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In brief

The Federation of Greek Maricultures (FGM) is one of the largest Associations of sea bass and sea bream farmers globally. It was founded in 1989 and currently represents nearly 80% of Greece’s production and 74% of the industry's employees. The purpose of this document is to give stakeholders a better insight into the sea bream and sea bass farming industry.

Executive Summary - State of aquaculture in Greece

- In 2019 total aquaculture production reached 149,975 tons with a value of 564.6 million euros, which is 2% more in terms of volume and 5% more in terms of value compared to the previous year.
- Finfish and mussels are the main groups of species produced. Fish farming (marine and fresh water) holds a dominant position of 85% in volume and 98% in value, followed by mussels with 15% and 2% respectively.
- Fish farming (marine and fresh water) reached 127,055 tons in 2019 with an estimated value at first sale of 553.4 million euros (1% more in volume but 14.5% more in value compared to the previous year).
- Shellfish production reached 22,020 in 2019 with an estimated value of 7.7 million euros (10% more in terms of volume and 1.5% more in terms of value).
- In 2019 the production of sea bream and sea bass reached 120,500 tons, 3% more compared to the previous year.
- In 2019 exports of bass and bream are estimated at 88,651 tons, of which 95% are marketed in the EU countries and 5% in third countries.
- In 2019 Greece supplied 59% of the sea bream and sea bass sold in the EU and 22.2% sold worldwide.
- In 2020 sea bream and sea bass production is expected to reach 117,000 tons, which is 2.9% less than the previous year.

Clarifications - Methodology

- The most recent and complete statistics on aquaculture at international and European level are from 2018 and mainly provided by the FAO, EUMOFA and the JRC.
- The most recent and complete statistical data on Mediterranean fish farming (sea bream and sea bass) are from 2019 and provided by the FEAP, FGM and Kontali.
- 2020 estimates are from FEAP, FGM and Kontali.
- Provisional statistical data used in this publication will be updated in upcoming editions and differences may arise.
- Production of export value denotes the value at the first sale by the producer and not the final price paid by the consumer.
- The value of aquaculture production at the international level is provided by FAO in US dollars and the average annual exchange rate for 2015, $1.0 = € 0.80 (rounded) has been used for conversion.

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The purpose of this report is to disseminate the information contained therein. Therefore, the use of text, graphics and tables from others is allowed as long as the source is referred, i.e. FGM.
Country Profile

- Almost 63% of seafood harvested in Greece comes from aquaculture with the remaining 37% from wild catches.
- Total seafood harvested from aquaculture amounted to 149,975 tons, with an estimated first-sale value of 564.6 million euros (+2% in volume and +5% in value over the last year).
- Per capita seafood consumption is 19 kg/person.
- Greece ranks 2nd in volume and in value among the EU-28 in fish farming (following the UK).

Main groups of species produced

- Mariculture is the main aquaculture activity where finfish and shellfish are the main group of species produced.
- Fish farming represents 85% in terms of volume and 98% in terms of value of the total aquaculture production while mussel production stands for 15% and 2% respectively.
- Marine fish farming (mainly sea bass and sea bream) holds a dominant position accounting almost for 85% of the volume and 97.2% of the value of the total aquaculture production in Greece.

Marine fish farming - 2019

- 124,800T of production of farmed marine fish
- 22.2% of global supply
- 460 million meals annually delivered in over 42 countries
- 63 companies in the Ionian & Aegean Sea
- 12,000 employees
- €0.55 bn production value
- €0.44 bn exports value
- Rank 1st in animal food exports

source: FGM

Mediterranean fish farming

- Sea Bream
- Sea Bass
- Other

source: FGM
1. Marine finfish farming in Greece

Mediterranean fish farming remains since 1981 the main aquaculture activity in the country. Nowadays there are 302 farms operating all over Greece most of which are family-owned and SMEs. The production ranges between 110,000 - 120,000 tons per year, contributing to the social and economic development of local communities and the supply of food of high nutritional value with a low environmental footprint. In 2019 the total production of sea bass and sea bream increased by 3% compared to the previous year reaching 120,500 tons. Greek production represents 59% of the Sea Bass and Sea Bream farmed in the EU-28 and 22.2% globally.

