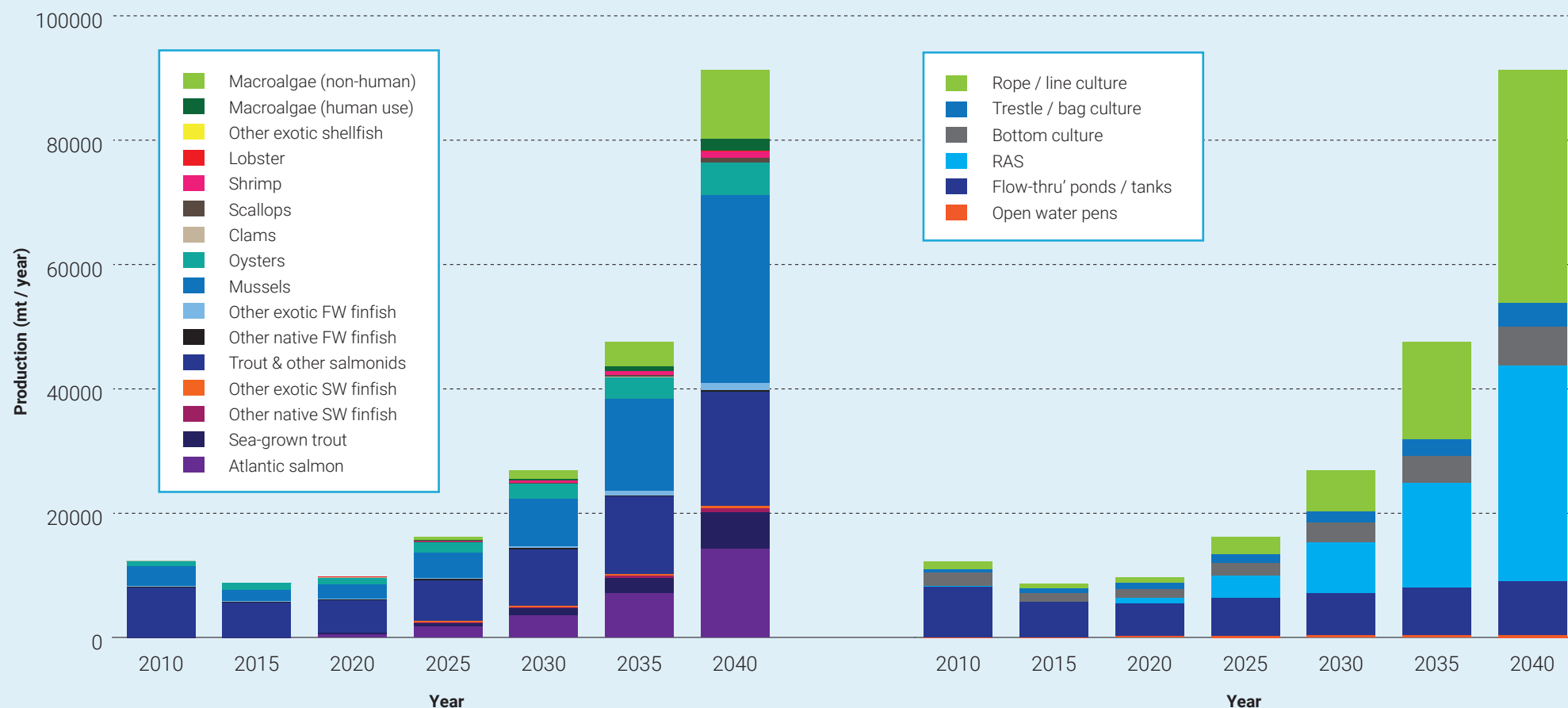
## Principles

- Aquaculture production should be environmentally, economically and socially **sustainable**.
- Aquaculture operations both establish and follow **good practice** across the supply chain in terms of animal health and welfare, environmental stewardship, food safety and conducive working conditions.
- Aquaculture development should be **regulated** in a proportionate and balanced way.
- **Innovation** will be core to the development of new production systems, feeds and products.
- The **development** of low-trophic species or the use of integrated multi-trophic aquaculture is encouraged.
- **Effective co-existence** of aquaculture with other maritime activities, including wild capture fisheries, is key.
- Aquaculture can develop at different scales.
- Aquaculture can provide a diverse range of **job opportunities** across the supply chain.
- A co-management, **partnering approach** is developed between government, regulators, industry, universities and research organisations, local communities and other sector participants.
- This Strategy's implementation will occur through a combination of **national and regional actions**.

