AQUACULTURE IN SPAIN

2020

APROMAR

Index

1. Executive Summary 3

2. Introduction 5

3. Aquaculture in the world 8
   3.1. Global availability of aquatic products 8
   3.2. Situation of aquaculture in the world 10
   3.3. Aquaculture productions in the world 11
   3.4. Aquaculture productions by groups and by environments 16
   3.5. Potential of aquaculture and sustainable development 18

4. Aquaculture in the European Union 20
   4.1. Situation of aquaculture in the European Union 20
   4.2. Situation of finfish aquaculture in the European Union 24
   4.3. Situation of shellfish aquaculture in the European Union 27
   4.4. Potential of European aquaculture 28
   4.5. Videos of interest 30

5. Aquaculture production in Spain and Europe 31
   5.1. Aquatic food production in Spain 31
   5.2. Types of aquaculture facilities in Spain 34
   5.3. Number of aquaculture establishments in Spain 35
   5.4. Employment in aquaculture in Spain 36
   5.5. Consumption of aquaculture feed in Spain 37
   5.6. Marine aquaculture in Spain and Europe 38
   5.7. Freshwater aquaculture in Spain and Europe 63

6. Marketing and consumption of aquaculture products in Europe and Spain 68
   6.1. Consumption of aquatic products in the European Union 68
   6.2. Food consumption in Spain 70
   6.3. Consumption of aquatic products in Spain 70
   6.4. Consumption of fresh aquatic products in Spain 73
   6.5. Sea bream market development 75
   6.6. Sea bass market development 78
   6.7. Turbot market development 80

7. Spanish scientific production in the field of aquaculture 82

8. The challenges of aquaculture in Spain 89

9. Bibliography 94

1. Executive abstract

1.1. Aquaculture production in Spain

» The aquaculture production in Spain in 2019 has been 342,867 tonnes. This production reached a value in its first sale of 501 million Euros. The main species produced has been mussels (261,513 t), followed by sea bass (27,335 t), rainbow trout (18,955 t) and seabream (13,521 t).

» Significant reduction in the number of aquaculture facilities in Spain, from a maximum in 2007 of 5,313 to 5,075 in 2018. Of these, 4,793 were for molluscs, 166 farms of freshwater aquaculture, 73 facilities on the coast, beaches, intertidal areas and estuaries, and 41 in pens.

» The employment rate in aquaculture in Spain in 2018 was 6,730 UTA, although this quantity was distributed among 18,587 people. The estimation of indirect employment associated with the 18,587 people working in aquaculture was 46,467 jobs.

» In 2018, 146,829 tonnes of aquaculture feed were used in Spain. This amount is 4.8% higher than in 2018. To marine fish species was suppied the 85.6% of it and the remaining 14.4% to freshwater species.

» The aquaculture seabream harvest in Spain in 2019 was 13,521 tonnes, -9.4% less than the previous year. The Valencian Community has led the production of aquaculture seabream in Spain with 6,629 t (49% of the total), followed by Murcia (2,906 t, 21.5%), Canarias (2,380 t, 17.6%) and Andalusia (1,606 t, 11.9%).

» The production of seabream juveniles in Spain in 2019 was 30 million units, -19.8% less than in 2018. The production was mainly in the Valencian Community (60.8%), Cantabria (19.9%), the Balearic Islands (12.7%) and Andalusia (6.5%).

» The harvest of sea bass in Spain in 2019 was 27,335 tonnes, 21.7% more than in 2018. Production is led by the Murcia Region has with 9,181 tonnes (34% of the total), followed by Andalusia (7,120 t, 26%), the Canary Islands (6,253 t, 23%), Valencian Community (4,751 t 17%)), and Catalonia (30 t, 0.1%).

» The production seabass juveniles in Spain in 2019 was 55.8 million units, which represents a decrease of -15.4% over the 2018 production. The sea bass juveniles harvest in Spain takes place in the Balearic Islands (75.7%), the Valencian Community (13.8%), Cantabria (4%) and Andalusia (6.4%). For 2020, it is estimated that the production of juvenile seabass in Spain will decrease by -1.5% to 55 million units.

» Rainbow trout production in Spain in 2019 is estimated at 18,955 tons, 0.5% more than in the previous year. Similar production is expected for 2020, around 19,400 t.

» Total turbot harvested in Spain in 2019 was 8,258 tonnes, 10.8% more than the previous year. All the production was done in Galicia.

» The production of turbot juveniles in Spain in 2019 was 7,030,150 units.

» The production of meagre in Spain in 2019 was 3,623 tonnes, 44.9% more than in 2018. The bulk of the harvest of Spanish meagre comes from the Valencian Community but it is also produced in Andalusia. It is expected a growth of 5.5% for 2020, around 3,823 tonnes.

» In 2019, Spain produced a total of 818 tonnes of sole, -6.7% less than in 2018. This production occurs in Galicia and Andalusia. The 2020 harvest is estimated to decrease by -27% to 597 tonnes.

1.2. Aquaculture in the European Union and in the world

» Global aquaculture production reached 114.5 million tonnes in 2018, 2% more than the previous year. It exceeded capture fisheries production by 17.1 million tonnes and reached a value of 200.8 billion Euros in first sale.

» EU aquaculture production in 2018 was 1,365,112 tonnes, with a value of 4,357 million Euros. The main species produced in the EU are mussels, of which two species are produced with a total of 527,192 tonnes in 2018, followed by Atlantic salmon with 179,314 tonnes and rainbow trout with 174,987 tonnes.

» Spain is the Member State of the European Union with the highest aquaculture harvest with 347,825 tonnes in 2018 (25.5% of the total). However, when considering the value of production, it occupies the fourth position, with 478.8 million (11%).

» In 2018, the EU harvested 695,885 tonnes of finfish species, -4.9% less compared to 2017. This production accounted for 51% in weight of the total aquaculture production and reached a value of 3,241.3 million Euros in first sale (74.4% of the total value).

» Spain is the third largest finfish producer country in the EU, with 60,535 tonnes (8.7%) behind the United Kingdom and Greece.

» The growth rate of total EU aquaculture (essentially finfish and molluscs) has decreased since 2000 by an average of -0.2% per year, while in the world aquaculture it has grown on average an 5.6%.

» Total aquaculture production of seabream in Europe and the rest of the Mediterranean in 2019 is estimated at 252,406 t, 2.5% higher than in 2018. The total value at first sale is estimated at 1,135.8 million Euros.

» The total production of seabream juveniles in 2018 in Europe (including Turkey) is estimated to be 701,511 million units, 2.4% more than in 2018.

» The sum of seabass aquaculture production in Europe and the rest of the Mediterranean arch in 2019 was 212,977 tonnes, 8.3% lower than the previous year. The total value at first sale was 1,064.9 million Euros.

» The production of seabass juveniles in 2018 in Europe (including Turkey) amounted to 625 million units, - 0.4% less than in 2018.

» Total production of aquaculture turbot in the world in 2018 was 58,798 tonnes, 2.4% higher than the previous year.

» Global aquaculture production of rainbow trout in 2018 was 848,051 tonnes, which represents an increase of 1.9% compared to the previous year.

» The global employment in the aquaculture sector represented 20.3 million people in 2018, of which it is estimated that only 14% were women.

1.3. Commercialization of the aquaculture products

» The EU is the first and most important world market for aquatic products. In 2019, the European Union consumed 12.8 million tonnes of aquatic products almost the same as the previous year, for which it was imported 9.5 million tonnes, 1.2% more than in 2018. The self-sufficiency of aquatic products in the EU is only 25.3%.

» Spanish households dedicated a 12.94% of food and beverages expenses to the purchase of aquatic products, wich means 195.06 Euros per capita and a consumption of 22.53 kg per person per year, -2,7% lower than in 2018.

» The average first sale price of aquaculture seabream produced in Spain in 2019 was 4.11 Euros/kg a -5.9% lower than the average price of 2018.

The total value of the 13,521 tonnes of Spanish sea bream marketed has been 55.6 million Euros.

» The average price for the first sale of aquaculture seabass produced in Spain in 2019 was 3.78 Euros/kg, wich is a -18.5% lower than the average price of the previous year. The total value of the 27,335 tonnes of Spanish seabass marketed has been 103.4 million euros.

» The average first sale price of aquaculture turbot produced in Spain in 2019 was 9.25 Euros/Kg that is a 10.8% higher than the previous year and represented a total amount of 76.4 million Euros.

2. Introduction

The European Union is suporting on policies that provide citizens with nutritious, safe and affordable food, especially after the Covid-19 crisis. This has been reflected in the Green Pact of the president of the European Commission, Ms. Ursula Von der Leyen, as well as in the strategy From Farm to Fork, which is part of it, to support farmers, ranchers, aquaculturists and fishermen with the sustainability of food throughout its entire value chain. This Farm to Fork strategy should cover every step of the food supply chain, from production to consumption, and drive the goals of the Circular Economy.

However, the European Green Deal cannot be achieved definitively without addressing the issue of real food sustainability. The health of European citizens, the environmental health of the planet and the socioeconomic health of the coastal and rural areas of Spain, and the rest of the EU Member States, go hand in hand.

The From Farm to Fork strategy must guarantee a fair, healthy and integrated diet in the environment combining regulatory and non-regulatory initiatives to achieve its objectives. In the case of aquaculture, the Common Fisheries Policy should be a key tool to support this strategy. Furthermore, the various lines of the strategy maintain strong connections and contribute directly to the new Circular Economy Action Plan, the EU Biodiversity Strategy for 2030, the Forestry Strategy, the EU Climate ambition and with the Zero Pollution Strategy. Logically, also with the United Nations Sustainable Development Goals of the United Nations 2030 Agenda.

The latest report on Earth and Climate Change from the Intergovernmental Panel on Climate Change (IPCC) has underlined that it will be impossible to keep global temperatures at safe levels unless there is a transformation in the way the world produces food and manages the land. Aquaculture has to feel alluded to in this call. The report estimates that 25-30% of global greenhouse gas emissions are attributable to the food system. Food systems contribute greatly to air, soil and water pollution and greenhouse gas emissions, as well as the loss of biodiversity. At the same time, extreme weather events due to climate change are seriously affecting agricultural and livestock production, with serious consequences for the livelihoods of farmers, ranchers, aquaculturists, fishermen and coastal and rural communities.

In each new edition of this annual report, it is worth remembering that aquaculture is the production of animals and plants in water through techniques aimed at making more efficient use of natural resources. It is an activity equivalent to what livestock and agriculture are on the mainland. It encompasses various practices and a very wide range of species and production systems. One of the distinguishing characteristics of fishing is that, throughout all, or at least part of its life cycle, the organisms produced are owned by someone. Aquaculture has a history of 4,000 years, but it has been 50 years since it has become a relevant socio-economic activity, employing more than 13 million people in the world.

Aquaculture is not a complement to fishing, but its natural evolution, as cattle ranching in its time replaced hunting as a means of livelihood. Aquaculture has a huge future projection since the resources needed to produce a kilogram of food in water are less than on land. It also has in its favor that 70% of the planet's surface is water, that its fresh water requirement is minimal, that the reproduction rates of aquatic animals are several orders of magnitude higher than those of terrestrial vertebrates, and that aquatic animals are more efficient converters of their food because they float on water and do not consume energy to maintain their body temperature. To successfully solve the great challenges facing aquaculture, research and innovation initiatives must be directed towards optimizing its efficiency and productivity, both in small and arge-scale systems.

Aquaculture is the production of animals and plants in water through techniques aimed at making more efficient use of natural resources.

These investigations should lead to improving knowledge on maintaining the good health of reared animals, optimizing feed and raw materials, improvements in farm management, as well as for the domestication of new species. However, the real challenges for the development of aquaculture in Spain are to make the administrative framework in which it must operate more efficient, as will be seen later in this report.

Never in the past has humanity consumed such a quantity of aquatic products as in the present. On the other hand, globalization and the interconnection between markets mean that changes in the supply of food affect all the countries of the world without exception, even when their population in a particular place does not increase in size or change their level of wealth. This situation will probably worsen with Climate Change, which is already causing alterations in traditional production models and trade flows.

Fish is an extraordinarily nutritious food, a vital source of protein, fatty acids and essential nutrients. Furthermore, the consumption of aquatic products and their incorporation into the diets of pregnant and lactating women, as well as young children, represents an important way to improve food security and nutrition. First of all, because the lipid composition of fish is exceptional, comprising long-chain polyunsaturated fatty acids (Omega-3 DHA and EPA) that offer multiple beneficial effects for health in adulthood and for child development. Second, fish protein has a higher bioavailability, approximately 5% to 15%, than that derived from plant sources, in addition to containing amino acids essential for human health. And third, fish is an important source of vitamins (D, A, and B) and mineral micronutrients (calcium, phosphorus, iodine, zinc, iron, and selenium).

Scope of the report

The preparation of this annual report on the evolution of the aquaculture sector is important to know the status of the activity and promote its sustainable development. Its target audience are companies and professionals in the sector, but also public administrations, legislators, politicians, researchers, the media, liberal professionals, unions, students and society in general.

Although this report focuses on aquaculture as a provider of food for people, there are other important purposes for the products of this activity, such as the production of pharmaceutical products, the release of specimens for sport fishing, the repopulation of the natural environment, aquarium hobby or scientific research.

This publication is an exercise of sectoral transparency that respects the right to free competition. In its wording, the publication of confidential information related to the strategies of the producing companies from which anti-competitive practices could be derived has been avoided.

Its objective is only to provide basic aggregated information that may be of interest to anyone interested in aquaculture, both producers and researchers, non-governmental organizations, suppliers, public administrations, unions, trainers and students.

The collection and processing of the data contained in this report has been carried out by APROMAR. In addition to the information collected by the association itself among its associates, information from the European Commission, the Spanish Ministry of Agriculture, Fisheries and Food (MAPA), the European Federation of Aquaculture Producers (FEAP) and the Food and Agriculture Organization of the United Nations (FAO) has been used. The National Aquaculture Advisory Board (JACUMAR-JACUCON) has also been a relevant source of data.

INFORMATIVE NOTES

- This study refers only to quantities produced and placed on the market by aquaculture farming companies. All references to the term "production" refer to quantities produced, harvested and marketed. Product volumes in production process (biomass increase), but not yet harvested, are not considered.
- The weight of the species produced refers to live weight. All references to production volumes refer to weight previously eviscerated or processed, if it is carried out.
- The value of global aquaculture productions offered by FAO is given in US dollars. In this report the US dollars have been converted into Euros at the change of 1.0 dollars = 0.80 Euros.
- In the time series of prices, no adjustment has been made based on changes in the price of money (CPI). All prices indicated are in nominal values.
- The annual publication of FAO and FEAP production statistics sometimes includes the review of data from past years. This circumstance may mean changes on the figures published for the same years in previous editions of this same report.
- "First sale" means the sale made by the primary producer (aquaculture farmer) to the first commercial link in the value chain.

NOTES ON STATISTICS

- The data that have been used for the preparation of this 2020 report refers to last year, and even 2 previous years, depending on the source consulted. Thus, the most recently published FAO and MAPA data refer to 2018. While the data resulting from the surveys carried out by APROMAR and FEAP refer to 2019. When possible, a forecast for 2020is offered.
- In the statistical compilation of aquaculture productions in Europe for this report, the data of the European Union are presented separately, in order to disaggregate them from those of Norway and Turkey.

3. Aquaculture in the world

3.1. Global availability of aquatic products

The growing global demand for healthy and nutritious aquatic products is a challenge that has only been met by adding aquaculture production to fisheries, two activities that will continue hand in hand for at least the next few decades.

The year 2018 is the most recent year in the extensive series of statistical information on global aquatic production (aquaculture and fisheries) offered by the Food and Agriculture Organization of the United Nations (FAO). In that year, the global aquatic production was 211.9 million tonnes, 2.6% more than in 2017. This production has continuously grown during the last three decades at an average annual rate of 2.5%, surpassing the growth rate of the world population which has been 1.6%. The global consumption of aquatic products per capita has gone from 9.0 kg in 1961 to 20.5 kg in 2018, according to the FAO Sofia 2020 report, growing by approximately 1.5% per year, thanks to the incessant increase in productions, to improvements in fish preservation techniques, reduction of food waste and more efficient distribution channels, in addition to increases in disposable income.

Global aquatic production (aquaculture + fishing) in 2018 was 211.9 million tonnes, 2.6% more than the previous year.
Aquatic products are one of the most important sources of animal protein in the world. According to FAO, aquatic products account for 17% of the globals animal protein intake and 7% of all protein consumed.

World aquatic production (aquaculture + fishing) in 2018 was 211.9 million tonnes, 2.6% more than the previous year.

Aquatic products have accounted for 20% of the average per capita intake of animal protein for 3.3 billion people and up to 50% in countries such as Bangladesh, Cambodia, Sierra Leone, Sri Lanka and several Small Island Developing States (SIDS). In addition to offering high quality protein, easily digestible and

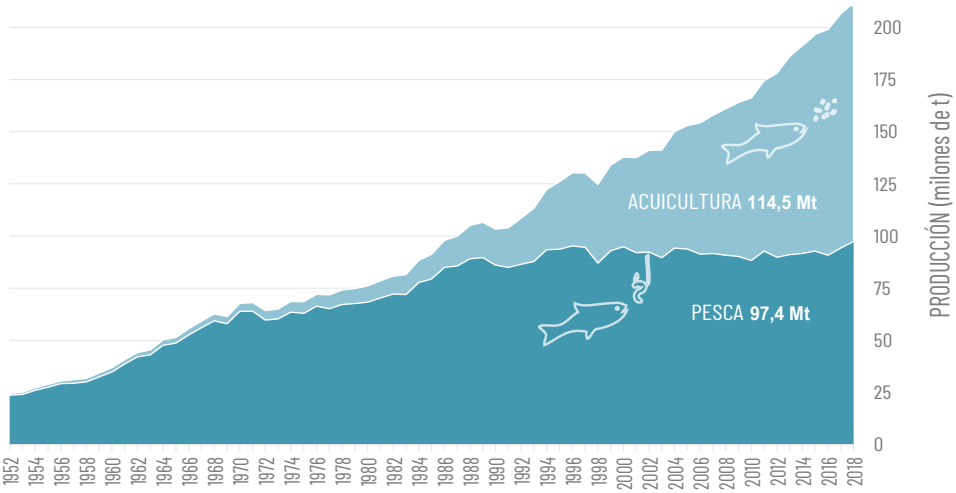


Figura 3-1. Evolution of world aquatic production (aquaculture plus capture fisheries) in the period 1952-2018 (FAO).

containing all essential amino acids, aquatic foods contain omega3 essential fatty acids (EPA and DHA), vitamins (D, A and B) and minerals (calcium, iodine, zinc, iron and selenium). With these nutritional values, fish and other aquatic species play an important role in correcting unbalanced diets.

Employment in all activities related to obtaining aquatic products has grown faster than the world population. It represents 59.5 million people, being 20.5 million in aquaculture and 39 million in extractive fishing. It is estimated that only 14% of these workers are women. The proportion of employment in aquaculture with respect to all fishing activities has grown from 17% in 1990 to 32% in 2016.

Of all products of aquatic origin, the proportion directed to direct human consumption has gone from 67% in 1960 to more than 88% in 2018. The rest is used mainly as raw material for animal feed, including aquaculture.

Aquatic products continue to be one of the most internationally traded staple foods in the world, specifically 38% of global production of aquatic products was traded internationally, that is, about 67 million tons, according to FAO. In 2018, the demand for aquatic products increased and produced an increase in prices, increasing the value of global exports by 5%. More than 221 countries reported exports of aquatic products. In 2017, China remained the largest exporter, followed by Norway, Vietnam, India, Chile and Thailand.

In 2018, aquaculture placed 114.5 million tonnes on the market, only 2.0% more than the previous year, although exceeding fisheries production by 17.1 million tonnes for the sixth consecutive year.

The world catches of extractive fishing in 2018 have exceeded the 95 million that were predicted for some time as the definitive ceiling for fishing activity. In 2018, the total catch was 97.4 million tonnes, 3.3% more than in 2017, and has represented the highest volume of catches since 1950. This increase is mainly due to the increase in catches of anchovy (*Engraulis ringens*) in Peru and Chile, about 7 million tons 2018 according to FAO.

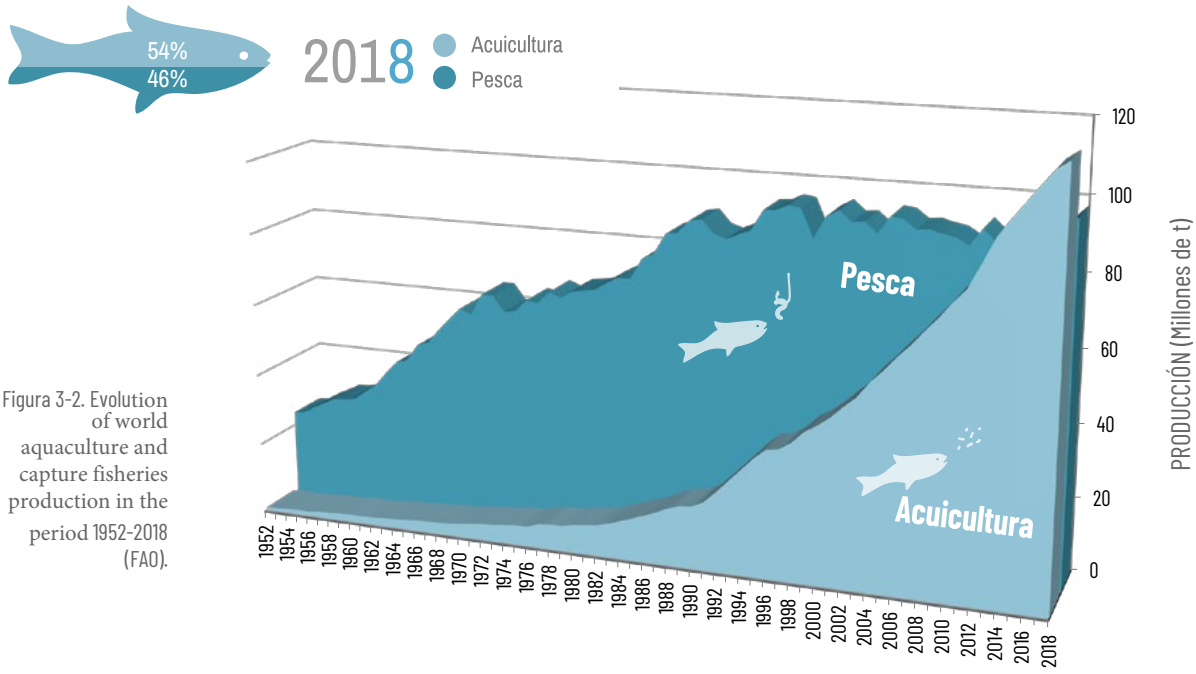


Figura 3-2. Evolution of world aquaculture and capture fisheries production in the period 1952-2018 (FAO).

The greater efficiency in the exploitation of the fishing grounds and the new technologies applied to the fishing fleets have led to reaching maximum levels of sustainable exploitation of wild fishing resources. However, although it has been a record-setting year for fisheries, the increase in demand for aquatic products has continued to drive the promotion of a quaculture for the global supply of these foods. In 2018 aquaculture pplaced 114.5 million tonnes on the market, exceeding fisheries production by 17.1 million tonnes for the sixth consecutive year. But these impressive numbers should not mask the fact that the global annual growth rate of aquaculture has declined considerably in recent years. After decades of year-on-year growth rates of 6% to 10%, 2018 has seen an increase of just 2.0% over 2017.

3.2. Situation of aquaculture in the world

Global aquaculture production comes from farms that raise fish, crustaceans, algae, molluscs and other invertebrates.

These establishments are playing a crucial role in many developing countries in their efforts to eradicate hunger and malnutrition, providing foods rich in protein, essential oils, vitamins and minerals to a wide sector of the population. But the contribution of the long-chain polyunsaturated omega-3 fats (EPA and DHA) contained in foods of aquatic origin to the health and quality of life of people is especially noteworthy.

The progress of aquaculture in the last four decades reveals not only the vitality of this activity as a productive technique, but also the capacity for innovation, entrepreneurship and sustainable use of available resources. FAO considers that aquaculture contributes to the efficient use of natural resources, food security and economic development, with a limited and controllable impact on the environment.

That is why the development of this activity continues its advance and consolidation in the world, both in developed and developing countries. In addition, aquaculture is an engine of economic development that is contributing, in an important way and in many countries, to reducing poverty by

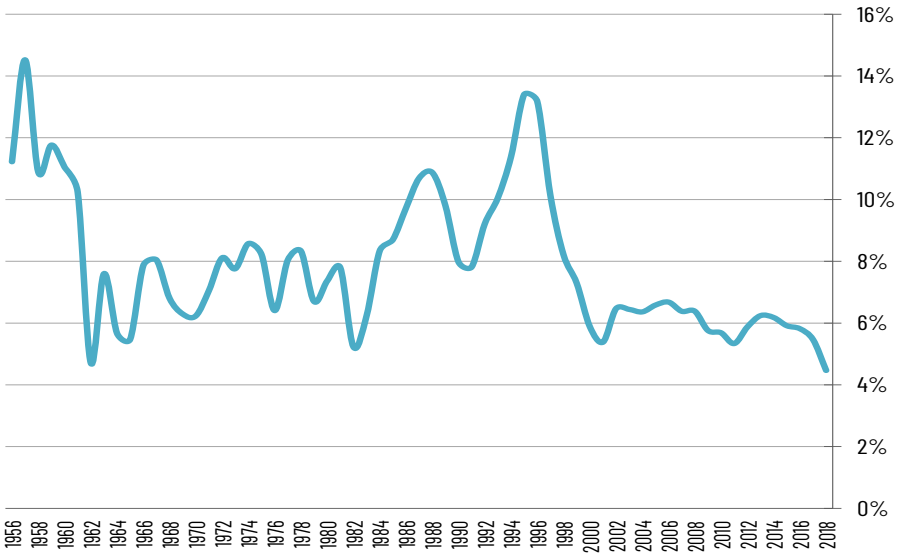


Figura 3-3. Evolution of the annual growth of world aquaculture production in the period 1956-2018, calculated on arithmetic averages by moving sections of 5 years to attenuate short-cycle oscillations (from FAO).

increasing the economic income of families, promoting local and international trade, providing foreign exchange, improving resources returns and offering employment opportunities.

To the direct jobs on the farms must be added the jobs generated by the large number of auxiliary activities to support aquaculture, such as transformation and processing, packaging, marketing and distribution, the manufacture of equipment, networks and technologies, production and supply of ice, construction and maintenance of vessels and aquaculture facilities, consulting services, scientific activity and that of the administrations involved in the monitoring and development of aquaculture.

3.3. Aquaculture productions in the world

Since the sixties of the 20th century, global aquaculture production has grown steadily and dramatically. Between 2000 and 2018, the year-on-year growth was 5.9% on average. Since 2014 the growth rate has been decreasing slightly and in 2018 it was 2% compared to 2017. From a production of less than 0.8 million tons in 1951, it has reached the referred 114.5 million tonnes in 2018, with a global first-sale value of more than 200.8 billion euros.

Most of the world's aquaculture is carried out in Asia, specifically 91.8%, as it is also the continent with the majority in fishing (51.3%). The rest of the aquaculture production is distributed by America (3.3%), Europe (2.7%), Africa (2.0%) and Oceania (0.2%).

In the analysis of FAO's world aquaculture production statistics, it stands out that, although aquaculture is carried out in practically all the countries of the world, it is a specialized activity in which only the countries that are strategically committed to it achieve real advances maintained over time. In 2018, the 10 main aquaculture producing countries worldwide increased their production volume with a joint growth rate of 1.9%, but the rest of

The value of the world aquaculture harvest in 2018 reached 200.8 billion euros.

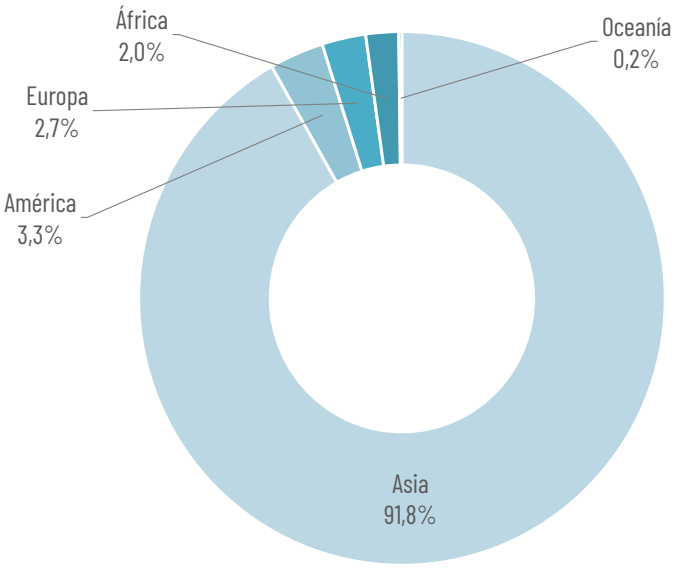


Figura 3-4. Distribution of aquaculture production across the five continents (from FAO).

the countries did so at 3.1%, confirming an important commitment to production aquaculture globally. With this, in 2018 the 10 main aquaculture producing countries in the world produced 103.3 million tonnes, 90.2% of the total amount produced.

The development of this activity is occurring mainly in developing countries, and to a lesser extent in developed countries, despite the fact that the first ones have less access to technologies. The first aquaculture producing countries are in Asia.

China continues to stand out as the first aquaculture producing country in the world, with 66.1 million tonnes harvested in 2018, which represents 57.8% of global production.

They are developing countries and suffer from food deficiencies. Although these Asian countries sometimes have intensive aquaculture industries with high-value products, such as prawns to export to other markets, the largest proportion of their aquaculture is traditional, extensive and for local consumption, with species such as carp and other cyprinids, in addition of algae.

China continues to be the undisputed leader in global aquaculture production with 66.1 million tonnes of production in 2018, 2.8% higher than in 2017, and with a great difference over the second country in production, Indonesia, which harvested 14,7 million tonnes. Despite the large size of China (9.3 million km^2), it represents only 6.26% of the world's land area, and its 14,500 km coastline accounts for just 4% of the world's entire coastline. This leadership with such an advantage over the rest of the countries is due, on the one hand, to the enormous population of that country (1,393 million inhabitants in 2018) associated with an outstanding culture of consumption of aquatic products. And, on the other, to the thousands of years of practice of subsistence aquaculture. The first recognized form of aquaculture in the world was the production of carp and its references date back to 3,500 BC, precisely in ancient China.

The three main species produced in aquaculture today in China are Japanese kelp, Chinese carp, and Japanese oyster. Indonesia remains the second largest producer country, although its growth rate has decreased by -8.35% in 2018. In Indonesia the largest productions are eucheuma and Japanese laminaria seaweed, along with Nile tilapia. It is followed by India with a production of 7.1 million tonnes and an annual increase of 14.33%, and Vietnam with 4.2 million tonnes and a growth compared to 2017 of 8.4%. Among the rest of the 10 main aquaculture producing countries, growth in Egypt (7.6%, 1.6 million tonnes) and Chile stands out in 2018, which entered the tenth position in the ranking

Tabla 3-1.
Main aquaculture producing countries by annual tonnes produced in 2018 and interannual variation rate (FAO).

País	Cantidad (t)	% Var. anual
China	66.135.059	2,8%
Indonesia	14.772.104	-8,4%
India	7.071.302	14,3%
Viet Nam	4.153.322	8,4%
Bangladesh	2.405.416	3,1%
Filipinas	2.304.361	3,0%
República de Corea	2.278.850	-2,4%
Egipto	1.561.457	7,6%
Noruega	1.355.117	3,6%
Chile	1.287.233	5,5%
TOTAL 10 PRALES. PRODUCTORES	103.324.221	1,9%
RESTO DE PAISES	11.183.821	3,1%
TOTAL MUNDIAL	114.508.042	2,0%
España	347.825	11,8%

Tabla 3-2.
Main aquaculture producing countries by value of annual production (millions of Euros) in 2018(FAO) and interannual variation rate.

País	Valor (M€)	% Var. anual
China	123.599	3,7%
Viet Nam	11.573	48,9%
Indonesia	10.716	-0,3%
India	10.543	7,2%
Chile	8.399	0,8%
Noruega	6.674	6,2%
Bangladesh	4.716	-0,2%
Japón	4.228	-0,2%
República de Corea	2.508	7,2%
Ecuador	2.240	14,9%
TOTAL 10 PRALES. PRODUCTORES	185.195	5,6%
RESTO DE PAISES	25.714	3,2%
TOTAL MUNDIAL	210.909	5,3%
España	479	2,4%

of the top 10 world producers in 2017 and it maintains a growth in 2018 of 5.5% and a production of 1.3 million tonnes.

Spain remains in the same position in the ranking as in 2017 (20th position) with 347,825 tonnes and an increase of 11.8%.

In relation to the value of their first-sale crops, the 10 main aquaculture producing countries worldwide increased their 2018 figures compared to the previous year by 5.3%, compared to the rest

If the European Union were considered as a unit, its aquaculture harvest would be, with 1.37 million tonnes, in 9th place, between Egypt and Norway.

of the countries that did so to 3.2 %, increasing the gap between both groups. With this, the 10 main aquaculture producing countries in the world produced in 2018 worth 231.5 million euros, 87.8% of the value of the total global harvest.

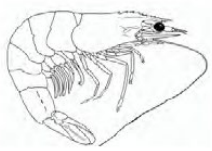
Also from the point of view of the value of the harvest, China's aquaculture production is notably higher than that of the rest of the countries, reaching 123,599 million Euros. Vietnam experienced an exceptional increase of 48.9% generating 11,573 million Euros. Indonesia and India produced a value of 10,716 (-0.3%) and 10,543 (+ 7.2%) million Euros respectively. Ecuador ranks 10th, replacing Thailand with a production value of 2,240 million Euros, 14.9% more than in 2017, with white shrimp, Nile tilapia and rainbow trout being the 3 most cultivated species. Norway, grew in value by 6.2% in 2018 with a total value in aquaculture of 6.7 million Euros and remains in 6th position. The Republic of Korea also maintains its position, experiencing a growth in value of 7.2% with a total of 2.5 million Euros.

Spain remains in 31st place with a production value of some 479 million Euros, 2.4% more than in 2017.

The two main species produced by aquaculture in the world in 2018 were the Japanese laminaria or kombu algae (*Saccharina japonica*) with 11.4 million tonnes and the eucheuma algae (genera Eucheuma and Kappaphycus) with 9.2 million tonnes. The third species is the Japanese oyster (*Crassostrea gigas*) with 5.8 million tonnes and in 4th place the Chinese carp (*Ctenopharyngodon idella*) with 5.7 million tonnes. The first 10 species accounted for 50.9% of the total production, and increased their production with respect to the previous year by 0.4%, while the rest of the species increased it by 3.8%.

Of the species produced in Spain, the production of rainbow trout stands out in the world context, the 31st species produced, with 848,051 t in total, European mussels, 37th position, with 262,477 t, sea bass, 59th species, with 235,538 t, sea bream, 61st species, with 228,576 t, and turbot, 97th species, with 58,798 t.

Regarding the value of production, the white shrimp (*Litopenaeus vannamei)* is the main global species with a first-sale value in 2018 of 24,177 million Euros and is followed by the Atlantic salmon (*Salmo salar),* with a value of 13,714 million Euros. In third place is the marsh crab (*Procambarus clarkii)* for the first year after an exceptional increase of 44.5% compared to 2017 with 11,565 million Euros in 2018 and surpasses the Chinese carp (*Ctenopharyngodon idella*) with 10,437 million of Euros. The first 10 species accounted for 47.8% of the 210,909 million Euros in value of the total harvest of globalaquaculture, that is, 100,827 million Euros.



Litopenaeus vannamei

WHITELEG SHRIMP (Litopenaeus vannamei)
Subphylum: Crustacea - Order: Decapoda - Family: Penaeidae

Meaningful characters and morphology: The white shrimp, also called equatorial shrimp, is a species characterized by having whitish legs, and has a raw greenish gray colour (red when cooked). It can reach a maximum size of 230 mm.

Cultivation: Its production is carried out on the coast, in ponds located in intertidal areas and with different levels of intensification.

Presentation of the product: It is presented in the fresh, frozen, whole or decapitated market.

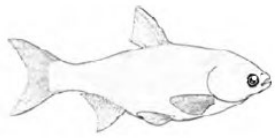
Saccharina japonica

SACCHARINA JAPONICA (*Saccharina japonica*)
Class: Phaeophyceae - Order: Laminariales - Family: Laminariaceae

Meaningful characters and morphology: Brown seaweed formed by a sheet and a brown-gold stipe. The edges of the central nerve expand in a pinatifid manner along with the lamina.

Cultivation: It is one of the species with the highest world production due to its high growth rate, facilitating its large-scale cultivation. It can occur both on exposed and calm coasts.

Marketing and consumption: Cultivated for human consumption, it takes advantage of almost everything including the stem. About 10.6 kilos can be obtained for each meter of rope.



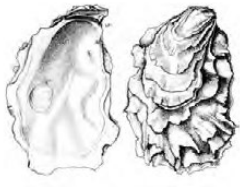
Hypophthalmichthys molitrix

SILVER CARP (*Hypophthalmichthys molitrix*)
Class: Osteictios - Order: Cypriniformes - Family: Cyprinidae

Meaningful characters and morphology: Robust fish with a slight elevation in its dorsal part. The body is laterally compressed fusiform and the ventral part forms an acute keel, which goes from the chest to the belly.

Cultivation: It is widely used in polyculture for the best use of the systems, when they do not contain fish that use the trophic level of phytoplankton. It is used in waters affected by eutrophication from anthropic action. Its reproduction is obtained inductively in the laboratory, not spawning spontaneously in naturalized or closed environments.

Products and consumption: Species suitable for consumption, but with lots of thorns that hinder its commercialization.



Crassostrea gigas

PACIFIC OYSTER (*Crassostrea gigas*)
Class: Bivalvia Order: Ostreida - Family: Ostreidae

Meaningful characters and morphology: Bivalve mollusc, filter, dirty white or gray. The leaflets are slightly elongated on the anteroposterior axis with one end (where the hinge is) terminated at the tip. The right or upper leaflet is relatively flat and the left or lower leaflet is concave and with it adheres to the substrate. The average size is 9 to 10 cm and reaches a maximum size of 20 cm.