The major milestones of the industry for 2019 were the progress achieved concerning the restructuring of the sector and the strong investment interest, the high extroversion rate, the development of the brand “Fish from Greece” and the increasing competition with third Countries. More specifically and regarding the restructuring progress of the sector, the process of merging and consolidating the largest companies in the industry went further as the remedies set by the competent European authorities were met. The last phase of the acquisition agreement will be completed in 2021. When it comes to the second milestone and the market conditions, the export volume increased by 4%, confirming the strategy of Greek companies to increase production and expand to new markets. In 2019 the Hellenic Aquaculture Producers Organization (ELOPY) developed a brand for aquaculture products originating from Greece, “Fish from Greece”.

Finally, 2019 was also marked by relatively slow progress concerning the ongoing administrative reforms affecting the operation of the aquaculture companies and the growing competition with third countries.
Spatial distribution of farms and labor

In total there are 1007 aquaculture operators, where 84% of them are established in marine waters (822 fish and selfish farms), 9% are in fresh and brackish waters and 7% in lagoons. In the above analysis the hatcheries are not included. Marine fish farmers operate 302 farms and regarding the spatial distribution of their farms, 77% of them are located in three decentralized Administrations accounting for 82% of the production. These are the Decentralized Administrations of:

1. Peloponnese, Western Greece and the Ionian Islands,
2. Thessaly and Central Greece,
3. the Aegean

At regional level, out of the 13 regional units countrywide, the industry operates farms in 11 of them (Evia, Dodecanese, Etolokamania, Kefalonia, Fthiotida, Thesprota, Attica, Argolis, Corinth, Chios and Preveza), with an average of less than 10 licensed farms per unit in the remaining coastal areas.

<table>
<thead>
<tr>
<th>Decentralized Administration</th>
<th>Number of farms</th>
<th>Marine area (acres)</th>
<th>Approved tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aegean</td>
<td>51</td>
<td>1,099</td>
<td>16.60 %</td>
</tr>
<tr>
<td>Attica</td>
<td>24</td>
<td>517</td>
<td>6.18 %</td>
</tr>
<tr>
<td>Epirus &amp; West Macedonia</td>
<td>38</td>
<td>667</td>
<td>8.60 %</td>
</tr>
<tr>
<td>Thessaly &amp; Central Greece</td>
<td>72</td>
<td>2,121</td>
<td>32.40 %</td>
</tr>
<tr>
<td>Crete</td>
<td>2</td>
<td>50</td>
<td>0.223 %</td>
</tr>
<tr>
<td>Macedonia - Thrace</td>
<td>6</td>
<td>125</td>
<td>3.00 %</td>
</tr>
<tr>
<td>Peloponnese - West Greece &amp; Ionian</td>
<td>109</td>
<td>2,791</td>
<td>33.00 %</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>302</strong></td>
<td><strong>7,370</strong></td>
<td><strong>100.00 %</strong></td>
</tr>
</tbody>
</table>

source: FGM, Minagric

In terms of employment in aquaculture, Greece has one of the highest shares in the E.U. The industry employs directly almost 4,000 people and indirectly about 12,000 workers and scientific, technical and managerial personnel. Most importantly, these jobs are created in remoted coastal areas contributing significantly to the economic and social development of local communities. Marine aquaculture (fish and mussels) accounts for 83% of the employment in the sector, brackish water 10% and inland aquaculture 7%. With regard to marine fish farming, the industry creates significant number of jobs in ten out of the thirteen Regions of Greece.
2. Volume and value of main species produced

In 2019 the production of Sea bream and Sea bass amounted 120,500 tons (65,300 tons of sea bream and 55,200 tons of sea bass), up 3% compared to the previous year. Sea bream stands for 54% of the production volume and Sea bass for 46%. The increase in production was accompanied by a marginal decrease of 1% in sales value due to the reduced price for both species.

