GLOBEFISH

GLOBEFISH RESEARCH PROGRAMME

Eel (*Anguilla* spp.): Production and trade

Volume 114

Eel (*Anguilla* spp.): Production and trade according to Washington Convention Legislation

by

Pierluigi Monticini

(July, 2014)

The GLOBEFISH Research Programme is an activity initiated by FAO's Products, Trade and Marketing Service, Fisheries and Aquaculture Policy and Economics Division, Rome, Italy and financed jointly by:

- National Marine Fisheries Service (NMFS), Washington DC, **USA**
- Ministerio de Agricultura, Alimentación y Medio Ambiente, Madrid, **Spain**
- European Commission, DG MARE, Brussels, **EU**
- Norwegian Seafood Council, Tromsoe, **Norway**
- FranceAgriMer, Montreuil-sous-Bois, **France**
- Alaska Seafood Marketing Institute (ASMI), **USA**
- Seafish, the Authority on Seafood, **United Kingdom**

Food and Agriculture Organization of the United Nations, GLOBEFISH, Products, Trade and Marketing Service, Fisheries and Aquaculture Policy and Economics Division
Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (39) 06570 54163
E-mail: globefish@fao.org; globefish-pub@fao.org - Fax: (39) 06570 53020 - www.globefish.org

Pierluigi MONTICINI, GLOBEFISH consultant.
EEL (ANGUILLA SPP.): PRODUCTION AND TRADE ACCORDING TO WASHINGTON CONVENTION LEGISLATION
GLOBEFISH Research Programme, Vol. 114. Rome, FAO 2014. 78p.

This report provides operators in the sector with up-to-date and complete information on the trade of *Anguilla anguilla* – eel. Statistical data from the last ten years has been examined, which represents a significant period for an economic evaluation of the sector and for assessing the availability and resilience of the various species, particularly the European eel.

Layout: Gloria Loriente
Cover photographs: Courtesy of Pierluigi Monticini

TABLE OF CONTENT

TABLES

FOREWORD

The primary aim of this report is to provide operators in the sector with up-to-date and complete information on the trade of *Anguilla anguilla* – eel. With numbers decreasing drastically, *Anguilla anguilla* is now featured on the list of protected species in Annex II of the Washington Convention on International Trade of Endangered Species (CITES).

Eels have traditionally been caught, bred for trade and consumed live, fresh, chilled, frozen or smoked. They are part of the culinary traditions in countries located in quite distant geographical areas, ranging from the Japanese eel (*Anguilla japonica)* in countries of East Asia such as China and Korea to the European eel (*Anguilla anguilla)* in Europe. Countries in southern Europe, such as Italy and France, have made the eel market a segment of economic interest in the fisheries and aquaculture sector.

For this study, we examined statistical data from the last ten years, which represents a significant period for an economic evaluation of the sector and for assessing the availability and resilience of the various species, particularly the European eel. Only a few of the roughly 15 species and their subspecies are of relevance from an economic point of view. These include: the European eel and the Japanese eel, as well as the American eel (*Anguilla rostrata*), and the short-finned Eel (*Anguilla australis australis*).

Of these, only the European eel is subject to protection programmes after being listed as a protected species under the Washington Convention, due to the drastic drop in the number of wild eels since 2009. Its vulnerability is due to its relatively long biological cycle (being a catadromous species), the effects of numerous pathologies, some of which are typical to the species, and numerous anthropic threats such as overfishing, pollution, modified natural habitat and poaching. Due to these threats, an eel management plan has been implemented through Council Regulation (EC) 338/1997, which implements CITES within the European Union (EU) and Council Regulation (EC) 1100/2007 which establishes the measures for wild European eel stock recovery.

For this study, we used United Nations Commodity Trade Statistics Data Base (UNData) from the last ten years to examine imports and exports in the major countries involved. We report findings in USD in terms according to Commodity Codes, i.e. fresh or chilled eel, frozen eel and live eel. In addition, data from the FAO FishStat Plus system was used for the homogenous categories of live, fresh or chilled, frozen and smoked eel, in terms of value and in terms of quantity (tonnes). Data on production typologies was examined according to global production, aquaculture production and capture production, in order to evaluate the quantities in terms of tonnes. Data from Eurostat 2010 data (Traffic report on the Trade in *Anguilla* spp., (Crook, 2010) was used for the smoked eel category. The FAO Code of Practice for Fish and Fishery Products **(**first edition) provided definitions for the various commodity codes and production processes.

An analysis of the information and an assessment of the strengths, weaknesses, opportunities and threats (SWOT analysis**)** found a notable drop in the availability of wild fish for the market. The numerous anthropic threats seem to be the major cause of this drastic drop in the capture of wild eel, although often production data fails to consider elements such as over fishing and food fraud.

Currently, international discourse Legislation appears to be limited to recording a decline in the numbers, which have been dropping for some time, without offering a solution for the present situation. Only through the development of the strong points of the trade, and by establishing new opportunities for the future (full lifecycle completed in captivity and mass indoor reproduction for commercial purposes) with greater awareness at an international level, in particular for the biggest global importers, can we hope to protect the species from an inexorable decline and reap the benefits from sustainable production for future generations.

1. BIOLOGY

1.1. CLASSIFICATION

Anguilla or eels: teleost species, anguilliforme order, easily recognizable by snake-shaped elongated body, with no ventral fins, small pectoral fins to swim along the river bottom, no pelvic cirdle, small cycloid-type scales, greenish brown or black color depending on habitat, with ventral part more clear, and length averages around 1 m.

CLASSIFICATION (common in all species)
Class: Teleostomi, **Subclass**: Actinopterygii
Order: Anguilliformes, **Suborder:** Anguilloidei
Family: Anguillidae
Genus: Anguilla
Species: more than 15 species and 5 subspecies – according different reports – with only a few of commercial interest.

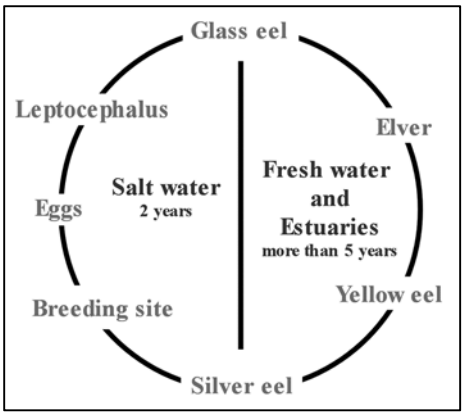
Eels also have characteristics in common with all the other Anguilliformes, namely: cycloid scales, no spiny fins, long dorsal and anal fins, multi-stages development, demersal species, catadromous.