Cultivation: The breeding method used depends on the environment, in addition to tradition. In "high lift" culture, the oysters are placed in plastic meshes attached to easels on the ground. In the "bottom" crop they are placed directly on the shore or in shallow water. The "rope" culture is done with the oysters on ropes. And in the “deep water” culture, oysters are placed in parks located at depths of up to ten meters.

Commercialization: It is sold in fresh, frozen (meat and half shell) and canned.

Especie	Nombre científico	Toneladas	% Var. anual
Laminaria japonesa	*(Saccharina japonica)*	11.448.250	2,5%
Alga Eucheuma	*(Eucheuma y Kappaphycus)*	9.237.530	-3,6%
Carpa china	*(Ctenopharyngodon idella)*	5.703.950	3,3%
Ostión japones	*(Crassostrea gigas)*	5.814.615	4,5%
Langostino blanco	*(Litopenaeus vannamei)*	4.966.241	4,9%
Carpa plateada	*(Hypophthalmichthys molitrix)*	4.788.493	1,8%
Tilapia del Nilo	*(Oreochromis niloticus)*	4.525.431	1,5%
Carpa común	*(Cyprinus carpio)*	4.189.524	7,3%
Almeja japonesa	*(Ruditapes philippinarum)*	4.139.157	-2,1%
Alga Gracilaria	*(Gracilaria sp.)*	3.454.778	-17,2%
TOTAL 10 PRALES. ESPECIES		58.267.969	0,4%
RESTO DE ESPECIES		56.240.073	3,8%
TOTAL ACUICULTURA MUNDIAL		114.508.042	2,0%
Trucha arco iris	*(Oncorhynchus mykiss)*	848.051	1,9%
Mejillones europeos	*(Mytilus galloprovincialis y edulis)*	262.477	1,2%
Dorada	*(Sparus aurata)*	228.576	4,8%
Lubina	*(Dicentrarchus labrax)*	235.538	9,4%
Rodaballo	*(Psetta maxima)*	58.798	2,4%

Tabla 3-3. Main species produced by aquaculture in the world (in tonnes) in 2018 (FAO) and interannual variation rate.

Especie	Nombre científico	Valor (M€)	% Var. anual
Langostino blanco	*(Litopenaeus vannamei)*	24.177	7,5%
Salmón atlántico	*(Salmo salar)*	13.714	2,5%
Cangrejo de las marismas	*(Procambarus clarkii)*	11.565	44,5%
Carpa china	*(Ctenopharyngodon idella)*	10.437	3,1%
Carpa plateada	*(Hypophthalmichthys molitrix)*	8.292	0,9%
Cangrejo de canal chino	*(Eriocheir sinensis)*	7.694	0,8%
Carpa común	*(Cyprinus carpio)*	6.983	6,3%
Tilapia del Nilo	*(Oreochromis niloticus)*	6.581	1,2%
Carpa cabezona	*(Hypophthalmichthys nobilis)*	5.852	-0,1%
Almeja japonesa	*(Venerupis philippinarum)*	5.531	-0,6%
TOTAL 10 PRALES. ESPECIES		100.827	6,9%
RESTO DE ESPECIES		110.082	3,9%
TOTAL ACUICULTURA MUNDIAL		210.909	5,3%
Trucha arco iris	*(Oncorhynchus mykiss)*	3.103	5,2%
Lubina	*(Dicentrarchus labrax)*	932	3,1%
Dorada	*(Sparus aurata)*	865	3,0%
Rodaballo	*(Psetta maxima)*	322	3,7%
Mejillones europeos	(Mytilus galloprovincialis y edulis)	316	12,4%

Table 3-4. Main species worth (millions of Euros) produced through aquaculture in the world in 2018 (FAO) and interannual variation.

3.4. Aquaculture productions by groups and environments

Almost half of the entire global aquaculture harvested in 2018 consisted of finfish, a 47.4% and about 54.3 million tonnes. The harvest vegetables (algae) represented 28.3% of the tonnes (32.4 million t), that of molluscs a 15.3% (17.5 million t), crustaceans a 8.2% (9.4 million of t), while the production of amphibians and reptiles and other invertebrates has been an anecdotal 0.4% in both cases.

The aquaculture finfish harvest in 2018 represented a value in first-sale of more than 111,771 million Euros, equivalent to 53% of the value of the total aquaculture production. The harvest of crustaceans represented 55,418 million Euros (26.3%), that of molluscs 27,876 million euros (13.2%) and algae 10,625 million Euros (5% of the total).

The 56.6% of world aquaculture production takes place in marine waters and 43.4% in freshwater. Contrary to land farming systems in which most of the production is obtained from a small number of highly domesticated species of animals and plants, in 2018, about 466 different aquatic species were being raised in the world, including fish, molluscs, crustaceans, algae and others, according to FAO.

The diversity of species produced in aquaculture is due to the rich biodiversity of the aquatic environment, the adaptability of the species to controlled production systems and the ingenuity of people.

Of these, about 305 are in significant quantities (more than 100 tons per year). This diversity is due to the richness of species of the aquatic environment, the adaptability of these organisms to the systems of controlled production and the ingenuity of the people.

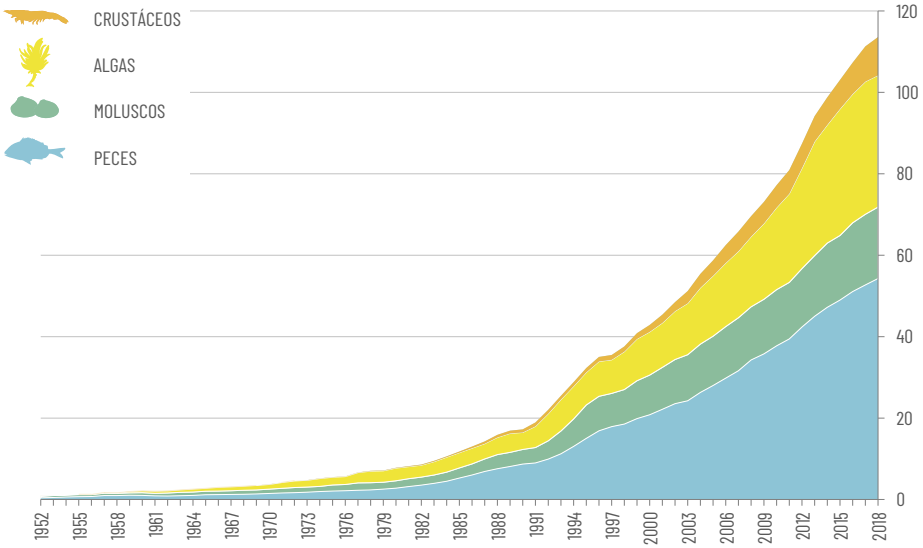


Figure 3-5. Evolution of world aquaculture production (millions of tonnes), by groups, for the period 1952-2018 (FAO).

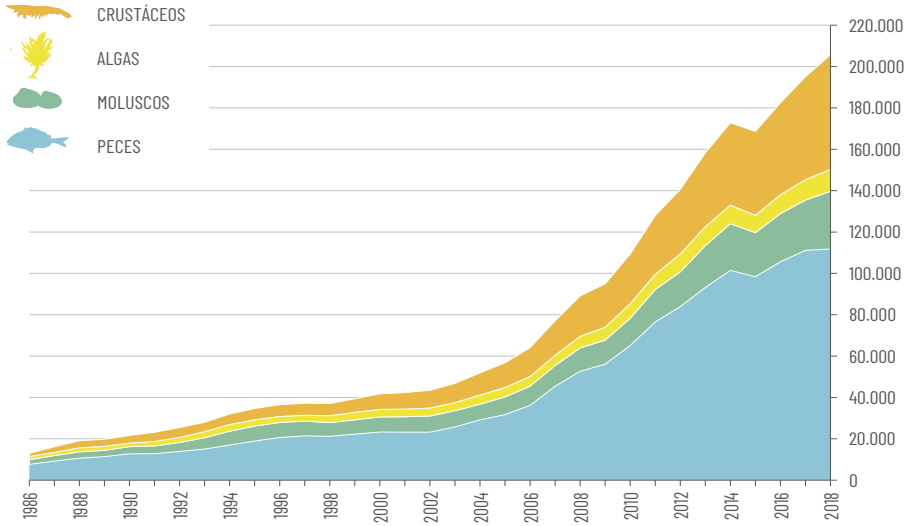


Figura 3-6. Evolution of the value of world aquaculture production, by groups, for the period 1986-2018, in millions of Euros (FAO).

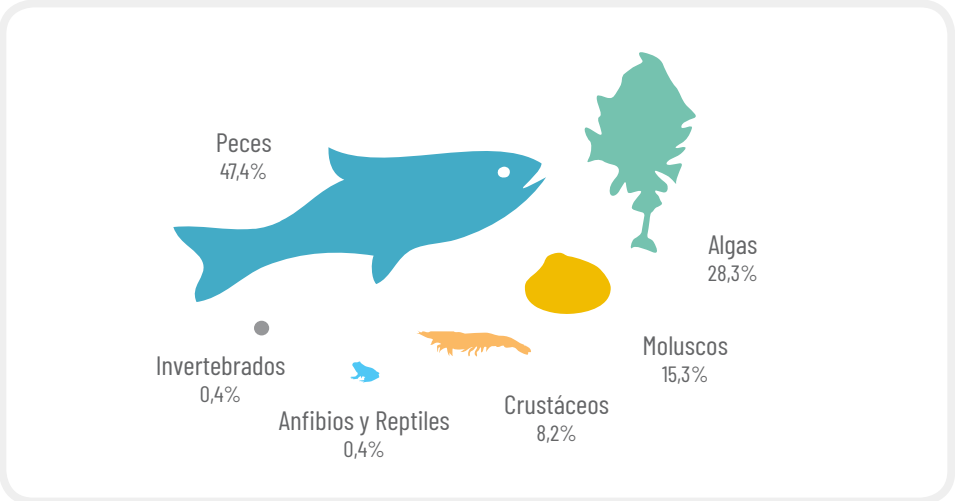


Figure 3-7 Percentage distribution of world aquaculture production (t) in 2018 by groups (FAO).

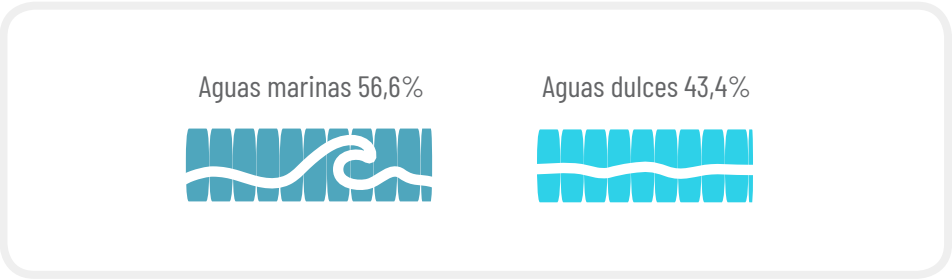


Figure 3-7/3-8. Percentage distribution of world aquaculture production (t) in 2018 by environment (FAO).

3.5. Potential of aquaculture and sustainable development

During the last four decades, aquaculture has developed, diversified and registered notable technological and scientific advances. The success of modern aquaculture is based on the proper management of the biology of the farmed species, on the introduction of technological innovations, on the development of specific foods and on business organization. The potential of these advances for economic growth, both in developed and developing countries, for improving the standard of living and for increasing food security, was already recognized by FAO in its Bangkok Declaration and Strategy of 2000, which stressed that aquaculture must continue to develop until it offers its full potential to humanity and so on at it has been observed over the years.

At FAO's second International Conference on Nutrition (ICN2), held in Rome in November 2014, world leaders renewed their commitment to establishing and implementing policies aimed at eradicating malnutrition and transforming nutrition systems. nutrition to make nutritious diets affordable for all. This conference confirmed the importance of aquatic food as a source of nutrition and health for many coastal and river communities, especially for its proteins and trace elements, particularly for women of childbearing age and children.

To provide guidelines for better governance of the sector, FAO is advocating its Blue Growth program as a framework for the sustainable management of aquatic resources, for the balance in their use and for their conservation in a way that is economically, socially and environmentally responsible. This program is based on the 1995 FAO Code of Conduct for Responsible Fisheries and addresses fisheries, aquaculture, ecosystem services, trade and social protection. It seeks the balance between growth and conservation, between industrial and artisanal activity, to ensure fair benefits between societies. Blue Growth is integrated into the United Nations 2030 Agenda for Sustainable Development that we referenced in the introduction to this report.

In October 2015, seventy FAO member states, plus the private sector, non-governmental organizations and civil society, celebrated in Vigo the twentieth anniversary of the adoption of the FAO Code of Conduct for Responsible Fisheries.

The success of modern aquaculture is based on the proper management of the biology of the farmed species, on the introduction of technological innovations, on the development of specific foods and on business organization.

In that event, the achievements of the code and the obstacles encountered in its implementation were highlighted, but above all its essential role in the sustainable management of living aquatic resources. Especially with regard to aquaculture, which in the year the code was adopted accounted for barely 25% of global aquatic production and currently exceeds 50%.

The Scientific Advisory Mechanism of the European Commission (SAM) published its report "Food from the oceans" in 2016. (Available at http://bit.ly/2oWMzGP). It indicates that, although the oceans represent about 50% of the new animal and plant biomass that is created annually on the planet, food from the oceans only reaches 2% of the daily consumption of calories per person and 15 % of protein consumption worldwide. Food from the oceans can and should make up a much larger percentage of the total amount of food consumed. They are foods that, in addition to being generally very healthy, are essential for the fight against hunger and malnutrition in some parts of the world. Furthermore, the resources required (energy, nutrients, space and water) to produce one kilogram of food fit for consumption are less in the oceans than on land. Therefore, if you increase the proportion of food from the oceans, you will be helping to reduce the pressure of agriculture on terrestrial natural resources.

The 2015 United Nations Summit endorsed the 2030 Agenda for Sustainable Development. It includes 17 Sustainable Development Goals (SDGs) and 169 targets, covering a broad set of issues related to the technical, institutional and regulatory changes required to achieve sustainable development. The 2030 Agenda applies to all countries, integrates the three dimensions of sustainable development (economic, social and environmental) and offers guidance to Members, the United Nations and other intergovernmental organizations, civil society organizations and other institutions on future opportunities, difficulties and needs related to sustainable development in all sectors, with the ambitious purpose of eradicating extreme poverty and hunger. The 2030 Agenda and the SDGs are very important for policy formulation, planning and management of the sustainable development of aquaculture. In particular, SDG 1 (end poverty), SDG 2 (end hunger), SDG 5 (gender), SDG 8 (growth, employment), SDG 12 (production and consumption), SDG 13 (climate change), SDG 14 (marine resources and ecosystems) and SDG 15 (biodiversity) will be highly relevant for aquaculture, although other SDGs will also influence efforts to promote the sustainable development of aquaculture.

4. Aquaculture in the European Union

4.1. Situation of aquaculture in the European Union

Aquaculture is an important source of aquatic products in the European Union. In 2018, 1,365,112 tonnes of aquaculture products were harvested in the European Union. This data represents an increase of 0.4% compared to what was put on the market in 2017, although

Aquaculture production in the European Union had a first-sale value in 2018 of 4,357 million Euros, which represented an annual increase of 3.2%. However, the importance of aquaculture is not the same in all countries of the Union. In some, its economic and social relevance already

The aquaculture production of the European Union in 2018 was 1.365.112 tonnes, with a value of 4.357 millon Euros.

Aquaculture plays a very significant role in the socioeconomic development of European coastal and river areas, as well as in the preservation of maritime-river and fishing culture.

it is still below the maximum production of European aquaculture that took place in 1999, when it exceeded 1,435,350 tonnes. On the other hand, aquaculture represents 19.9% of the volume of total aquatic production (aquaculture and fisheries) in the European Union. The remaining 80.1% of production came from capture fisheries, 5,489,308 tonnes.

exceeds that of fishing, as is also the case in Spain in some autonomous communities. Aquaculture plays a very significant role in the social and economic development of certain coastal and river areas, as well as in the preservation of the maritime-river and fishing culture of those same areas.

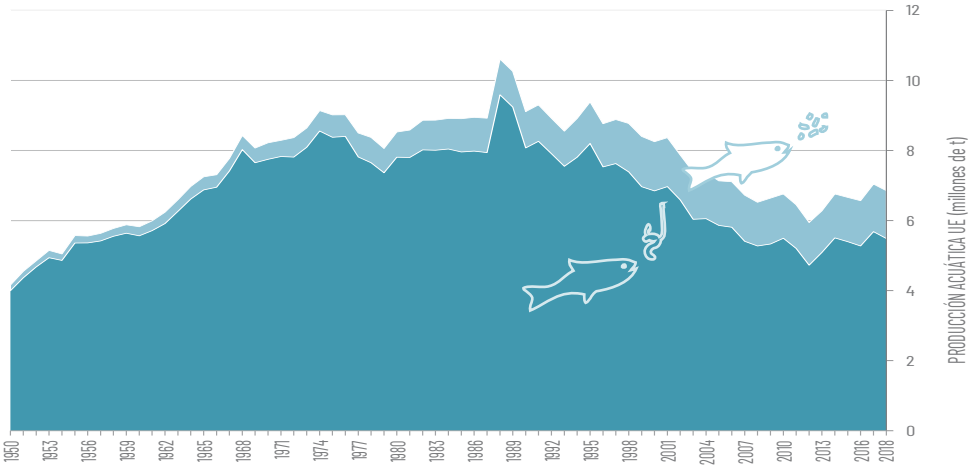


Figure 4-1. Evolution of global aquaculture and capture fisheries production of the 28 member states of the European Union between 1950 and 2018, in millions of tonnes (FAO).

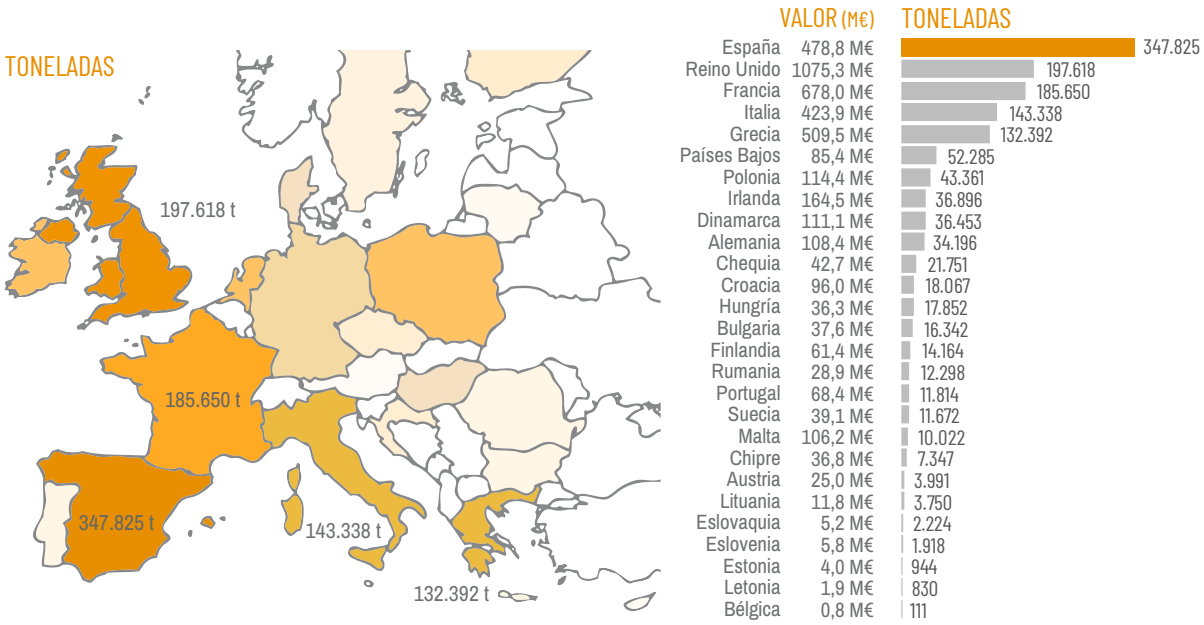


Figure 4-2. Distribution of aquaculture production in the Member States of the European Union by their quantity (tonnes) and value (millions of Euros) in 2018 (FAO).

The total production of aquatic products (aquaculture plus capture fisheris) in the European Union in 2018 was 6,854,420 tonnes, experiencing a decrease of -2.7%. The maximum production was reached in 1988 with a production of 10,612,520 tons and from that year to 2018, it has decreased by 35.4%. Despite its promising expectations, aquaculture production in the EU has not been able, in any case, to compensate for the sharp reduction suffered by European capture fisheries in the last two decades.

Spain is the Member State of the European Union with the largest aquaculture harvest, with 347,825 tonnes in 2018 (25.5% of the Union total), followed by the United Kingdom with 197,618 tonnes (14.5%) and France with 185,650 tons (13.6%). However, when the value of production is considered, the United Kingdom is the main producer Member State with 1,075.3 million Euros (24.7% of the total value), followed by France with 678 million Euros (15.6 %) and Greece with 509.5 million Euros (11.7%). Spain occupies the fourth position, with 478.8 million (11%), followed by Italy.

In the European Union the main aquaculture products are finfish and molluscs. The aquaculture of crustaceans, algae or other invertebrates is very limited. The finfish harvest in 2018 amounted to 695,885 tonnes that accounted for 51% by weight of the total aquaculture, and reached a value of 3,241.3 million Euros in first sale (74.4% of the total value of aquaculture production). The harvested molluscs totaled 667,934 tonnes, 48.9% of the total weight, reaching a value of 1,108 million Euros (25.4% of the total).

The main species produced in the EU are mussels, with 527,192 tonnes in 2018, of which two species are produced, the common and the Mediterranean, not always adequately differentiated in the statistics. It is followed by Atlantic salmon with 179,314 tonnes, and rainbow trout, of which 174,987 tonnes were produced in 2018. Considering its value at first sale, Atlantic salmon is the first farmed species (1,106.4 million euros) with an annual decrease of -8.4%, followed by rainbow trout (573.9 million Euros) with a decrease of -0.2% and sea bass experienced an increase of 14.3% compared to 2017 with a value of 465 million Euros.

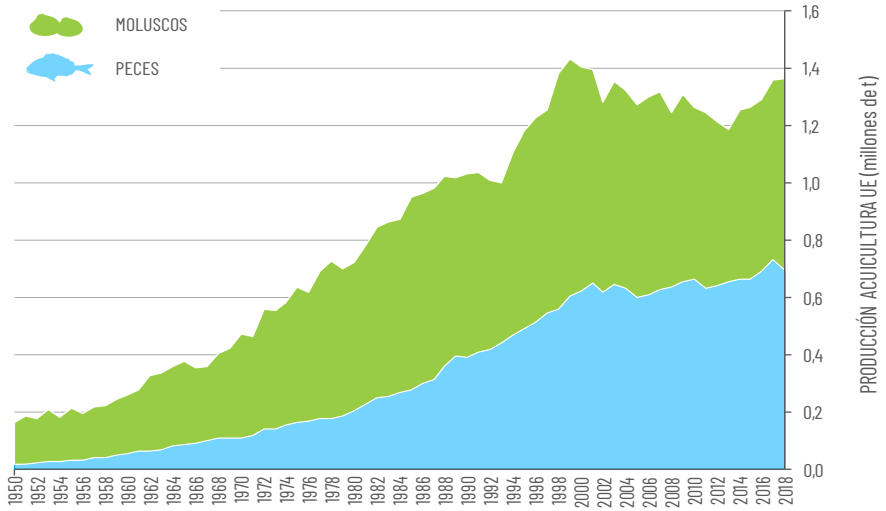


Figure 4-3. Evolution of aquaculture production (millions of t.) in the European Union by groups for the period 1950-2018 (FAO).

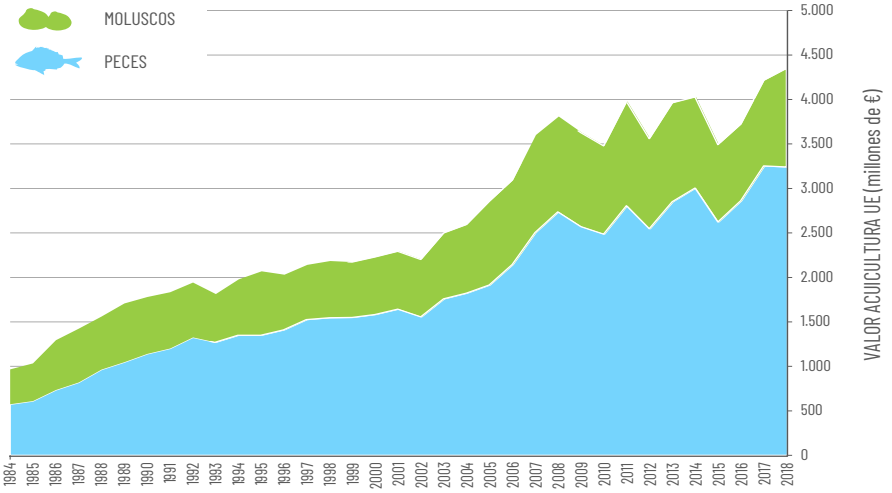


Figure 4-4. Evolution of the value of aquaculture production in the European Union in millions of Euros, by groups for the period 1984-2018 (FAO).

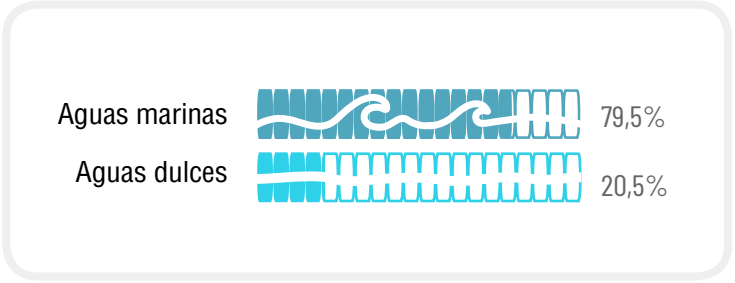


Figure 4-5. Percentage distribution of aquaculture production (tonnes) in the European Union in 2018 by production environments (FAO).

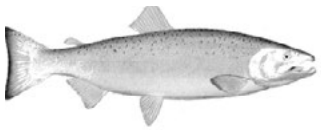
Table 4-1. Main species produced by aquaculture in the European Union, by tonnes, in 2018 (FAO).

Especie	Nombre científico	Toneladas	% Var. anual
Mejillones	*(Mytilus spp)*	527.192	8,4%
Salmón del Atlántico	*(Salmo salar)*	179.314	-14,3%
Trucha arco iris	*(Onchorynchus mykiss)*	174.987	-5,6%
Ostión japonés	*(Crassostrea gigas)*	98.681	8,2%
Dorada	*(Sparus aurata)*	91.964	-3,5%
Lubina	*(Dicentrarchus labrax)*	84.400	7,0%
Carpa común	*(Cyprinus carpio)*	75.348	1,7%
Almeja japonesa	*(Ruditapes philippinarum)*	33.050	-5,9%
Atún rojo del Atlántico	*(Thunnus thynnus)*	11.181	69,0%
Rodaballo	*(Psetta maxima)*	8.395	-29,6%
TOTAL 10 PRALES. ESPECIES		1.284.512	0,8%
RESTO DE ESPECIES		80.598	-5,8%
TOTAL ACUICULTURA UE		1.365.110	0,4%

Table 4-2. Main species produced by aquaculture in the European Union, by value, in 2018 (FAO).

Especie	Nombre científico	Valor (M€)	% Var. anual
Salmón del Atlántico	*(Salmo salar)*	1.106,4	-8,4%
Trucha arco iris	*(Onchorynchus mykiss)*	573,9	-0,2%
Lubina	*(Dicentrarchus labrax)*	465,0	14,3%
Dorada	*(Sparus aurata)*	463,0	5,5%
Ostión japonés	*(Crassostrea gigas)*	434,1	-0,5%
Mejillones	*(Mytilus spp)*	419,7	10,1%
Carpa común	*(Cyprinus carpio)*	165,7	7,8%
Almeja japonesa	*(Ruditapes philippinarum)*	165,4	71,1%
Atún rojo del Atlántico	*(Thunnus thynnus)*	127,6	60,4%
Rodaballo	*(Psetta maxima)*	59,7	-18,9%
TOTAL 10 PRALES. ESPECIES		3.980,4	3,4%
RESTO DE ESPECIES		376,7	1,4%
TOTAL ACUICULTURA UE		4.357,1	3,2%

especies



Salmo salar

SALMON

ATLANTIC SALMON *(Salmo salar)*

Class: Actinopterygii - Order: Salmoniformes - Family: Salmonidae

Significant characters and morphology: Blue-gray fish in the dorsal part with some points, lighter on the flanks and with a silver belly. Elongated body covered with small scales. Big mouth with strong teeth. Second fat dorsal fin. Narrow caudal peduncle.

Farming: The farming of Atlantic salmon has an initial stage in fresh water that is carried out in facilities on land. When they are between 1 year and 18 months, and reach a weight of 50-90 g, they are transferred to nurseries at sea. There they are raised for 12 to 18 months, until they reach a harvest weight of 4 to 5 kg.

Product presentation: The main final product is fresh fillet, although it is also sold whole (or eviscerated) in fresh. Frozen fillets and other products are also sold

Finfish production through modern aquaculture systems has been a success in Europe in the development of a new and innovative economic activity. Despite its current limited growth, aquaculture in the European Union is a model of sustainable progress led by companies of all sizes with strong scientific and technological support. It should be pointed out that in parallel there are more traditional aquaculture systems perfectly adapted also to ecosystems and social uses.

4.2. Situation of finfish aquaculture in the European Union

In 2018, 695,886 tonnes of aquaculture finfish were harvested in the European Union, -4.9% less compared to 2017. The total harvest volumes of the first 10 finfish species accounted for 645,346 tonnes, -5.5% compared to 2017. In contrast, the harvest of the rest of the finfish species increased by 3.5%, which denotes the diversification of species produced.

The total first-sale value of aquaculture finfish produced in the EU in 2018 was around 3,241.3 million Euros, which represents a decrease of -0.4% compared to 2017. The average value of a kilo of fish from Aquaculture in first sale was 4.66 euros/kg, it has grown 4.7% compared to the previous year.

The main species of farmed finfish produced in the European Union is Atlantic salmon, of which 179,314 tonnes were produced in 2018, a -14.3% less than the previous year. The rainbow trout follows with 174,987 tonnes produced in 2018, -5.6% less than in 2017. And the third place is for the sea bream with 91,964 tonnes, which has also decreased by -3.5%. In terms of economic value, the first species produced in 2018 was Atlantic salmon, which accounted for 1,106.4 million Euros, which decreased by -8.4% compared to the previous year, followed by rainbow trout with 573.9 million euros. , -0.2% less than in 2017.

The United Kingdom is the EU Member State with the highest production of aquaculture finfish in 2018, both in weight, 180,476 tonnes (25.9% of the total), and in value, 1,047.8 million Euros (33.3 % of the total value), although in 2018 it experienced a decrease compared to the previous year of -11.6% in volume and -7.7% in value after reaching its highest historical value since 1950 in 2017. Greece is the second largest producer, with 110,226 tonnes (15.8% of the total and a growth of 3.8%) and 499.8 million Euros (15.4% of the total and a growth of 3.2%), which are mostly sea bass and sea bream. Spain is the third producer country, with 60,535 tonnes (8.7% of the total) experiencing a decrease of -9.1% and its production had a value of 326.1 million Euros (10.1% of the total value of finfish farming in the European Union and a decrease of -1.9%.

The growth rate of finfish aquaculture in the European Union since 2000 has been very low. Its average increase over the last three decades has been only 0.1% per year, compared to 5.5% that has been observed in the rest of the world. This difference is even more marked when other forms of aquaculture are also considered. Thus, total aquaculture in the EU (essentially fish and molluscs) has decreased since 2000 an average of -0.2% per year, while in the world aquaculture has grown in that time an average of 5.6%. It should be clarified that these production figures for the Member States of the European Union do not, logically, include data from other European countries such as Norway or, where appropriate, Turkey. Annual growth averages in the last decade for aquaculture across Europe were 3.2% for all aquaculture and 3.8% for fish farming (including Turkey, but especially taking into account Norway). These data confirm the existence of severe limitations for the development of aquaculture in the European Union, which do not occur in other countries or occur to a lesser extent.

Table 4-3. Main finfish species produced by aquaculture in the European Union, in tonnes, in 2018 (FAO).

Especie	Nombre científico	Toneladas	% Var. anual
Salmón del Atlántico	*(Salmo salar)*	179.314	-14,3%
Trucha arco iris	*(Onchorynchus mykiss)*	174.987	-5,6%
Dorada	*(Sparus aurata)*	91.964	-3,5%
Lubina	*(Dicentrarchus labrax)*	84.400	7,0%
Carpa común	*(Cyprinus carpio)*	75.348	1,7%
Atún rojo del Atlántico	*(Thunnus thynnus)*	11.181	69,0%
Rodaballo	*(Psetta maxima)*	8.395	-29,6%
Corvina	(Argyrosomus regius)	7.052	14,1%
Pez-gato	*(Clarias gariepinus)*	6.687	-24,2%
Carpa cabezona	*(Hypophthalmichthys nobilis)*	6.018	-6,4%
TOTAL 10 PRALES. ESPECIES		645.346	-5,5%
RESTO DE ESPECIES		50.540	3,5%
TOTAL ACUICULTURA PECES UE		695.886	-4,9%

Table 4-4. Main finfish species produced by aquaculture in the European Union, by value, in 2018 (FAO).

Especie	Nombre científico	Valor M€	% Var. anual
Salmón del Atlántico	*(Salmo salar)*	1.106,4	-8,4%
Trucha arco iris	*(Onchorynchus mykiss)*	573,9	-0,2%
Lubina	*(Dicentrarchus labrax)*	463,0	5,5%
Dorada	*(Sparus aurata)*	434,1	-0,5%
Carpa común	*(Cyprinus carpio)*	165,7	7,8%
Atún rojo del Atlántico	*(Thunnus thynnus)*	127,6	60,4%
Rodaballo	*(Psetta maxima)*	59,7	-18,9%
Anguila europea	*(Anguilla anguilla)*	48,9	-11,0%
Corvina	*(Argyrosomus regius)*	37,5	23,1%
Esturiones nep	(varias)	21,6	9,5%
TOTAL 10 PRALES. ESPECIES		3.038,5	-1,0%
RESTO DE ESPECIES		202,8	10,8%
TOTAL ACUICULTURA PECES UE		3.241,3	-0,4%

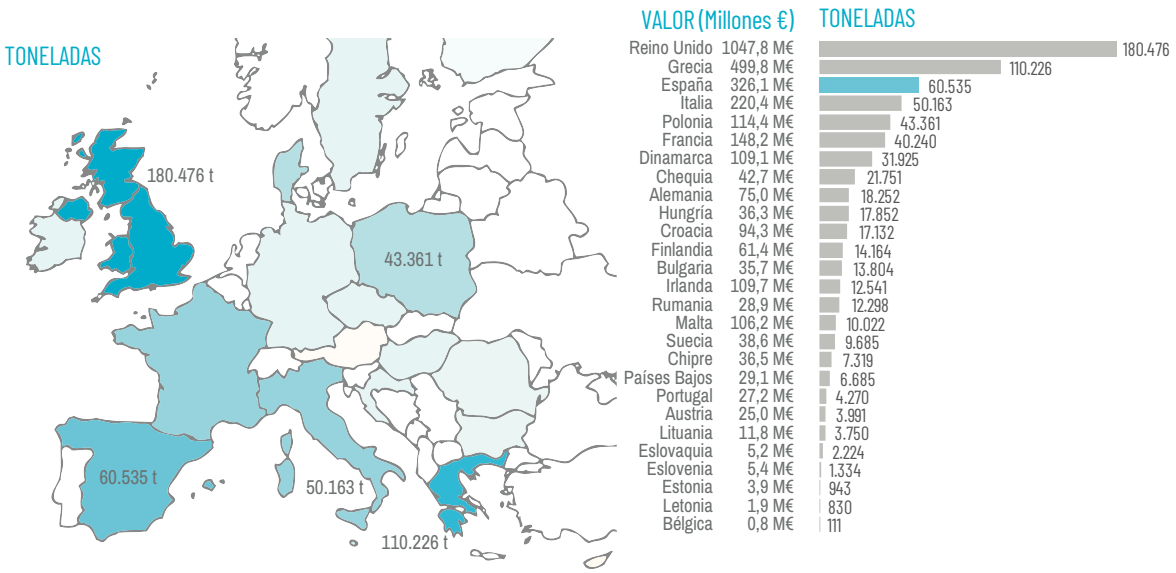


Figure 4-6. Distribution of aquaculture finfish production in the Member States of the European Union by its volume (tonnes) and value (millions of Euros) in 2018 (FAO).

Figure 4-7. Relative evolution of increases in total aquaculture production in the areas of the European Union, Europe (including Turkey) and global between 2000 and 2018. Cumulative percentage increases are shown, based on the year 2000 (on FAO data).

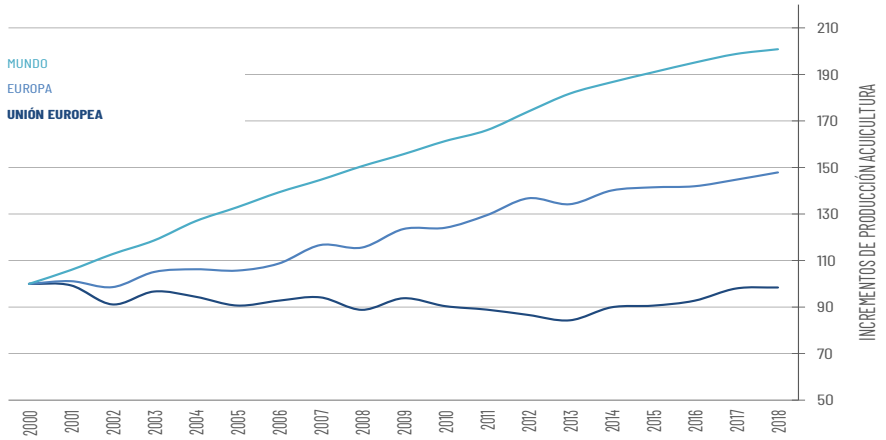


Figure 4-8. Relative evolution of increases in aquaculture fish production in the areas of the European Union, Europe (including Turkey) and global between 2000 and 2018. Cumulative percentage increases are shown, based on the year 2000 (Year 2000=100) (on FAO data).