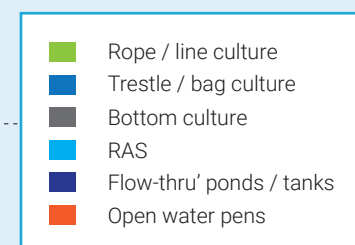
# Growth aspirations for English Aquaculture by 2040

The Strategy includes evidence-based growth aspirations for the next 20 years, developed in consultation with the SF2040 Aquaculture Leadership Group (ALG). They are realistic given the prevailing difficulties and uncertainties, however, if the delivery plan is fully implemented, there is every reason to believe they can be surpassed.

## By species



## By system





# Delivery plan

The EAS will be delivered via the delivery plan which has specific actions across three sub-sectors and six cross-cutting areas. This plan is a high-level, preliminary and prioritised list.

## Sub-sectors

- **Finfish** – 7 actions
- **Shellfish** – 7 actions
- **Macroalgae** – 6 actions

## Cross-cutting elements

- **Governance and Regulation** – 8 actions
- **Knowledge, Innovation and Technology** – 7 actions
- **Infrastructure** – 3 actions
- **Financial support** – 4 actions
- **Human Capacity Development** – 5 actions
- **Blue Economy** – 6 actions

The priority levels are:

### Critical

Key actions which are essential to the success of the Strategy. These are often precursors to other, usually lower priority actions.

### High

Actions that whilst not critical are highly important to the success of the Strategy.

### Medium

Actions that may not be critical nor high priority but are nevertheless essential to the long-term success of the Strategy.

The next step in the process is for the SF2040 ALG to review the actions and timelines with strategy partners and other potential participants to agree the way forward based on resources, finances, and planning. **It is expected that the delivery plan will be flexible and adaptable as the landscape changes, and resources and funding are available.**

# Implementation

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The EAS was commissioned by the SF2040 SILG and its delivery will be overseen by the SF2040 ALG.

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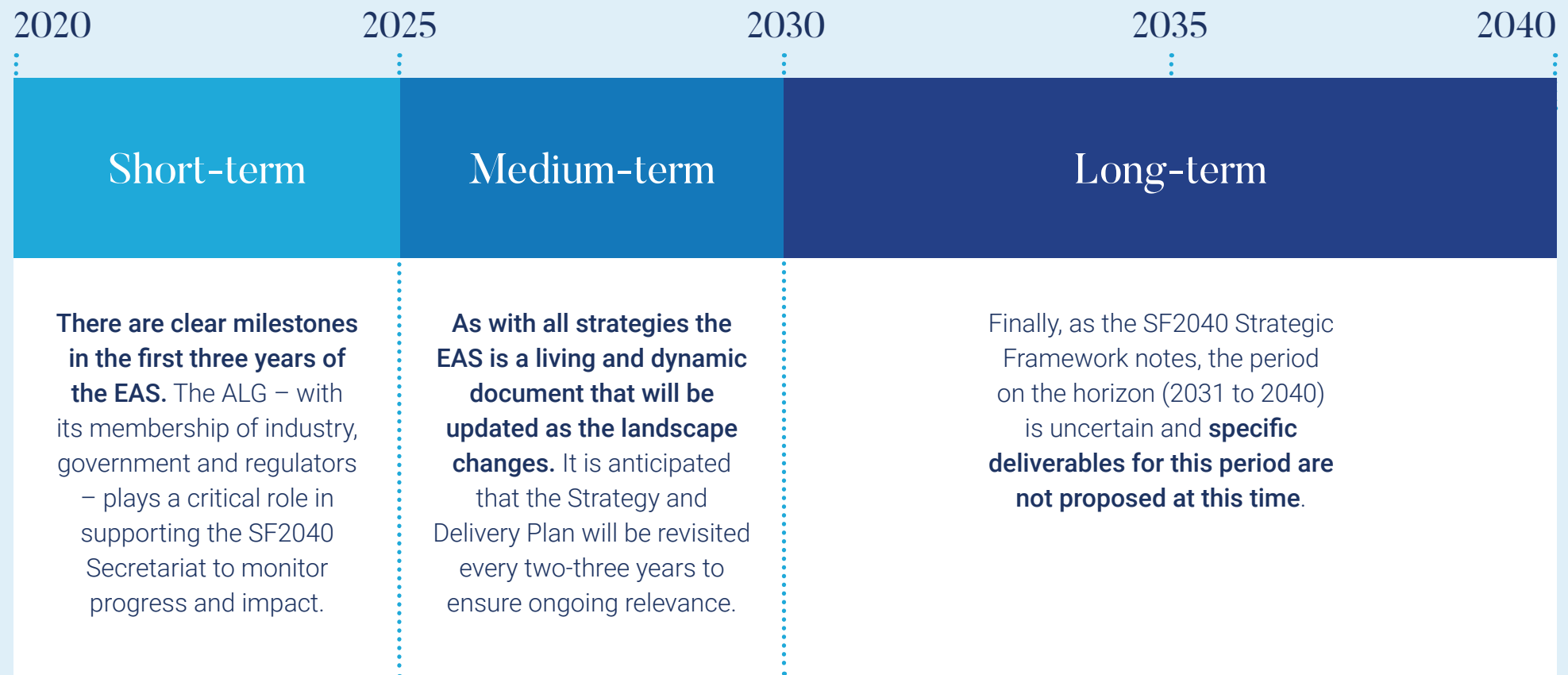
The delivery plan contains prioritised and time-bound actions to be undertaken taken by key partners across the aquaculture sector including industry, the Department for Environment, Food, and Rural Affairs (Defra), Seafish, and the regulators with oversight throughout the next 20 years from the SF2040 ALG. Some of these will require sector-wide collective action whilst others are specific to certain parts of the sector. A co-management approach between the industry and the regulators and their advisory agencies is needed. This will ensure that English aquaculture develops as part of a sustainable Blue Economy.