The very long lifecycle, which can be up to 20 years, can be divided in different stages. The eggs (pelagic) become leaf-like larvae (*leptocephalus*), which consume "marine snow" or small particles that float in the water. The larvae metamorphose into the glass eel stage, so called because at this point they have a transparent body, averaging around 5 cm length and weighing 1 g. They then become elver and yellow eels with freshwater and estuary habitats. The dark colored elvers reach 10 cm, and the yellow eels over 10 cm. The adult or silver eels live in freshwater or estuaries before moving to the sea for breeding.

The yellow phase is long, ranging from 5 to 9 years, depending on species and habitat. Sexual maturity is 3 to 9 years for male and 5 to 18 years for female. The *Anguilla* species adult grows to 1 m and weighs 4–6 kg.

The specimens live around 20 years. Some spend most of their lives in freshwater before going back to the sea for reproduction, while others remain all their lives in saltwater. All eel species die after the breeding season.

Figure 1. Eel life cycle



The adults return to the sea to spawn after reaching sexual maturity. The leptocephalus larvae migrate from the sea to the coastal areas and inland-water courses where they grow into elvers. This euraline fish species adapts excellently to both inland-water courses and seawater.

This species has a high commercial value and is sold in markets all over the world – live, fresh or chilled, frozen, marinated, smoked, whole or in pieces. Although it has already been bred successfully, progress is still needed in order to breed this species in a controlled environment for commercial purposes. International fish markets are supplied exclusively by specimens captured in the wild, during the morphological stage as glass eels change into elvers.

Due to the biological and physiological characteristics and more intensive exploitation, particularly in Southeast Asia, the numbers of wild eel populations migrating upstream from river mouths to inland water courses has dropped considerably. In Italy, eels are one of the most important products for the fish market and the reduction in the number of young adults in the larvae stage is mainly due to the anthropic impact and morphological changes in freshwater courses.

The United Nations Food and Agriculture Organization (FAO) considers four of the 15 eel species to be of commercial interest:

- European eel (*Anguilla anguilla*),
- American eel (*Anguilla rostrata*),
- Japanese eel (*Anguilla japonic*a)
- Short-finned eel (*Anguilla australis australis*).

Other species of tropical and subtropical origin, which are not relevant from the commercial point of view, include: Indian eel (*Anguilla bengalensis),* mottled eel *(Anguilla nebulosa),* African long fin eel *(Anguilla mossambica),* and New Zealand eel *(Anguilla dieffenbachii).*

1.2. EUROPEAN EEL

Species: *Anguilla anguilla* (Linnaeus, 1758)

Courtesy: P. Monticini

Synonymous: *Anguilla anguilla*, Schrank, 1798
Anguilla vulgaris, Shaw, 1803

FAO common name: European eel (En)
Anguille europe (Fr)
Anguila europea (Sp)

IUCN Red List status: not evaluated until 2006, Critically Endangered (2008)

Convention on International Trade in Endangered Species of Fauna and Flora (CITES): Appendix II (in force from 13 March 2009), Council Regulation (EC) N. 338/1997 which implement CITES within European Union

Resilience: very low, doubling time on average 15 years

Vulnerability: very high, due to human impact

FAO fishing area: Mediterranean and Black Sea (FAO fishing area 37), Atlantic Northeast (FAO fishing area 27)

Geographical distribution: Mediterranean region, Iceland Madera, North Europe, North Africa. *Anguilla anguilla* is found in all European rivers and streams draining to the Mediterranean Sea, with low presence in Black Sea, very rare presence in northwest Russia and Barents Sea, and occasional in the Volga River drainage. This species breeds in the Sargasso Sea in Western Atlantic migrating across the Atlantic Ocean

Climate: temperate

Size and weight: female – 150 cm and more than 2 kg; male – 50 cm and 300 g. Usually less size reporting

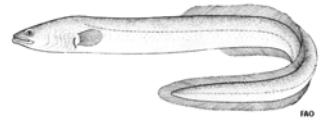
Description, biology: elongated, snake-like body like a snake, cylindrical anteriorly, dorsal and anal fins end in caudal fin. Pectoral fins small, no pelvic fins. Wide mouth, color varies in relation to the environment, size and stage of development. In freshwater gray or blackish on the back, white or yellowish belly. Some rare specimens have an orange coloring

Habitat: *Anguilla anguilla* is found in all types of benthic environment, rivers, streams, estuaries and lakes that are connected to the sea. They spend their lives in freshwater and return to the sea for the breeding season

1.3. AMERICAN EEL

Species*: Anguilla rostrata* (Lesueur, 1817)

Synonymous: none



Source: FAO

FAO common name: American eel (En)
Anguille amerique (Fr)
Anguila americana (Sp)

IUCN Red List status: not evaluated

Convention on International Trade in Endangered Species of Fauna and Flora (CITES): Last concern

Resilience: low, doubling time on average 9 years

Vulnerability: very high, due to human impact

FAO fishing area: Atlantic, Western Central (31) and Atlantic, Northwest (21)

Geographical distribution: Western North Atlantic, Gulf of Mexico, Atlantic coast of USA and South of Canada. This species breed in the Sargasso Sea in Western Atlantic

Climate: subtropical, range from 4 °C to 25 °C

Size and weight: species close to European eel but smaller size, usually reaching 50 cm length, with females growing much larger than males

Description, biology: see the Type Species (*Anguilla anguilla*)

Although very close to European eel, the FAO Guide notes the following external phenotypic characters that distinguish *Anguilla rostrata* from all the other eel species: presence of cycloid scales near the pectoral fins, small teeth in upper and lower jaws, lower jaw beyond upper jaw

Habitat: *Anguilla rostrata* is found in all types of benthic environments, rivers, streams, estuaries and lakes that are connected to the sea. They spend their lives in freshwater and return to the sea for the breeding season

1.4. JAPANESE EEL

Species: ***Anguilla japonica*** (Temminck and & Schlegel, 1847)

Synonymous: none

FAO common name: Japanese eel (En)
Anguille du Japan (Fr)
Anguila japonesa (Sp)

IUCN Red List Status: not evaluated

Convention on International Trade in Endangered Species of Fauna and Flora (CITES): last concern

Resilience: low, on average 10 years

Vulnerability: high to very high

FAO fishing Area: Pacific Northwest (61)

Geographical distribution: around Japan and China, Pacific Northwest Ocean, This species breed in the Mariana Ridge, Western Pacific

Climate: Subtropical, range from 4 °C to 27 °C

Size and weight: common length 40 cm maxiumum weight 1.90 kg

Description, biology: see the Type Species (*Anguilla anguilla*)

Habitat: *Anguilla japonica* is found in all types of benthic environments, rivers, streams, estuaries and lakes that are connected to the sea. They spend their lives in freshwater and return to the sea for the breeding season

1.5. SHORT-FINNED EEL

Species: Anguilla australis australis (Richardson, 1841)

Synonymous: none

FAO common name: short-finned eel

IUCN Red List Status: not evaluated

Convention on International Trade in Endangered Species of Fauna and Flora (CITES): last concern.