In 2020 it is estimated that the production of the two species will decrease by 2.9% to 117,000 tons.

Prices in 2019 for sea bream and sea bass decreased compared to 2018. The average price of sea bream was 4.5€/kg, a 0.4% decrease while for sea bass, the average price was 4.5€/kg, an 8.4% decrease.
Currently, there are two companies certified to produce organic fish in Greece and there are three private agencies providing such certification schemes for aquaculture. The certification companies are authorized and supervised by a state agency (Greek Agricultural Organization "Dimitra").

Other marine species

Apart from sea bass and sea bream, there are also some other Mediterranean species (often described as “new species”) that represent approximately 3% of the total production of marine fish farming. In 2019 their production reached 4,300 tons, which is 24.6% more than in 2018. Among the new species, meagre holds one of the largest market shares. In 2020 their production is expected to grow by 18% and exceed 5,000 tons.

Organic Sea Bream and Sea Bass

Organic aquaculture consists of approximately 800 tons which is 0.7% of the total harvest volume. However, it should be noted that about 62% (495 tons) of this production was sold as organic fish, while the rest was sold as non-organic. Compared to 2018, the production remained the same at 800 tons. Organic fish are up to 60% more expensive than the non-organic and therefore demand grows relatively slow.
3. Economics of Sea Bass and Sea Bream farming

The main raw materials used in the production of fish are fish feed (57% - 59%) and juveniles (13% - 16%). Together they represent a total of 70% of production costs. The remaining 30% varies according to the size and operational structure of each company and is divided into labor costs (13%), depreciation (2%) and other operating expenses (16%).

Feed Market

In terms of production costs, fish feed is the most important raw material used in the production process and represent 57% - 59% of the production cost. In Greece there are 8 manufacturers of compound feed, three farming companies that own fish feed manufacturing companies and one feed manufacturing company that owns fish farms. The raw materials used in fish feed are fishmeal and fish oil, cereals, vegetable protein and oilseed products, which are imported to a large degree from South America, northern Europe and Africa.

Feed sales in 2019 are estimated at 258,000 tons showing 2% increase compared to 2018. Of these, almost 95% of the fish feed sold was manufactured in Greece and 4.5% were imported by fish feed companies. A very small segment of 0.5% was imported directly by the farms. In 2020 it is estimated that feed sales will increase slightly.
Production of Juveniles

The on-growing activity is supported by several hatcheries with an annual production capacity of 500 million juveniles. Almost 97% of the juveniles produced for stocking is sea bream and sea bass fry and the remaining 3% is for all other Mediterranean species.

In 2019 the total production of juveniles for stocking was 422.3 million pieces, valued 86.7 million euro. Of these, 14% were exported to other countries (Spain, Croatia, Egypt, UAE, Tunisia).

Per species:

- 173 million sea bass juveniles were produced. Their production was decreased by 4.9% compared to 2018. Out of those, 16.5 million juveniles were exported.
- 238 million sea bream juveniles were produced. Compared to 2018, there is 4.8% decrease in production volume. Of those, in 2019, 6.5 million juveniles were exported.
- It is estimated that in 2019 a small amount of fry was imported from Italy and France.

In 2020 the production of sea bream and sea bass juveniles is expected to decrease by 8% and reach a total of 378 million pieces (166 million juveniles of seabass and 212 million of sea bream, corresponding to a 4% and 10.9% decrease respectively over 2019).
4. Main markets and trade of Sea Bass and Sea Bream

The Aquaculture industry in Greece is highly export oriented as approximately 80% of the production is sold in the EU and third countries. This trend was reaffirmed in 2019 as 72% of sales went to EU markets, almost 5% to third countries and the rest to the domestic market. Greek farmed fish was sold in 42 countries worldwide. By far the largest market for Greek products is the EU and a smaller share is sold to North America and other third countries. The primary markets for the Greek fish are Italy, Spain, and France as 60% of the Greek production was sold there in 2019.