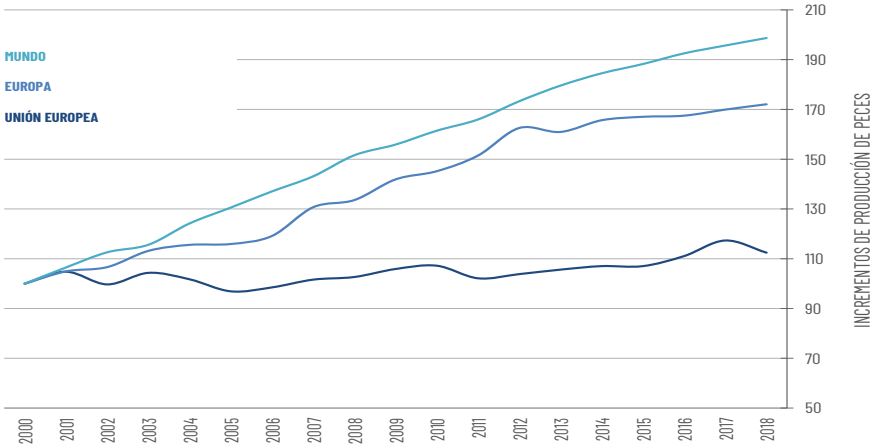
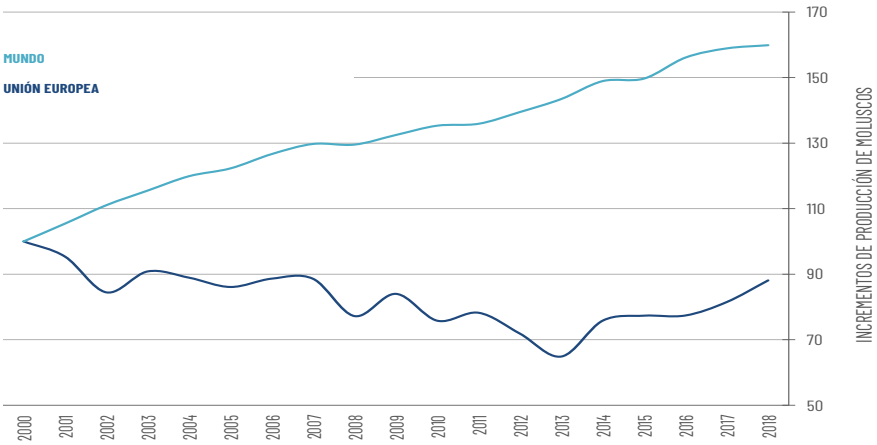


Figure 4-9. Relative evolution of increases in aquaculture mollusc production in the European union and global levels between 2000 and 2018. Cumulative percentage increases are shown, based on the year 2000 (Year 2000=100) (on FAO data).



4.3. Situation of shellfish aquaculture in the European Union

In 2018, 17,537,748 tonnes of aquaculture molluscs were harvested worldwide. The European Union contributed 667,934 tonnes to this production, that is, 3.8%, and with a first sale value of 1,107 million Euros.

The main producing country is Spain, based on the mussel farming, followed by France (oysters) and Italy (clams). These three countries

In 2018, 17.5 million tonnes of aquaculture molluscs were harvested worldwide. The European Union contributed 0.66 million to this production, with a value in first sale of 1,107 million Euros.

represented 78.6% of the total European harvest of aquaculture molluscs in 2018.

European production of aquaculture molluscs has experienced an average year-on-year variation of 1.1% in the last decade. From a maximum of 826,140 tons in 1999 to 667,933 tons in 2018. Its economic value has experienced an average year-on-year variation of 1% in the last 10 years.

Mussel aquaculture in the European Union put 527,192 tonnes on the market in 2018, which represented 77.6% of the total mollusc harvest. It is followed in production by the Japanese oyster, with 100,968 tons (15%) and the Japanese clam, with 33,050 (5.6%). Another species with significant productions is the fine clam (2,211 tonnes).

Although the production volume of the Japanese oyster is much lower than that of the mussel, its value is higher and that is why, in 2018 it was worth 471.4 million Euros, at approximately 4.67 euros/kg. The total value of mussels produced in the EU in 2018 was 471.4 million Euros, at an average of 0.8 euros/kg at first sale. And that of the Japanese clam 165.4 million, at an average of 5 euros/kg.

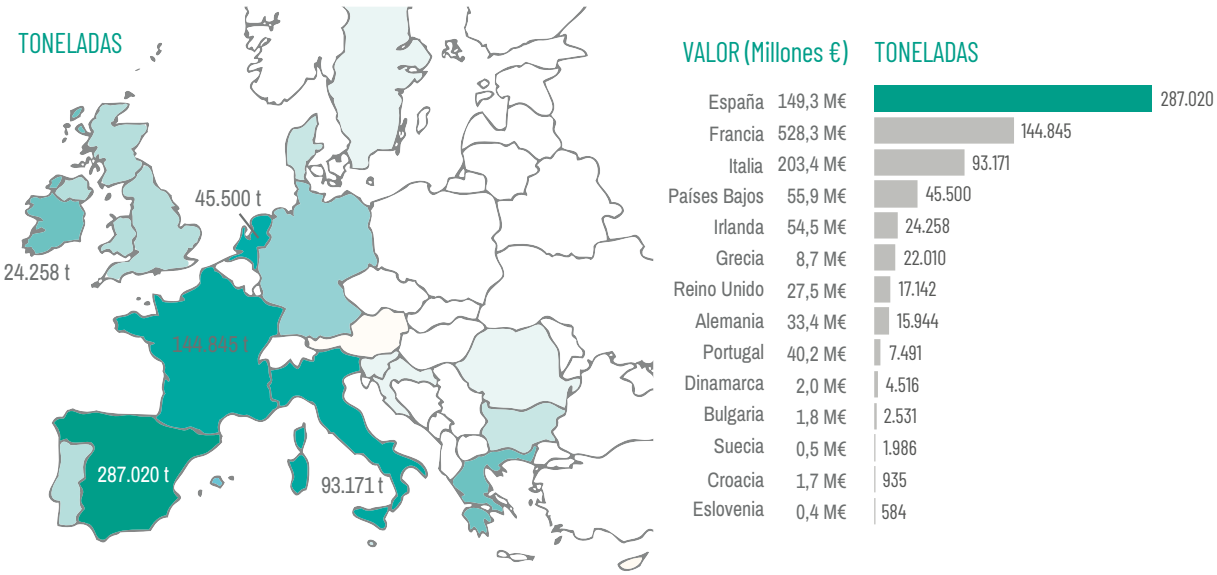


Figure 4-10. Production of aquaculture molluscs in EU Member States by volume (tonnes) and value (millions of Euros) in 2018 (on FAO data).

Table 4-5. Main species of molluscs produced by aquaculture in the European Union, by tonnes, in 2018 (FAO).

Especie	Nombre científico	Toneladas	% Var. anual
Mejillones	*(Mytilus spp)*	527.192	77,6%
Ostión japonés	*(Crassostrea gigas)*	100.968	15,0%
Almeja japonesa	*(Ruditapes philippinarum)*	33.050	5,6%
Almeja fina	*(Ruditapes decussatus)*	2.211	1,1%
Ostra europea	*(Ostrea edulis)*	1.371	0,3%
Almeja babosa	*(Venerupis pullastra)*	279	0,0%
TOTAL 6 PRALES. ESPECIES		665.071	99,6%
RESTO DE ESPECIES		2.861	0,4%
TOTAL ACUICULTURA MOLUSCOS UE		667.932	4,0%

Table 4-6. Main species of molluscs produced by aquaculture in the European Union, by value, in 2018 (FAO).

Especie	Nombre científico	Valor M€	% Var. anual
Ostión japonés	*(Crassostrea gigas)*	471,4	42,6%
Mejillones	*(Mytilus spp)*	419,7	37,9%
Almeja japonesa	*(Ruditapes philippinarum)*	165,4	14,9%
Almeja fina	*(Ruditapes decussatus)*	28,4	2,6%
Ostra europea	*(Ostrea edulis)*	8,8	0,8%
Almeja babosa	*(Venerupis pullastra)*	2,9	0,3%
TOTAL 6 PRALES. ESPECIES		1.096,6	99,0%
RESTO DE ESPECIES		11,0	1,0%
TOTAL ACUICULTURA MOLUSCOS UE		1.107,7	11,7%

4.4. Potential for European aquaculture

Europe has 55,000 km of coastline, the second longest coastline in the world after Canada, and offers environmental, physical and oceanographic conditions conducive to aquaculture. On the other hand, the industry of European aquaculture has proven to have the knowledge, experience and technical means to be an activity that is sustainable from an environmental point of view, economically profitable, offering safe, healthy and quality food, and socially welcome with stable and quality jobs.

In addition, the European Union has other advantages. The Member States of the Union are leaders in technology and research, they have well-trained human resources, and as mentioned, the environmental conditions are appropriate for the cultivation of many of the species that are currently most demanded by consumers. But, on the other hand, the demanding regulatory standards that the European Union has endowed with aimed at guaranteeing that the aquaculture products grown in it are as safe as a food can be, that the natural environment of its production is scrupulously respected, that workers have safe and motivating working conditions, and that the well-being of the animals raised, offer added value that society must know.

The Scientific Advisory Mechanism (SAM) of the European Commission recommends making aquaculture an explicit priority of the EU and of global policies by integrating its policies into a global food production policy framework that takes into account the needs of producers and consumers.

However, aquaculture in the European Union, both for finfish and molluscs, has been virtually stagnant for the last fifteen years for various reasons and is not exploiting its potential source of wealth and employment, as has been strongly recommended by FAO. This situation, together with the lower catches of capture fisheries has consolidated a situation of great dependence on fish imports to satisfy the growing European demand for food of aquatic origin. Today the fish import and processing industries of the European Union are more relevant in terms of their turnover and employment than the fish and aquaculture producers combined.

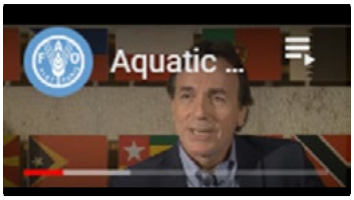
Having a demanding legal regulatory framework, but tight, is a plus of competitiveness that nobody disputes. But when these standards are taken to higher levels without sufficient justification, or without that greater demand providing added value to society, then they become a slab due to the non-compensable economic costs that they entail. This circumstance of sublimation of the regulations occurs, for example, in environmental matters. However, the opposite case occurs in consumer information, in which the requirements are clearly lower than those demanded by society (for example, indicating at the final points of sale the date of capture or harvest of fresh non-packed fish).

Sublimation at national or regional level, also called gold platting of European regulations. It results in the procedures to obtain an authorisation to carry aquaculture (license to produce), or to achieve the granting of a concession of a space in the public domain, lasting up to 8 years and unnecessarily raising business costs. Thus, the possibility of growing and taking advantage of economies of scale, or simply to start producing, entails anomalously high costs when operating within the European Union. And with these higher costs it is complex to compete with imported fish from developing third countries. On the other hand, the growing demand for the use of space in coastal and river areas by other activities leads to increased competition that confronts aquaculture with these other industries, including those relating to the construction of residential housing, tourism or capture or even recreational fishing. The management of these spaces in search of synergies is a social and political necessity.

Finally, even today there are occasional problems related to the image of aquaculture, mostly unsupported by real facts, which continue to prevent this activity from taking advantage of all the benefits of the stringent legal standards to which it must conform, both environmental issues, such as public health or animal health.

While at the level of the European Commission and the European Parliament the regulatory framework for aquaculture has improved markedly in recent years, at national, and above all regional (subnational) levels, there is considerable work to be done in relation to the implementation of EU legislation and to establishing a framework conductive to the development of this activity that ensures a level playing field for entrepreneurs in front of similar product imports, and providing a strong level of confidence for both consumers and neighbours of aquaculture farms.

4.5. Videos of interest



Video of the FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)
Aquatic Genetic Resources -- D. Bartley & M. Halwart
What are aquatic genetic resources and what are the Commission's achievements and future priorities in that area?
https://youtu.be/JsVMITreJdc?list=PLzp5NgJ2-dK6VnCtxmZi2gXcq5K-RYwgs

Video of the GOVERNMENT OF CANTABRIA
Miguel Ángel Revilla
President of Cantabria values the work of farmers, ranchers, aquaculturists and fishermen.
https://www.youtube.com/watch?v=w9sMcT2VNJI

Video of the FOOD AND DRINK INDUSTRY FEDERATION (FIAB)
#YoTrabajoParaQueComasTranquilo
Thanks to the workers in the food and beverage sector, who continue to go to their jobs during the COVID-19 crisis.
https://www.youtube.com/watch?v=i0aNrWLys-w&feature=youtu.be

Video of the SPANISH MINISTERY OF AGRICULTURE, FISHERIES AND FOOD (MAPA)
Y tú, ¿qué has pescado hoy?
MAPA campaign to promote consumption of Spanish fish.
https://www.alimentosdespana.es/es/campanas/ultimas-campanas/

Video of the SPANISH MINISTERY OF AGRICULTURE, FISHERIES AND FOOD (MAPA)
Campaña #alimentosdespaña
Improve the positioning of the agri-food and fishing sector, putting in value the work of farmers, ranchers and fishermen who represent the origin of our food.
https://www.alimentosdespana.es/es/campanas/ultimas-campanas/alimentos-de-

Video of the FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)
Fish4ACP
The FAO, EU and ACP Fish4ACP project prioritizes the strengthening of fisheries and aquaculture value chains in Africa, the Caribbean and the Pacific to benefit local communities and facilitate trade.
https://www.youtube.com/watch?v=tY8SJYB2vFE

Video of the FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)
The State of World Fisheries and Aquaculture 2020 (SOFIA)
The State of World Fisheries and Aquaculture (SOFIA) report is the main guidance document of the Department of Fisheries and Aquaculture.
http://www.fao.org/publications/sofia/2020/es/

5. Aquaculture production in Spain and Europe

5.1. Aquatic food production in Spain

At the end of the 1960s, Spain occupied a prominent position on the world stage for the production of aquatic products. This situation was based on extractive fishing and, above all, on that in third country waters. Starting in the 1970s, the volume of extractive activity began to gradually decrease due to the reduction in fishing opportunities. Aquaculture, which began in Spain in the 1960s, despite the progressive increase in its specific weight and the expectations generated, has not been able to compensate for the drop in fishing activity and or to counteract the decrease in catches.

The primary obtaining in Spain in 2018 of aquatic products, that is, from the aquatic environment through aquaculture and fishing, increased by 0.9% compared to 2017, reaching 1,276,616 tons, according to FAO.

The mussel (*Mytilus* spp.), Of which 242,700 tonnes were harvested in 2018, was the main living aquatic resource in Spain in terms of weight. Regarding fishing, the main species caught by the Spanish fleet was skipjack (*Katsuwonus pelamis*), of which 197,701 tons were caught that same year.

For 2018 the aquaculture harvest figures in Spain are for a total of 348,891 tonnes and a first sale value of 452.9 million Euros. Broken down into mussels (273,600 t), sea bass (22,460 t), rainbow trout (18,955 t) and sea bream (14,930 t) as the main species.

For 2018, the aquaculture harvest figures in Spain are for a total of 348,891 tonnes and a first-sale value of 452.9 million Euros. Broken down into mussels (273,600 t), sea bass (22,460 t), rainbow trout (18,955 t) and sea bream (14,930 t) as the main species.

The aquaculture harvest in Spain in 2019 is estimated at 342,867 tonnes and a first-sale value of 501 million euros.

Based on the most recent statistics collected by APROMAR, the aquaculture harvest in Spain in 2019 totaled 342,867 tonnes. This production reached a value in its first sale of 501 million Euros. The main species produced has been the referred mussel (261,513 t), followed by sea bass (27,335 t), rainbow trout (18,955 t) and sea bream (13,521 t).

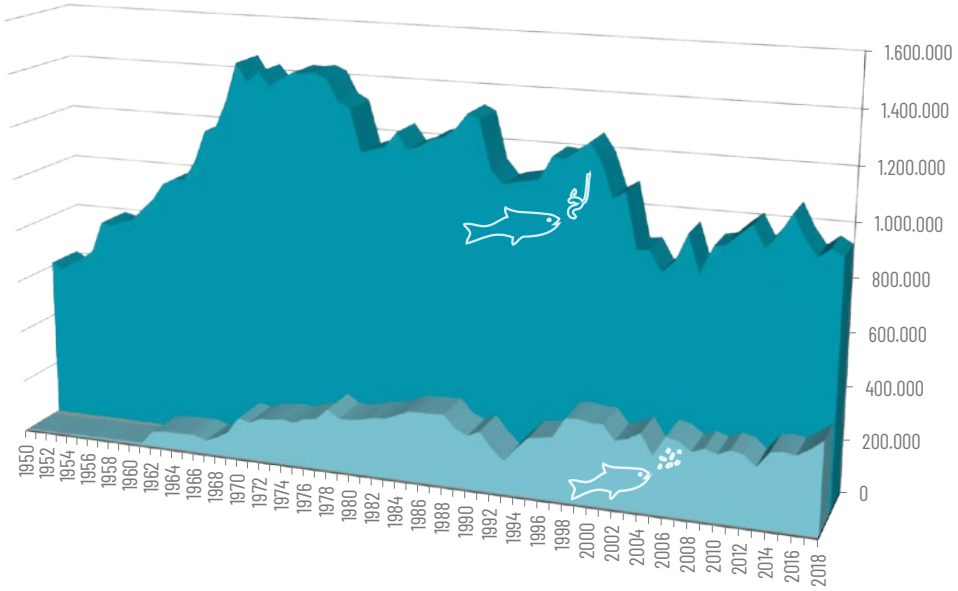


Figure 5-1. Evolution of total aquatic production (aquaculture + fisheries) in Spain (tonnes) in the period 1950-2018 (FAO).

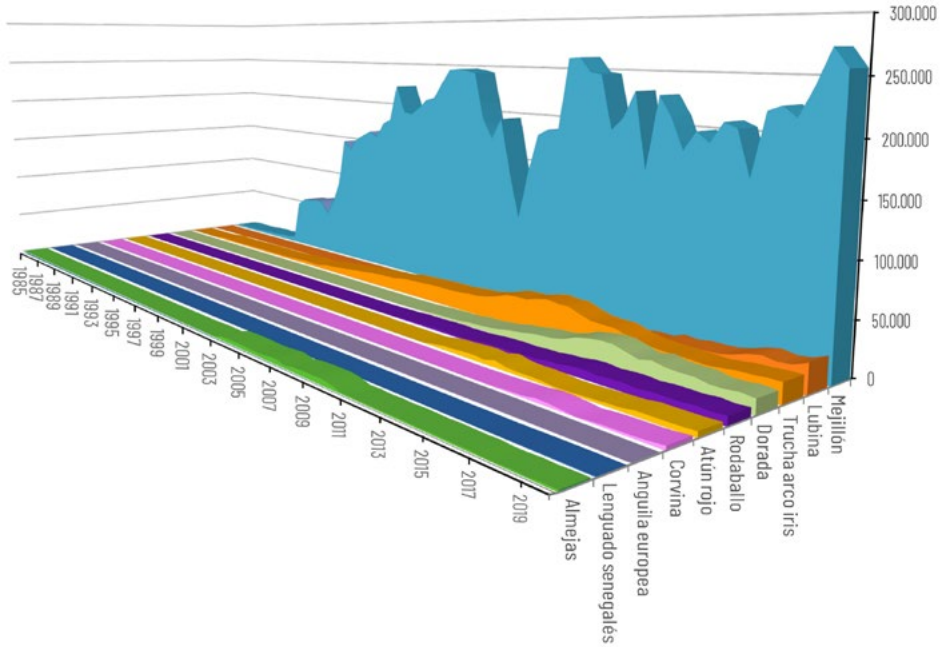


Figure 5-2. Evolution of the aquaculture harvest in Spain, in tonnes and by species, in the period 1985-2019 (MAPA and APROMAR).

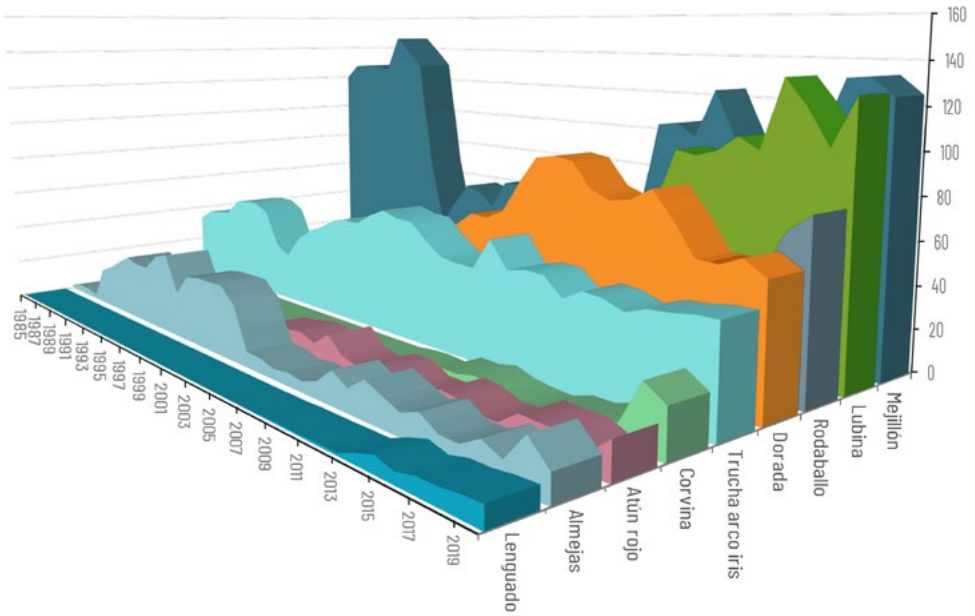


Figure 5-3. Evolution of the value of the aquaculture harvest in Spain, in millions of Euros and by species, in the period 1985-2019 (MAPA and APROMAR data).

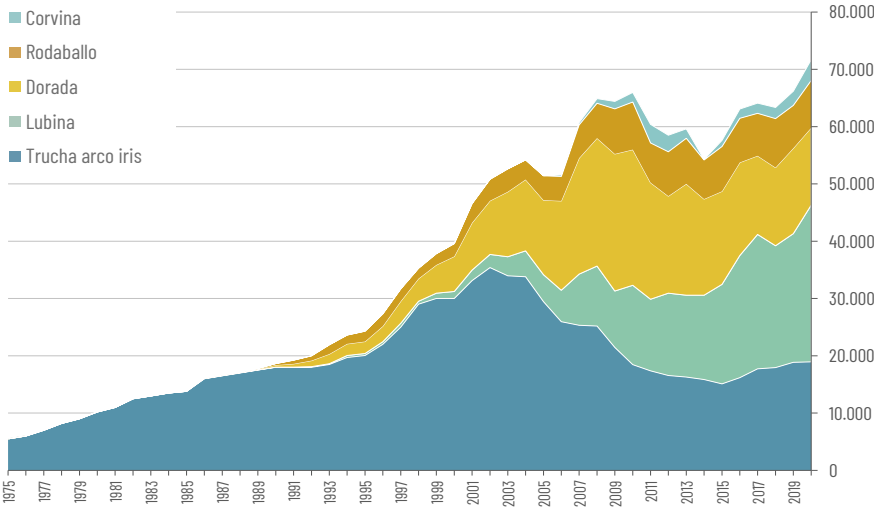


Figure 5-4. Evolution of the harvest of aquaculture finfish in Spain, in tonnes and for the main species, in the period 1975-2019 (MAPA and APROMAR).

5.2. Types of aquaculture facilities in Spain

Spain has a wide range of water resources on which aquaculture is feasible, both in marine and inland (freshwater) areas. Thus, to the almost 8,000 km of coastline are added nine large rivers, numerous minor river courses, lakes and dammed water capacity of more than 55,000 hm^3, in addition to an orography and diversity of climates that provide environmental and physiochemical characteristics suitable for the development of aquaculture. Aquaculture facilities are designed and built to meet the needs of the species produced and adapted to the conditions of the physical environment. In this way, the following categorization of aquaculture facilities in Spain can be made:

AQUACULTURE FACILITIES IN SPAIN

- **At sea in pens.**
  These facilities consist of rigid plastic rings that support and float net bags inside which finfish such as Gilthead seabream, European seabass or meagre are stocked and raised.

- **At sea in platforms and long-lines.**
  These are floating structures for the cultivation of bivalve molluscs, mainly mussels. The platforms consist of a structure from which the culture ropes hang, and the *long-lines* are non-rigid structures consisting of a mother line, arranged between buoys linearly on the sea surface, from which hang in turn the ropes of culture. The platforms operate better in sheltered waters, as in the case of Galician estuaries, while *long-lines* offer better results in open water, as is the case of mussel cultivation in Andalusia.

- **On the coast line (salt water).**
  These are facilities built on land on the coast and obtaining their water by pumping from the sea or wells. It is the type of farm on which the production of turbot is carried out, for example, or sole.

- **On the beach, intertidal areas and estuaries (salt water).**
  They are aquaculture facilities where the farming is carried out with minimal physical intervention on the environment. This is the case with the production of clams and oysters. It is done in beach or intertidal areas where animals are deposited directly on the substrate or inside meshes on tables. It is also the type of farms located in ponds dug into the land in ancient salt areas or marshes, being an example of this the estuaries for the production of finfish such as Gilthead seabream, European sea bass or meagre.

- **In land (fresh water).**
  They consist of facilities built on the banks of rivers, or their sources, that take advantage of the circulation by gravity of the water. It is the type of farm in which the production of rainbow trout or sturgeon take place.

5.3. Number of aquaculture facilities in Spain

In 2018, a total of 5,075 aquaculture facilities were in operation and with production in Spain. Of these, 4,793 were for molluscs in marine aquaculture, consisting of rafts and long-lines in which vertical cultivation of mussels and other mollusks is carried out. Inland aquaculture (freshwater) had 166 active farms, mainly for fish such as rainbow trout and sturgeon.

The number of facilities on the coast, beaches, intertidal zones and estuaries was 73. And operating in pens in the sea there were 43, for finfish farming.

The statistics show a persistent reduction over the years in the number of aquaculture facilities in Spain, from a maximum in 2007 of 5,313 to the current 5,075.

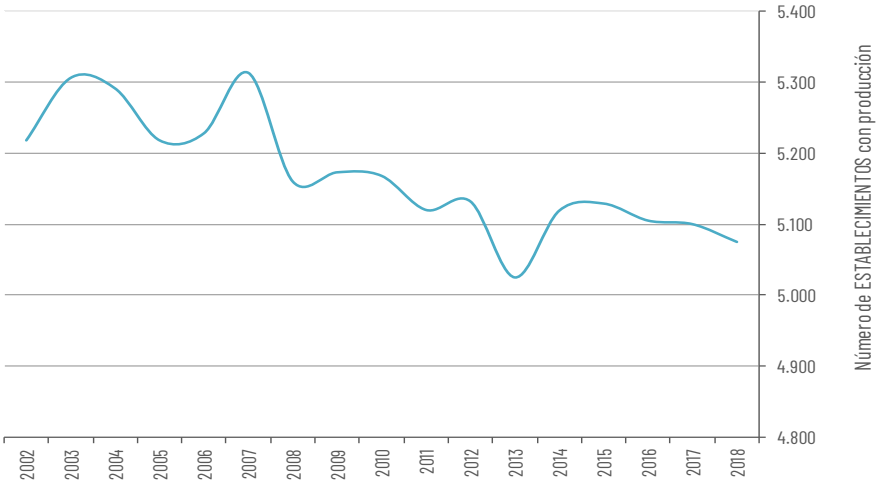


Figure 5-5. Evolution of the total number of aquaculture facilities in Spain with production between 2002 and 2018 (Source MAPA/ APROMAR).

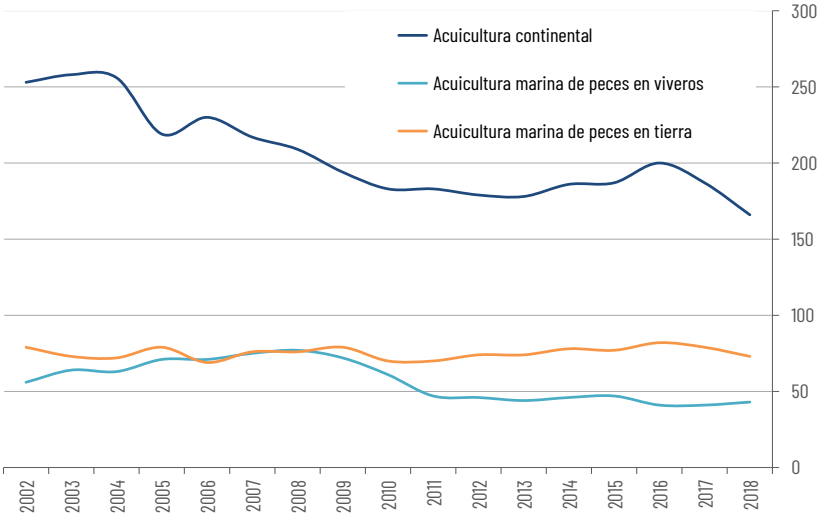


Figure 5-6. Evolution of the number of aquaculture facilities in Spain with production, dedicated to freshwater aquaculture, to marine fish in pens and in marine onshore fish farms between 2002 and 2018 (source MAPA/APROMAR).

5.4. Employment in aquaculture in Spain

The statistics produced annually by the Ministry of Agriculture, Fisheries and Food (MAPA) indicate that the number of annual work units (UTA) in aquaculture in Spain in 2018 was 6,730, although this figure was distributed among 18,587 people. Most of these, 9,978, were non-salaried (self-employed), mainly from the mussel subsector. It was followed by 4,080 specialized workers, 3,087 non-specialized workers, 1,034 technicians with higher or middle degrees, 351 administrative staff and 57 people with other professional categories.

It is noteworthy that since 2007 there has been an agreement in Spain between unions and employers to regulate minimum labor relations in marine aquaculture. On June 5, 2019, the V National Collective Agreement for Marine Aquaculture that applies for the 2018-2020 period was published in the BOE.

The evolution of employment in aquaculture in Spain shows a decreasing trend over the years in terms of the number of people employed. However, the statistics measured in Annual Work Units show a situation of relative stability. In 2018, there has been a 7% increase in Annual Work Units from 6,301 to 6,730 and a 15% in total number of people, from 16,151 in 2017 to 18,587 in 2018.

The indirect employment estimate associated with the 18,587 people working in aquaculture was 46,467 jobs.

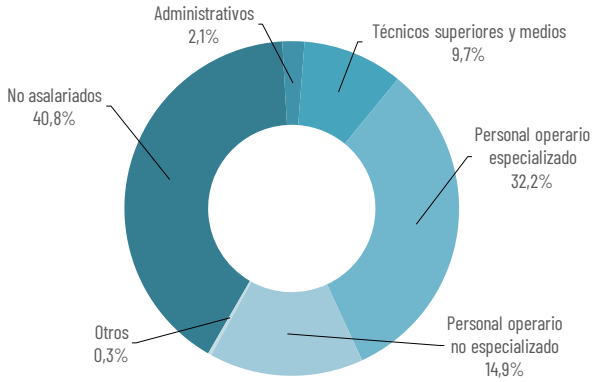


Figure 5-7.
Distribution of employment in aquaculture in Spain, by professional category, in 2018 calculated on Annual Working Units (MAPA).

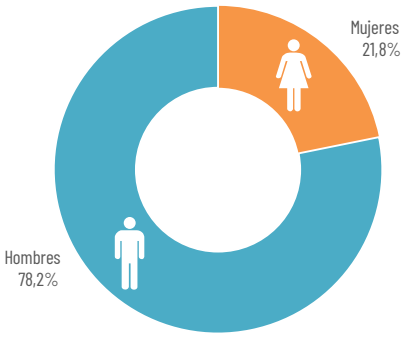
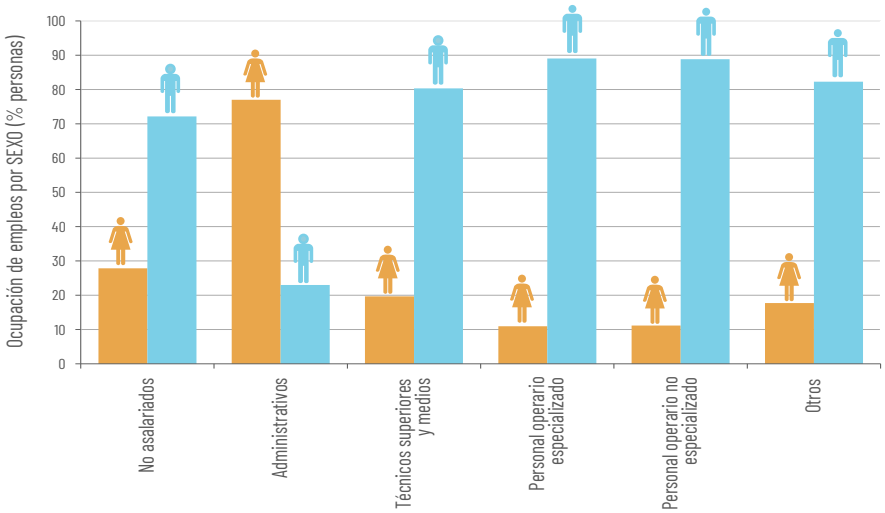


Figure 5-8.
Distribution of employment by sex calculated on the number of people in aquaculture in Spain in 2018 (MAPA).

Figure 5-9.
Occupation of jobs by sex calculated on the number of people in aquaculture in Spain in 2018 (MAPA).



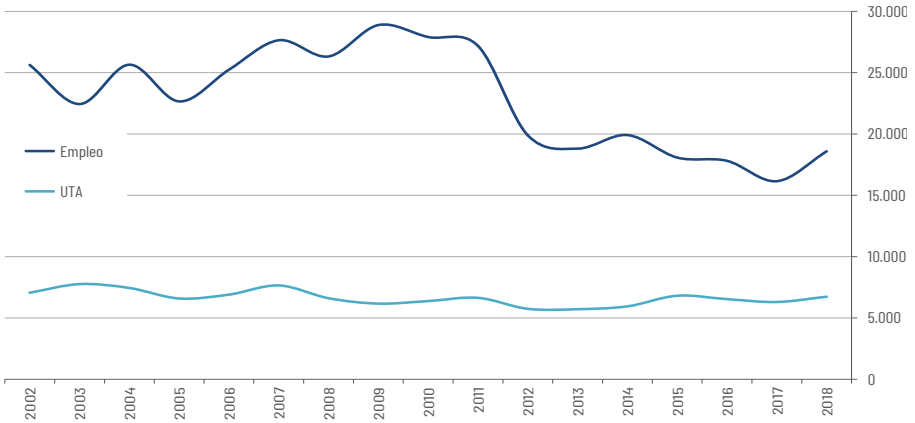


Figure 5-10. Evolution of employment in aquaculture in Spain during the period 2002-2018, showing the figures of people and Annual Working Units (MAPA).

5.5. Consumption of aquaculture feed in Spain

The feeding of aquaculture animals, particularly finfish, is a key element of their viability. Optimizing the use of raw materials, knowledge about nutrients, their digestibility and the correct handling of the feed are essential for the responsible development of this activity. In 2019, 146,829 tonnes of aquaculture feed were used in Spain. This amount is 4.8% higher than in 2018. 85.6% of it was administered mainly to marine finfish: seabass, meager, turbot, sea bream, eel and sole. And the remaining 14.4% to continental species such as trout and sturgeon. The amount of aquaculture feed used in Spain barely adds up to 1% of the total livestock feed consumed in this country.

The feed used in Spanish aquaculture farms is practically all of the extruded type and has been produced for the most part in the country itself, being completed with imports from other EU Member States, mainly France and Portugal.

The location in Spain of the feed factories facilitates the carrying out of an important research and innovation activity in the field of nutrition and feeding of fish. This innovation is promoted by the feed manufacturers themselves and by the aquaculture companies, but public research centers and universities also play a crucial role.

In the cultivation of molluscs there is no consumption of feed since it is filter animals. Their diet is based on taking advantage of the natural productivity of the waters, whose nutrients favor the presence of plankton that is filtered and consumed by the mollusks. Galicia, which is the main mollusc producing region in Spain and Europe, stands out for the high natural productivity of its five estuaries.

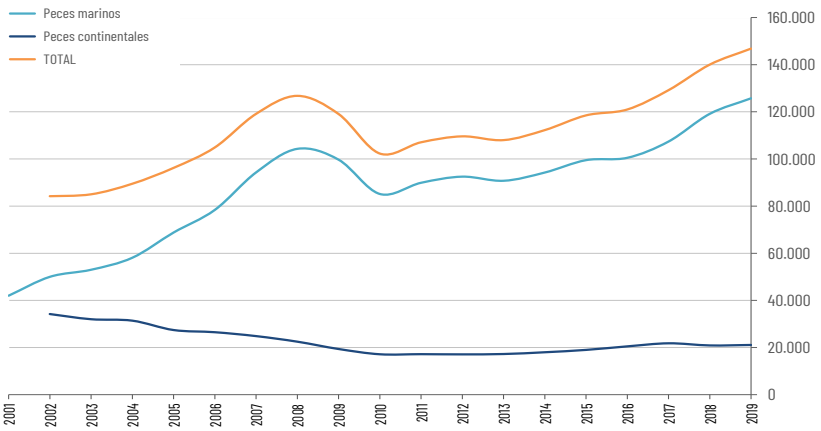


Figure 5-11. Evolution of feed consumption (tonnes) for aquaculture in Spain broken down between marine and freshwater finfish during the period 2001-2019 (Skretting and Biomar sources).

5.6. Marine aquaculture in Spain and Europe

The species produced through aquaculture in Spanish marine waters, and considered in greater detail in this report, are sea bream, sea bass, turbot, corvina, sole, bluefin tuna, mussels, clams, oysters and abalones.