Resilience: low, doubling time averages 9 years

Vulnerability: very high, due to human impact

FAO Fishing Area: Pacific Southwest (81)

Geographical distribution: Pacific Southwest, Australia, New Zealand, North New Caledonia, American Samoa. The short-finned eel spawns in the Coral Sea, off New Caledonia

Climate: Subtropical

Size: male – maximum 130 cm; female 105 cm; standard size – 45–50 cm

Description, biology, habitat: see the Type Species (*Anguilla anguilla*)

1.6. TECHNICAL ASPECTS

There are many factors that justify eel farming. Biologically, eel have a high rate of survival in captivity, better tolerance to different water parameters, good growth rates and high productivity, thanks to well-tested rearing methods. Eel aquaculture is based solely on glass eels (elvers) caught in the wild and grown in captivity. The most widely used farming techniques worldwide are: extensive systems such as vallicultura in Italy, intensive rearing in open recirculation systems and intensive rearing in closed systems.

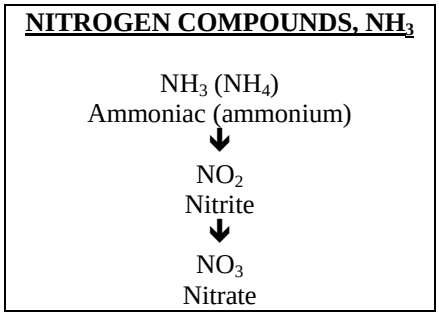
- **Extensive rearing** is the traditional form of eel aquaculture in Europe. Fish are reared in large earth ponds, characterized by low density stock, using no technical equipment or artificial oxygen, at a temperature range of 18 to 25 °C.

- **Intensive closed system** in calls for artificial tanks of different sizes, each used for a specific purpose, (for different purposes: nursery, quarantine, growing or, treatment), and which and can be either cdifferent shapes (circular or rectangular). Usually they the tanks are made of PVC, fiberglass or concrete. The technical equipment is complete and controls all the water parameters and flow rate. An efficient recycling system can increase eEel biomass in the system with a relatively small quantity of water.
- **Intensive open system** is set in medium size earth ponds, with medium to low density of elvers biomass. This technique is similar to valliculture, but less available surface area and water is required.

1.7. WATER QUALITY CONTROL

All *Anguilla* spp. species are robust fish and can be raised in high density (intensive farming). However, great attention to physical and chemical parameters is required to guarantee high growth rate and survival, as follows:

- **Temperature** is the most important factor for eel production. In valliculture, around 25 °C is optimal for the rearing system, although the temperature can range from 18 to 26 °C. In a closed system, the water must be heated, with optimal results at 24–26 °C. Eel growth ceases at 12 °C. Water temperature is not a problem during eel migration because, in the yellow stage, eel can tolerate a high temperature range.
- **Salinity** parameter is is an extremely variable parameter, ranging from freshwater to around 36 percent saltwater. Eels are euryhaline and adapt to different environmental conditions. While elvers prefer freshwater or brackish water with a low saline concentration, silver eels prefer high salinity.
- **Oxygen** concentration must be high, at levels depending on the rearing methods – whether it is a saltwater or freshwater environment, or open or closed system. Eels can survive in a low oxygen concentration, but the best concentration is a saturation of 40 to 50 percent. Oxygen consumption is affected by many behavioral and environmental factors such as temperature, eel size, quantity of food and health conditions. In an intensive closed system, the oxygen level can easily be monitored and regulated by electronic instruments and aerators.
- **Nitrogen compounds** such as ammonia are highly toxic. However, *Anguilla* spp. is tolerant to nitrites and to the less toxic nitrates. Free ammonia is extremely toxic and harmful, especially for gill epithelia at certain situations, such as water with high pH value and high fish density. A high concentration of ammonia in the gills makes the fish susceptible to secondary infections and to fungi, such as *Saprolegna* spp. Thus, recycling, biological filters and frequent water changes are often used to remove harmful substances from the water.
- **pH value** optimum for eel farming is pH 7–8. The ideal situation is the availability of freshwater and saltwater to obtain an optimal mix and regulate the pH value as required. Achieving this value is closely related to temperature, salinity and oxygen concentration.



1.8. FEEDING AND GROWTH RATE

Eel farming calls for various type of diet, depending on the type of rearing methods and eel size. All forms of intensive eel farming often use moist paste or an artificial diet.

- **Natural food diets** call for frozen or fresh fish (whole or chopped) such as shrimp and sardines. This use is now decreasing.
- **Artificial diets** call for pellets and extruded food, which contain a high level of protein (40–50 percent) and a variable level of fats (7–20 percent).

The quantity of the food depends on many factors such as type of diet, body weight, bio-mass and number of daily meals. Silver eels stop feeding before migration with a consequent reduction in stomach size.

The composition of the food gives good results with a suitable level of crude proteins and fats: essential L-amino acids such as arginine and methionine, essential fatty acids such as linoleic acid, vitamins and minerals.

Eels reach commercial size after about two years.

1.9. DISEASES AND DISORDERS

Worldwide, many eel diseases are problematic in both wild, saltwater environments, and in farm environments, which can be either freshwater or saltwater. Commercial harvesting of live eels has contributed to an increase in the spread of various pathogens (not all endemic): parasites, bacteria, fungi and viruses. The growth of eel diseases can be due to incorrect fishing methods, bad management, environmental factors such as inadequate temperature, high salinity or free ammonia, and infectious biological agents.