The EAS is a document to support all of English aquaculture. Within this national framework there will necessarily be regional initiatives to plan and develop aquaculture in line with the Government's regional approach to marine planning.



# Timeline

The Strategy will be implemented through the remaining SF2040 timeframe i.e. a 20 year period from 2020 to 2040. It will be delivered over three distinct time frames as follows:



# Critical actions

## Cross-cutting elements

### Knowledge, Innovation & Technology

- 1 Development of a research sub-strategy for English aquaculture.
- 2 Provide funding to support the establishment of an Aquaculture Innovation Hub in KI 3.
- 3 Establish an Aquaculture Innovation Hub and online forum for English aquaculture.

### Financial Support

- 1 Public funding of English aquaculture is reassessed and directed in line with the aspirations set out in the Strategy.
- 2 Work to align the replacement scheme for the European Maritime and Fisheries Fund and its successor public funding programmes with the funding sub-strategy resulting from FS 1.

### Governance & Regulation

- 1 A clear policy for English aquaculture development is prepared within the framework of the Fisheries Bill, the Common Fisheries Policy (Amendment etc.) (EU Exit) Regulations 2019, and the wider policy environment.
- 2 Following completion of Defra's review of aquaculture regulations, implement the agreed approach for transparent, streamlined and proportionate regulation.
- 3 Develop a regional approach to aquaculture development, management and regulation, creating regional hubs.

### Human Capacity Development

- 1 Develop a training needs analysis for human capacity development for English aquaculture up to 2040.

## Sub-sectors

### Shellfish

- 1 Finalise a formal policy for the use of Pacific oysters in English waters.
- 2 Develop the risk-based approach to the classification of shellfish production waters.<sup>3</sup>

### Macroalgae

- 1 Develop specific marine licensing for macroalgae culture.

<sup>3</sup> This action is already underway via the following initiative: [Developing an Assurance Scheme for Shellfish and Human Health](#).



# High priority actions

## Cross-cutting elements

### Governance & Regulation

- 4 Seek capacity-building within the statutory agencies responsible for aquaculture permitting, regulation and management.
- 5 Review and develop the planning and permitting regulatory regime for land-based aquaculture.
- 6 Establish and promote the direct benefits of aquaculture (feed and seafood production) and its economic value as well as those indirect ecosystem services that can be provided.
- 7 Report, compile and analyse English aquaculture production, economic performance and supply chain activity.
- 8 Formation of an English Aquaculture Producer Organisation to represent all production and supply chain sub-sectors.

### Human Capacity Development

- 2 Assist in the establishment of an aquaculture apprenticeship scheme accredited by the Institute for Apprenticeships & Technical Education.
- 3 Promote aquaculture as a growing sector in the Blue Economy and a progressive career choice.

### Infrastructure

- 1 Encourage and support harbour authorities to provide commercial operations with favourable rates for berthing and the use of other facilities.
- 2 Establish partnerships between aquaculture business and other MEAs where there are synergistic advantages.

### Knowledge, Innovation & Technology

- 4 Develop a time-bound short-, medium- and long-term research programme for English aquaculture that addresses the differing needs identified in the sub-strategy.
- 5 Establish an English aquaculture research and innovation group to manage the research programme.
- 6 Government to work with industry, academia and research organisations to determine the long-term, centrally-funded research needs that will address enduring regulatory barriers.
- 7 Identify synergies with other MEAs and develop research and innovation linkages.