Marine finfish farming

Marine fish farming in Spain maintained a vigorous growth path from its beginnings in the 80s of the 20th century until 2009, when it reached 48,441 tonnes harvested. However, in the last 10 years it has suffered stagnation and its production hovers around 45,000.

In 2019, production reached a record 53,920 tonnes. At the end of 2019 and the beginning of 2020, due to climatic and epidemiological episodes, the losses of this production were very marked and a further decrease is expected in 2020 with a production of about 45,103 tonnes.

Other species of interest such as eel, sea bream, bream, prawn, microalgae and macroalgae are also analyzed, but with less detail. The Valencian Community is the one with the highest harvested production of marine fish in Spain in 2019 with 16,045 tons, followed by Galicia with 8,337 tonnes, the Canary Islands with 8,239 tonnes, Murcia with 6,513 tonnes and Andalusia with 5,644 tonnes. Production in Catalonia has been declining over the years and is now anecdotal (30 tonnes).

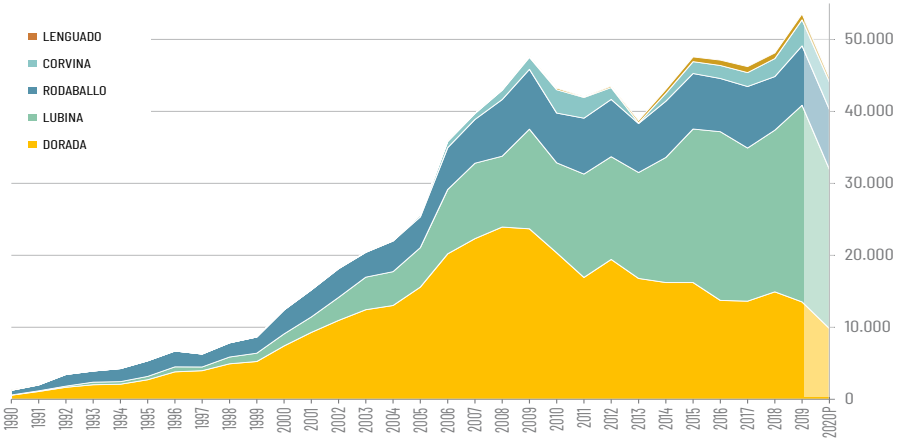


Figure 5-12. Evolution of the harvest (tonnes) of marine aquaculture finfish in Spain in the period 1990-2020.

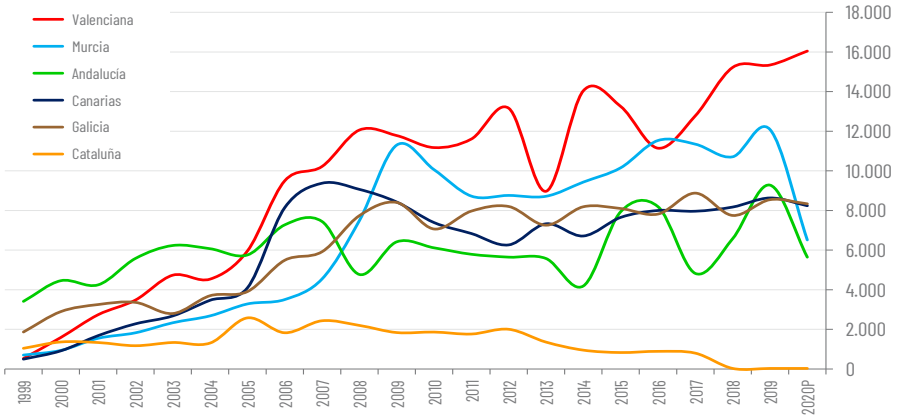
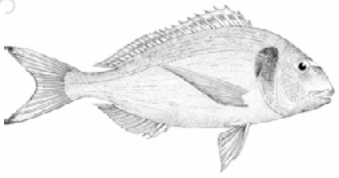


Figure 5-13. Evolution of the harvest (tonnes) of aquaculture marine fish in the different Autonomous regions in Spain for the period 1999-2020.

Species

SEABREAM



Sparus aurata

GILTHEAD SEABREAM (*Sparus aurata*)
Class: Osteidacty - Order: Perciformes - Family: Sparidae

Significant characters: High oval body and laterally flattened. Large head with arched profile. Silver-grey coloration with a dark spot at the beginning of the sideline and a small scarlet band on the upper edge of the operculum. Shows a characteristic golden band between the eyes. Forked caudal fin. It reaches a size of up to 57 cm in length. It is a proteranical hermaphrodite animal, first mature as a male and from the second or third year becomes female. It can live more than 10 years.

Habitat and biology: Coastal species found in brackish and marine waters. It is distributed in wildlife along the eastern shores of the Atlantic Ocean, from Great Britain to Cape Green, and all over the Mediterranean Sea. Protruding Hermaphrodite first matures as male and from the second or third year becomes female. You can live more than 10 years.

Farming: It takes place in almost all Mediterranean countries. Hatcheries produce eggs from breeding individuals under tightly controlled conditions. Each female gets to lay 2 million eggs of 1 mm in diameter per kilo of weight. During their first month of life, the larvae feed on living organisms: rotifers and artemia. They later on fed a diet with feed made from natural raw materials. The ongrowing facilities are varied: floating pens at sea, concrete tanks or ponds on land. Each Gilthead seabream takes between 18 and 24 months to reach 400g since hatching. The commercial size ranges from 250 g to more than 2.000 g.

SEABREAM farming

The total aquaculture production of githead seabream (*Sparus aurata*) in Europe and the rest of the Mediterranean in 2019 is estimated at 252,406 tonnes, according to statistics from APROMAR, FEAP and FAO. This figure is 2.3% higher than that of 2018. For 2020, a decrease of -1.3% is estimated to reach around 249,200 tonnes.

The total first sale value of the Mediterranean aquaculture seabream harvested in 2019 is estimated at 1,135.8 million Euros.

There is production of aquaculture seabream in 20 countries, the main producers being Turkey with 85,000 tons (representing 33.7% of total production,

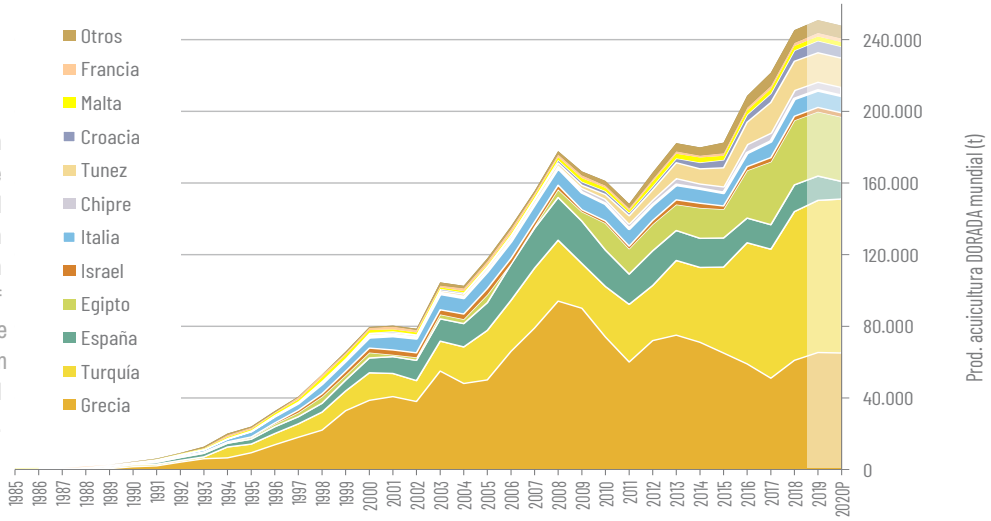


Figure 5-14. Evolution of aquaculture production of Gilthead seabream (tonnes) in the Mediterranean area and the rest of the world for the period 1985-2020 (On FAO, FEAP and APROMAR data).

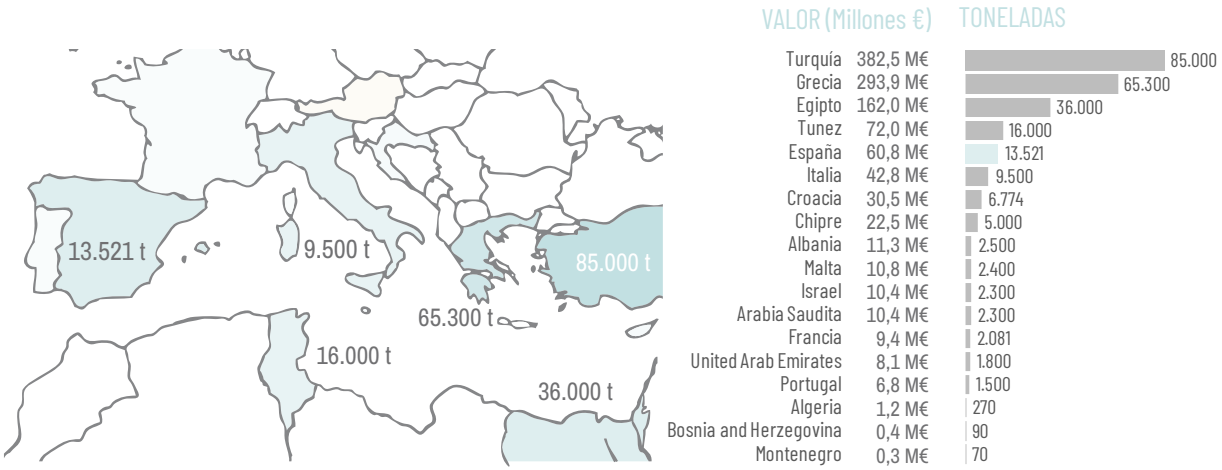


Figure 5-15. Distribution of aquaculture production of Gilthead seabream in the Mediterranean area in 2019 by volume (tonnes) and value (millions of euros), on FAO, FEAP and APROMAR data.

Greece with 65,300 tonnes (25.9%), Egypt with 36,000 tonnes (14 , 3%), Tunisia with 16,000 t (6.3%) and Spain with 13,521 t (5.4%). Its cultivation is also carried out in Italy, Cyprus, Croatia and there are smaller productions in: Malta, Israel, France, Portugal, Albania, Algeria, United Arab Emirates and Bosnia, among others.

The total production of juvenile seabream in 2019 in Europe (including Turkey) is estimated to be 701,511 million units, 2.4% higher than 2018. The main producing country is Turkey (240 million) followed by Greece (238 million). Further away are Italy (90 million), France (55.1 million) and Spain (36.4 million).

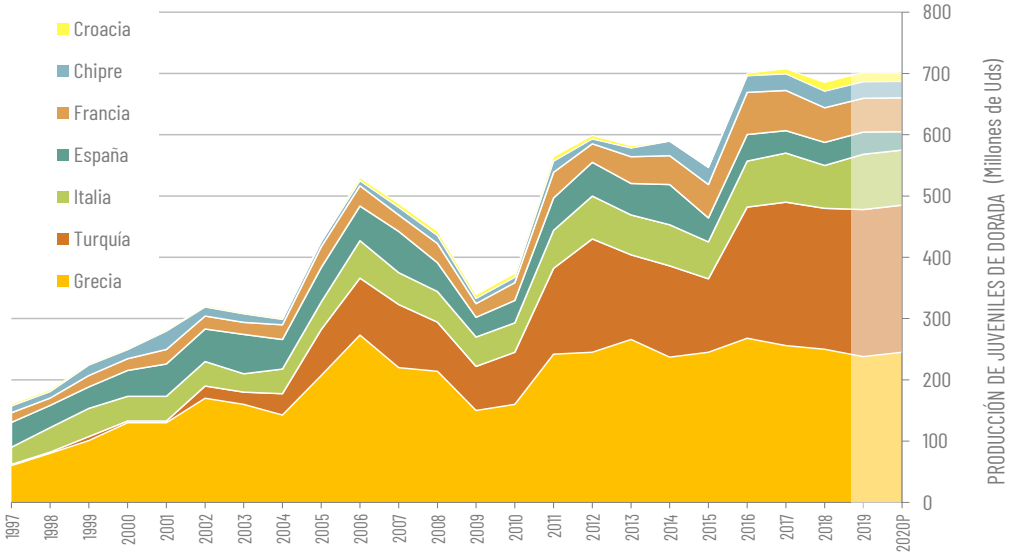


Figure 5-16. Evolution of the total production of juveniles of gilthead seabream (millions of units) in the Mediterranean area for the period 1997-2020 (on FEAP and APROMAR).

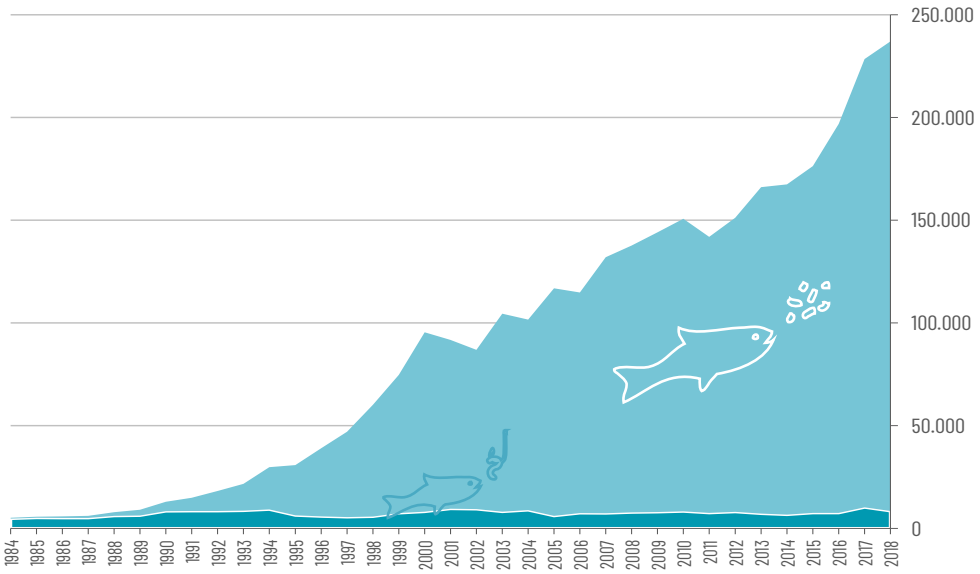


Figure 5-17. Evolution of world production (tonnes) of gilthead seabream (Sparus aurata), through aquaculture and fisheries, for the period 1984-2018 (FAO).

In any case, the difficulty of contrasting these figures, especially in Greece and Turkey, should be noted again. It is estimated that the production of juvenile seabream will decrease by -0.2% in 2020, reaching around 700 million units. The unloading in the fishing ports in the countries of the Mediterranean Sea and the Atlantic Ocean of seabream from capture fisheries totaled 8,473 tonnes in 2018, a figure -17.5% lower than the previous year. However, this amount has remained relatively constant in recent years, fluctuating between 6,000 and 9,500 tonnes per year, while the breeding gilthead bream accounts for 96.4% of the total supply of this species.

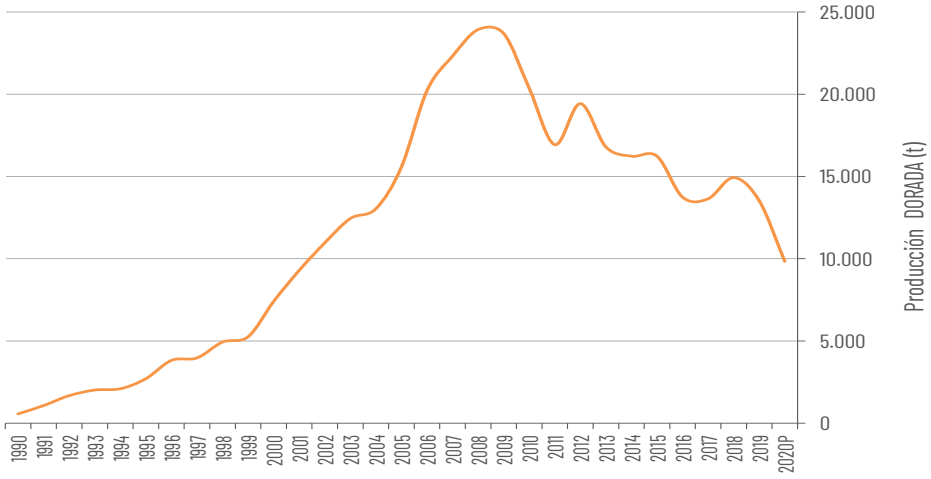


Figure 5-18. Evolution of aquaculture production of gilthead seabream (Sparus aurata) in tonnes (1990-2020).

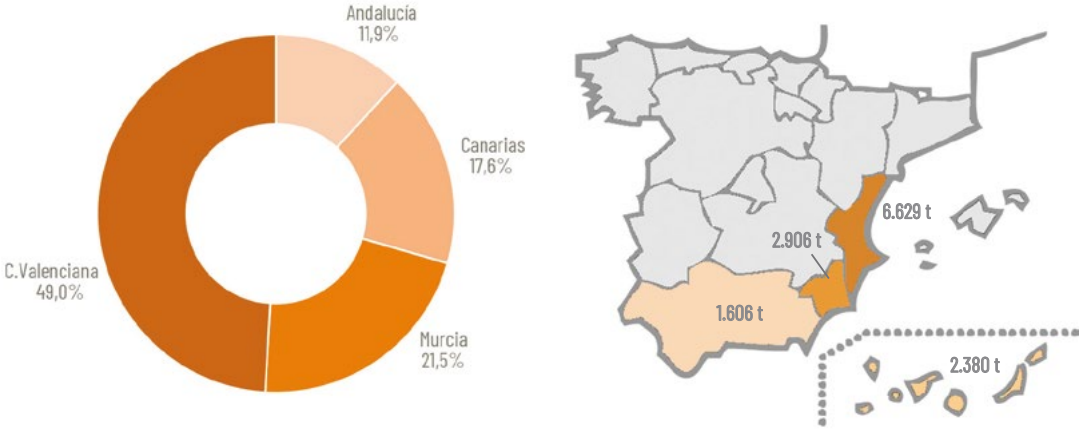
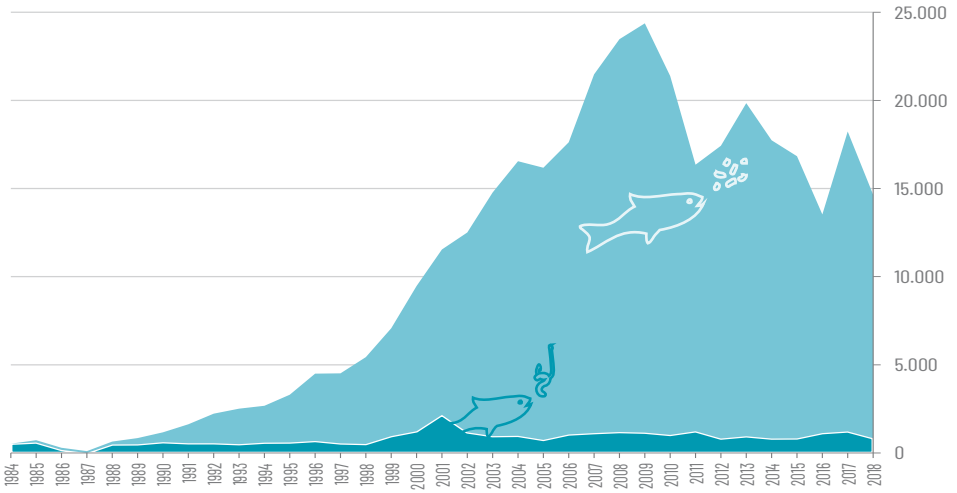


Figure 5-19. Distribution percentage productions (tonnes) of Gilthead seabream in Spain by Autonomous region for 2019



igure 5-20. Evolution of the sources of Gilthead seabream (Sparus aurata) in Spain in tonnes: aquaculture and fisheries, in the period 1984-2018 (MAPA-FAO).

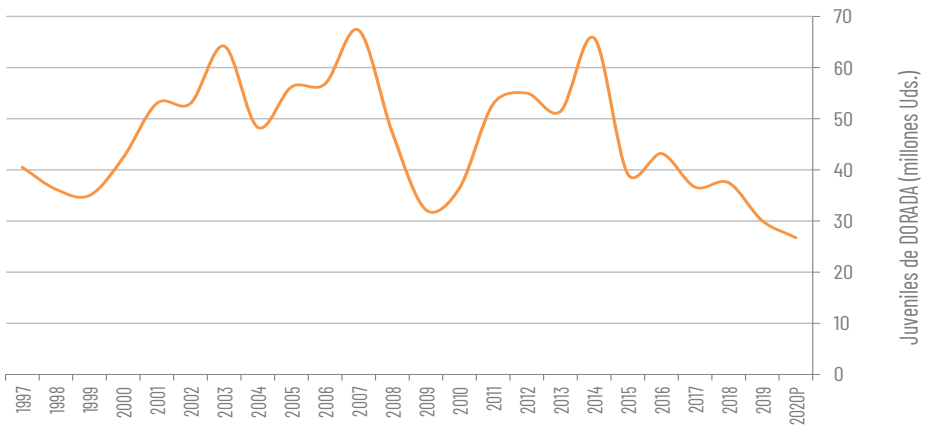


Figure 5-21. Evolution of the production of juveniles of gilthead seabreams in millions of units (1997-2020).

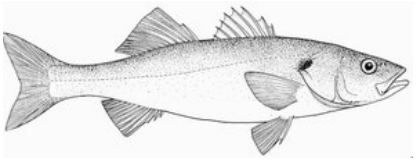
The harvest of aquaculture seabream in Spain in 2019 was 13,521 tons, -9.4% less than the previous year. For 2020, a decrease of -27.3% is estimated to reach 9,836 tons due to the effects of the "Gloria" storm and losses caused by pathologies between the last quarter of 2019 and the first of 2020. The maximum Spanish annual harvest of sea bream of aquaculture took place in 2008, with 23,930 t. In 2019, the Valencian Community has led the production of aquaculture seabream in Spain with 6,629 t (49% of the total), followed by Murcia (2,906 t, 21.5%), Canarias (2,380 t, 17.6 %) and Andalusia (1,606 t, 11.9%).

Although a small amount of wild seabream caught by fishing boats continues to arrive in Spanish fishing ports today (836 tonnes in 2018), its volume remains relatively constant around that amount, while breeding seabream is 94 3% of the total gilthead seabream placed on the market.

The production of juvenile sea bream in Spain in 2019 was 30 million units, which represents a decrease of -19.8% over the data of the previous year. Production in 2020 is estimated to decrease by around -11%. The production of juvenile seabream was concentrated in 2019 in the Valencian Community (60.8%), Cantabria (19.9%), the Balearic Islands (12.7%) and Andalusia (6.5%). The average sale price of juvenile sea bream in Spain, at an equivalent weight of 2 g per unit, is estimated at 0.22 euros / unit.

SEABASS farming

The total aquaculture production of seabass (*Dicentrarchus labrax*) in Europe and the rest of the Mediterranean arc in 2019 was 212,977 tonnes, according to consolidated statistics from FAO, FEAP and APROMAR. This figure is 8.3% higher than the previous year. For 2020 a decrease of -4% is estimated to approximately 204,400 tonnes.



Dicentrarchus labrax

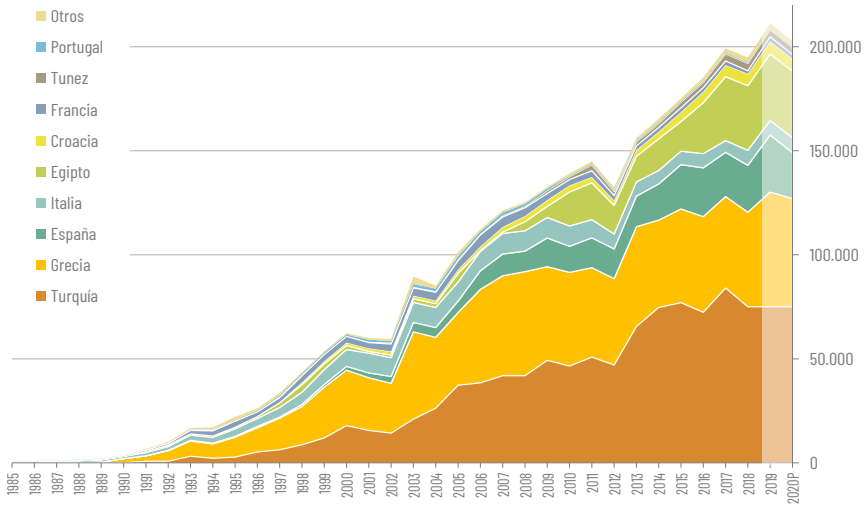
EUROPEAN SEABASS (*Dicentrarchus labrax*)

Class: Osteidacty - Order: Perciformes - Family: Moronidae

Significant characters: Fusiform and vigorous body with large scales. Pointed head with small nasal openings, small eyes and large mouth. The lower jaw is prominent. Pale grey coloration, darker on the dorsal and silvery sides. On the operculum has a black spot. Slightly forked caudal fin. It reaches a size of up to 70 cm in length. It tolerates wide variations in temperature and salinity of water. The first sexual maturation usually occurs at 2-4 years. Its longevity is estimated at about 30 years.

Habitat and biology: Pelagic littoral species that is distributed naturally along the coasts Eastern Atlantic Ocean, English Channel and Baltic Sea, from Norway to Morocco, and all over the Mediterranean Sea. It frequents estuaries and coastal lagoons. Can live in a wide variation of temperature and salinity of the water. The first sexual maturation occurs Usually at 2-4 years. Its longevity is estimated at about 30 years.

Farming: European seabass is a fish that is farmed in almost all Mediterranean countries. Hatcheries produce eggs from breeding individuals under tightly controlled conditions. Each female gets to lay 250,000 eggs of 1 mm in diameter per kilo of weight. During their first month of life, the larvae feed on living organisms: rotifers and artemia. They then start to eat based on feeds made from natural raw materials. The breeding facilities are varied: floating pens at sea, concrete tanks or ponds on land. Each seabass takes between 20 and 24 months to reach 400g since hatching the egg. The commercial size ranges from 250 g to more than 2,500 g.



igure 5-22. Evolution of total production (tonnes) of aquaculture seabass in the Mediterranean area and the rest of the world in the period 1985-2020 (On FAO, FEAP and APROMAR data).

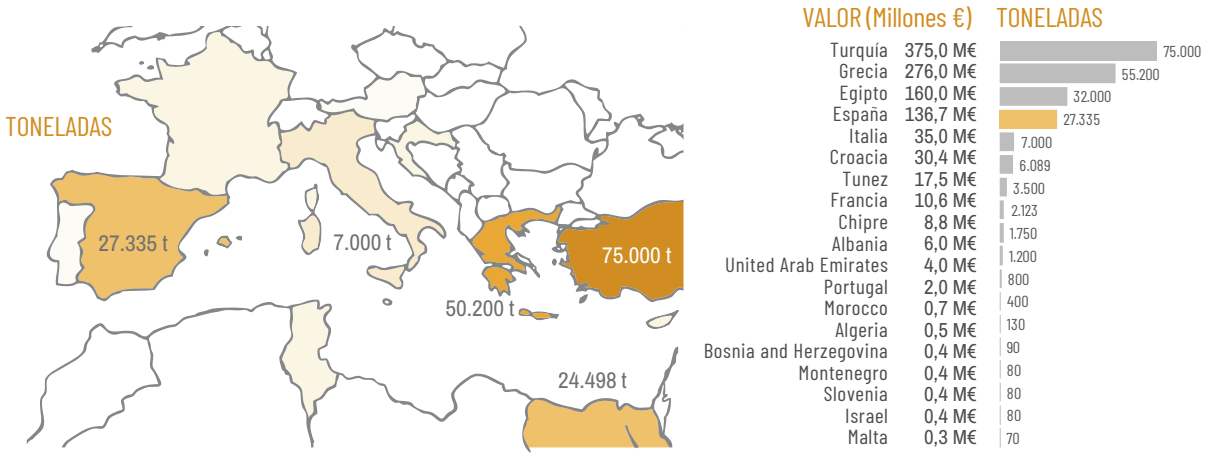


Figure 5-23. Distribution of sea bass aquaculture production in the Mediterranean area in 2019 by volume (tonnes) and value (millions of Euros), on FAO, FEAP and APROMAR data.

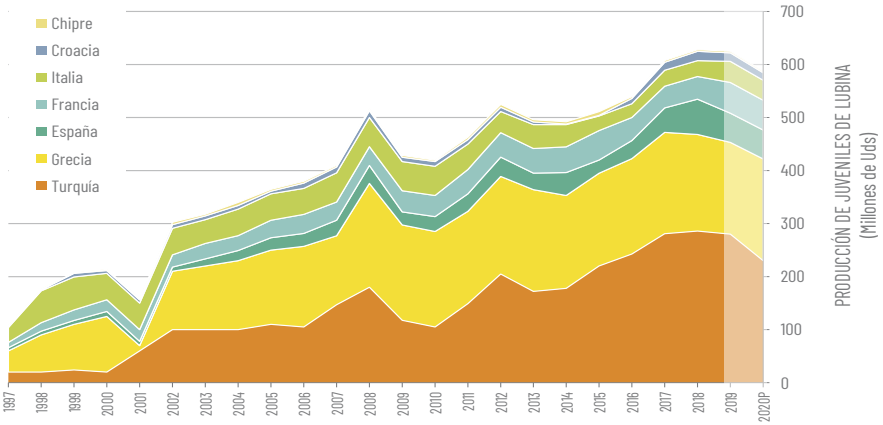


Figure 5-24. Evolution of the total production of juvenile European seabass in the Mediterranean area in the period 1997-2020, in millions of units (on FEAP and APROMAR).

The total first-sale value of aquaculture seabass in 2019 was approximately 1,064.9 million Euros.

The main sea bass producing countries are Turkey, with 75,000 tonnes (representing 35.2% of the total), Greece with 55,200 tonnes (25.9%), Egypt with 32,000 tonnes (15.0%) and Spain with 22,105 t (12.8%). But sea bass is produced in a total of 19 countries, including, in addition to the above, Italy, Egypt, Croatia, France, Tunisia, Portugal, Cyprus, Israel, the United Kingdom, Bosnia, Algeria, Montenegro, Malta, Slovenia and Morocco.

The production of juvenile seabass in 2019 in Europe (including Turkey) amounted to 625 million units, -0.4% less than in 2018. The main producing country is Turkey with 280 million, followed by Greece with 182 million. While with smaller productions are: Spain (66.6 million), France (57.8 million) and Italy (40.0 million youth). For 2020, a production of 587 million juvenile seabass is estimated, that is, -6% less.

Although it continues to land seabass from extractive fishing in the fishing ports of various countries of the Mediterranean Sea and the Atlantic Ocean, 5,135 tonnes in 2018 (-3.6% less than the previous year), this amount has decreased slightly since 2013, while the rearing seabass represents 97.9% of the total.

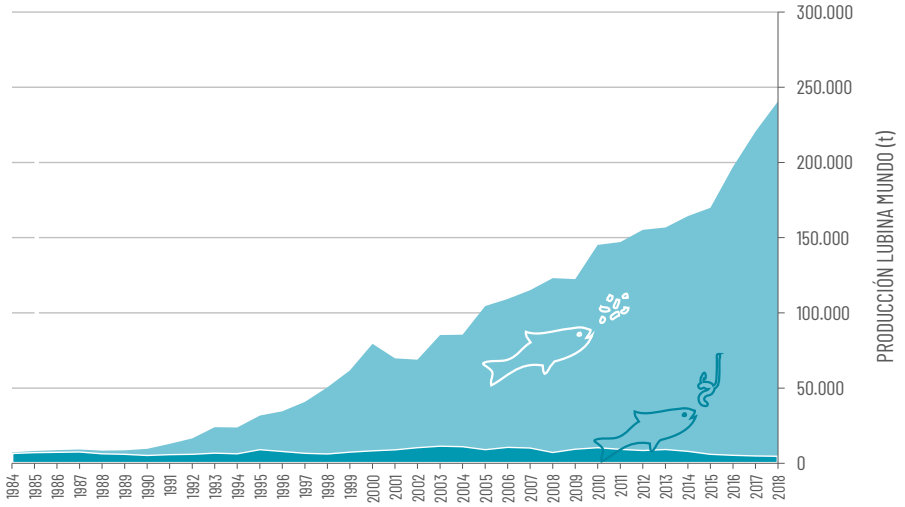


Figure 5-25. Evolution of total global production (tonnes) of European seabass (Dicentrarchus labrax), through aquaculture and fisheries, in the period 1 1984-2018 (FAO).

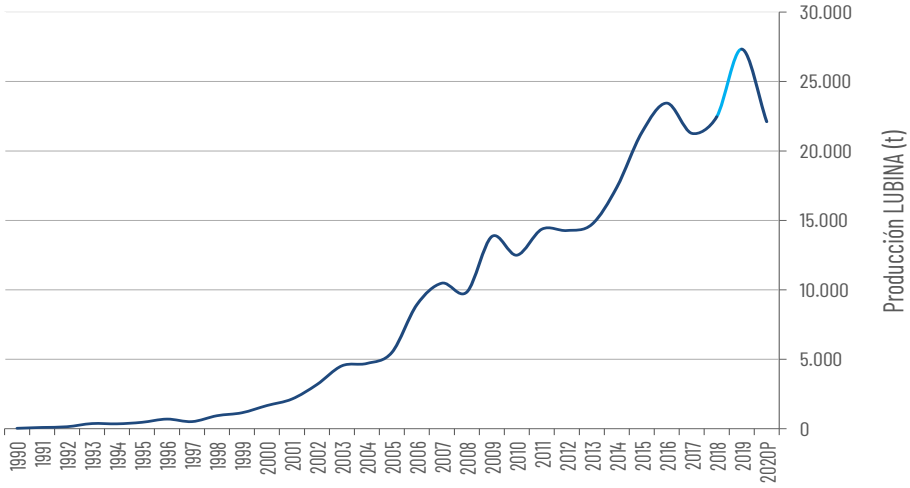


Figure 5-26. Evolution of aquaculture production of seabass (*Dicentrarchus labrax*) in tonnes (1990-2020).

The aquaculture seabass harvest in Spain in 2019 was 27,335 tonnes, 21.7% more than in 2018. The Region of Murcia led production with 9,181 tonnes (34% of the total), followed by Andalusia (7,120 t, 26%), the Canary Islands (6,253 t, 23%), Comunidad Valenciana (4,751 t, 17%), and Catalonia (30 t, 0.1%). For 2020, a decrease of -19.0% is expected due to the climatic and epidemiological events that occurred between the last quarter of 2019 and the first of 2020 with a harvest in Spain of 22,105 t.

Although a small quantity of wild seabass caught by fishing boats continues to reach Spanish fishing ports today (507 tonnes in 2018), its volume remains relatively constant around that amount, while farmed seabass accounts for 96 , 7% of the total.

The production of juvenile seabass in Spain in 2019 was 55.8 million units, which represents a decrease of -15.4% over the figure for 2018. The production of juvenile seabass in Spain is carried out in the Balearic Islands (75.7%), Valencian Community (13.8%), Cantabria (4%) and Andalusia (6.4%). By 2020, it is estimated that the production of juvenile seabass in Spain will decrease by -1.5% to 55 million units.

The average sale price of juvenile seabass in Spain, at an equivalent weight of 2 g per unit, is estimated at 0.22 euros / unit.

The Spanish production of commercial-size seabass requires the importation of juveniles in addition to those of national production. The origin of these fish is, in order of importance, France, Italy and Greece. Although juveniles are also exported from Spain to other countries.

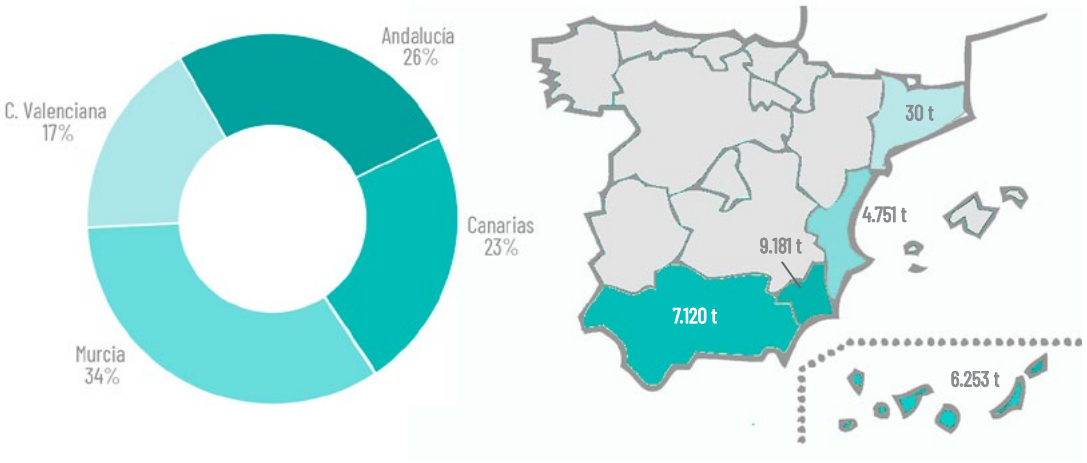


Figure 5-27. Percentage distribution of seabass production (tonnes) in Spain by Autonomous regions in 2019.