1.9.1. Parasitic diseases

Parasitic diseases occur due to certain rearing situations. In nature, parasites are usually not pathogenic, but can become so due to overcrowding and high density biomass associated with low water exchange. The parasites most frequently found in eel farming are:

- Crustacean: *Argulus* spp. – fish lice; *Learnea* spp. – copepod crustaceans, commonly called anchor worms; and the *Ergasiluss* spp.*;*
- Trematodes: *Gyrodactylus* spp. and *Dactylogyrus* spp. – gills and skin worms
- Nematodes: *Anguillicola crassum* – swim bladder disease;
- Fungi: *Saprolegna* spp. as a result of poor water quality and as a secondary infection; *Ichthyophonus hoferi* – widespread in eels but with no serious symptoms;
- Protozoa: *Ichthyophthirius multifilis* – white spot disease; *Tricodina* spp. –found often in skin and gills.

1.9.2. Infectious diseases

Infectious diseases occur in the presence of the bacterial agents: *Aeromonas punctata* – red fin disease; *Pseudomonas hydrophila* – fin rot disease; and *Vibrio anguillarum* – red eel pest.

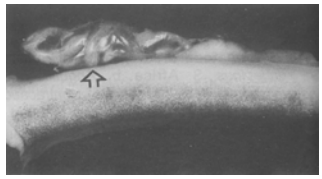
However, the major diseases caused by secondary bacterial infection can be eradicated by maintaining conditions such as: controlling stress factors, eliminating poor farming practices, following valid quarantine protocol, and having correct diagnosis and effective treatment.

1.9.3. Viral diseases

Three viral diseases are known to affect eel:

- cauliflower disease (**EV2**) – an orthomyoxovirus group, specific to *Anguilla Anguilla;*
- viral kidney disease (**EVE**) – an IPN-like birnaviridae that occurs in European and Japanese eel with a high mortality rate, especially for juveniles;
- eel virus American (**EVA**) – occurs in European and American eel, with the specimens showing signs of haemorrhages and necroses in the muscle tissue.

Nematode: *Anguillicola crassum*
(Responsible for major losses in European eel farming).



Courtesy: Ian Paperna, 1996

Family: Anguillicolidae

Genus: Angullicola

Disease: swim bladder nematode

Host: potentially all freshwater and brackish water fish may be affected (Paperna, 1991). Fish are the intermediate or final host for nematode. Copepods are the first intermediate hosts for Angullicolidae

Site: swim bladder

Predisposing factors: overcrowding, incorrect quarantine protocol, live food

Pathology: *Anguillicola* spp. occurs in *Anguilla japonica* and *Anguilla australis* eels. Often it is found in earth ponds, rarely in intensive farming systems

Pathological infection varies with farming conditions and eel species, serious infection causes haemorrhagich inflammation of the swim bladder

Lesions are evident in post-juvenile eels. Up to 20% losses caused by secondary bacterial infection

Prevention and controlcontrol: effective quarantine period, continuous monitoring, elimination of predisposing factors (intermediate hosts), adequate sanitation should prevent infection with a direct life cycle (e.g. clean the bottom of the tanks)

Treatment and cure: anthelminthic for adults. Encysted nematodes are difficult to treat

2. STATISTICAL DATA

2.1. UNDATA

The United Nations Commodity Trade Statistic Data Base (UNData) contains over 1 million entries on the commercial exchange of the various Commodity Codes dating back to 1962.

Every year, more than 140 UN Member States provide statistical data to calculate the figures of international trade. The data are updated at regular intervals.

The Commodity Codes in question are those of the following homogeneous product categories: fish, mollusks, aquatic invertebrates (Cod. 03); fresh or chilled eels (Commodity Code 30266), frozen eels (Commodity Code 30376), live eels (Commodity Code 30192).

The above Commodity Codes are also used for European classification.

2.2. FAO FISHSTAT PLUS

FAOSTAT is part of FAO's mission to improve statistical data collection and dissemination for development, and to fight against global hunger and malnutrition. Member States and regional areas have been involved in gathering and sharing data since 1961.

The FAO Fisheries and Aquaculture Department compiles fisheries and aquaculture statistical data using FishStat Plus as a part of FAOSTAT.

FishStat statistical data has been used to present an exhaustive overview of the eel market at global level, including: global production, aquaculture production and capture production.

ASFIS Eel species considered in relation to statistical analysis are: European eel, American eel, Japanese eel and Short- finned eel.

Data on global eel trade has been processed (aggregated) for live eels, fresh or chilled eels, frozen eels, smoked eels (FAOSTAT PLUS does not use Commodity Codes).

2.3. EUROSTAT

EUROSTAT provides statistical details on the European Member States and candidate countries, through various statistical publications.

This study extracted EUROSTAT data on the smoked eel trade from the 2010 TRAFFIC report on *Trade in Anguilla species* (Crook, 2010).

Table 1. Global, Aquaculture and Capture production (tonnes)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total production	221 452	217 875	218 583	217 701	230 901	223 981	249 121	281 569	267 709	275 557	274 574	268 342
Aquaculture production	210 228	207 708	208 897	209 470	223 238	216 616	238 697	273 449	260 835	269 397	268 585	262 392
Capture producti	11 224	10 167	9 692	8 235	7 676	7 375	10 616	8 279	6 899	6 679	5 989	5 842

Source: FAO FISHSTAT Plus (2014).

STATISTICAL DATA ANALYSIS

FAO FishStat Plus data on global production of eel show an increase that peaked in 2007 at 281 000 tonnes. During the following years, 2008 to 2011, there was a slight reduction of eel global production. Approximately 95 percent of this production was from aquaculture. As shown in Figure 1, aquaculture production runs parallel to total production. The quantity of capture production has little relevance for statistical purposes.

In terms of imports and exports, cumulative FAO FishStat Plus data on live, fresh, chilled, frozen and smoked eel indicate the following considerations.

IMPORTS. From 2000 to 2011, global eel imports dropped drastically, from 119 000 tonnes in 2000 to 57 000 tonnes in 2009. None of the markets maintained the same level of imports reached in the previous years. The major player in this segment was Japan, importing 32 500 tonnes in 2009, followed by China at 9 500 tonnes. For many of the countries examined, the crucial year seemed to be 2007, after which there was a drastic drop in incoming trade (Table 2). Data on trade value appear to follow an increasing trend until 2004, with a peak of USD 1.080 billion followed by years of decreasing values until reaching USD 590 million in 2009 (Table 3).