# High priority actions

## Cross-cutting elements

### Blue Economy

- 1 Develop local alliances and partnerships for co-location of aquaculture, marine protected areas (MPAs) and fishing areas.
- 2 Conduct an independent national 'Strategic Environmental Assessment' (SEA) of English aquaculture and its likely development pathways.
- 3 Develop partnerships at local level in priority aquaculture areas including development of 'Aquaculture parks' at a local level.
- 4 Assess ways of including aquaculture and its supply chain components in the Blue Economy.

## Sub-sectors

### Finfish

- 1 Develop commercial marine finfish hatchery capacity and capabilities.
- 2 Prepare models for more efficient finfish farming in marine and freshwater.
- 3 Develop mooring, power supply, feeding, stock monitoring and other support systems for use in exposed and offshore sites in English waters.
- 4 Establish assessment protocols to examine the environmental benefits of, and services provided by, developing extensive terrestrial aquaculture.

### Shellfish

- 3 Improve industry dialogue and partnership with the Environment Agency, Defra and other agencies, as well as local government bodies and the water companies.
- 4 Review and revision of seabed lease and Several Order mechanisms to provide long-term security and promote investment in shellfish growing areas, both inshore and offshore.

### Macroalgae

- 2 Prepare models and pilot projects for seaweed farms in English waters.
- 3 Quantify and model ecosystem service provision by cultured seaweed species.
- 4 Investigate and develop seaweed supply chains, product development and market diversification opportunities for both human and non-human uses.
- 5 Establishment of a professional trade body to provide a voice for the developing macroalgae farming sub-sector, as well as supporting knowledge-sharing, supply chain and development and coordinated harvesting.



# Medium priority actions

## Cross-cutting elements

### Financial Support

- 3 Monitor and evaluate public sector development funding in aquaculture projects.
- 4 Engage with Non-Governmental Organisations (NGOs) and existing ethical funding programmes to identify and support aquaculture businesses.

### Infrastructure

- 3 Conduct a feasibility study to identify the potential for a strategic network of seafood clusters, servicing both aquaculture and capture fisheries interests.

### Human Capacity & Development

- 4 Identify cross-sectoral learning opportunities e.g. with sectors such as oil and gas in relation to technology and offshore operations.
- 5 Provide support for general management, leadership and business skills.

### Blue Economy

- 5 Collaborate with both offshore energy companies and aquaculture to develop conceptual models for multi-use operational platforms at sea.
- 6 Identify and promote supply chain opportunities for English aquaculture, such as novel feed raw material production, feed manufacturing, equipment recycling and disposal, etc.

# Medium priority actions

## Sub-sectors

### Finfish

- 5 Expand and enhance current skill and service base in genetics, disease prevention and vaccine development, etc.
- 6 Promote investment in to novel, IT connected stock and environmental monitoring systems for application in English and other aquaculture systems.
- 7 Draft a policy and guidance for land-based RAS.

### Macroalgae

- 6 Develop models for integrating seaweed farming into Integrated Multi-Trophic Aquaculture (IMTA) sites and locations.

### Shellfish

- 5 Develop a certified hatchery network for different shellfish species with increased public support to develop, test and demonstrate new technologies in polyploidy, live feed and larval rearing systems.
- 6 Explore opportunities for hi-value invertebrate aquaculture e.g. sea cucumber, sea urchins, abalone etc. in both open water and closed systems, including IMTA and RAS.
- 7 Create product value-addition, market and branding opportunities for English shellfish products at regional, national and international levels.