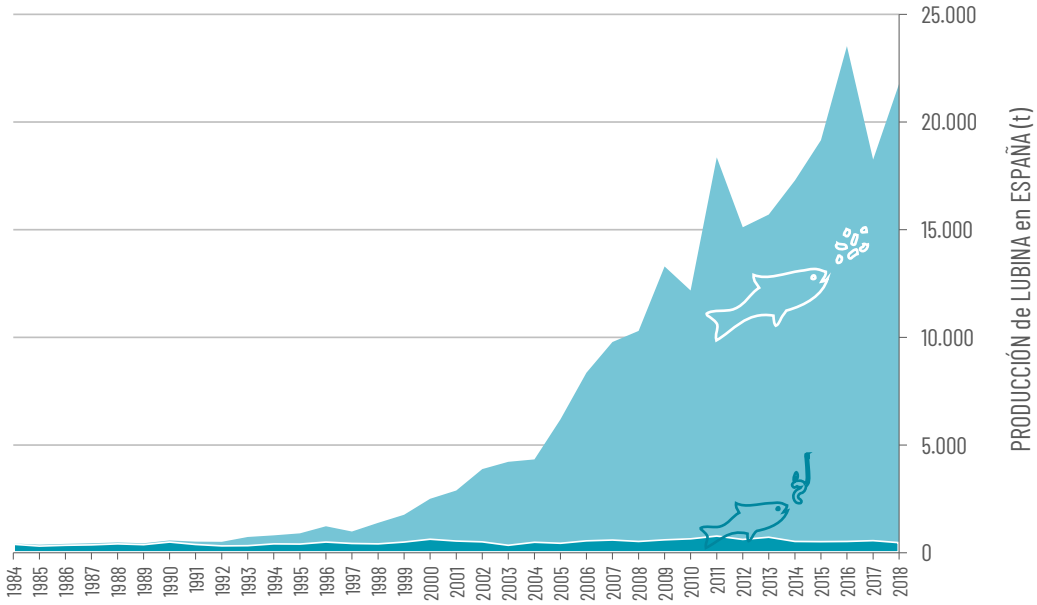


Figure 5-28. Evolution of seabass sources (*Dicentrarchus labrax*) in Spain: aquaculture and fishing in tonnes, for the period 1984-2018 (MAPA-FAO).

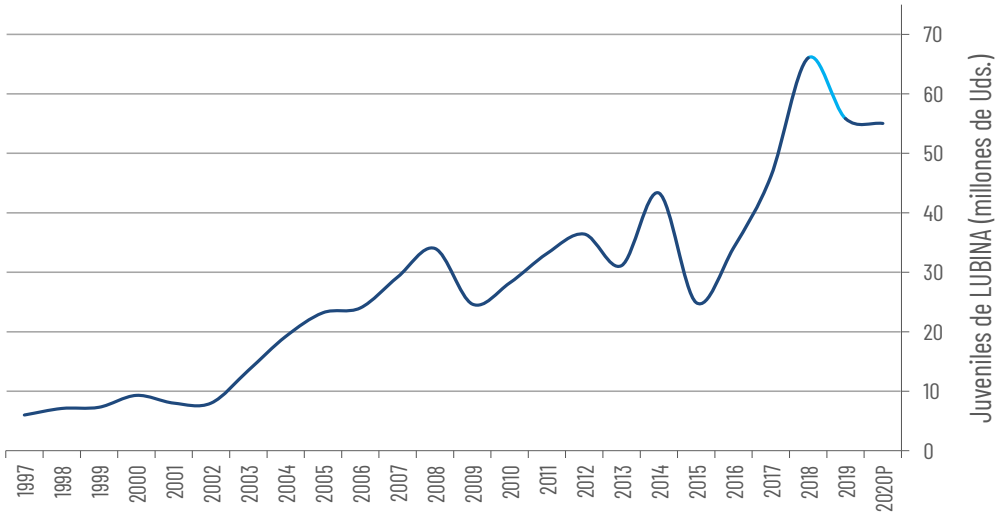


Figure 5-29. Evolution of the production of juvenile of seabass in Spain in millions of units (1997-2020).

Joint figures on the farming of SEABREAM and SEABASS

Given the very similar environmental and biological requirements for sea bream and sea bass, their production methods are very similar. For this reason, they are often grown on the same farms and both are interchangeable. Even at the market level, the situation of seabream affects that of seabass, and vice versa. Therefore, it is interesting to show the joint analysis of the production of both species.

The total aquaculture production of seabream plus seabass in Europe and the rest of the world in 2019 is estimated at 465,383 tonnes, according to consolidated statistics from FEAP, APROMAR and FAO. This figure is 5% higher than the previous year. For 2020 a decrease of -2.5% is forecast with an estimated production of 453,000 tonnes.

The joint production of juvenile sea bream plus sea bass in the Mediterranean area in 2019 (not including Egypt and Tunisia) has been 1,327 million units, which represents an increase of 1% over the data of the previous year. The main producing countries in order of importance are Turkey (520 million), Greece (411 million), Italy (130 million), France (113 million) and Spain (92 million). In 2020, production is expected to be approximately -2.9% lower than the previous year, assuming an approximate production of 1,288 million juveniles.

The total aquaculture production of sea bream plus sea bass in Spain in 2019 was 40,856 tonnes, 9.3% more than the previous year. The highest production took place in the Valencian Community (28% of the total), followed by Murcia (30%), Andalusia and the Canary Islands (21% each), and Catalonia (0.1%).

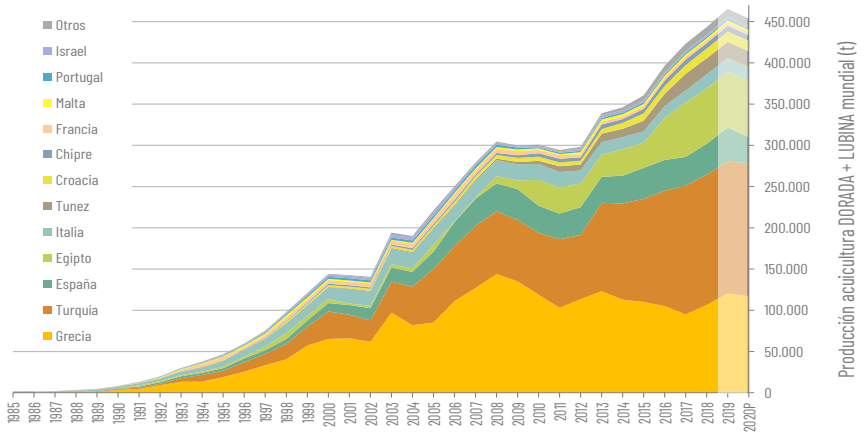


Figure 5-30.
Evolution of joint production of aquaculture seabream and seabass (tonnes) in the Mediterranean area and the rest of the world for the period 1985-2020 (On FAO, FEAP and APROMAR data).

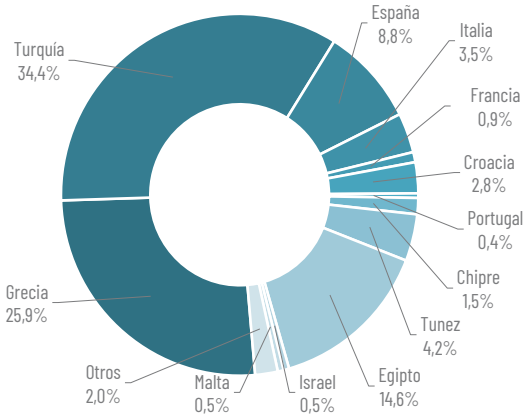


Figure 5-31.
Distribution of aquaculture production of seabream plus seabass in the Mediterranean area in 2019 by volume (tonnes) and value (millions of euros), on FAO, FEAP and APROMAR data.

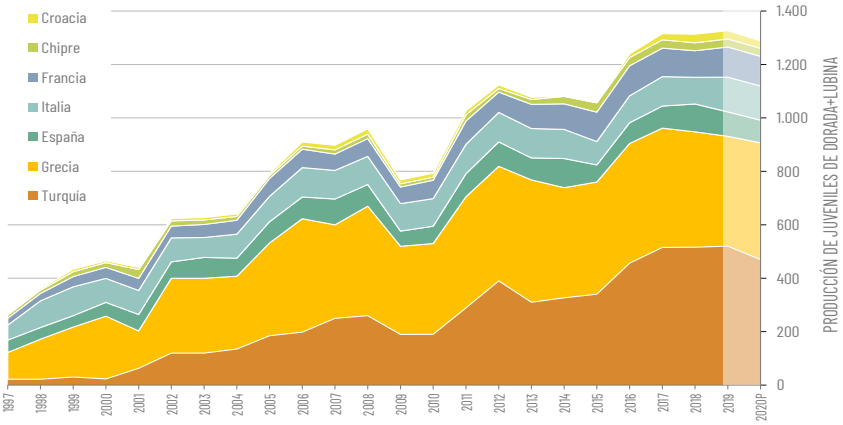


Figure 5-32. Evolution of the joint production of juveniles of gilthead seabream and European seabass in the Mediterranean area in the period 1997-2020, in millions of units (on FEAP and APROMAR).

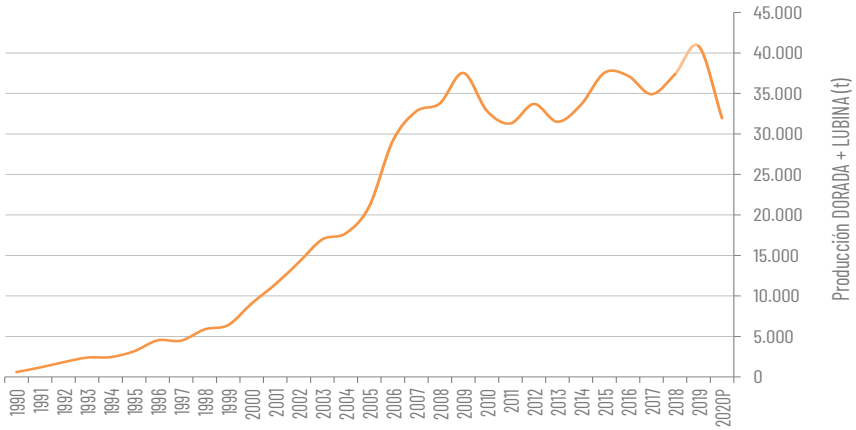


Figure 5-33. Evolution of aquaculture production of seabream plus seabass in Spain in tonnes (1990-2020).

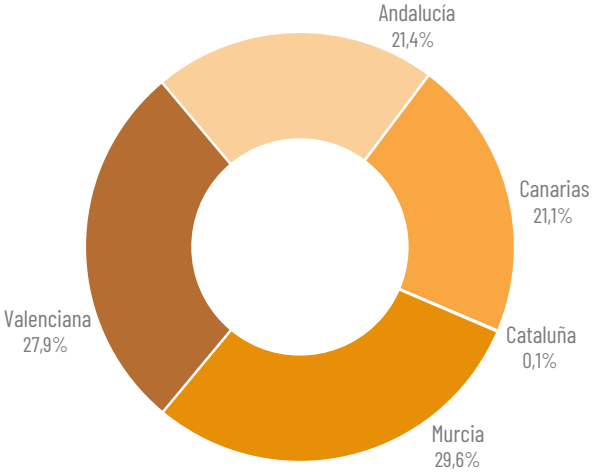
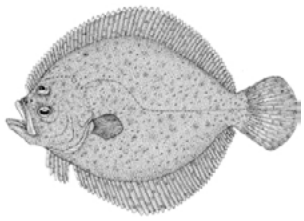


Figure 5-34. Percentage distribution of the production (tonnes) of seabream plus seabass in Spain by Autonomous regions in 2019.



Psetta maxima

TURBOT (*Psetta maxima*)

Class: Osteopathies - Orden: Pleuronectiformes - Family: Scophthalmidae

Significant characters: The body of the adult specimens has no bilateral symmetry, being rounded and flattened. Eyes bulging, located on the left side. Large mouth with prominent jaw. Top brownish more or less dark, which varies depending on the environment, presenting numerous spots that also cover the fins. The lower flank is depigmented. It can reach up to 100 cm in length. It reaches sexual maturity during the 4th or 5th year of life.

Habitat and biology: It is a benthic species that is distributed naturally by the Baltic Sea, North Sea, English Channel, Northeast Atlantic to Morocco, Mediterranean Sea and Sea Black. They reach sexual maturity during the 4th or 5th year of life.

Farming: In aquaculture the reproduction is carried out in hatcheries under very controlled conditions. The spawns are about 500,000 to 1,000,000 eggs per kilo of female's weight. After an incubation period of 5 to 7 days the larvae hatch. During their first month of life they feed on living organisms: rotifers and artemia. They then start a feed made with natural ingredients. Farming facilities are usually circular concrete tanks in facilities on the coast.

Farming of TURBOT

Total aquaculture production of turbot (*Scophthalmus maximus* = *Psetta maxima*) in the world in 2018 was 58,798 tonnes, 2.4% higher than the previous year. In China there is a very relevant production of farmed turbot of about 108,000 tonnes in 2018, although both the figures and the exact species are imprecise. In Europe, the main producing country is Spain, which harvested 8,258 tons (76.9% of the total). Portugal, with 2,350 tons, is the second producer (21.6%). There are harvests, albeit substantially smaller, in France and the Netherlands. For 2020, a slight increase in the European turbot crop of 0.7% to 10,947 tonnes is forecast.

Unlike seabream and seabass, in the case of turbot, 90% of the world is produced in aquaculture (58,798 t) and the rest comes from extractive fishing (6,509 tonnes in 2018).

The aquaculture turbot harvest in Spain in 2019 was 8,258 tonnes, 10.8% more than the previous year. Galicia was the only autonomous community producing turbot in Spain.

As in the case of sea bream and seabass, the amount of wild turbot that is caught by the Spanish fleet is increasingly scarce and testimonial for the markets (62 tons in 2018). The production of aquaculture turbot represents more than 99% of the production of this species in Spain. Although the imports to Spain of turbot from Europe are relevant, mainly from the Netherlands.

The production of juvenile turbot in Spain in 2019 was 7,030,150 units. Galicia is where all the juveniles of this species are produced. The average sale price of juvenile turbot in Spain is estimated at 1.30 euros / unit.

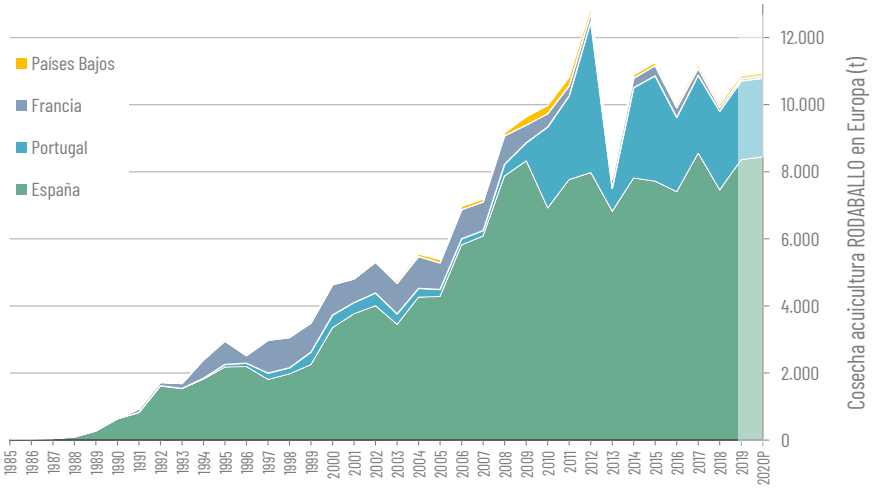


Figure 5-35. Evolution of the turbot aquaculture (production) in Europe (tonnes) for the period 1985-2020 (On FAO, FEAP and APROMAR data).

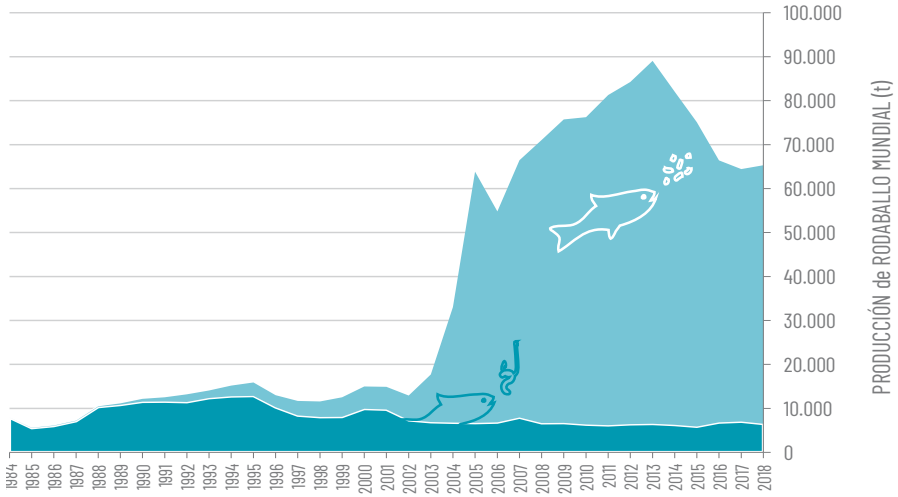


Figure 5-36. Evolution of global production (tonnes) of turbot (*Psetta maxima*), through aquaculture and capture fisheries, for the period 1985-2018 (FAO).

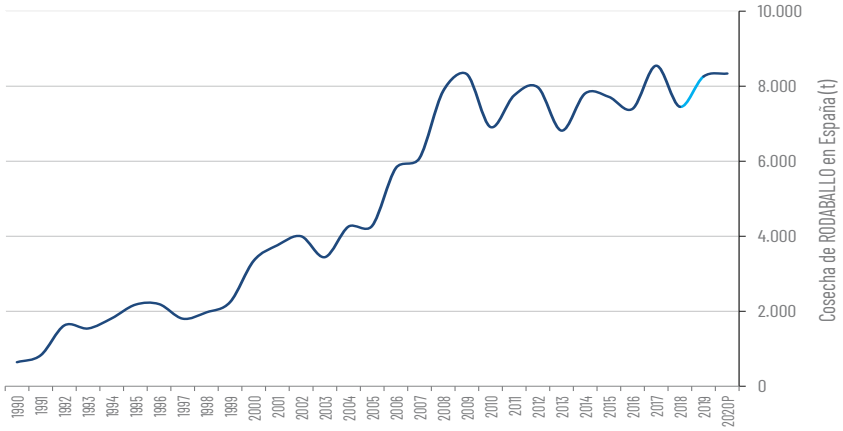


Figure 5-36. Evolution of global production (tonnes) of turbot (*Psetta maxima*), through aquaculture and capture fisheries, for the period 1990-2020 (FAO).

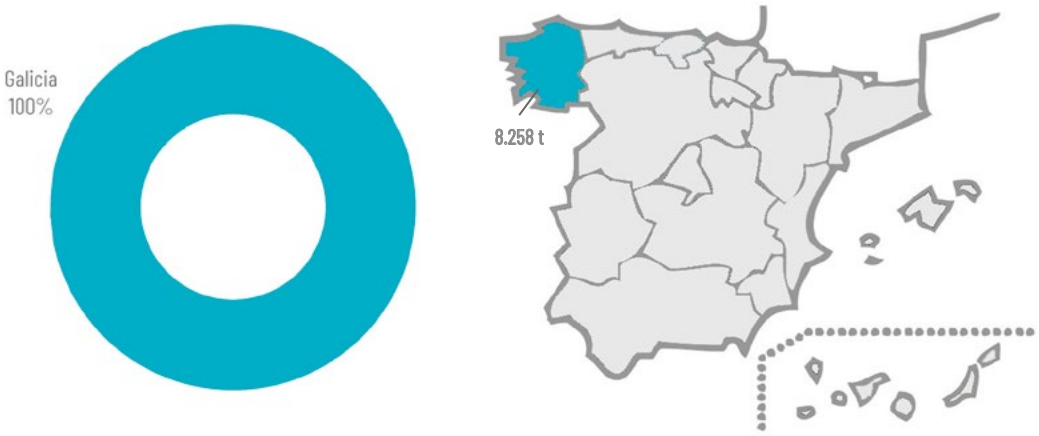


Figure 5-38. Distribution map of turbot production in Spain.

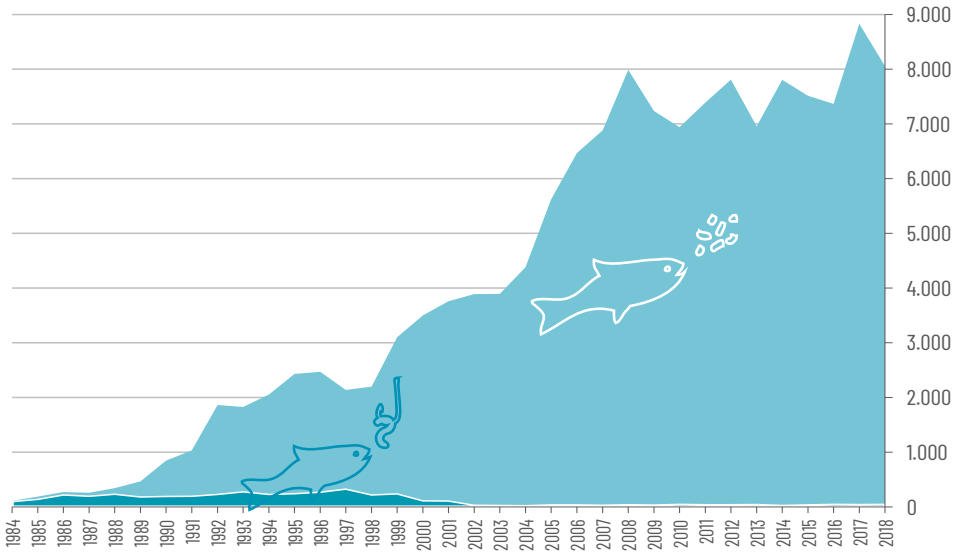


Figure 5-39. Evolution of the sources of turbot (Psetta máxima) in Spain: aquaculture and capture fisheries, for the period 1984-2018, in tonnes (MAPA-FAO).

Argyrosomus regius

MEAGRE (*Argyrosomus regius*)

Class: Osteidacty - Order: Perciformes - Family: Scienidae

Significant characters: Relatively large head and elongated body with a mixture of dark tones. The head is coloured yellow with a rounded snout. Mouth in terminal position without chines, with conical and robust teeth. Small eyes. It reaches lengths of between 50 cm and up to 2m, and a weight of up to 40 kg.

Habitat and biology: The natural distribution covers the eastern Atlantic, from Senegal to the north of France, including the Canary Islands and the Mediterranean Sea.

Farming: The farming of meagre is carried out in various Mediterranean countries. Breeding centres produce eggs from breeding individuals under tightly controlled conditions. A female 1 m long produces more than 1 million eggs per year, which have a diameter of less than 1 mm. During their first month of growing life, the larvae feed on living organisms: rotifers and artemia. They then feed on feed made from natural raw materials. Breeding techniques are similar to those used for seabass and gilthead seabream, both in floating pens at sea and in earthen ponds. Meagres grow substantially faster than seabream or seabass and can reach 1 kg in 12 months. Commercial size is between 1 and 4 kg.

Farming of MEAGRE

The production of meagre (*Argyrosomus regius*) from aquaculture in the Mediterranean area in 2019 is estimated at 41,295 tonnes, which represents a growth of 10.5% compared to the previous year. The main producing countries are Egypt (32,000 tonnes), Spain (3,650 tonnes), Turkey (2,600 tonnes), and Greece (1,800 tonnes). For 2020 an additional growth of 2.8% is estimated to exceed 42,000 tonnes.

Meagre is a highly valued fish in those regions where it has been traditionally consumed. Recent increases in its aquaculture production have started to make it recognized in many new markets. In 2018 the world captures of this species were 9,522 tonnes.

The production of meager through aquaculture in Spain in 2019 was 3,623 tonnes, 44.9% more than in 2018. This figure refers to fish finished and placed on the market, and not to increases in live biomass. This nuance is important in a fish, such as meagre, which is grown up to several kilograms of individual weight. The bulk of the Spanish meagre harvest comes from the Valencian Community but is also produced in Andalusia. For 2020 a growth of 5.5% in the total of Spain is estimated to reach 3,823 tonnes.

The captureof meager by fishing fleets in the world in 2018 was 9,522 tonnes. Of these, 6,367 tons in Mauritania and 1,214 tonnes in Egypt. At the European level, France (649 t), Portugal (531 t) and Spain (270 t) stood out.

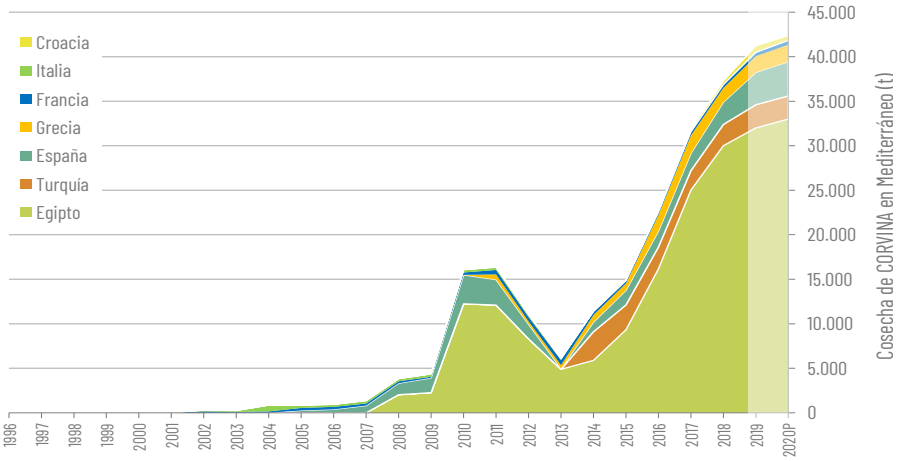


Figure 5-40. Evolution of the harvest (production) of meagre aquaculture (in tonnes) in the Mediterranean for the period 1996-2020 (On FAO, FEAP and APROMAR data).

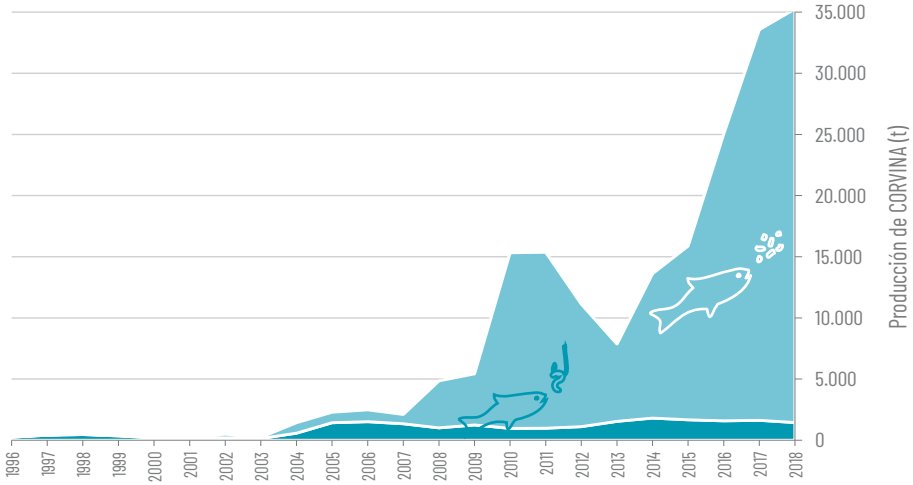


Figure 5-41. Evolution of Mediterranean production of meagre (Argyrosomus regius), in tonnes, by aquaculture and fisheries, in the period 1996-2018 (FAO).

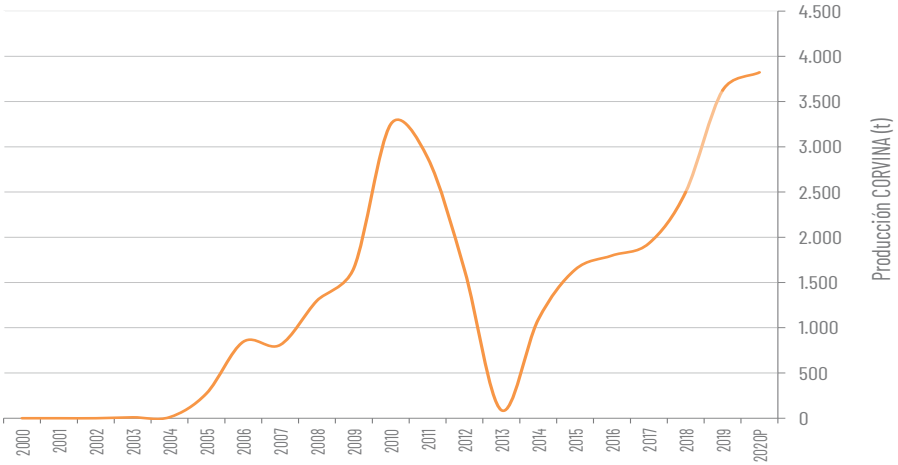
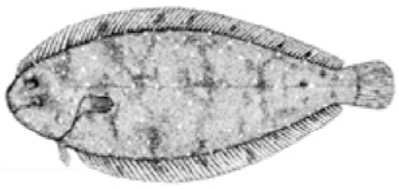


Figure 5-42. Evolution of meagre harvest (*Argyrosomus regius*) in Spain in tonnes (2000-2020).

Farming of SOLE

In 2019, the world harvest of Senegalese sole (*Solea senegalensis*) from aquaculture was 1,651 tonnes, 2.2% more than the previous year. For 2020, a decrease of -11.8% is expected to 1,450 tonnes. The Senegalese sole capture fishing adds 46 tonnes globally in 2018, mainly in France.

In 2019, 818 tonnes of aquaculture sole were produced in Spain, 5.7% more than in 2018. This production is located in Galicia and Andalusia. The 2020 harvest is estimated to decrease by - 27% to 597 tonnes.



Solea senegalensis

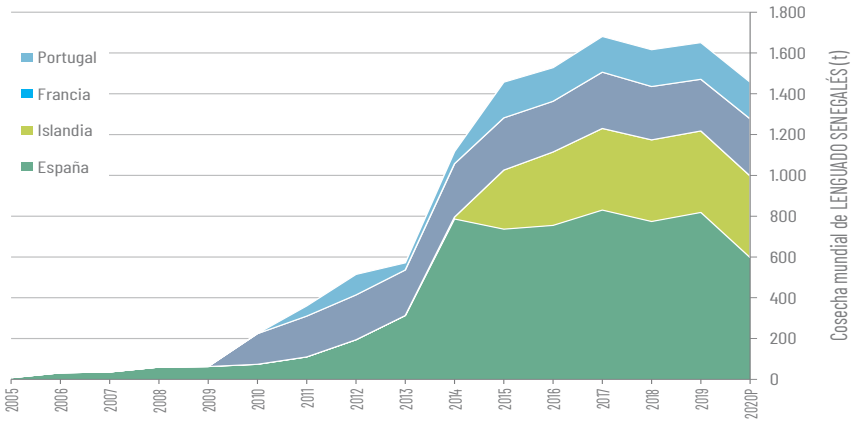


Figure 5-43. Evolution of the harvest (aquaculture production) of Senegalese sole (*Solea senegalensis*) in the world for the period 2005-2020 (on FAO, FEAP and APROMAR data).

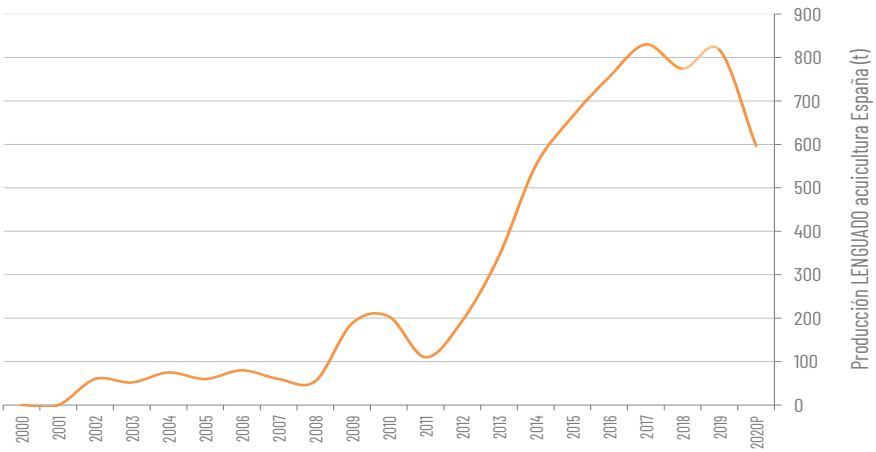
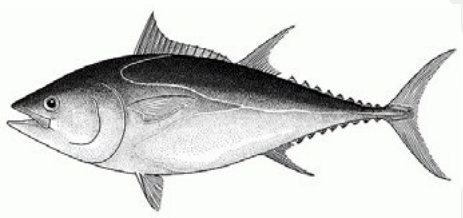


Figure 5-44. Evolution of the harvest (aquaculture production) of Senegalese sole (Solea senegalensis) in Spain in tonnes (2000-2020).

Farming of BLUEFIN TUNA

Almost all of the bluefin tuna (*Thunnus thynnus*) that is available in consumer markets comes originally from wild stocks. Part of them are placed on the market immediately after their capture and are considered the product of fishing activities. But another relevant part of the bluefin tuna, increasing and now the most important, is caught from the wild alive by purse seine gear or almadrabas and kept for months in aquaculture farms. In these farms, consisting of pens in the sea, bluefin tuna are fed to recover their optimal body condition after the breeding migration they will have made from the Atlantic Ocean to the interior of the Mediterranean Sea, and to regulate the market.



Thunnus thynnus

But in addition to this partial aquaculture activity, there is a remarkable scientific effort to close the production cycle and to raise bluefin tuna from egg to commercial size in captivity. Spain is a world leader in the investigation of the integral cultivation of bluefin tuna, especially through the Spanish Institute of Oceanography (IEO), and very satisfactory results have been achieved both in its reproduction and in ongrowing to commercial size.

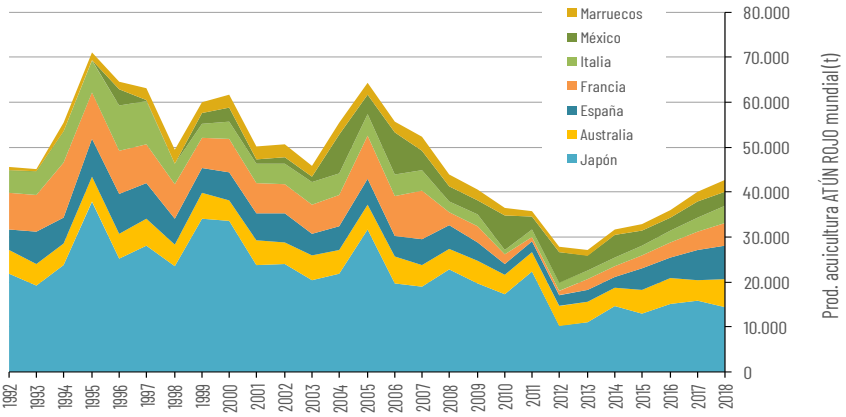


Figure 5-45.
Evolution of aquaculture production (fattening) of bluefin tuna in the world for the period 1992-2018, in tonnes (on FAO data).

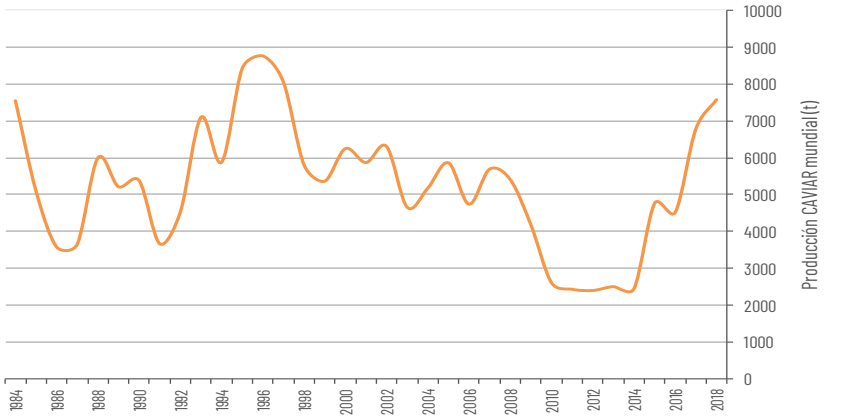


Figure 5-46.
Harvest evolution (aquaculture production/fattening) of bluefin tuna in Spain for the period 1984-2018 in tonnes (on MAPA-FAO data).

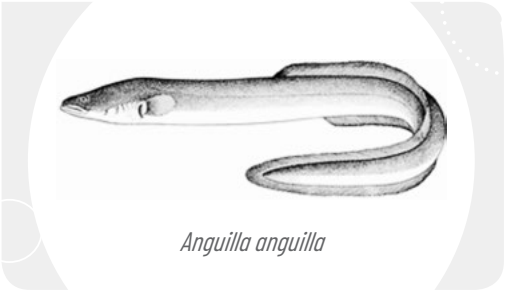
Global production of aquaculture bluefin tuna (Pacific, Atlantic and South) in 2018 was 52,738 tonnes, which represents an increase of 5.6% compared to the previous year.

The main producing countries are Japan with 14,303 t (27.1%), Spain with 7,575 t (14.4%) and Australia with 6,315 t (12.0%). Bluefin tuna production is limited by internationally established catch quotas.

Farming of other marine fish species

Farming of EEL

The cultivation of European eel (*Anguilla anguilla*) is a traditional activity in Spain, with various levels of intensification. Its production depends on the capture of wild eels since there is not enough scientific knowledge for its reproduction in captivity. Therefore, its future is highly conditioned by the European Recovery Plan of this species.



Anguilla anguilla

Spanish production at a commercial level in 2018, located essentially in the Valencian region, was 360 tonnes. Its destination is both the restocking of rivers and for human consumption. At European level, in 2018 5,510 tonnes of European eel were produced, a -11.3% than in 2017, with the Netherlands (2,150 t), Germany (1,229 t), Italy (510 t) and Denmark (451 t) being the main producing countries.

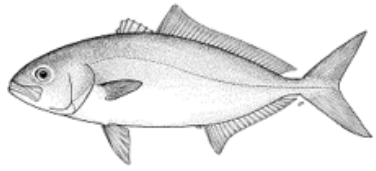
Farming of BLACKSPOT SEABREAM

The aquaculture of Blacksport seabream (*Pagellus bogaraveo*) in Europe was carried out only in Galicia but in 2019 this cultivation ended. There are lines of research on its cultivation in several other Spanish autonomous regions that could reverse this situation.

Pagellus bogaraveo

Farming of GREATER AMBERJACK

Aquaculture of Greater amberjack (*Seriola dumerili*), also known in Spain as Lemon Fish, is currently being incorporated into mainstream aquaculture production on a commercial scale in Spain, although still incipient. It is the culmination of many years of scientific research and technological development. With Its cultivation new business opportunities and job creation are opened, becoming one of the species with the greatest potential for Spanish aquaculture.