EXPORTS. Export quantities have followed the same trend as imports. The entire sector is on a downturn, with a drastic drop since 2004. Apparently, this fall-off in exports (at a global level) was due to a lack of product to trade.

At a national level, China accounted for around 50 percent global imports at 44 000 tonnes in 2009. The data on quantities for European countries examined (including Germany, Italy, Norway, etc.) are irrelevant for statistical purposes (Table 4).

Data on export value show a notable drop in volumes traded, although this does not seem to have had a substantial effect on prices. The global figure of USD 813 million in 2009 is well below that of USD 1 309 million reached in 2004. The major exporters are countries in EastAsia such as China and Taiwan Province of China. Of the European countries, only Denmark and the Netherlands figured prominently in the overall statistics, at respectively USD 28 million and USD 24 million in 2008, although these figures are well below those of Asia.

2.4. TOTAL IMPORT QUANTITY

Table 2. Total import quantity (tonnes)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	2 479	1 955	1 342	721	1 604	5 679	7 671	11 067	10 288	9 439
Japan	85 673	86 782	80 639	66 367	75 362	55 960	55 726	56 732	32 708	32 547
Korea, Republic of	2 868	5 784	5 484	4 537	5 486	1 775	2 188	587	2 748	288
Taiwan Province of China	14 732	13 328	9 655	5 110	4 252	3 642	2 847	2 757	2 475	2 396
Denmark	1 299	2 586	1 786	1 542	1 552	1 262	864	1 055	742	1 074
France	248	347	262	241	166	175	207	216	183	215
Germany	2 270	2 443	2 162	2 194	1 953	3 124	2 301	3 051	2 126	2 153
Greece	15	14	693	700	587	564	481	661	357	284
Italy	1 169	1 096	719	929	794	906	866	845	780	682
Netherlands	2 438	3 181	2 420	2 744	2 499	2 335	1 638	2 163	1 815	2 170
Norway	1	<0.5	1	2	1	2	1	3	4	4
Spain	738	655	668	623	556	356	327	273	413	289
Sweden	90	264	159	156	202	199	235	205	175	34
United Kingdom	175	358	268	187	264	275	268	423	373	287
Australia	48	63	54	105	97	75	159	101	46	69
Canada	595	470	429	383	383	563	484	448	567	519
United States of America	1 253	1 123	1 158	1 225	1 312	1 744	1 870	1 042	1 507	976
Other	2 735	2 846	2 220	4 130	3 632	5 314	4 204	5 083	4 934	3 837
TOTAL	**118 826**	**123 296**	**110 119**	**91 916**	**100 702**	**83 950**	**82 337**	**86 712**	**62 241**	**57 263**

Source: FAO FISHSTAT Plus (2014).

2.5. IMPORT VALUES

Table 3. Total import value ('000 USD)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	2 698	2 881	1 654	1 087	1 865	4 974	8 762	11 258	9 721	11 657
Japan	899 310	661 252	648 994	556 555	885 370	772 290	727 265	649 290	516 787	425 642
Korea, Republic of	16 494	30 561	31 190	25 320	33 991	13 296	15 285	5 946	24 699	3 157
Taiwan Province of China	23 897	21 352	12 798	6 792	5 196	7 237	3 931	3 534	3 673	4 430
Denmark	8 928	17 395	11 805	13 627	17 924	20 314	13 879	16 217	12 056	11 596
France	2 893	3 954	3 476	3 120	5 816	9 601	7 477	8 811	7 619	3 428
Germany	16 523	18 814	16 831	20 214	20 689	34 538	27 983	43 061	33 305	27 199
Greece	144	265	4 678	5 238	6 773	6 362	6 321	8 024	5 696	2 488
Italy	5 932	6 858	4 806	7 572	8 565	10 649	10 026	9 927	8 809	7 426
Netherlands	12 166	16 887	14 280	18 231	24 777	26 578	18 922	28 274	26 159	26 193
Norway	5	13	22	18	13	38	24	94	112	49
Spain	16 490	13 761	14 759	12 743	14 857	22 390	13 409	13 700	13 278	5 969
Sweden	579	1 733	1 116	1 444	2 272	2 572	2 999	4 067	3 635	526
United Kingdom	4 310	4 921	4 664	4 581	7 657	13 028	6 122	6 424	15 040	4 186
Australia	279	362	355	716	782	774	1 667	1 016	675	908
Canada	1 370	1 158	1 158	1 443	1 480	1 905	1 915	1 613	2 250	3 214
United States of America	8 740	6 819	7 564	8 484	10 803	15 225	15 908	8 767	15 548	8 034
Other	19 276	20 089	18 807	27 479	30 533	41 361	37 992	63 247	65 558	45 824
TOTAL	**1 040 033**	**829 075**	**798 957**	**714 664**	**1 079 363**	**1 003 132**	**919 887**	**883 270**	**764 620**	**591 926**

Source: FAO FISHSTAT Plus (2014).

2.6. EXPORT QUANTITY

Table 4. Total export quantity (tonnes)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	73 478	81 800	72 600	63 761	76 810	58 500	63 025	60 112	44 646	44 093
Japan	52	12	9	76	59	62	97	59	37	71
Korea, Republic of	57	9	2	106	38	95	23	62	47	28
Taiwan Province of China	26 048	25 216	27 891	22 236	23 150	14 665	10 783	16 662	9 406	6 933
Denmark	3 150	2 757	3 172	3 084	2 581	2 257	2 423	2 109	2 099	2 686
France	987	524	889	658	1 064	401	447	450	359	337
Germany	261	228	277	428	358	284	184	663	592	560
Greece	347	796	875	884	684	578	786	557	406	252
Italy	1 107	549	403	307	226	151	181	166	125	126
Netherlands	1 920	2 026	1 616	1 323	1 745	2 037	1 960	1 524	1 960	1 950
Norway	279	299	373	251	216	247	292	193	210	67
Spain	244	291	374	317	406	561	284	250	389	641
Sweden	824	799	389	370	677	848	766	542	566	464
United Kingdom	929	932	876	682	598	559	420	487	570	493
Australia	515	574	425	349	369	273	234	306	245	169
Canada	602	443	323	580	2 553	1 938	1 619	1 427	1 426	1 632
United States of America	1 773	3020	3 311	3 683	2 327	2 223	1660	1 958	2 378	2 347
Other	13 487	14 115	14 026	15 142	17 187	20 698	15 669	10 738	17 528	19 902
TOTAL	**126 060**	**134 390**	**127 831**	**114 237**	**131 048**	**106 377**	**100 853**	**98 265**	**82 989**	**82 751**

Source: FAO FISHSTAT Plus (2014).