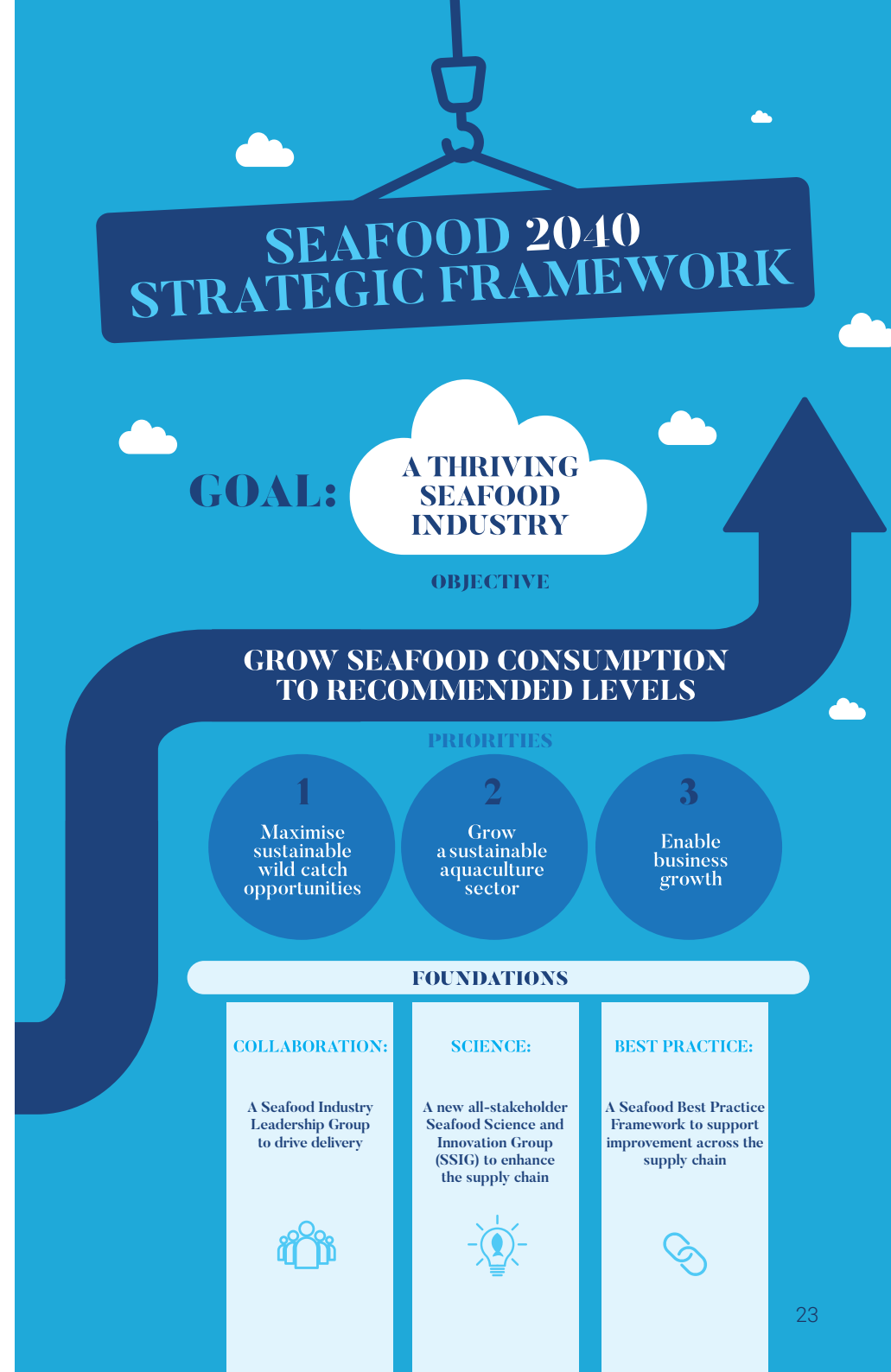
# What is Seafood 2040?

The SF2040 programme is an England-only strategic programme facilitated by Seafish in partnership with Defra and seafood industry partners.

The **SF2040 Strategic Framework** consists of 25 recommendations that set out a vision for a thriving seafood industry. The drivers are: Collaboration; Communication; Science, Innovation and Technology; and Best Practice. SF2040 is funded by the European Maritime and Fisheries Fund (EMFF). The governance includes the Chair, Programme Manager and two committees:

- **The Seafood Industry Leadership Group** (SILG) oversees the SF2040 programme and is comprised of stakeholders from across the English seafood supply chain including fisheries, aquaculture, processing and retail. Seafish and Defra are also members.
- **The Aquaculture Leadership Group** (ALG) comprises membership from across the aquaculture industry, academia, and government including Defra, Seafish, and several regulators. ALG champions and advances the aquaculture recommendations on behalf of SILG.

Following the establishment of the ALG, the first task was to “Deliver an English Aquaculture Growth Strategy, with Government supported growth targets and a revised short, medium and long term delivery plan”. This is the basis for the current English Aquaculture Strategy.



For further information on the  
**English Aquaculture Strategy:**

Visit the [\*\*SF2040\*\* webpage](#)  
on the Seafish website.

For more information about Seafood 2040:

Contact **Kimberly Cullen**

M: +44 (0) 7876 035762

E: [kimberly.cullen@seafish.co.uk](mailto:kimberly.cullen@seafish.co.uk)

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