Seriola dumerili

It is very well valued fish in its quality by the markts which know it. In 2018, 70 tons were produced in the United Arab Emirates and 48 tons in Spain. There are other species of amberjack produced in the world, such as *Seriola quinqueradiata*, of which more than 138,900 t are harvested annually in Japan, cultivated from wild juveniles.

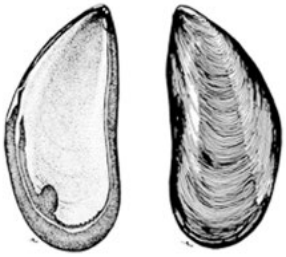
Farming of molluscs

Spanish aquaculture stands out as a reference at European and global level for the quantity and quality of its mollusc farming. In 2018, the harvest was 245,655 tonnes, 0.7% more than in the previous year with a value in first-sale of 148.7 million Euros.

Farming of MUSSELS

The harvest of mussels in Spain in the last five years moves in a fork between 170,000 and 240,000 tonnes. The interannual differences are not conditioned so much by the production capacity, which is stable, but by the greater or lesser incidence of red tide episodes that disturb regular harvesting of the mollusc. The mussel harvest in Spain in 2019 is estimated at 256,590 tonnes, with a total value at first sale of 124.9 million Euros.

There are five Spanish autonomous regions in which mussels are grown, but it is mainly produced in the Galician estuaries ("rías") through its traditional farming in floating platforms. Galician production represents 97% of the total national mussel production, but there are also productions in Catalonia, Andalusia, the Valencian Community and the Balearic Islands.



Mytilus edulis

The mussel seed is usually collected from the natural environment, or collected by using collecting ropes, for later placing in platforms or long-lines.

62% of the mussel harvested in Spain is placed on the fresh market depuration treatment plants; while the remaining 38% goes to the processing industry, that is, towards cookers and canners.

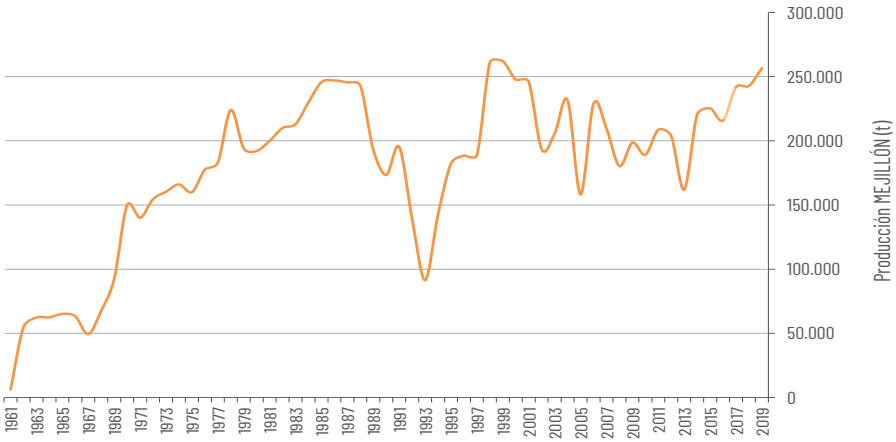


Figure 5-47. Evolution of aquaculture production of mussels in Spain between 1961 and 2019 in tonnes (according to MAPA-APROMAR).

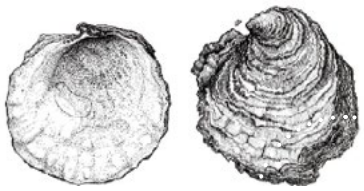
Farming of OYSTERS

Oysters are an important group of molluscs in economic terms in Spain. Two are the farmed species: the European flat oyster (*Ostrea edulis*) and the Pacific cupped oyster or Japanese oyster (*Crassostrea gigas*). Joint production in 2019 of both species was 1,119 tonnes and its economic value in first sale 4.2 million Euros.

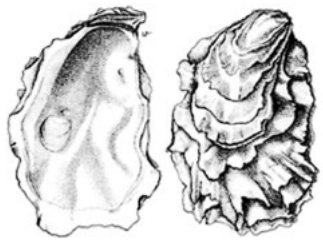
Of the Pacific cupped oyster 1,425 tonnes were produced in Spain in 2019, mainly in Galicia, Catalonia, Andalusia, Asturias, Cantabria and the Valencian region. Its total value in first sale was 1.4 million Euros.

Galicia is the main autonomous community producing European flat oysters, followed by the Valencian region. In total, in 2019, 394 tons of this species were produced in Spain, with a value of 2.1 million Euros.

Oyster farming can be done through several techniques, but the usual ones in Spain are intertidal production in ongrowing plots, or in vertical cultivation from platforms using hanging baskets. The oyster seed is obtained from domestic and imported hatcheries.



Ostrea edulis



Crassostrea gigas

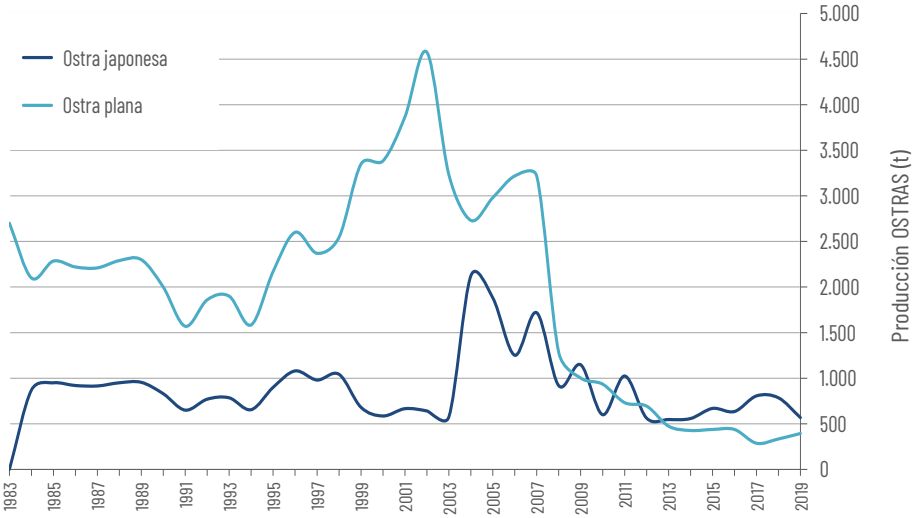


Figure 5-48. Evolution of aquaculture production of oysters in Spain between 1983 and 2019 tonnes (according to MAPA-APROMAR).

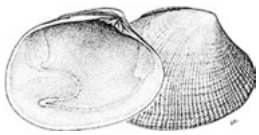
Farming of CLAMS

In Spain, three species of clams are farmed: Grooved carpet shell, slug and Japanese carpet shell, with a combined production in 2019 of 1,917 tonnes and an economic value at first sale of 21.6 million Euros.

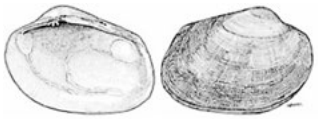
The Japanese carpet shell clam (*Ruditapes philippinarum*) is the main clam grown in Spain. It has a shell whose color varies between brown, gray and black, with very marked striations that form squares. It is known as Italian clam, due to the importance of its production in that country. In 2019, its production in Spain was 1,425 tonnes, with a first sale value of 12.1 million Euros.

The Grooved carpet shell (*Ruditapes decussatus*) is between white and light brown colour, varies depending on the sand where it is bred. The inner face is bright white with yellowish tones, sometimes bluish in the area near the umbo that is located in the anterior part of the shell. In 2019, Spain produced 189 tons of this species which reached an economic value in its first sale of 5.1 million Euros.

The Pullet carpet shell (*Venerupis pullastra*) is gray or cream in color with brown spots. Its shell is oval and on its external surface it has concentric lines that intersect with finer radial lines. In 2019, 304 tonnes were produced in Spain, with a value in first-sale of 4.4 million Euros.



Ruditapes philippinarum



Venerupis pullastra

Ruditapes decussatus

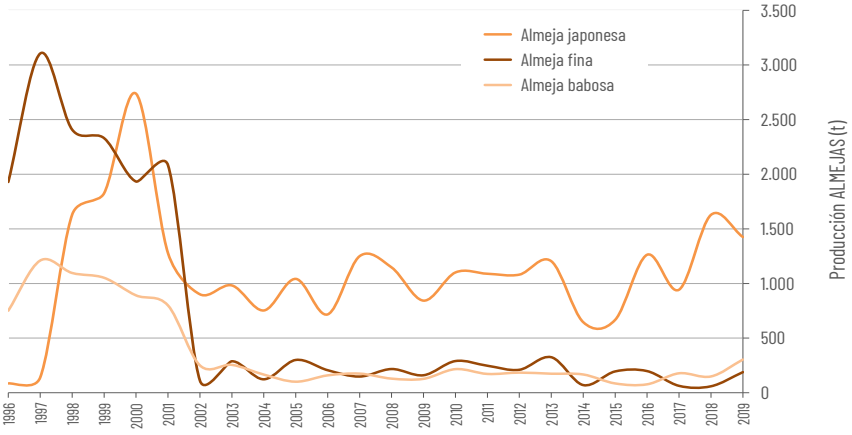


Figure 5-49. Evolution of aquaculture production of clams in Spain between 1996 and 2019 in tonnes (according to MAPA-APROMAR).

The seed for the production of clams comes from hatcheries and to a lesser extent from its collection in natural banks.

In Spain, clam farming is carried out in plot parks or in natural banks with good water current and at different depths depending on the species.

In all three cases its farming is based on the care of the sandy bottoms, the elimination of algae, the control of predators, the oxygenation of the substrate, the grading of the population when it is excessive and the stocking of juvenile specimens.

Farming of ABALONE

Abalone is a gastropod mollusc whose consumption is highly appreciated in the Asian consumer market. Its shells are also valued for the quality of their mother-of-pearl. Since 2014 an abalone farm located in Galicia has been in operation in Spain. Its production system is technologically more sophisticated than that of the rest of the molluscs farmed in Spain.

Globally, 163,169 tonnes of abalones of various species were harvested in 2018. China is the first producer, with 87% of the total harvested production.

Abalone

Farming of other species

Farming of MICROALGAE

In various regions of Spain, companies dedicated to the commercial production of microalgae are located.
Its facilities are sophisticated and make significant efforts in research, development and innovation. The destination of the microalgae produced is human nutrition, animal feed (including aquaculture), biofuels and cosmetics, among others. In Spain, more than 8,000 kilograms of microalgae were produced in 2017. The main cultivated species are *Nannochloropsis gaditana*, *Tetraselmis chuii*, Isochrysis *galbana* and *Phaeodactylum tricornutum*. In addition to direct marketing, the farming of microalgae is common in fish, mollusc and crustacean hatcheries as food for the larval phases of those animals.

Microalgae

Microalgae have been incorporated in 2015 into the European Regulation for organic production, as well as their recognition as food products natural source of Omega-3 oils, thus opening up new marketing possibilities.

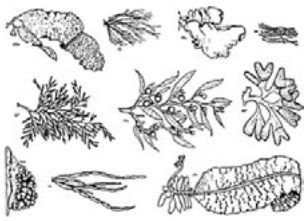
Farming of SHRIMP

There is currently a single prawn farm in operation in Spain, located in Medina del Campo (Valladolid), which has been demostrating a great dynamism and capacity for innovation. The species produced is white shrimp (*Litopenaeus vannamei*) and they stand out for the quality and freshness of their production. In 2019, 2 tonnes of this species were produced in Spain.

Litopenaeus vannamei

Farming of MACROALGAE (SEAWEED)

The use of macroalgae for uses such as obtaining agar and gelatines or as an agricultural fertilizer is traditional on the northern coast of Spain. Most are obtained from the natural environment without greater human intervention than the harvesting of algae brought to the coast by storms, but there are several initiatives underway for their farming. These macroalgae aquaculture initiatives produce species of the genera Laminaria and Gracilaria also for direct human consumption. In 2019, 5.2 tonnes were produced mainly in Galicia (17%) and Andalusia (83%).



Macroalgae

5.7. Freshwater aquaculture in Spain and Europe

Freshwater aquaculture is that carried out in rivers. In Spain the main species produced by freshwater aquaculture are rainbow trout, various species of sturgeon and tench. There are also minor productions of common carp and Nile tilapia.

Farming of RAINBOW TROUT

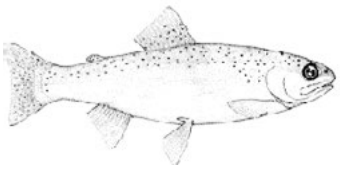
Global aquaculture production of rainbow trout (*Oncorhynchus mykiss*) in 2018 was 848,051 tonnes, which represents an increase of 1.9% compared to the previous year.

The main rainbow trout farming countries are Iran with 179,684 tonnes (21.2% of the world total), Turkey with 112,427 tonnes (13.3%), Chile with 78,446 tonnes (9.3%), Norway with 68,216 tonnes (8%) and Peru with 55,030 tonnes (6.5%). Other relevant countries are: China, Russia, Italy, Denmark, France, Colombia and the United States, but it is a species produced in 79 countries distributed over the five continents, although it is native to North America.

Most of the rainbow trout is produced in fresh water (70%), but a significant part of its production ends up being raised in salt water, especially in Chile and Norway.

Commercial capture fishing for rainbow trout is very small and amounted to only 1,145 tonnes worldwide in 2018, in countries such as Finland, Peru and the United Kingdom.

The production of rainbow trout in Spain in 2019 is estimated to be 18,955 tonnes, 0.5% more than in the previous year. For 2020, a similar harvest is expected in terms of tonnes around 19,400 t, although both productions are far from the maximum of 35,384 tonnes in 2001, although it shows the consolidation of its recovery. The main producing Spanish regions are Castilla y León, Galicia, Andalusia, Catalonia, La Rioja, Castilla la Mancha, Asturias and Aragon.



Oncorhynchus mykiss

RAINBOW TROUT (*Oncorhynchus mykiss*)

Clase: Actinopterygii - Orden: Salmoniformes - Familia: Salmonidae

Significant characters: Elongated body, fusiform and adipose fin present. Blue to olive green coloration on a pink destitious band along the sideline and silver below it. Back, sides, head and fins covered with small black dots. The coloration varies from intense dark to bright-silver.

Habitat and biology: The natural distribution covers the eastern Atlantic, from Senegal to the north of France, including the Canary Islands and the Mediterranean Sea.

Farming: Its farming takes place all over the world. Females are able to produce up to 2,000 eggs per kg of body weight. The eggs are relatively large (3-7 mm in diameter). After hatching, the fry nourish from the reserve food provided by the vitelin vesicle for a short period of time. They then startto eat on feed made with natural ingredients. Aquaculture farms are varied, with ponds on land, concrete or fiberglass facilities and even pens in fresh or salt water. Rainbow trout usually take 10 months from hatching to portion size (250-300 g), although commercial sizes reach several kilograms of weight.

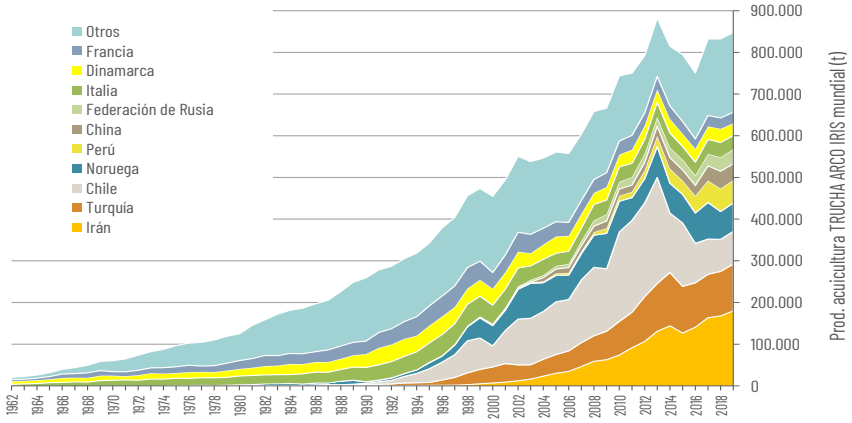


Figure 5-50. Evolution of rainbow trout aquaculture production in the world in the period 1962-2018 in tonnes (on FAO data).

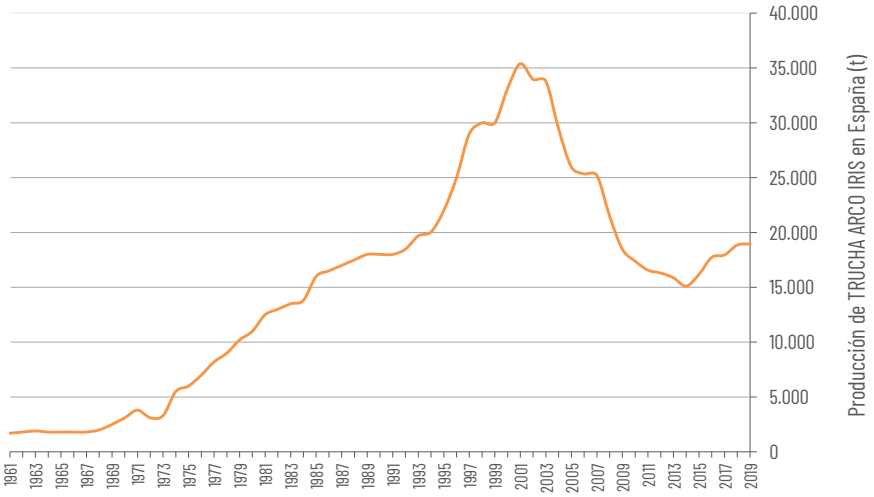


Figure 5-51. Evolution of aquaculture production of rainbow trout in Spain in tonnes (1961-2019). MAPA-APROMAR data.

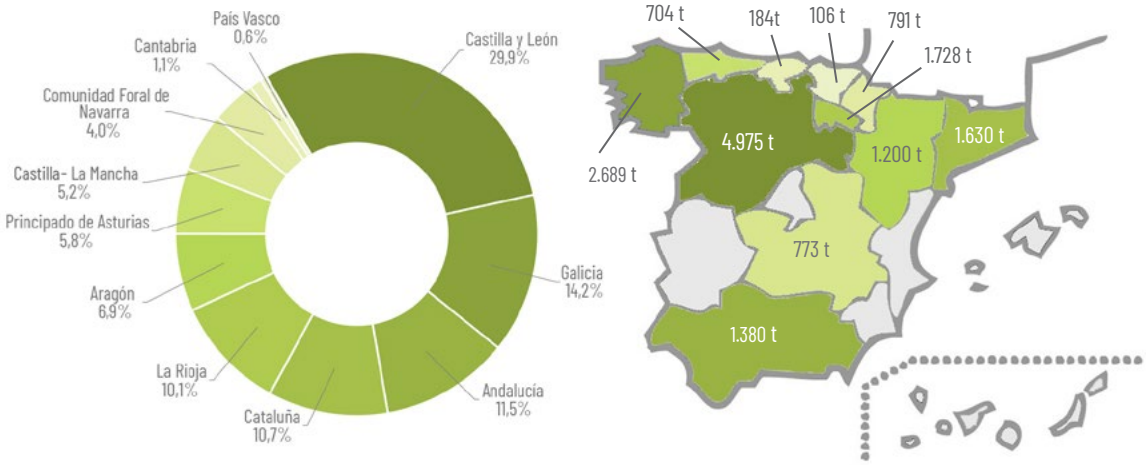


Figure 5-52. Distribution of the rainbow trout harvest among the autonomous regions in 2018 (MAPA data).

Farming of STURGEON

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) agreed in 2006 to ban exports of caviar in the face of a severe decline in wild sturgeon populations. From that moment began the interest in aquaculture of the various species of sturgeon for the production of farmed caviar which is authorized to be traded internationally. Since then, the only caviar that can be purchased in international markets is the one obtained by the cultivation of these fish. There are several species of sturgeon cultivated in the world, all encompassed within the family Acipenseridae: Siberian Sturgeon (Acipenser baerii baerii), Russian sturgeon or the Danube (Acipenser gueldenstaedtii), Beluga sturgeon (Huso huso), sterlete sturgeon (Acipenser ruthenus), starry sturgeon or Sevruga (Acipenser stellatus), white sturgeon (Acipenser transmontanus) and Adriatic sturgeon (Acipenser naccarii).

The world production of caviar was about 380 tonnes in 2018, of which 176.5 tonnes was produced in Europe (46.5%). It is estimated that world caviar production could reach 450 tonnes in 2019.

Although the main product of sturgeon aquaculture is the production of caviar, the meat of these fish is also valued and placed on the market for consumption. Worldwinde, an estimated 115,164 tonnes of sturgeon meat were produced in 2019.

In Spain 2.8 tonnes of caviar were produced in 2019 and 168.8 tonnes of sturgeon meat. The two species produced are Adriatic sturgeon and to a lesser extent Siberian sturgeon.

Acipenser naccarii

Acipenser baerii

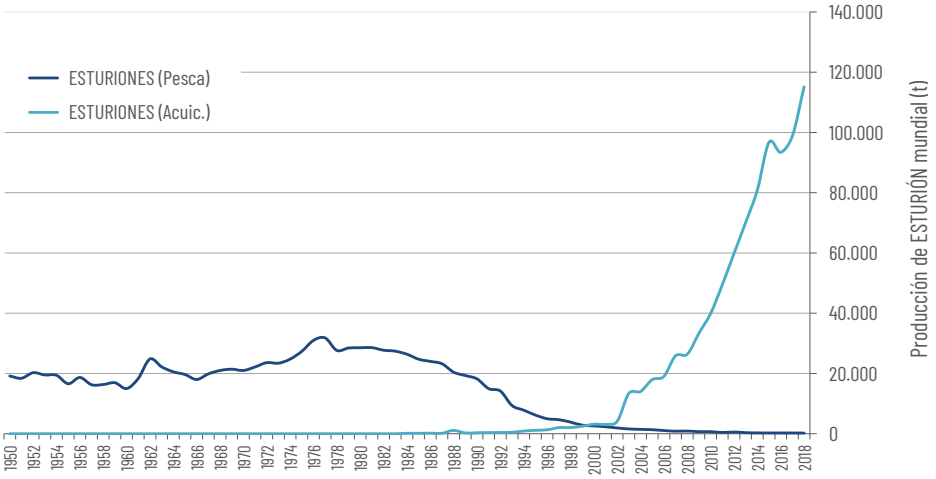


Figure 5-53. Evolution of global sturgeon production (fishing and aquaculture) between 1950 and 2018 (FAO data).

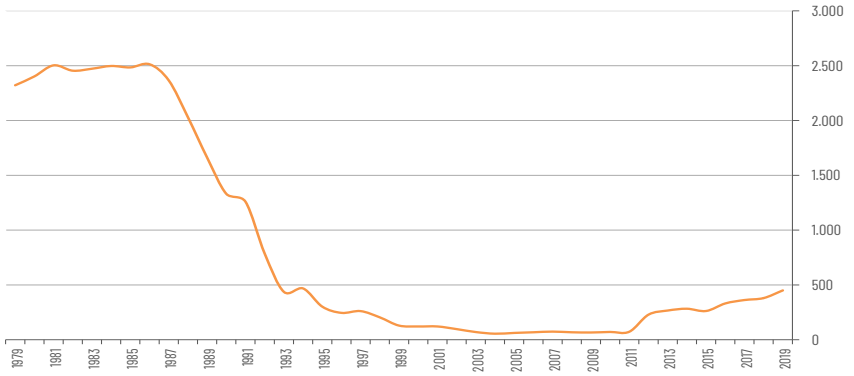


Figure 5-54. Evolution of global caviar production (originating in both fisheries and aquaculture) in tonnes, between 1979 and 2019 (FAO and FEAP data).

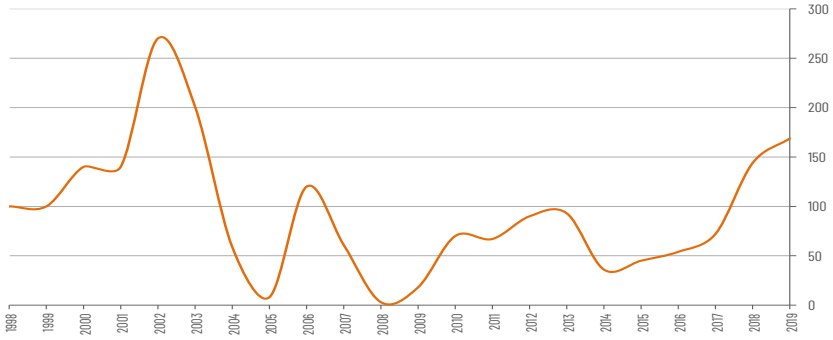
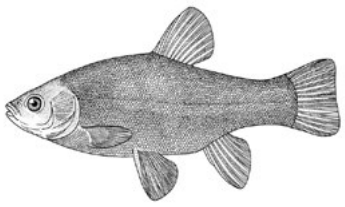


Figure 5-55. Evolution of aquaculture production of sturgeons (several species) in tonnes in Spain (1998-2019). MAPA-FAO data.

Farming of TENCH

The tench (*Tinca tinca*) is an exclusively European species. Its cultivation in 2018 represented a total of 1,414 tons. France is the main producer (900 t), followed by Poland (150 t), the Czech Republic (147 t) and Germany (125 t). Tench is harvested in 13 countries.

In Spain 45 tonnes were produced in 2019, grown in ponds, mainly in the autonomous region of Extremadura and less in Castile and Leon. This figure is far from the maximum it reached at the end of the eighties, around 460 tonnes.



Tinca tinca

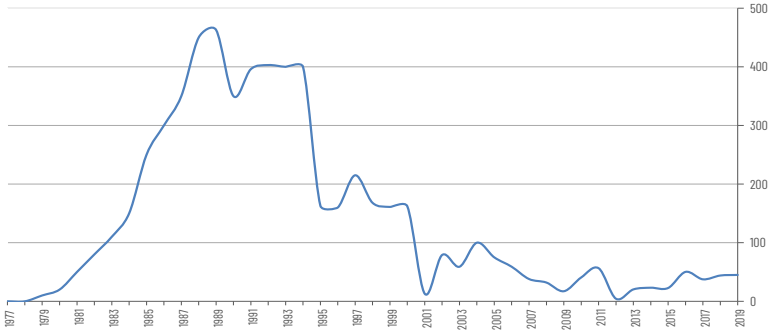


Figure 5-56. Evolution of aquaculture production of tench (*Tinca tinca*) in tonnes (1977-2019) in Spain. MAPA-FAO data.

Table 5-1. Data on production of aquaculture breeding species in Spain (tonnes).

DORADA	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
Andalucía	1818	1530	1786	1136	2333	1605	980	1560	1606	1450
Baleares	0	0	0	0	0	0	0	0	0	0
Canarias	3259	2740	3013	1588	1884	2492	2063	2380	2380	2265
Cataluña	1471	1570	1292	952	514	656	654	0	0	0
Murcia	3469	3880	3730	3892	4103	3368	4356	3184	2906	2780
Valenciana	6913	9710	6974	8662	7397	5619	5590	7806	6629	3341
TOTAL	**16930**	**19430**	**16795**	**16230**	**16231**	**13740**	**13643**	**14930**	**13521**	**9836**
Variación %	-0,17	0,15	-0,14	-0,03	0,00	-0,15	-0,01	0,09	-0,09	-0,27
Precio €/Kg.	5,00	4,31	4,79	5,45	5,84	5,78	4,87	4,37	4,11	
Valor (M€)	**84,65**	**83,74**	**80,45**	**88,45**	**94,79**	**79,42**	**66,44**	**65,24**	**55,60**	

LUBINA	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
Andalucía	3.895	4.000	3.777	2.815	5.356	6.081	3.261	4.479	7.120	3.864
Canarias	3.478	3.500	4.286	5.097	5.767	5.507	5.900	5.793	6.253	5.974
Cataluña	250	390	66	0	318	236	146	30	30	30
Murcia	3.956	3.880	4.987	5.519	6.009	8.164	6.990	7.525	9.181	3.733
Valenciana	2.788	2.500	1.591	3.945	3.874	3.457	4.972	4.633	4.751	8.504
TOTAL	**14.367**	**14.270**	**14.707**	**17.376**	**21.324**	**23.445**	**21.269**	**22.460**	**27.335**	**22.105**
Variación %	15,0%	-0,7%	3,1%	18,1%	22,7%	9,9%	-9,3%	5,6%	21,7%	-19,1%
Precio €/Kg.	4,96 €	5,42 €	5,35 €	5,79 €	5,64 €	5,67 €				
Valor (M€)	**71,3**	**77,3**	**78,7**	**100,6**	**120,3**	**132,93**				

RODABALLO	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
Asturias	0	0	0	0	0	0	0	0	0	0
Cantabria	50	100	75	75	108	50	105	100	0	0
Galicia	7690	7845	6729	7733	7607	7346	8441	7350	8258	8337
País Vasco	15	25	10	0	0	0	0	0	0	0
TOTAL	**7755**	**7970**	**6814**	**7808**	**7715**	**7396**	**8546**	**7450**	**8258**	**8337**

CORVINA	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
Andalucía	0	40	0	0	0	46	46	50	23	23
Canarias	70	0	0	0	0	0	0	0	0	0
Cataluña	0	0	0	0	0	0	0	0	0	0
Murcia	1300	1000	0	23	42	0	0	0	0	0
Valenciana	1510	600	89	1067	1600	1752	1886	2450	3600	3800
TOTAL	**2880**	**1640**	**89**	**1090**	**1642**	**1798**	**1932**	**2500**	**3623**	**3823**

ANGUILA	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
TOTAL	**505**	**460**	**315**	**366**	**380**	**315**	**330**	**330**	**360**	**400**

BESUGO	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
TOTAL	**200**	**187**	**228**	**172**	**104**	**178**	**142**	**113**	**0**	**0**

LENGUADO	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
TOTAL	**110**	**194**	**343**	**551**	**664**	**755**	**830**	**774**	**818**	**597**

LANGOSTINO	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020P
TOTAL	**38**	**32**	**30**	**0**	**4**	**5**	**8**	**5**	**5**	**5**

TOTAL MARINOS	42.779	44.181	39.291	43.597	48.065	47.635	46.697	48.562	53.920	45.103

TRUCHA	2011	2012	2013	2014	2015	2016	2017	2018
Castilla y León	5.318	5.780	5.670	5.477	5.318	5.413	5.049	4.975
Galicia	2.993	4.017	4.034	3.146	2.993	3.101	2.403	2.689
Andalucía	1.896	1.645	1.422	1.375	1.896	2.159	1.941	1.380
Cataluña	1.727	1.172	1.179	1.247	1.727	1.872	1.813	1.630
La Rioja	1.260	1.104	934	1.019	1.260	1.304	1.715	1.728
Aragón	595	550	550	833	595	1.076	1.168	1.200
Principado de Asturias	855	627	589	688	855	733	987	704
Castilla - La Mancha	1.043	1.003	1.027	762	1.043	861	872	773
Comunidad Foral de Navarra	200	118	165	245	200	555	678	791
Cantabria	179	180	178	174	179	180	182	184
País Vasco	108	100	111	144	108	95	95	106
Comunidad Valenciana		9	9	0	6	5	0	0
TOTAL	**16.173**	**16.305**	**15.868**	**15.111**	**16.179**	**17.354**	**16.902**	**16.160**

6. Marketing and consumption of aquaculture products in Europe and Spain

6.1. Consumption of aquatic products in the European Union

The European Union is the first and most important world import and export market for aquatic products, that is, the main market for food harvested through aquaculture or caught through fishing. The average per capita consumption of aquatic products in the European Union in 2017 was approximately 24.35 kilograms (in whole fish equivalents) but shows huge differences between countries and regions.

In 2019, the Union consumed 12.8 million tonnes of aquatic products, the same as in the previous year. But in the face of steady global increases in the production of aquatic products, essentially due to the growth of aquaculture, in the European Union there is the paradox of a decreasing trend in its internal production. This implies the need to import very large quantities of aquatic products into the European Union each year, 9.5 million tons in 2019, 1.2% more than in 2018, and which in 2019 created a negative net trade balance of 7,2 million tonnes, which correspond to 74.7% of consumption, therefore the self-sufficiency of aquatic products (aquaculture plus fishing) is only 25.3%.

The increases in the consumption of aquatic products are due to a combination of factors. On the one hand, to a greater awareness of the nutritional benefits of these foods, as well as the appreciation of their gastronomic properties. Also due to the increase in the offer of value-added products, together with the extensive development of logistics distribution chains.

In addition and in a general way, globalization has led to a greater knowledge of other cultures and new forms of consumption that include fish and algae as main elements.

The economic value of imports of foods of aquatic origin from non-EU countries has been increasing since 2009. The deficit in the Community trade balance (exports minus imports) of fishery and aquaculture products has been increasing since 2013.

In the European Union there is the circumstance of a decreasing production of aquatic products despite a constant increase in their consumption. The self-sufficiency of aquatic products in the EU is only 25.3%

In 2016, reached its highest figure ever recorded, with 19.6 billion Euros. Comparatively, imports are four times higher in value than meat. Norway and China are the main supplying countries to the Union. Imports from Norway, which cover 25% of the total, peaked in 2014, consisting mostly of Atlantic salmon. China is, on the other hand, the leader of processed white fish (processed cod and pollock) for the European Union.

In 2019, it is estimated that exports of aquatic products from the European Union were 2.35 million tonnes. These exports are almost exclusively made up of processed capture products, leaving the European aquaculture production marketed in the domestic market.

The average consumption of aquatic products per person per year in the European Union is 24.35 kg (in 2017), but varies between 5 kg/year in Hungary and 57 kg/year in Portugal.

Consumption of aquatic products in the Union is dominated by the supply of captured fish, which represents 74% of the total, while the remaining 26% of consumption comes from aquaculture. Among the preferred aquatic species are, in order from highest to lowest, tuna (various species), cod, salmon, haddock, herring, mussels, mackerel and hake. It is worth highlighting the preferential position of several aquaculture species apart from Atlantic salmon, such as sea bream, sea bass, as well as mussels.

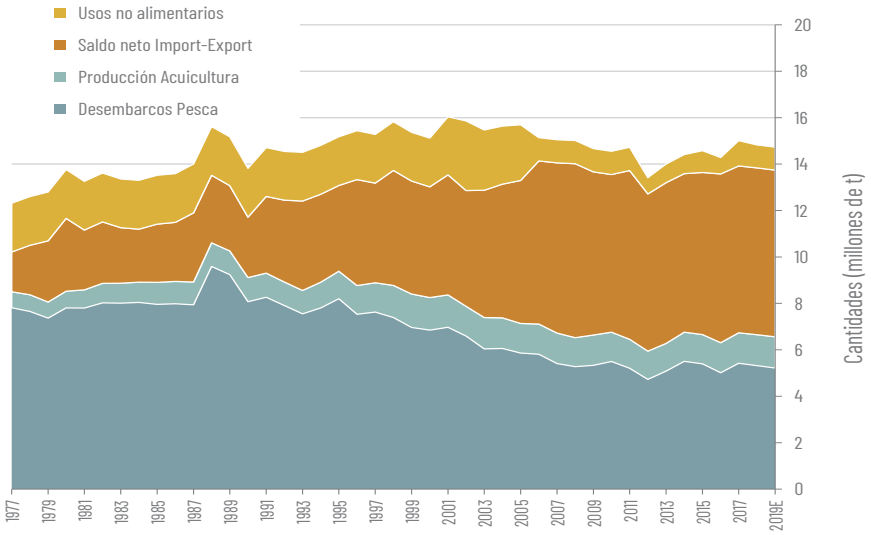


Figure 6-1. Evolution of the origin of aquatic products consumed in the European Union until 2019, in tonnes of equivalent body weight. EU aquaculture and fisheries productions are considered in addition to the net balance of imports and exports and non-food uses (CETA and FAO).

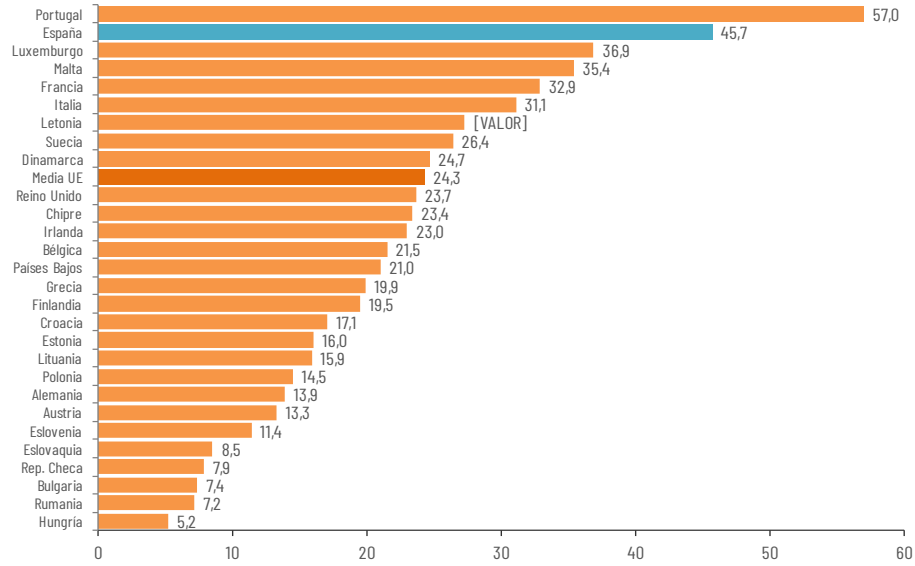


Figure 6-2. Per capita consumption of aquatic products in the member states of the European Union in 2019 (European Commission. EUMOFA).

6.2. Food consumption in Spain

Having quality and timely information on markets and consumption is a relevant element for companies to make decisions. For more than a decade, the Spanish Ministry of Agriculture, Fisheries and Food (MAPA) has been publishing reports on the situation of food consumption in Spain. The most up-to-date information published by MAPA as of the date of publication of this APROMAR report refers to 2019.

The analysis of the evolution of the Spanish population, tourism and the number of households shows that after years of population decline, during the last two years it has grown slightly, going from 47,021,031 people in 2010 to 47,100,396 in 2019. There is an increase in single-person households, those made up of two people and households made up of five or more people, and those made up of three or four people are reduced.