2.7. EXPORT VALUES

Table 5. Total export value ('000 USD)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	770 222	656 336	615 811	527 746	858 267	750 206	741 830	676 055	554 543	543 215
Japan	1 360	145	263	6 545	6 662	15 767	12 737	9 025	5 069	7 772
Korea, Republic of	579	317	304	214	634	275	205	68	61	223
Taiwan Province of China	212 906	169 644	184 745	171 414	227 367	187 471	131 083	165 210	141 471	90 295
Denmark	24 511	20 075	21 719	25 522	28 289	30 279	32 067	28 706	28 768	28 387
France	30 382	23 874	32 907	34 380	50 998	80 749	37 589	49 878	46 985	14 291
Germany	2 623	1 775	2 085	3 926	3 759	3 871	2 429	11 066	10 316	7 980
Greece	2 520	5 099	6 753	8 341	8 652	7 010	10 365	8 337	5 828	3 436
Italy	7 114	3 679	2 495	2 383	2 352	1 807	2 477	2 217	1 641	1 304
Netherlands	13 827	14 560	12 232	12 788	20 845	25 802	26 271	24 189	28 721	23 510
Norway	1 346	1 688	1 724	1 343	1 544	1 912	2 267	1 723	1 743	571
Spain	14 250	13 452	10 574	7 452	17 191	16 583	8 801	12 016	14 455	4 519
Sweden	5 257	5 001	2 334	2 813	6 796	9 455	9 090	7 678	7 264	5 082
United Kingdom	7 168	6 723	7 998	8 759	13 136	21 265	9 501	11 396	9 926	7 446
Australia	3 157	3 753	3 608	3 552	4 083	3 341	3 528	4 002	4 138	2 605
Canada	2 522	1 820	1 827	3 471	7 098	8 183	6 204	6 902	4 898	5 385
United States of America	4 838	7 121	6 581	7 793	6 183	8 583	6 416	10 618	8 932	7 966
Other	18 506	24 690	25 288	32 071	45 045	59 134	46 934	49 707	59 489	58 894
TOTAL	**1 123 088**	**959 752**	**939 248**	**860 513**	**1 308 901**	**1 231 693**	**1 089 794**	**1 078 793**	**934 248**	**812 881**

Source: FAO FISHSTAT Plus (2014).

2.8. FAO-FISHSTAT PLUS DATA

2.8.1. Global Production

Table 6. World global production

Species group		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
River eels	Quantity tonnes	210 303	209 823	209 963	223 672	217 185	238 831	273 479	265 114	275 174	271 536	255 284
	Value ('000 USD)	800 372	773 281	690 782	740 090	969 803	1 044 383	1 270 489	1 324 802	1 395 645	1 526 197	1 685 107

Source: FAO FISHSTAT Plus (2014).

STATISTICAL DATA ANALISYS

Global production. The tables and graphs on global production (in tonnes) have been drawn up on the basis of FAO FishStat Plus data for the years 2000 to 2011 (the most recent year for which data is available).

The total aggregate data and the relevant graph show a substantial increase in the quantities produced, going against the trend of other available data, as the trend seems to be slightly on the increase. The figure for 2009, 275 000 tonnes, is slightly lower than that of 2007, 281 500 tonnes (Table 1).

The previous tables show the major stakeholders at a global level in various geographical areas (Asian countries, EU-Member States plus Norway, Australia, Canada and USA). The data, which probably includes quantities of various eel species and thus is worthy of note in terms of trade, shows:

- China is the major player not only at a regional level, but also in global terms with a market share of around 78 percent;
- Europe holds a share equal to approximately 3.5 percent at 9 200 tonnes (in 2008) – the species in question for statistical purposes is surely *Anguilla Anguilla;*
- Market shares of Australia, Canada and the USA are not relevant.

In this case, we can assume the figures for Australia refer to the production of short-finned eel (*Anguilla australis australis*), while those for Canada and the USA refer to the production of American eel (*Anguilla rostrata*). These species have been subject to monitoring several times by the federal authorities in the USA and Ottawa in Canada due to the drastic reduction in wild eel catches all along the west coast of the Atlantic Ocean. Another point to consider in the above two cases is that none of the eel species is included in the FAO Production by Species Tables because they do not reach a minimum production of approximately 250 000 tonnes per year. Only the *Anguilla japonica* is currently included, although there are currently no protection programmes for this eel of East Asian origin (Table 8).

The total values reported on Table 6 and Table 8 are very similar to the data on World Aquaculture Production by species groups, both in terms of value and quantity (tonnes). The two databases show a certain concurrence in terms of results and trends: a rising trend up to 2006 or 2007 with subsequent stabilization of the market and global production in the following years.

Table 7. Global production (tonnes).

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
China	140 067	135 078	141 721	139 344	153 828	154 703	177 119	207 332	205 325	214 698	213 811	208 266
Japan	24 883	23 800	21 722	22 115	22 154	19 979	20 885	22 530	21222	22 673	20 788	22 360
Korea, Republic of	2 725	2 644	2 968	4 332	5 205	5 610	7 966	10 597	6576	6 766	8 021	15 278
Taiwan Province of China	30 480	34 160	34 862	35 116	33 480	28 481	23 838	24 822	21038	19 044	19 361	10 535
Netherlands	4 051	4 374	4 241	4 566	4 831	4 317	5 316	4 258	3956	3 003	3 301	3 369
Denmark	3 294	2 758	1735	2 632	2 357	2 204	2 279	2 145	1352	2 125	1 954	1 510
France	1 504	1 433	1 372	1 382	1 301	1 176	1 219	1 229	1221	1 116	1 300	1 318
Germany	836	788	786	401	565	614	870	734	775	690	698	885
Italy	3 249	2 946	2 101	2 008	1 607	1 247	871	1 109	626	654	736	1 048
Norway	281	304	310	240	237	249	296	194	211	69		
Spain	481	401	517	379	481	482	489	529	594	569	476	489
Sweden	834	780	801	735	726	890	921	873	838	518	523	530
United Kingdom	796	595	571	588	504	493	405	486	416	463	461	459
Australia	217	284	244	165	126	105	93	211	189	205	44	99
Canada	681	474	472	633	503	382	424	395	411	337	341	337
United States of America	649	393	277	463	326	406	351	336	268	330	717	1751
Other	6 424	6 663	3 883	2 902	2 670	2 643	5 779	3 789	2 691	2 297		
TOTAL	**221 452**	**217 875**	**218 583**	**217 701**	**230 901**	**223 981**	**249 121**	**281 569**	**267 709**	**275 557**	**272 532**	**268 234**

Source: FAO FISHSTAT Plus (2014).