More specifically, in 2019, 88,651 tons worth 420.1 million euros were sold abroad, showing a 4% increase in volume. The value of exports remained stable due to the reduced prices throughout the year. Of the total exports, 93% (81,973 tonnes) were sold in 25 EU markets and 7% (6,678 tonnes) in 17 third countries. The domestic market is estimated at 25,000 - 26,000 tons. Almost all exports were fresh fish and only 0.5% of frozen fish sold mainly to third countries. 52% of the export volume (46,200 tons worth 219.2 million euros) was sea bream and 48% sea bass (42,450 tons worth 200.8 million euros). In 2019, a small export activity was recorded in 11 new third countries.
5. Environmental and social sustainability

Environmental sustainability and social responsibility
Greek aquaculture sector is committed to provide high nutritional value marine protein through responsible and sustainable operations. Sustainability means creating value for the employees, for the environment and for the society, without compromising the ability of future generations to meet their needs. As the demand for fishery products and consequently the production of fish farming is constantly increasing, FGM and its Members work consistently to minimize the environmental footprint of the Mediterranean fish farming. For over 20 years our companies have adopted and are committed to the principles of the Code of Conduct of the Federation of European Fish Farmers, applying all the technical recommendations and guidelines of the World Food Organization.

Creating value for the employees

Employment: FGM members’ operations cover 10 out of the 13 regions in Greece and share a common set of core values that promote fair treatment and safe working conditions for all employees across all their operations. Direct labor is calculated as full-time equivalent employees per calendar year. In 2019 it was 3,100 persons (seasonal employment was almost 500 persons).

Health and safety at work: FGM members provide their employees with all means of personal protection, aiming to minimize the risk of accidents at work. Safety protocols have been developed and are constantly updated while annual training sessions for health and safety issues are held at company level. At the same time, employees are encouraged to participate in Health and Safety training seminars provided by external organizations.

Business ethics & human rights at work: FGM members sign written contracts with their employees, according to a General Collective Agreement and sign written remuneration agreements with the representatives of technical staff. FGM members have established and follow Code of Conducts with their employees. Companies are committed to uphold UN Universal Declaration of Human Rights and are in compliance with the relevant Greek legislation. Workers’ unions are supported. Companies are also committed to respect the human right to privacy and to comply with the new European Union General Data Protection Regulation (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016) on the protection of natural persons with regard to the processing of personal data and on the free movement of such data.

Vocational training and education: Employees are encouraged and supported to pursue post graduate studies and diplomas. Scientific stuff and technicians attend national and international conferences for aquaculture, feed production, fish health and genomics. As from 2018 a two year national vocational training program for 1,250 employees who work or intend to work in the aquaculture sector is implemented with the cooperation of FGM.

Creating value for the society

Financial performance: FGM members try hard in this competitive market of seafood commodities, to secure market shares and profitability and contribute to the national economy. Volatile prices significantly affects the financial results, despite the continuous efforts by the producers to reduce the production costs. The sector’s productivity and economic figures are published on a yearly basis by FGM, based on data collected from official sources (EUMOFA, EUROSTAT, FAO etc).

Consumer health and safety: Establishments for handling feed and food enforce HACCP principles and are certified with international standards. In addition, more strict standards are enforced in packing plants and fish processing...
plants certified with IFS and/or BRC standards. In addition to the regulatory requirements, FGM Members ensure the quality of their products by following a series of good practices which include:

- The use of genetically unmodified raw materials.
- The continuous control at all stages of the production process.
- The continuous and strict quality controls of brood, fish feed, finished products.
- The continuous environmental monitoring through thorough controls and measurements.
- The complete traceability system.

**Research and innovation investments**: FGM promotes investments in R&D as an opportunity to improve further fish farming operations, reduce possible operational and environmental risks, reduce dependence on fishmeal and fish oils and ensure continuous progress towards sustainable Sea Bass and Sea Bream farming. Since 2018, 25 R&D projects are implemented with a total budget of 12 million euros.