A smaller total population together with a higher proportion of smaller households without children means that consumption within the household does not grow. Likewise, the reduction in food waste and greater consumption outside the home could also explain the lower purchase of food by households.

Adding consumption inside and outside the home, during 2019 each Spaniard ingested an average of around 758.1 kilos-liters of food and beverages. According to these figures, total consumption in Spain reached the figure of 105,465.2 million Euros, which represents an average expenditure of 2,567.17 Euros per person per year.

Comparing consumption inside and outside home, 86.1% of the volume of food and beverages are consumed at home, with only 13.9% of the total consumed outside. In relation to per capita consumption, the distribution is similar, with 82 percent of the consumption consumed within the home. Regarding the distribution of value, the difference is somewhat greater, since consumption outside the home reaches 34.1% of total expenditure.

6.3. Consumption of aquatic products in Spain

This food category includes fresh fish, frozen fish, mollusc, crustaceans, and canned fish and molluscs. Imports of aquatic products in general in Spain in 2019 have been 1,746,060 tonnes, with a value of 7,167 million Euros. Exports have accounted for 1,108,366 tonnes, with a value of 4,096 million Euros. With this, the Spanish trade balance in this area is clearly in deficit, amounting to -3,072 million Euros, a figure very similar to that of 2018, and which represents a market coverage rate, by national production, of 57.14%.

Household consumption of aquatic products fell by 1.6% compared to 2018, although in terms of value it increased slightly (1.2%) as a result of the increase in the average price of 2.9%, standing at 8, 66 euros/kg. Households allocated 12.94% of spending on food and beverages to the purchase of fish, making a per capita expenditure of 195.06 euros and an average consumption of 22.53 kg per person per year, an amount of 2.7 % lower than that ingested in 2018. Domestic fish consumption has progressively decreased in the last 8 years. The main species consumed in Spanish households are hake, sardines, salmon, sole, cod and tuna. Except for the consumption of preserves, the others have seen their purchase gradually reduced in the long term, especially in the case of fresh fish and shellfish. Apart from the consumption of fish and shellfish at home, there is a notable consumption in Spain in restaurants and hotels that is not quantified by the MAPA in its annual reports.

51.6% of the kilos of aquatic products that are bought in Spain for domestic consumption are bought in the supermarket, with a negative variation of -2.2%. The most favorable evolutions are those of electronic commerce, with an increase of 2.3% and the discount store with 3.4%, whose shares are 0.8% and 9.3% of the total volume respectively.

The traditional store is a channel with a very significant weight, assuming 23.3% of the total, but with a decrease in volume of -2.6% during 2019.

The consumption of fresh fish represented 43.3% of the volume of fish consumed, being the main type in 2019. The second most purchased type corresponds to canned fish and molluscs with a 19.6% share in the segment, with a weight in turnover of 23.2%, while fresh and frozen seafood accounted for 14.6% and 10.1% of the volume, respectively. The months with the highest volume and value in purchases of fish and other aquatic foods are always the last, coinciding with the Christmas period. Specifically, December is a key month in the consumption of aquatic products, moving billings that are even 50% higher than the rest of the months.

There is no clear statistic on the consumption of aquatic products per capita in Spain, although the European Commission places it at 45.7 kg / inhabitant / year. More statistical information is needed from the Ministry of Agriculture and Fisheries in this matter. Also if this figure corresponds to kg of equivalent living biomass or kg of product actually purchased or ingested by each inhabitant.

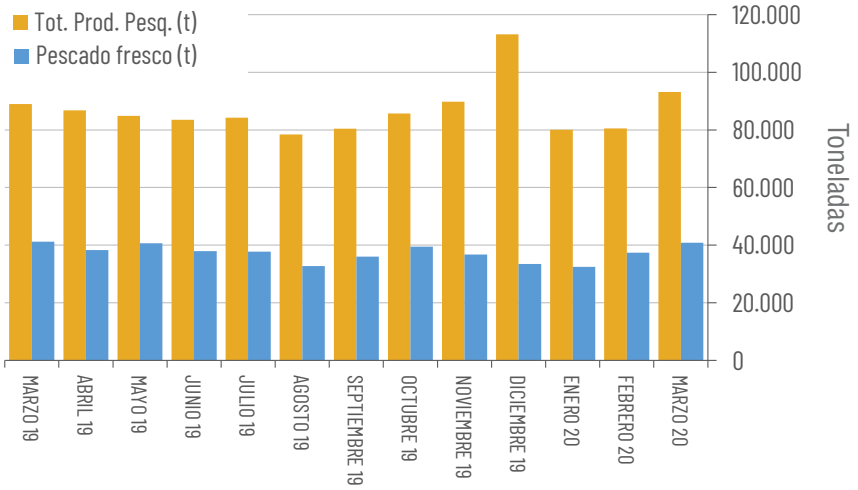


Figure 6-3. Evolution of the consumption of aquatic products (aquaculture plus fishing) in Spanish households in 2019 and early 2020 (until March). It shows the total of aquatic products (= fish products) and, within them, the fresh ones (source: Directorate General of the Food Industry of MAPA)

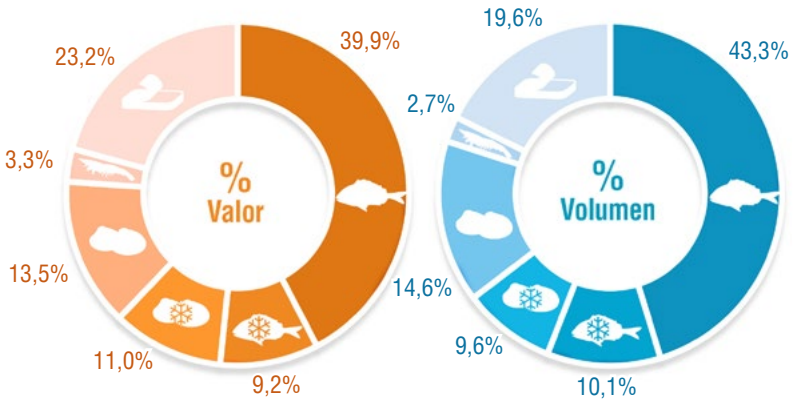


Figure 6-4. Main statistical magnitudes in the marketing of fish in Spain for consumption in households in 2019. Data of MAPA.

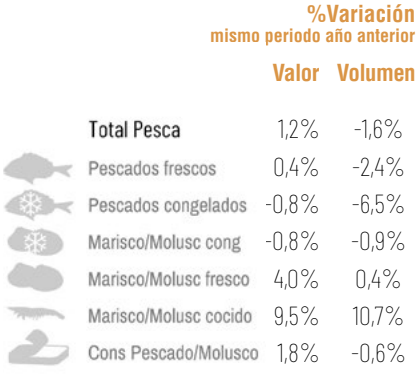


Figure 6-5. Percentage distribution of the purchase of aquatic products in 2019 by types of establishments and percentage variation over the previous year (MAP data).

Table 6-1. Main statistical magnitudes in the marketing of fish in Spain for consumption by households in 2019 and early 2020 (until March). Data from the General Directorate of the Food Industry of MAPA..

CONSUMO HOGARES EN EL MES

Productos	Cantidad consumida en el mes (miles de t) 2019	2020	Evolución %20/19	Valor (millones de €) 2019	2020	Evolución %20/19	PVP en el mes (€/Kg) 2020
TOT. PROD. PESQUEROS***	88,99	93,17	4,7	740,58	814,90	10,0	8,75
TOT. PESCADO FRESCO	41,17	40,85	-0,8	315,67	335,08	6,1	8,20
TRUCHA fresca	1,10	1,02	-7,3	7,59	7,02	-7,5	6,91
LENGUADO	2,81	2,47	-12,1	28,40	27,00	-4,9	10,96
SALMÓN	4,52	5,53	22,3	50,38	63,42	25,9	11,05
LUBINA	2,44	3,03	24,2	20,09	26,04	29,6	8,59
DORADA	2,65	3,05	15,1	20,11	24,20	20,3	7,94
RODABALLO	0,27	0,32	18,5	3,11	3,66	17,7	11,30
TOTAL ALIMENTACIÓN	2.432,28	2.807,71	15,4	5.872,61	6.815,25	16,1	2,43

CONSUMO en HOGARES TAM* MES 2020 vs 2019

Productos	Cantidad consumida en el período (miles de t) TAM mes 2019	TAM mes 2020	Evolución %20/19	Valor (millones de €) TAM mes 2019	TAM mes 2020	Evolución %20/19	Kg per cápita TAM mes 2020
TOT. PROD. PESQUEROS***	1.048,10	1.040,60	-0,7	8.839,70	9.112,10	3,1	22,80
TOT. PESCADO FRESCO	459,70	443,80	-3,5	3.560,50	3.597,50	1,0	9,70
TRUCHA fresca	11,90	11,20	-5,9	78,40	75,70	-3,4	0,20
LENGUADO	30,20	29,90	-1,0	292,60	307,40	5,1	0,70
SALMÓN	52,50	59,70	13,7	574,70	639,60	11,3	1,30
LUBINA	25,30	29,10	15,0	213,90	243,20	13,7	0,60
DORADA	27,60	31,40	13,8	214,80	245,80	14,4	0,70
RODABALLO	4,60	4,50	-2,2	51,00	49,90	-2,2	0,10
TOTAL ALIMENTACIÓN	28.744,50	29.128,60	1,3	68.639,50	70.981,30	3,4	637,80

Notas: * TAM = Mes en curso + 11 meses anteriores.
** PARTICIPACIÓN del MERCADO en VALOR representa el % de gasto en cada producto comprado con el Gasto Total en Alimentación (= 100%)
Fuente: Subdir. Gral. de Estructura de la Cadena Alimentaria. Dirección Gral. de Industria y Mercados Alimentarios. MAPA.

The most consumed product is fresh fish (43.3% in volume and 39.9% in value), although its evolution in volume is negative (-2.4%), in value its data is stable with a slight growth of the 0.4%.

The next product with the greatest presence in Spanish households throughout 2019 is canned fish and mollusk (19.6% in volume and 23.2% in value). The evolution for both indicators is uneven, decreasing in volume by 0.6% and growing in value by 1.8%.

Fresh molluscs are the third in order of importance with 14.6% in volume and its variation is 0.4% positive, and in value, this segment represents 13.5% and obtains an increase in value of the 4.0%. Frozen fish are as follows (10.1% by volume and 9.2% by value).

The best evolution both in volume and value has been for cooked shellfish / molluscs with notable increases, 10.7% and 9.5% respectively.

6.4. Consumption of fresh aquatic products in Spain

In 2019, the supermarket and self-service channel had the highest percentage (51.6%) of purchases within the total catch, although its evolution with respect to 2018 was negative (-2.2%). The rest of the channels that make up the dynamic channel have a lower share, but their evolution is stable in the case of the hypermarket (+ 0.1%) and increasing in the case of discount stores, with an evolution of 3.4% and a share that reaches 9.3%. Traditional stores have a very significant weight for these products, currently they represent 23.3% of the total volume, although their evolution is negative in these twelve months (-2.6%).

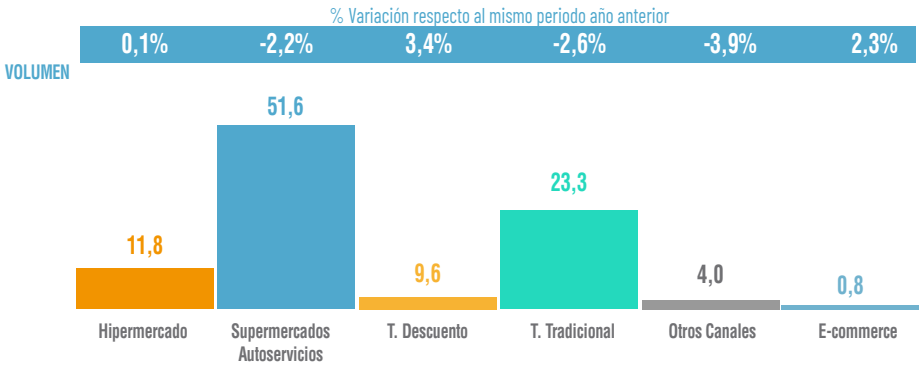


Figure 6-6. Percentage distribution of the purchase of fresh aquatic products in 2019 by type of establishments and percentage variation over the previous year (MAPA data).

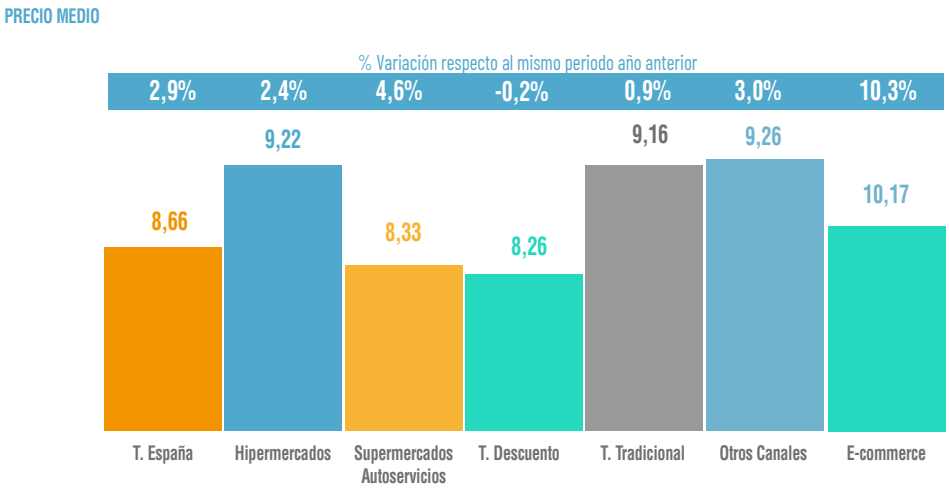


Figure 6-7. Percentage distribution of the average price of fresh aquatic products by sales channels in 2019 and percentage change over the previous year (MAPA data).

Figure 6-8. Evolution of the consumption of fish from aquaculture and fishing in Spanish households in 2019 and early 2020 (until March). The quantity (t) and the sale price to the public are indicated (source: Directorate General of the Food Industry of MAPA).

In 2019, the average price of total fishing was 8.66 Euros/kg, increasing on average by 2.9%.

The price increases in all shopping channels except in discount stores, which are positioned as the channel with the most affordable average price (8.26 Euros/kg).

The hypermarket in 2019 maintained the highest price (9.22 euros/kilo) within the dynamic channels, but Ecommerce was the channel with the highest average price in the category, with 10.17euros/kilo, 17.4 % higher than the market average and which also makes it more expensive in these twelve months by 10.3%.

6.5. Marketing of Gilthead seabream

The average first sale price of aquaculture Gilthead seabream produced in Spain in 2019 was 4.11 Euros/kg. This figure is -5.9% lower than the average price of 2018. The total value of the 13,521 tonnes of Spanish seabream sold was 55.6 million Euros.

Considering the consumption of sea bream in Spanish households in 2019, this increased by 12.4%, reaching 30,495 tonnes, according to the MAPA Consumption Panel. This figure would mean the household consumption of 660 g of sea bream per person (in Kg equivalent of body weight) in 2019, i. e. only two servings per year. APROMAR considers that, even though they are small, these figures for household consumption (excluding extra-domestic consumption) are magnified by question of procedure in the sampling used by the MAPA Consumption Panel. However, the association values the reported variation indices as adequate and illustrative.

The total retail value of these quantities of sea bream for consumption in households, reported in the MAPA's statistics, has increase by 11.4% in 2019, to 238.11 million Euros, with an average retail price of 7.87 Euros/Kg. This average retail price represented an increase of 47.8% above the first sale price, which in absolute values means 3.76 Euros more paid by final consumers for each kilogram than those obtained by fish farmers.

The commercialization of aquaculture Gilthead seabream is mainly carried out through supermarkets and multiple retailers. Traditional fishmongers (specialized trade) are the third largest channel to sale. There is also marketing through the extra-domestic channel Horeca (Hospitality, Restoration and Catering), but most of the consumption is carried out in homes (approximately 80%).

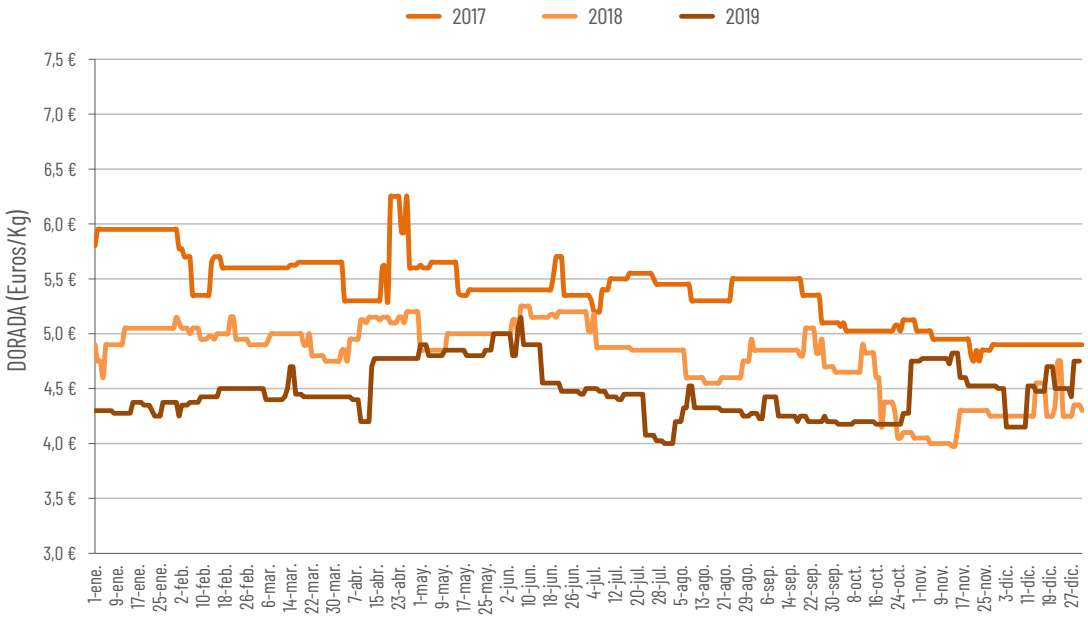


Figure 6-9. Evolution of average prices (Euros/kg) of sea bream (400/600 g.) sold in MercaMadrid and MercaBarna (Mercas exit prices) between 2017 and 2019 (data from the Ministry of Economy and Competitiveness). All price values are nominal and have not been adjusted to IPC variations.

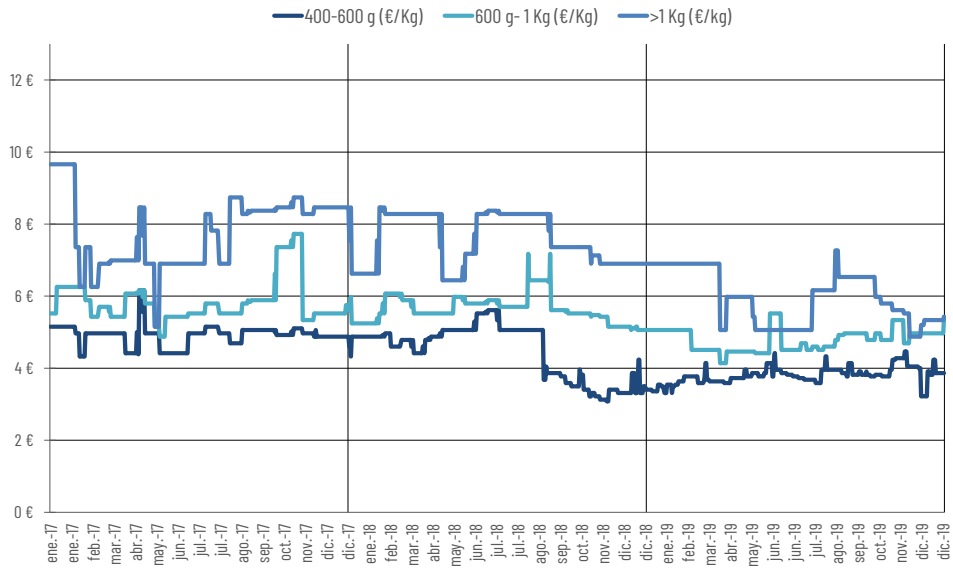


Figure 6-10. Evolution of average prices (Euros/kg) of first sale of gilthead sea bream in its three main commercial sizes between 2017 and 2019 (Ministry of Economy and Competitiveness).

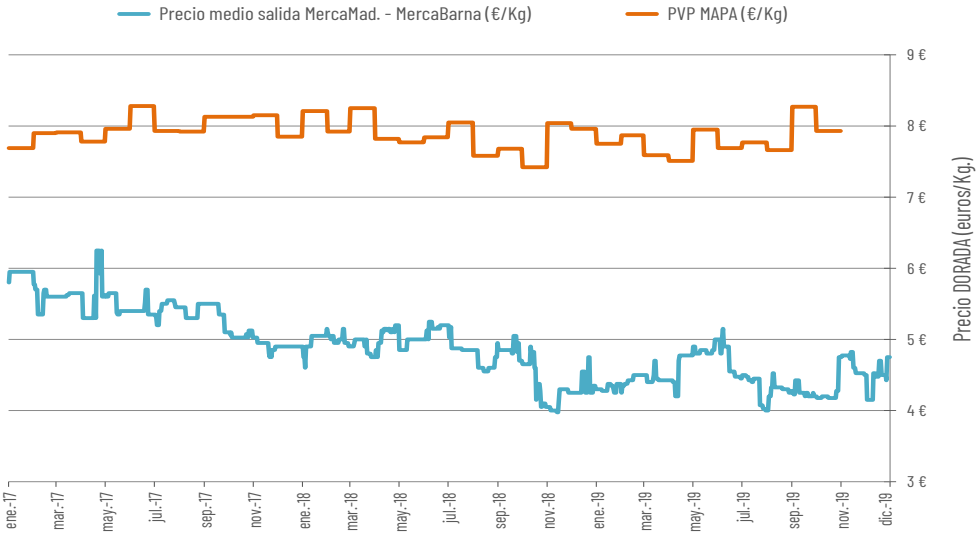


Figure 6-11. Evolution of the prices of Sea bream output of Mercas and the final consumer prices between 2017 and 2019 (Euros/kg). All price values are nominal and have not been adjusted with IPC variations.

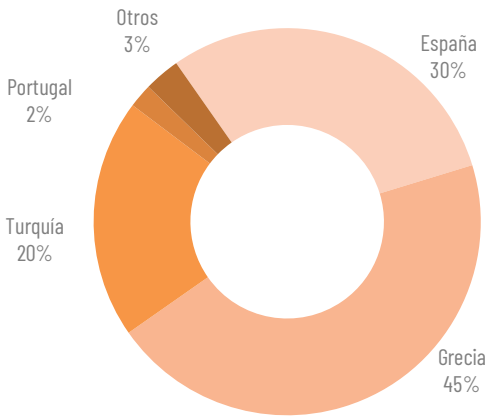
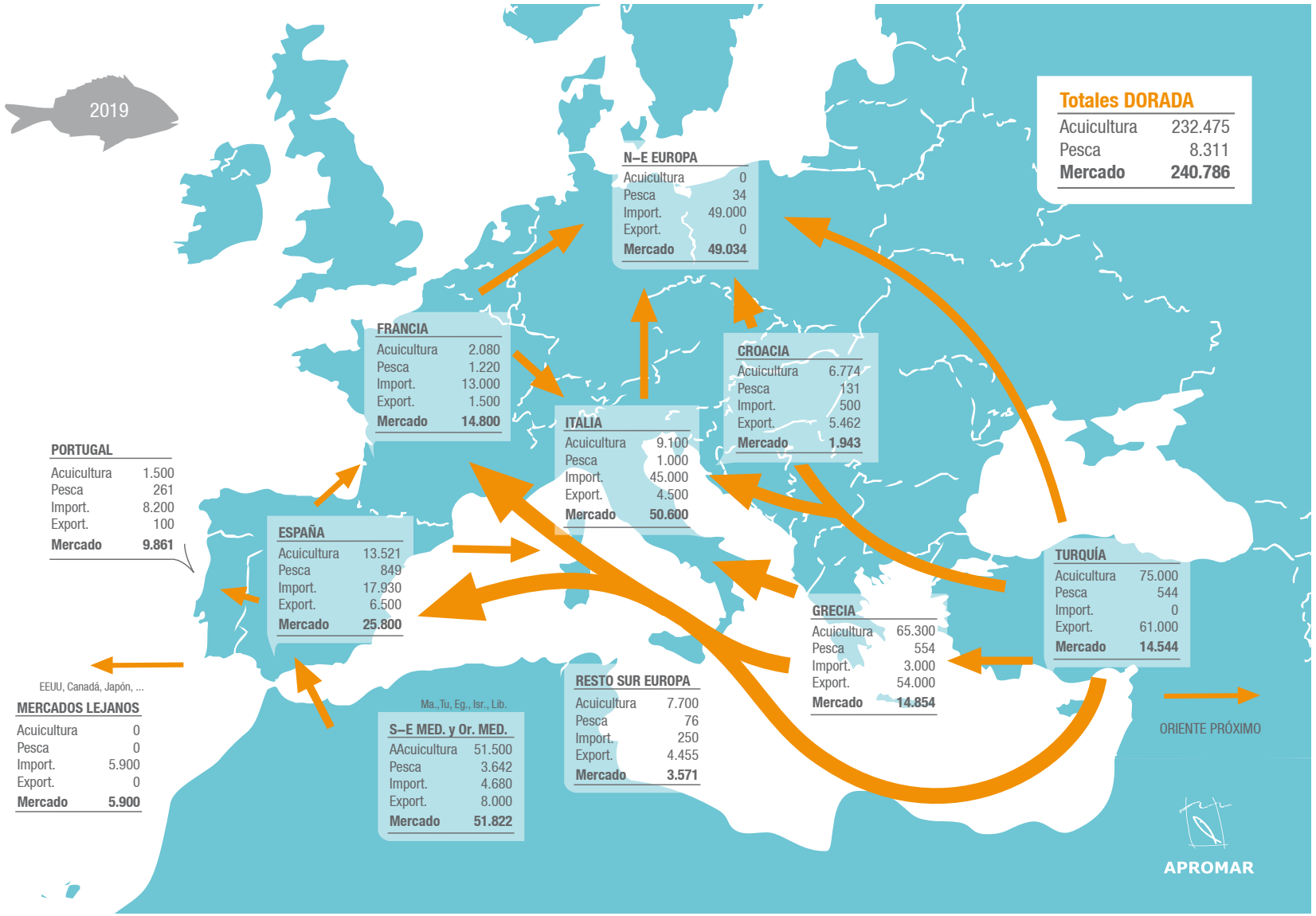


Figure 6-12. Percentage distribution of the country of origin of Gilthead sea bream sold in Spain.

Figure 6-13. Diagram of production, trade flows and apparent markets for sea bream in Europe in 2018. Based on data from FEAP, FAO and APROMAR.



At the Mediterranean level, the main market for seabream continues to be Italy, where about 50,600 tonnes are consumed annually. The next four markets are Spain (25,800 t), Greece (14,854 t), France (14,800 t) and Turkey (14,544 t).

APROMAR estimates in Spain the consumption (production+ imports-exports) of seabream in 2019 in 25,800 tonnes, 11.4% more than the previous year. The national harvest of this species was 13,521 t and from capture fisheries 849 t, while 17,930 t were imported and 6,500 t exported. However, only 30% of the seabream consumed in Spain in 2019 was from national production (assuming that all the exports of seabream from Spain were of Spanish productive origin).

6.6. Marketing of European sea bass

The average first sale price of aquaculture European seabass produced in Spain in 2019 was 3.78 Euros/Kg. This figure is -18.5% lower than the average price of the previous year. The total value of the 27,335 tonnes of Spanish seabass marketed was 103.4 million Euros.

Sea bass consumption in Spanish households increased in 2019 by 14.2% in quantity compared to 2018, remaining at 27,830 tonnes, according to the MAPA Consumption Panel. This figure would mean the household consumption of 600 g of sea bass per Spaniard in 2019. APROMAR considers that, as in the case of sea bream, although the percentages of variation in sea bass consumption could be correct, they are numbers magnified by a question of procedure in the sampling used by the MAPA Consumption Panel, although the evolution of the magnitudes is correct.

The total value of the sale to the public of these tonness of sea bass for consumption in households would have reached 231.2 million Euros, an increase of 10.6% compared to 2018, according to MAPA,. The average retail price for sea bass in 2019 was 8.31 Euros/Kg, which meant a reduction of 3.2%. This retail value represented an increase of 54.5% over the first sale price, which in absolute values was 4.53 Euros per kilo more paid by consumers than those paid to producers in the first sale.

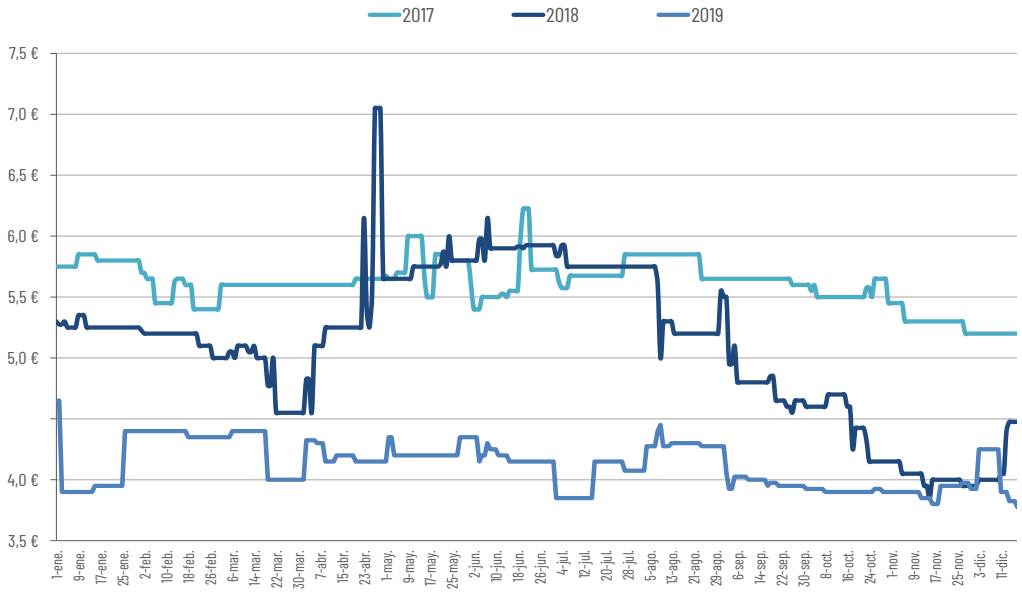


Figure 6-14. Evolution of average prices (euros / kg) of commercialization of sea bass (400 / 600g) in MercaMadrid and MercaBarna (Mercas exit prices) between 2017 and 2019 (data from Ministry of Economy and Competitiveness). All price values are nominal and have not been adjusted for

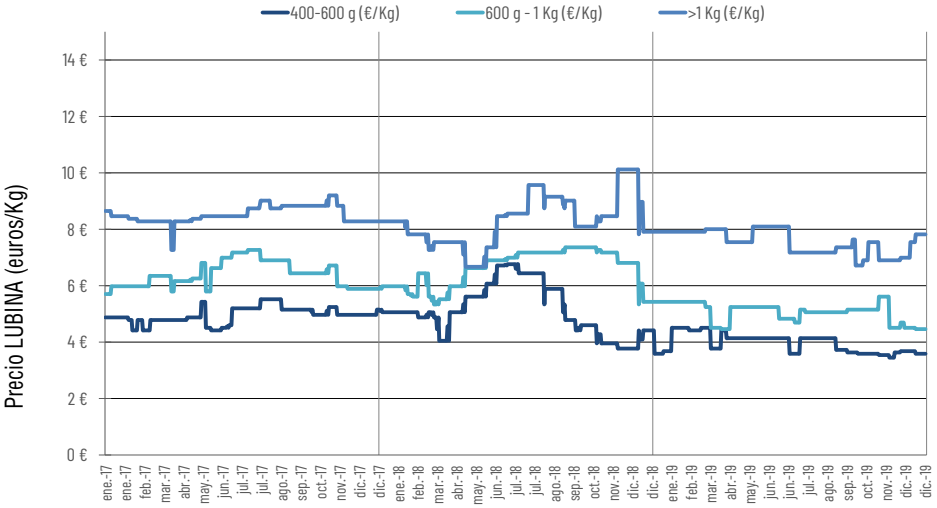


Figure 6-15. Evolution of the prices of off-sea bass from Mercas and the final consumer prices between 2017 and 2019 (Euros/kg). All price values are nominal.

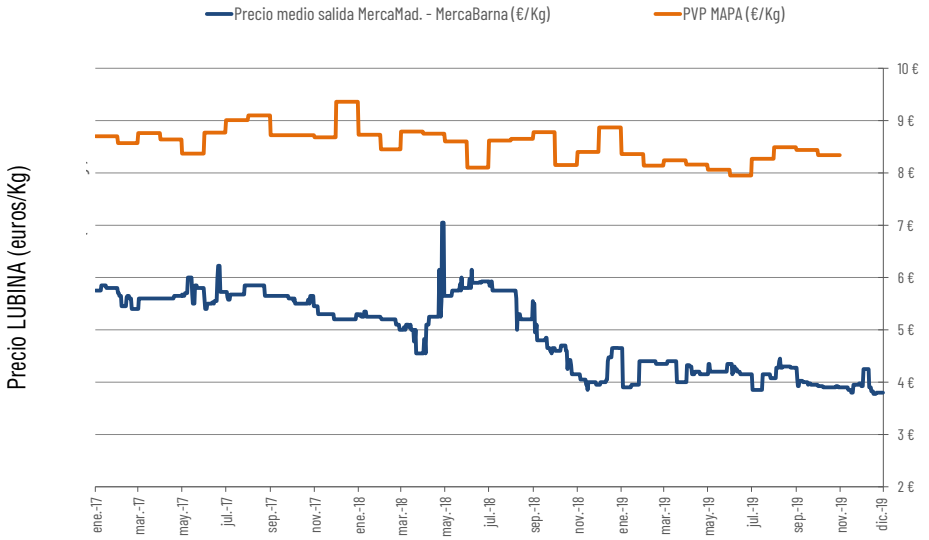


Figure 6-16. Evolution of Mercas outbound seabass prices and RRP between 2017 and 2019 (Euros / Kg). All values are nominal.

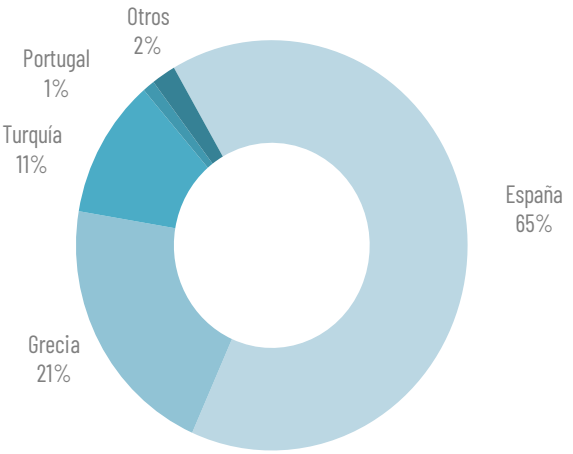


Figure 6-17. Diagram of productions, trade flows and apparent sea bass markets in Europe in 2019. Based on data from FEAP, FAO and APROMAR.

The commercialization of aquaculture seabass, like seabream, is carried out mainly through supermarkets and department stores. The specialized channel (traditional fishmongers) are the third way of sale. There is also marketing through the Horeca channel (Hospitality, Restoration and Catering), but most of the consumption is produced in homes (approximately 80%).

The main international markets for seabass are Italy and Spain, where approximately 44,200 and 33,100 tonnes are consumed annually respectively. The next markets are Turkey (25,000 t), Greece (10,976 t) and France (10,138 t).

APROMAR estimates the consumption (production+imports-exports) of seabass in Spain at those 33,100 tonnes in 2019, 17% more than the previous year. The national harvest of this species was 27,335 t and the fishing 500 t, while 11,300 t were imported and 6,035 t were exported.Thus, 65% of the seabass consumed in 2019 in Spain were of national harvest (assuming that all the exports of seabass from Spain were of Spanish productive origin).

6.7. Marketing of turbot

The average first sale price of aquaculture turbot produced in Spain in 2019 was 9.25 Euros/Kg. This figure is 10.8% higher than the previous year and represented a total amount of 76.4 million Euros.

The consumption of turbot in Spanish households increased by 2.2% in 2019 with 4,466 tonnes, according to the MAPA Consumption Panel. This figure means the household consumption of an average of 100 g of turbot per person this year. The total retail value of tthese tonnes of turbot represented an increase of 6.8%, and meant

a total of 50.5 million Euros, with an average retail price of 11.31 Euros/Kg. This average retail price represents an increase of 22.3% over the first sale price, which in absolute values represents an additional 2.06 Euros per kilo.

Spanish aquaculture turbot is marketed through various channels, but essentially through the Horeca, and to a lesser extent through traditional fishmongers, but also, and increasingly, in supermarkets and multiple retailers. It stands out, unlike in the case of sea bream or sea bass, a greater tendency to export, due, among other issues, to the fact that Spain produces 74% of aquaculture turbot from across Europe.