2.8.2. Aquaculture Production

Table 8. World Aquaculture Production

Species group		2002	2003	2004	2005	2006	2007	2008	2009	2010
Anguilla Japonica	Quantity tonnes	200 732	200 298	214 053	208 254	229 506	264 952	253 795	262 729	261 617
	Value ('000 USD)	718 240	619 366	649 018	879 906	940 326	1 170 440	1 242 023	1 320 056	1 441 566

Source: FAO FISHSTAT Plus (2014).

STATISTICAL DATA ANALISYS

Aquaculture production. FAO FishStat Plus data on aquaculture production indicates the share in global production. Tonnes are used as the unit of measure, and the period examined is from 2000 to 2011.

In 2010 aquaculture production accounted for 97 percent of total production at 268 585 tonnes. The figure is significant and shows that most eel production is aquaculture production. In 2011, the total amount of aquaculture production is 253 000 tonnes.

Data on China (the major stakeholder) show that approximately 99 percent of its production is from aquaculture. Taiwan Province of China, which has a more modest market share, follows the same trend.

Of the European countries, only the Netherlands with 3 000 tonnes and Denmark with 1 900 tonnes have market shares in the range of a few percentage points. The figure for Italy is interesting, as there has been a drastic drop in aquaculture eel production – from 2 700 tonnes in 2000 to 1 000 tonnes in 2011. This reduction is probably due to businesses which are no longer profitable and a conversion from eel to other fish species more profitable both in terms of market and price stability, such as sea bream (*Sparus aurata)* or seabass (*Dicentrarchus labrax)* or new species such as white sturgeon (*Acipenser transmontanus).*

No figures are indicated for Australia, Canada and the USA, as aquaculture production of this species in these countries is irrelevant for statistical purposes.

The aggregate trend of aquaculture production is in line with that of global production. Production stabilized in 2007, most probably in response to mature markets. In some cases, the introduction of catch quotas on juvenile eel limited the quantity of product for on-growing on farms.

Aquaculture Production by Principal Species (Table 8. World aquaculture production) data provide only information on *Anguilla japonica* for the period 2002–2010. In 2009, this eel species held a major share of the market, equal to 262 769 tonnes of the total 269 397 tonnes. There are no figures for other eel species (including *Anguilla anguilla*) as the volume of these in 2010 was less than 250 000 tonnes.

Table 9. Aquaculture production (tonnes)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
China	140 067	135 078	141 721	139 344	153 828	154 703	177 119	207 332	205 325	214 698	213 811	208 266
Japan	24 118	23 123	21 112	21 526	21 540	19 495	20 583	22 241	20 952	22 406	20 543	22 006
Korea, Republic of	2 725	2 644	2 968	4 312	5 205	5 575	7 966	10 557	6 480	6 621	7 902	7 185
Taiwan Province of China	30 480	34 160	34 862	35 116	33 480	28 481	23 838	24 822	21 038	19 044	19 361	10 521
Denmark	2 674	2 100	1 166	2 012	1 823	1 673	1 699	1 614	895	1 658	1 900	1 154
Germany	150	150	150	150	322	329	567	440	447	385	398	660
Greece	602	639	433	544	557	372	385	454	489	428	430	320
Italy	2 700	2 500	1 699	1 550	1 220	1 132	807	1 000	551	567	647	1 000
Netherlands	3 700	4 000	3 868	4 200	4 500	4 000	5 000	4 000	3 700	2 800	3 000	3 000
Spain	411	339	424	339	424	427	403	479	534	488	423	427
Other	2 601	2 975	494	377	339	429	330	510	424	302	170	
TOTAL	**210 228**	**207 708**	**208 897**	**209 470**	**223 238**	**216 616**	**238 697**	**273 449**	**260 835**	**269 397**	**268 585**	**254 539**

Source: FAO FISHSTAT Plus (2014).

2.8.3. Capture production

Table 10. World capture production (tonnes)

Species group	2004	2005	2006	2007	2008	2009	2010	2011
River eels	11 791	9 578	13 643	10 917	8 845	8 938	8 440	7 546

Source: FAO FISHSTAT Plus (2014).

STATISTICAL DATA ANALISYS

Capture production. FAO FishStat Plus data on capture production indicate the share of global production, in tonnes, from 2000 to 2011.

The market share represented a small percentage of the global production, and therefore of little economic importance, and was reported merely for completeness purposes. This data was not in line with Capture Production by Group of Species data for river eels (Table 10).

The total capture production in 2010 was 5 989 tonnes and 4 342 tonnes in 2011. France had the largest market share in 2011, with 1 318 tonnes or approximately 23 percent of the total.

After a remarkable drop in the capture of wild eel, some countries such as New Zealand, established quotas in order to limit the capture of wild eel enforcing locally the international regulation, These fishing limits affected both the fresh product to send to markets (capture production) and eel to send to fish farms for fattening (aquaculture production).

Table 11. Capture production (tonnes)

Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Japan	765	677	610	589	614	484	302	289	270	263	245	230
Korea, Republic of	0	0	0	20	0	35	0	40	96	145	119	72
Denmark	620	658	569	620	534	531	580	531	457	467	422	356
France	1 462	1 391	1 372	1 382	1 301	1 176	1 219	1 229	1 221	1 194	1 300	1 318
Germany	686	638	636	251	243	285	303	294	328	305	298	225
Italy	549	446	402	458	387	115	64	109	75	87	64	48
Netherlands	351	374	373	366	331	317	316	258	256	253	307	369
Norway	281	304	310	240	237	249	296	194	211	69	32	32
Sweden	561	580	634	565	568	668	730	698	666	518	523	355
United Kingdom	796	595	571	588	504	493	405	486	416	463	461	459
Australia	170	213	200	133	118	97	85	70	84	57	44	36
Canada	681	474	472	633	503	382	604	547	411	409	349	313
United States of America	649	393	277	463	326	406	351	336	268	330	384	529
Other	3 653	3 424	3 266	1 927	2 110	2 137	5 361	3 198	2 140	2 119	1 441	
TOTAL	**11 224**	**10 167**	**9 692**	**8 235**	**7 676**	**7 375**	**10 616**	**8 279**	**6 899**	**6 679**	**5 989**	**4 342**

Source: FAO FISHSTAT Plus (2014).