**Collaboration with local communities**: Our local operations actively engage with the local communities and support their socioeconomic development. To highlight our Members’ commitment to working with local communities, indicatively we can mention that financial and practical support was offered to schools, medical centers, cultural events and athletic organizations, multiple initiatives were taken concerning the protection of the natural environment, e.g. beach clean ups in coastal regions, and fish were offered as meals, (more than 10,000 kg fish offered in 2018), just to mention a few.

**Creating value for the environment**

**Sustainable fish feed**: Minimize dependency on sustainable natural resources such as fish meal and fish oil is the target of Greek producers. The use ratios, for fishmeal and for fish oil are calculated every year and the trend is to reduce this in the next 5 years. More than that the dependency on forage fisheries is reduced. Figures for 2019 are gathered and will be published in the next annual report of FGM.

**Escapes and interactions with wildlife**: FGM members are committed to reducing any negative wildlife interactions through responsible management of the ecosystems in which they operate. Due to our efforts it is only in rare cases that wildlife, mainly birds, are affected as a result of interacting with the cages. This has been calculated as the total number of interactions divided by the total number of sites from January to December each year. In 2019 there were no incidents to report. Since 2000 FGM members have adopted a code of conduct providing best practices to minimize the number of escapes. Despite their best efforts there remains a low risk of fish escapes as a consequence of bad weather, predation or possible human errors. Data for 2020 has been gathered and will be published in the next annual report of FGM.

**Fish welfare**: The well-being of fish depends on a number of biological and environmental factors including, inter alia, their living conditions, health and diet. Ensuring their optimal possible living is a priority for FGM because it is a prerequisite for the breeding of healthy and high-quality fish. FGM members apply appropriate preventive measures with full regard to the needs of the fish and so that pain, distress, suffering, disease outbreaks, mortality, stress, aggression...
and behavioral disorders are minimized. Apart from the best practices, FGM and our members:

- Participate to the Performfish research program where, among other things, it aims to establish fish welfare indicators.
- Participate at European level to the Platform for animal welfare, AAC where under the auspices of the European Commission and the Ministry of Rural Development & Food work to update the animal welfare guidelines. They are expected to be approved in 2020.
- At national level, the Hellenic Organization of Aquaculture Producers, in collaboration with the University of Crete, develop a guide for the well-being of farmed sea bream and sea bass.

**Prevention:** The focus of our members is on disease prevention rather than disease treatment: antibiotics are therefore not used unless considered to be essential for disease treatment. At times, this means we have to use them to ensure the health of our fish, in the same way we as people use antibiotics to fight off illness. If they are used, it is exclusively with the direction of a veterinary prescription, and under close supervision by certified fish health professionals.

**Certifications and environmental compliance:**
All our members are committed to greater transparency, and continuous improvements in their sustainability performance. In addition to the various industry certifications each one of our Members has acquired, they are committed to obtain one more standard that has been developed by the Hellenic Aquaculture Producers Organization, namely «Fish from Greece» and is certified by TUV based on 6 pillars to assure high quality of the products, health and well-being of farmed fish, food safety, minimum environmental footprint etc. (more info at https://fishfromgreece.com/about/certifications/?lang=en)
6. Growth Vision 2030

This section presents the vision for the development of Greek aquaculture as originally drafted in 2012 along with the European Aquaculture Research and Innovation Platform (EATiP) and elaborated further in the “Multiannual National Strategic Plan for Aquaculture 2014-2020”. Greece in particular is expected to double its production by 2030 in order to meet the growing demand and maintain its market position globally. Harvest volume is expected to reach nearly 220,000 tons, worth 1 billion euros. The export rate will be further strengthened (85% - 90%) as exports are expected to exceed 170,000 tons annually. It is estimated that this will create up to 3,000 new jobs in direct employment and many more in related activities.

However, during the 2012–2016 period, due to the financial crisis in the country and the ongoing restructuring process of the largest companies, the growth strategy was revised, focusing on stabilizing the sector and improving profitability rather than increasing production. According to the mid-term evaluation of the Multiannual National Strategic Plan for the Development of Aquaculture 2014-2020, the average growth rate has been revised, based on the production trends. The industry is projected to grow further in 2018.

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