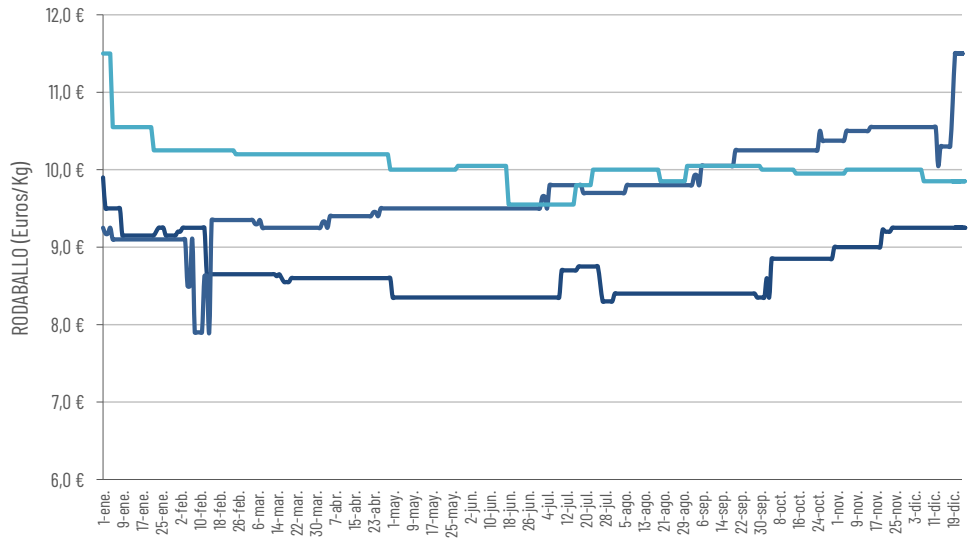
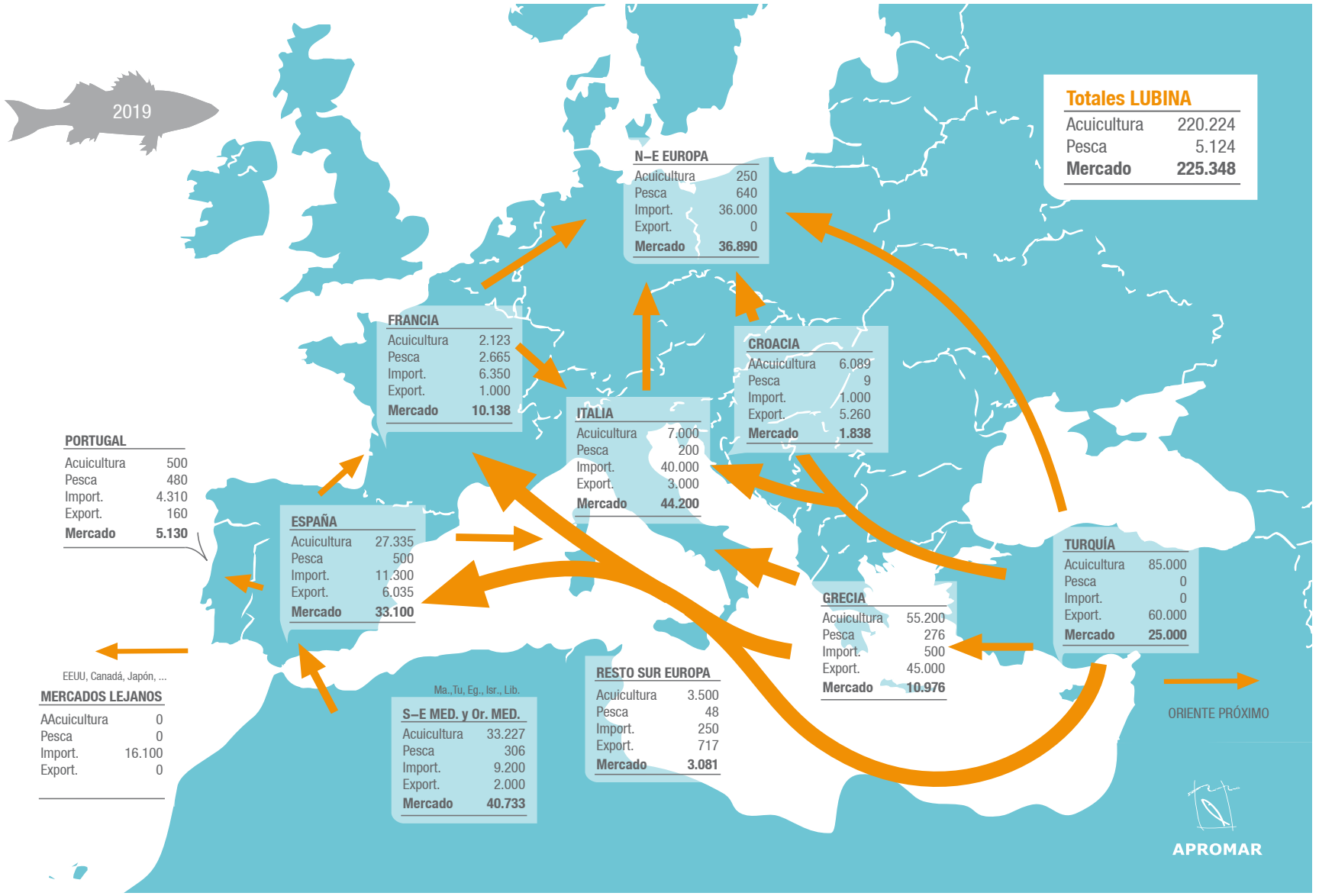


Fig.6-19.
Price evolution in the sales of turbot (1,000/2,500 g.) in MercaMadrid and final consumer prices between 2017 and 2019. All price values are nominal.

Figure 6-18. Diagram of production, trade flows and apparent markets for sea bass in Europe in 2018. Based on data from FEAP, FAO and APROMAR.



7. Aquaculture challenges in Spain

Aquaculture is an activity that has a remarkable tradition in Spain and is socially and economically relevant in many of its coasts and rivers. This primary sector, of which this country is the main producer in the European Union as can be read in the previous chapters of this report, is made up of micro, small and medium-sized enterprises. As a whole they are competitive entities, each at its own level, but still constantly innovating to optimize their activity. Many of these companies are even at the forefront of European aquaculture and attract investors of different nationalities. And as for the commercialization of their productions, they do it both in Spain and in demanding international markets.

Aquaculture facilities are usually located in remote rural, river or coastal areas, where other types of investment rarely reach and where aquaculture is often the only business activity generating stable and quality employment. In addition, it offers an significant percentage of inclusive employment, in productive, technical and manager positions.

As a consequence of the requirements inherent to its production process, i.e. the production of food destined for people and the need for water, which in Spain is a public good, the legal framework in which aquaculture must be carried out becomes easily a tangle that is tremendously complex to unravel. This adds additional economic costs and administrative burdens which undermine the companies' competitiveness.

Squal Gloria

The year 2020 is being a particularly critical time for Spain and for the entire world due to the coronavirus pandemic. Aquaculture is not being oblivious to this.

But prior to the pandemic there was another event that has marked the normal development of Spanish marine aquaculture. At the end of January, the squal Gloria, a long-distance extra tropical cyclone, crossed the Atlantic Ocean from the north of the United States to the Iberian Peninsula. After crossing the north of Spain as a weak front, Gloria intensified for several days over the western Mediterranean Sea, causing heavy rains and snowfalls, strong winds and very significant waves in many areas of southern Europe and North Africa. The east of Spain and the Balearic Islands were particularly affected by the passage of the squal between 19 and 21 January. In total, 13 people lost their lives in Spain and 4 were disappeared. The material damage was extensive. The Gloria maritime squal was especially violent, with hurricane-force winds of more than 120 kilometers per hour, a rise in sea level of more than 80 centimeters above its mean level, and waves with heights that significantly exceeded historical maximums and unusual directions of movement. A wave of 14.22 meters was measured in the west of Mallorca and in Valencia another of 8.44 meters, surpassing by almost 30 centimeters the previous record dating from 2003.

The storm Gloria was extremely violent, with hurricane-force winds, rising sea levels, waves of historical height and directions unusual movement. Many aquaculture nurseries suffered breaks in their nets, or in their anchoring systems, causing massive losses of fish and the destruction of productive infrastructure.

Gloria's violence caused severe damage to aquaculture nurseries located off the Spanish Mediterranean coast from Burriana in Castellon to Cabo de Palos in the Murcia region. Many of these facilities suffered breakage of their nets, or their anchoring systems, causing massive losses of fish and the destruction of productive infrastructure. The main sectoral reflections on the consequences of the squal Gloria have revolved around the prediction of the return periodicity of storms of such magnitude and on the model of concessions for the occupation of the maritime-terrestrial public domain that can accommodate more resistant nursery designs.

Various scientific studies suggest that climate change is behind the increase in the energy of squals such as Gloria in the Mediterranean. In the event that this is the case, it is necessary to have predictive mathematical models that provide information on the cyclicality of storms and that forecast them with greater anticipation in order to support decision-making by companies and public administrations. On the other hand, it is necessary to improve the resistance of the infrastructures of the nurseries against storms, including both the networks and the anchoring systems. Taking into account engineering issues, this would go through concessions with a larger surface area so that the damping systems (consisting of sets of buoys and ropes) have a greater amplitude in their work path. Nets with higher tensile strength will also be necessary, including perhaps new materials, and probably a shortening of their recommended wear time. In any case, the inevitable larger investments will require longer payback periods for those investments. The recent intention of the Ministry for the Ecological Transition and the Demographic Challenge to cut the duration of extraordinary extensions for occupation concessions goes in the opposite direction. However, these adaptation measures to climate change should not make us forget that aquaculture is the form of production of food of animal origin with the lowest carbon footprint and that, therefore, it should be promoted as a mitigating element.

Coronavirus Pandemia

The disease pandemic called Covid-19 has been caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This virus was identified for the first time in December 2019 in the Chinese city of Wuhan, capital of Hubei province, when cases were reported in a group of patients with unknown pneumonia. The World Health Organization (WHO) recognized it as a global pandemic on March 11, 2020. As of July 18, 2020, more than 14.2 million cases of the disease and 602,000 deaths have been reported in 218 countries. At the time of writing this report (July 2020), there was no medication or vaccine available to combat SARS-CoV-2.

Covid-19 has had a devastating socioeconomic effect. Most of the world's population has been homebound at one time or another and the movement of people has been drastically reduced.

Tourism practically has disappeared, remaining the hotel and restaurant sectors without activity. Colleges and universities have been closed. Industrial sectors complete and freight transport have stopped and only started to slowly reactivate months later.

Food producing sectors, such as aquaculture, have been classified as essential in Spain and other countries of the European Union and that they should not cease their activity, since feeding the population has been one of the main political priorities in the heights of the crisis. With this, the farms.

With this, aquaculture farms, along with their auxiliary activities (feed, liquid oxygen, etc.) have continued their work, although with the complications imposed by preventive measures for the general population. Sales of fresh fish in Spain, as well as in similar countries such as Italy or France have fallen on average by 30%, mainly due to the total closure of tourism and restaurants. However, frozen and canned fish have increased their sales, which means that people have continued to want to eat highly nutritious foods such as fish, but spending less time on the act of purchase, in addition to showing doubts about the duration of confinements . Faced with this scenario, aquaculture companies have had to deal with a general situation of uncertainty and applying the continuous changes in the rules of action dictated by the government. The most direct effects have been reductions in income due to lower sales and increases in operating costs, due to restrictions in working conditions caused by the mandatory distances between workers and to cope with the growing stocks of living biomass. The increased consumption of feed has been a fact despite having reduced feeding rates to try to limit the damage in case the crisis lasted long. The hatcheries have reduced their production of juvenile fish due to the lower turnover of fish in the breeding farms that are their clients and because of the conservative response of these in a scenario of uncertainty. Simultaneously, a risk that looms for the end of the crisis has been tense, which is that as soon as the markets are fully open, excess fish will be harvested and moved to markets driven by the need for companies to enter money. This will cause a sharp drop in prices that will take many months to recover.

Certainly, aquaculture is not the sector most affected in this crisis compared to tourism or other services, but when it comes to supplying food to markets, the case of activities that work with animals that must be kept alive is especially sensitive. To offset the damage to the aquaculture and fisheries sector, the EU has designed specific programs of financial support through the European Maritime and Fisheries Fund (EMFF). However, these compensation measures had not yet reached Spanish farmers in July 2020.

The crisis caused by the pandemic has begun to print social changes that must be recognized. One of them is that the reputation of the primary producers has improved. Perhaps only temporarily, but society has once again valued the importance of having food and other basic necessities, as well as the work of the people and companies that provide them. On the other hand, long value chains have exposed their weaknesses. Value chains must be resilient as a whole and rely more on locally produced food. Food sovereignty has taken on a new perspective. The quality of information accessed by consumers has also improved. Misinformation and hoaxes on a wide range of topics - including food safety and health - have been on hold for some time. Society has been very concerned, and the perceived value of reliable information sources has increased. Finally, an important lesson that has been perceived is the role played by producer associations. For aquaculture farms, isolated and located in remote locations, severely overwhelmed by the circumstances of the Covid-19 crisis, their partnerships have been the umbilical cord and the direct source of reliable information on the ever-changing situation of the legal framework. . Governments have been producing a daily flow of new legal regulations and their updates, ranging from the risks of transmission of the coronavirus through food, to transport regulations, working conditions, requirements on Personal Protective Equipment (PPE) and where to buy them, etc. Producer associations have played that role. At the same time, these associations have collected from their members and sent their situation and needs to the governments to better adjust the new legal framework.
Covid-19 has had a devastating socio-economic effect in Spain. Aquaculture companies have had to deal with a general situation of uncertainty and continuous changes in the rules of action, making decision-making difficult. The most direct effects have been reductions in income from lower sales and increases in costs to maintain the growing stocks of living biomass. The hatcheries have reduced their production of juveniles due to the lower rotation of fish in the breeding farms and due to the uncertainty scenario. And looming for the end of the crisis is the risk of a sudden massive harvest of excess fish causing a sharp drop in prices.

The Spanish strategy 2014-2020

The Pluriannual Strategic Plan for Spanish Aquaculture 2014-2020, approved by the General Secretariat of Fisheries of the Ministry of Agriculture and Fisheries, Food and Environment in 2014, analyzed the situation of this sector and guided it towards sustainable growth for the horizon of the years 2020 and 2030. This plan responds to the questions raised in the Strategic Guidelines for the sustainable development of European aquaculture published by the European Commission in 2013 regarding common priorities and needs for the development of this sector. The European Commission (DG MARE), together with the Member States and the European Aquaculture Advisory Council (AAC) have been working since mid-2019 on the revision of these Strategic Guidelines and they are expected to be published by the end of 2020.
The Strategic Plan for Spanish Aquaculture established ambitious objectives for aquaculture in this country, going from 266,684 tonnes of production in 2012, to 369,470 tonnes in 2020 and up to 527,766 tonnes in 2030. The first sale value of these figures would mean passing from 435 million euros in 2012, to 780 million in 2020 and reach 1,465 million euros in 2030. If these data are fulfilled, the employment of aquaculture in Spain could reach 30,000 people in 2030. By 2020 and even without discounting the effects of the squal Gloria or the coronavirus pandemic, these figures are clearly unattainable.

The Strategic Plan for Spanish Aquaculture pointed out eight strategic lines of action and within these a total of 37 strategic actions. APROMAR agrees with the definition of these lines and in the selection of actions, and trusts that they will be carried out, but doubts the effective involvement in them by various departments of the administration, both state and regional. , which either were not involved in the drafting of the strategic plan or were tangentially involved, but which nevertheless play a crucial role in the public administrative management of aquaculture. This is the case, at the state level, of the General Directorate of Merchant Marine (Ministry of Transport, Mobility and Urban Agenda), the General Directorate of Water and the General Directorate of Sustainability of the Coast and the Sea (both in the Ministry for the Ecological Transition and the Demographic Challenge), and at the regional level, of the Ministry of the Environment and the port authorities.

APROMAR recognizes that it is the responsibility of each company to improve its own competitiveness, but, even counting on this, in recent decades the development of Spanish aquaculture has been slowed by the inadequacy of the legal-administrative framework in which it must operate. Having the strategic plan is not enough. The objective must be

Even without discounting the effects Gloria and Covid-19 Spain it will not reach the growth forecasts established in the Pluriannual Strategic Plan for Spanish Aquaculture by far. Having a strategic plan is not enough. The objective is to achieve your goals or, at the very least, to assess the causes of the deviation. Spanish aquaculture continues to face challenges that are difficult to solve from private initiative without the decided support of public administrations.

to achieve its goals because Spanish aquaculture continues to face challenges that are difficult to solve from the private initiative without the determined support of the public administrations. The main obstacles are listed below. It is paradoxical that Spanish aquaculture, being able to display exceptional potential, is facing a stagnation due to perfectly surmountable issues.

Need to streamline administrative procedures

Aquaculture is an extremely normatively regulated activity by public administrations. This is basically the case for

two reasons: first because it involves the production of food for people, and second because it requires the use of water and public domain spaces. This entails the compulsory obtaining of permits, concessions and authorizations, the achievement and renewal of which are today so difficult and slow that they discourage entrepreneurship.

The Spanish political-administrative framework, with divisions between the state, regional and municipal levels, is poorly coordinated, implies a fragmentation of the national market, inefficiencies in its implementation and the lack of equal conditions between Spanish operators depending on their geographical location due to divergent regulations. This context creates heterogeneous situations and complicates the work of companies that have production farms in various autonomous communities. These differences are increased by the unequal interpretation by the Autonomous Communities of higher-ranking regulations (national or European). This situation occurs, for example, with environmental surveillance standards, with the requirements for the granting of authorizations, with the mandatory labeling of product boxes, with incompatibilities between professional qualifications (diving, for example), zoosanitary requirements, permits for immersion (planting fish), qualifying titles for the exercise of the activity, regulations on marketing, access to public aid, etc. This situation increases the costs of companies and hinders the mobility of companies and workers throughout the national territory. All of this resulting in the lack of equal conditions for companies in their internal and external operations. This last circumstance is another factor of imbalance to be added to the inequality suffered by European national producers in the face of imports, on numerous occasions unfair, from non-EU operators. The solution could begin with the establishment of an effective coordination between Autonomous Communities in the promulgation of their own regulations. The fact that an autonomous community is responsible for its powers does not necessarily imply that it must propose solutions different from those of its neighboring communities, even assuming the existence of particularities necessarily to be considered. And the solution would continue with the adoption of the same criteria when interpreting or improving higher-ranking standards.

In any case, it must be recognized that, in matters of aquaculture production management, the National Advisory Board for Marine Cultures (JACUMAR) and the National Advisory Board for Continental Crops (JACUCON), organized by the General Secretariat for Fisheries (MAPA) and with the participation of the General Directorates of aquaculture of the Autonomous Communities, in recent years they have been carrying out an important task of coordination between the various competent authorities. And it is in the scope of JACUMAR and JACUCON where they are working seriously and effectively in the elaboration of the Contribution of Spain to the Guidelines for the Sustainable Development of Marine and Continental Aquaculture of the EU..

Modification of the duration of DPMT occupancy concessions of the Coastal Law through the Law of Climate Change and Energy Transition

The activity of any marine aquaculture farm in Spain takes place, totally or partially, on a concession of occupation of the public domain, mainly maritime-terrestrial. Others are on the port public domain, but they are the least. The time for which the use of any concession in the maritime-terrestrial public domain is granted is regulated by regulations, mainly by the Coastal Law (Law 22/1988) and by the General Coastal Regulation (Royal Decree 876/2014). Having a clear and predictable knowledge about this time and the rest of the requirements is essential to provide the necessary legal security for investments in the public domain. Aquaculture is one of the few economic activities that, by its very nature, have no other option than to settle in that space. After decades of work by APROMAR collaborating with the General Directorate of the Coast and the Sea, of the Ministry of Ecological Transition and the Demographic Challenge (MITERD), the regulations have been refined and currently aquaculture is an activity acceptably embedded in the regulations of Coasts.

However, for a couple of years, and probably indirectly affected by other users of the public coastal space, APROMAR has been noting with concern the attempts of MITERD to change the temporary concession regime for the use of the Spanish coast. First

through attempts at the General Coastal Regulation then withdrawn and more recently through the introduction of an ad hoc article in the Climate Change Bill currently in the Congress of Deputies. APROMAR defends that the terms of extraordinary extensions count from the moment they are requested (as explicitly established by the Law of Costs in force) and not from the first day of the original concession. Applying the new MITERD criteria would mean reducing the possibility of duration of the concessions allowed by current regulations by 30 years.

APROMAR is fully aware of the need to respond to the threat of climate change and that governments and society must react to transform the economic model and opt for sustainable

Los plazos de las prórrogas extraordinarias cuentan desde que estas se solicitan, tal y como explícitamente establece la Ley de Costas en vigor, y no desde el día primero de la concesión original como pretende ahora el MITERD. El cambio supondría reducir en 30 años la duración de las concesiones que permite la actual normativa.

and inclusive development, in line with the European Green Deal and its strategy From Farm to Table. But the new policies must offer the stability and predictability necessary to open economic and employment opportunities, as well as avoid unnecessary damage to the business fabric and cost overruns to companies. The Spanish aquaculture sector, and its related activities such as the purification of mollusks, have for decades demonstrated their impeccable environmental integration on the coast, and understands that they should be seen as an ally to achieve the strategic goals of the EU in the field of food and the Pact Green for a fair, healthy and ecological food system. Also to achieve the objectives of neutrality of greenhouse gas emissions in Spain as it is the animal production sector with the lowest carbon footprint.

A good part of the companies in this sector is in an extreme situation since they come from concessions granted after the 1988 Coastal Law and are close to exceeding the initial concession period and requesting its extraordinary extension. Precisely at a critical time for the national economy, and in which many companies are also pending important structural investments and in a modernization process imposed by the growing globalization of the food market. In this context, APROMAR has told MITERD that a specific article of the Draft Law on Climate Change and Energy Transition (specifically article 18) must be deleted and a consensus reached so that any future modification of the Coastal Law is undertaken after a study In-depth and essential dialogue with the sector, thereby offering the necessary stability framework for maintaining investments and employment.

Farm to Fork Strategy

The European Commission announced in May 2020 its Farm to Forkstrategy for a fair, healthy and environmentally integrated food system. This initiative will establish regulatory and non-regulatory measures to offer more sustainable food systems and help achieve the goals of the EU Green Deal towards climate neutrality in Europe. The European Green Deal has set the path for a new strategy of sustainable and inclusive growth to boost the economy, improve people's health and quality of life, take care of nature and leave no one behind. The Farm to Table strategy now addresses the challenges of sustainable food systems and recognizes the links between healthy people, healthy societies and a healthy planet. APROMAR appreciates the relevant role that this strategy gives to aquaculture and points out the need to guarantee a fair livelihood for European primary producers, including aquaculturists. The sustainable food system pursued by the Farm-to-Fork Strategy will require putting in place measures to improve the incomes of primary producers and thereby strengthen the competitiveness of the European Union.

The European Green Deal sets out how to make Europe the first climate neutral continent by 2050. APROMAR agrees with the Strategy that farmed fish have a lower carbon footprint than land based animal production and that it should be promoted.

The Covid-19 crisis has highlighted the importance of a robust and resilient food system that works in all circumstances and is always capable of ensuring access to a sufficient supply of affordable food for all citizens. APROMAR emphasizes that European food is today a global standard for safe, nutritious and high-quality food. Now is the time to make it hearty.

European consumers are looking for fresh, less processed and sustainably sourced food. APROMAR stresses that this means that the transition to sustainable food systems must be an economic opportunity. But currently consumer information is not enough in Europe, particularly in the case of fish. APROMAR values the purpose of the Farm to Table strategy to provide clear information that makes it easier for consumers to choose healthy and sustainable diets. APROMAR will demand that the European Commission empower consumers to make those informed, healthy and sustainable purchasing decisions. In this sense, the Commission must expand its fight against insufficient information and food fraud in order to achieve a level playing field for operators, especially with regard to imports.

The EU is the world's largest importer of agri-food products and the largest market for seafood. The production of generic foods can have negative environmental and social impacts in the countries where they are produced. Therefore, APROMAR notes that efforts to adjust sustainability requirements in the EU food system must be accompanied by policies that help raise standards globally, in order to avoid outsourcing and exporting unsustainable practices. APROMAR stresses that all food placed on the EU market must become increasingly sustainable, including imported food.
Better animal welfare improves animal health and food quality, reduces the need for medicines, and can help preserve biodiversity. APROMAR assumes its responsibility in this matter and collaborates with the administrations to review the legislation on animal welfare, align it with the most recent scientific evidence, expand its scope, facilitate its application and, ultimately, guarantee a higher level of fish welfare.

Finally, research and innovation are key drivers in accelerating the transition to sustainable, healthy and inclusive food systems from primary production to consumption. APROMAR emphasizes that R + D + i must help develop and test solutions, overcome barriers and discover new market opportunities.

8. Spanish scientific production in the field of aquaculture

By Morris Villarroel Robinson, Polytechnic University of Madrid

Introduction

This section considers the evolution of scientific production in Spain related to aquaculture. It is important that the general public, companies and professionals in the sector know the importance of scientific production in order to have the necessary information to collaborate with scientists at the national level and have a basis for criticism, constructive and founded on what priorities are they should encourage. It is also important that the public administration, politicians and the media value that Spain, in terms of quality scientific production, is among the leading international powers and that this activity requires their support.

Next, all scientific articles in which at least one scientist or Spanish institution has participated in the most relevant magazines for aquaculture are quantified, within the main collection of the Web of Science, which is an information database. Scientific bibliography managed by the Clarivate company. This collection has been chosen since it is the largest database of scientific publications in the world and both the basic search (and the analysis of its results) and the Incites Journal Citation Reports service allow the evaluation and analysis of research performance in a very objective.

Spanish scientific production in the field of aquaculture

Entering the keyword "Spain" in the field of "Address" in the basic search of the Web of Science database, and the official name of each of the 17 key journals in the field of "Name of the publication" and The words "article" and "review" in the field of "Type of Document" have obtained the total number of scientific articles in which one or more Spanish scientists have participated. From 1979 to 2019, Spanish scientists have published a total of 3,269 articles in the 17 journals with the highest impact analyzed, of which 1,056 articles, about a third of the total, appear in the journal Aquaculture, the oldest in the sector . Since 2010, Spanish scientists have produced an average of 175 articles a year in the field of aquaculture, which has been increasing on average by 8% per year. To give an idea of the quality of production and the proportion of articles in each journal, a count is made of the total articles published in the 17 journals that are the object of the analysis (see Figure 2) and their impact. Generally, the quality of a journal is determined by its impact factor, a measure of the number of times that other publications cite those of the journal in question.

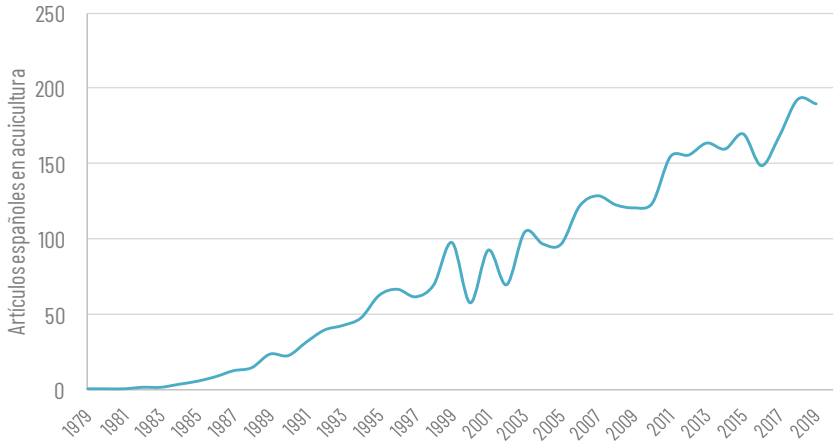


Figure 1.
Evolution of the number of impact scientific articles published by Spaniards in the 17 most relevant journals in the aquaculture area at an international level from 1979 to 2019.

In 2019, the two journals with the greatest impact in the field of aquaculture were Reviews in Aquaculture, with an impact factor of 7.19 and Reviews in Fisheries Science and Aquaculture with 3.78. However, these two journals are relatively new (they started in 2012), the third journal Fish and Shellfish Immunology is better known within the industry. In the 2019 ranking, the magazine Aquaculture Economics and Management appeared, which was not included in the list in 2018, and which now has an impact factor of 3.25, perhaps showing a greater interest in the topics of economics, administration and management of aquaculture companies. In total, over the years, Spanish scientists have published more than 200 articles in mainly six journals: Fish and Shellfish Immunology, Aquaculture, Journal of Fish Biology, Journal of Fish Diseases, Diseases of Aquatic Organisms and Aquaculture Research, which shows the great collective capacity of our country.

How does Spain compare with other countries in terms of scientific production?

In order to be able to compare our scientific production with that of other countries in the world, the total number of scientific articles on aquaculture by country has been added in each of the 17 journals object of the analysis (see Table 1), between the years 1979 to 2019. According to these dates.

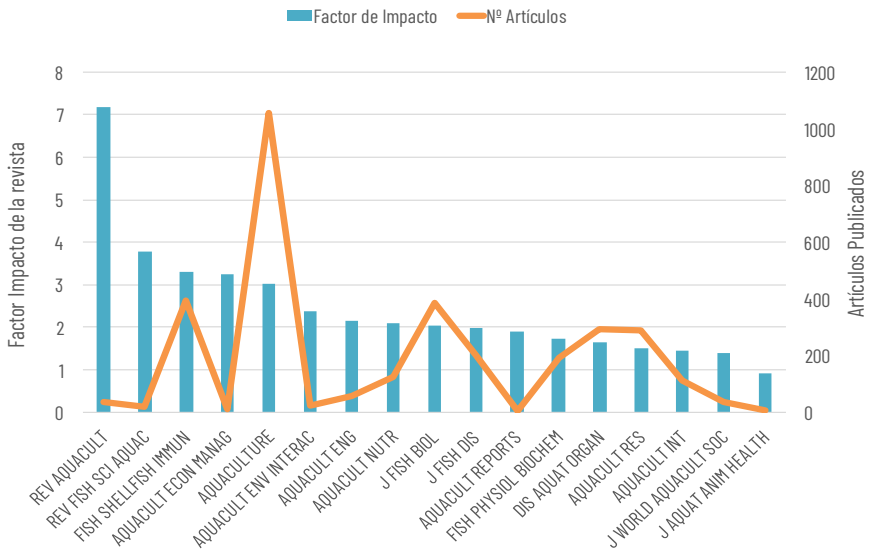


Figure 2.
Summary of the impact of the 17 most important journals in the area of aquaculture at an international level and the total number of articles published in each journal by Spanish scientists since 1979.

Spain is one of the world's leading potentials in terms of quality production, being in the top 10 positions in all magazines except Aquaculture reports (position 17) and the Journal of Aquatic Animal Health (position 11). For example, in Aquaculture, Spain appears as the fifth most productive country, ahead of France, Canada and Japan (Figure 3).

What institutions publish the most in Spain?

In order to find out which centers / institutions publish the most at the national level, the results obtained in the preceding figures and the origin of each signatory scientist are compared. First, the results of each journal are analyzed. Each journal has an area of specialization and knowing which institutions have more experience in each field can help companies when looking for applied collaborations. Table 2 shows the institutions that monopolize the majority of the "Spanish" publications in that journal, articles with at least one Spanish author. As can be seen, the scientists who work at the Higher Council for Scientific Research (CSIC) are the ones who publish the most in almost all the journals / areas, followed by those from the University of Santiago de Compostela (USC), the University of Murcia (UM) and the Spanish Institute of Oceanography (IEO). (Note: the total numbers of articles by institution may be less than the real ones since institutions cannot always be grouped if there are small differences in the name between them, for example CSIC versus CSIC Torre de la Sal).

Who are the Spanish scientists with the highest number of published scientific articles?

For each journal, the authors who have published the largest number of articles are counted. In the

Table 1. Summary of Spain's position in the world in terms of the percentage of total scientific articles published in each of the 17 most important impact journals in the aquaculture area, from 1979 to 2019.% means the percentage of total articles published.

Revista	Primer puesto	%	Puesto de España	%
REV AQUACULT	SPAIN	11.9	1	11.9
REV FISH SCI AQUAC	EEUU	33.3	2	12.0
FISH SHELLFISH IMMUN	CHINA	47.6	4	6.0
AQUACULT ECON MANAG	NORUEGA	35.1	8	5.4
AQUACULTURE	EEUU	16.3	5	7.0
AQUACULT ENV INTERAC	NORUEGA	29.1	8	6.8
AQUACULT NUTR	CHINA	25.7	4	6.7
J FISH DIS	EEUU	19.4	6	6.1
J FISH BIOL	EEUU	20.0	10	4.0
FISH PHYSIOL BIOCHEM	CHINA	17.5	5	6.5
DIS AQUAT ORGAN	EEUU	30.5	3	7.8
AQUACULT REPORTS	INDIA	14.9	17	2.2
AQUACULT ENG	EEUU	39.4	6	4.8
AQUACULT RES	CHINA	18.8	7	5.3
J WORLD AQUACULT SOC	EEUU	46.9	10	1.9
AQUACULT INT	CHINA	16.6	3	6.2
J AQUAT ANIM HEALTH	EEUU	73.0	11	1.0

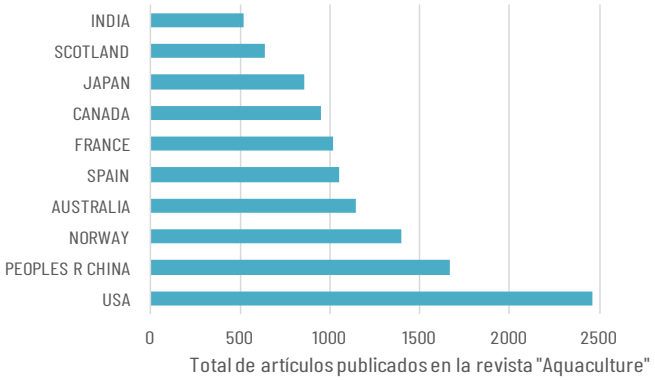


Figure 3.
Number of publications in Aquaculture magazine from 1979 to 2019 for the top 10 countries in terms of production.

Table 2.
Summary of the institutions that publish the most in the 17 most important magazines in the aquaculture area from 1979 to 2019 ("% articles" refers to the percentage of articles produced by that institution compared to the total of institutions involved in all "Spanish publications ", Some of which may be foreign).

Revista	Primer puesto	% de artículos	Número de artículos
REV AQUACULT	CSIC	35.1	13
REV FISH SCI AQUAC	CSIC	38.9	7
FISH SHELLFISH IMMUN	U MURCIA	32.7	129
AQUACULT ECON MANAG	CSIC	30.0	3
AQUACULTURE	CSIC	26.6	281
AQUACULT ENV INTERAC	U ALACANT	47.8	11
AQUACULT ENG	U P CATALONIA	25.4	15
AQUACULT NUTR	CSIC	18.6	23
J FISH BIOL	CSIC	33.4	129
J FISH DIS	U SANTIAGO COMPOSTELA	29.7	59
AQUACULT REPORT	CSIC	40.0	2
FISH PHYSIOL BIOCHEM	CSIC	23.2	45
DIS AQUAT ORGAN	CSIC	22.8	67
AQUACULT RES	CSIC	14.2	41
AQUACULT INT	IEO	20.7	23
J WORLD AQUACULT SOC	IRTA	17.1	6
J AQUAT ANIM HEALTH	U SANTIAGO COMPOSTELA	33.3	3

Table 3.
Summary of the most prolific Spanish authors in each scientific journal related to aquaculture from 1979 to 2019. The journals Aquaculture reports and the Journal of Aquatic Animal Health have not been included due to the low number of articles ("% articles" refers to the percentage of articles produced by the cited author compared to the total number of "Spanish" publications in that journal).

Revista	Primer puesto	% de artículos	Número de artículos
REV AQUACULT	DE BLAS I	10.8	4
REV FISH SCI AQUAC	CORT JL	27.8	5
FISH SHELLFISH IMMUN	ESTEBAN MA	28.9	115
AQUACULT ECON MANAG	FERNANDEZ-POLANCO J	30	3
AQUACULTURE	IZQUIERDO MS	4.3	45
AQUACULT ENV INTERAC	SANCHEZ-JEREZ P	30.4	7
AQUACULT ENG	OCA J	23.7	14
AQUACULT NUTR	IZQUIERDO M	10.5	13
J FISH BIOL	DOADRIO I	3.9	15
J FISH DIS	TORANZO AE	10.6	21
FISH PHYSIOL BIOCHEM	GISBERT E	8.2	16
DIS AQUAT ORGAN	TORANZO AE	12.6	37
AQUACULT RES	IZQUIERDO M	6.9	20
AQUACULT INT	DOMINGUES P	8.1	9
J WORLD AQUACULT SOC	ESTEVEZ A	8.6	3

case of Spain, many of them are women. For example, MarÃa de los Ã ngeles Esteban, from the University of Murcia, is the Spanish scientist who has published the most in Fish and Shellfish Immunology, with 115 articles. Marisol Izquierdo, a researcher at the University of Las Palmas de Gran Canaria, has published more than 40 articles in Aquaculture, 10 articles in Aquaculture Nutrition and almost 20 in Aquaculture Research. And another woman, Alicia Estévez Toranzo, is the one who has published the most articles in the Journal of Fish Diseases and Diseases of Aquatic Organisms. All these data highlight the important role of women in the field of aquaculture research in Spain.

What are the most relevant topics?

Similar to the ranking of pages generated by Google in a search, the importance of each scientific publication can be estimated according to the number of citations it receives from other publications. For example, if we take as a reference the scientific production in the last 5 years, from 2015 to 2019 inclusive, some 10 publications stand out that have received more than 50 citations each. The authors and subject matter of these important publications are reflected in Table 4.

Table 4. Summary of publications (with Spanish participation) over the last 5 years (2015-2019 inclusive) in the area of aquaculture.

Revista	Año	Autores	Citas	Temática
AQUACULTURE	2015	Chauton MS et al.	84	Producción de micro-algas para piensos
REV FISH SCI AQUAC	2015	Hoseinifar SH et al.	75	Prebióticos y respuesta inmune
FISH SHELLFISH IMMUN	2015	Hoseinifar SH et al.	67	Sistema inmune (trucha)
AQUACULTURE	2015	Betancor MB et al.	61	Nutrición salmón
FISH SHELLFISH IMMUN	2016	Guardiola et al.	109	Probióticos dorada
FISH SHELLFISH IMMUN	2016	Vallejos-Vidal E	103	Dietas inmunoestimulates
REV AQUACULT	2016	Hoseinifar SH et al.	82	Probioticos, prebióticos y sinbióticos
AQUACULTURE	2016	Anater A et al.	60	Micotoxinas en acuicultura
AQUACULTURE	2017	Magalhaes R et al.	70	Uso de insectos para piensos lubina
REV AQUACULT	2018	Dawood M et al.	79	Aditivos inmunoestimulantes

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This document is available at www.apromar.es

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Fondo Europeo Marítimo y de Pesca (FEMP)
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