2.9. COMMODITY CODE 30266 (EELS: FRESH OR CHILLED, WHOLE)

Fresh fish. The definition of fresh fish, in accordance with FAO Code of Practice for Fish and Fisheries Products specifies:_products that have received no preserving treatment other than chilling. The chilling facility should be capable of maintaining the temperature of the stock between 0 and 4 °C.

The chilled product must meet the requirements for preventing development of pathogens in foodstuffs for several days. This system is a discrete limiting factor against the proliferation of bacteria, preventing also enzyme activity. The available free water activity (AW) value is decreased, and temperatures are maintained at a few degrees (°C) above zero, as lower temperatures would freeze the product. The fish must be healthy and chilled as soon as possible after being caught, entering a continuous, uninterrupted cold-chain process, which is a technique used to keep foodstuffs for short periods of time.

STATISTICAL DATA ANALISYS

Fresh or chilled eel. In terms of the Commodity Code for fresh or chilled eel, UN Data divides the market into two macro geographical areas: EastAsia and European Union (EU).

This study examined China, Hong Kong, Japan and Korea in Southeast Asia, and Italy, Spain and Denmark in the EU. It considered the last ten years of eel trade, imports and exports, up to and including the last year on which data is available.

Imports. At the European level (EU-27 data), the effect of the Washington Convention, with the inclusion of *Anguilla anguilla* in Appendix II of CITES, has proven irrelevant. Since the peak volumes were reached in 2004, there has been a considerable drop in incoming trade volume, in terms of value and, in particular, in terms of quantity. The figures for Spain and Denmark have also followed this trend. However, data concerning Italian imports are not in line with this trend, so it isn't easy to draw conclusions.

Data on imports into Asian countries first and foremost are incomplete. The statistical data are unreliable for Japan, China and Korea, although Hong Kong has shown a clear drop since 2008.

Exports. The volume of European trade (Table 30) has been practically equal to zero since 2005 up to 2010. In 2012 the volume raised and reached 2003 figure.

Therefore we can only assume that all the product is consumed by the home market. Denmark is the only country with a slight and constant increase in exports, although the figures for 2010 are notably lower than those for 2008. Quantities traded seem to be constant and, therefore, at the same levels for the period in question. As statistical data on Asian countries is incomplete, it is impossible to establish a medium-term trend, but there has obviously been a drastic reduction in exports from China and especially Hong Kong (both exports and re-exports). These data are quite significant for the last 5-year period, 2008-2012, with an evident reduction that corresponds to the inclusion of the

European eel in Appendix II of CITES. In this case, we assume that product is scarce, and therefore available stocks are used almost entirely on the home market.

As for the species considered in this segment, it is unclear (in particular for the Asian area) whether data refers to the Japanese eel or also to the European eel. We can assume the drop in the European eel figures has been compensated by an over exploitation of the Japanese eel (there are no international limits on this species).

Unfortunately, for this analysis, we only have raw, often incomplete data to consider, based on non-homogeneous information that, for example refers to different eel species. The trade policies of the various countries are almost unknown as are the various market interactions – it is impossible to know how effective international regulations are and to what extent they are enforced in each country.

However, it is clear that the peak for this market segment (fresh – chilled eel) has already been reached. We should be able to consider the impact of international legislation on *Anguilla anguilla* over the next five years, as well as the possibility of adding a new endangered species, such as the American eel (*Anguilla rostrata*) to the CITES appendixes.
UN Data are available only until 2012, although it must be specified that data on this last year are not consolidated.

FAO FishStat Plus Data on the 3-year period 2007–2009, Commodity Code 30266:

Table 12. 030192 Eels (Anguilla spp. fresh or chilled) – International export of Fishery Commodities by FAO

Year	**2009**	**2010**	**2011**
Quantity (tonnes)	5 280	1 801	1 042
Value (‘000 USD)	28 697	15 547	9 227

Source: FAO FISHSTAT Plus (2014).

Data from United Nations Commodity Trade Statistics Database (UN ComTrade) was obtained from the major global importers with the value of imports and exports for the four years: 2008 to 2011.

Table 13. Importer Countries (30266 – COMTRADE)

Country	**Value (USD)**
Germany	8 729 000
Italy	6 256 000
Spain	4 824 000
United Kingdom	3 884 000
China, Hong Kong SAR	1 968 000
Other Reporters	13 206 000
Total	**38 869 000**

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 14. Exporters countries (30266 – COMTRADE)

Country	Value (USD)
Indonesia	39 538 000
Denmark	17 789 000
Sweden	4 501 000
Netherlands	3 344 000
France	3 264 000
Other Reporters	12 693 000
Total	81 129 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 15. Import years (30266 – COMTRADE)

Year	Value (USD)
2011	7 180 000
2010	6 313 000
2009	11 343 000
2008	14 031 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 16. Export years (30266 – COMTRADE)

Country	Value (USD)
2011	7 432 000
2010	15 819 000
2009	28 550 000
2008	29 329 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

2.9.1 Import

Table 17. Import China (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China import	2001	30266	Eels, fresh or chilled, whole	NA	NA
China import	2002	30266	Eels, fresh or chilled, whole	NA	NA
China import	2003	30266	Eels, fresh or chilled, whole	NA	NA
China import	2004	30266	Eels, fresh or chilled, whole	NA	NA
China import	2005	30266	Eels, fresh or chilled, whole	NA	NA
China import	2006	30266	Eels, fresh or chilled, whole	198	113
China import	2007	30266	Eels, fresh or chilled, whole	13 838	10 200
China import	2008	30266	Eels, fresh or chilled, whole	1 209	47
China import	2009	30266	Eels, fresh or chilled, whole	3 780	145
China import	2010	30266	Eels, fresh or chilled, whole	3 379	153
China import	2011	30266	Eels, fresh or chilled, whole	2 941	107
China import	2012	30266	Eels, fresh or chilled, whole	NA	NA

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 18. Import Hong Kong (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR import	2001	30266	Eels, fresh or chilled, whole	565 903	219 135
China, Hong Kong SAR import	2002	30266	Eels, fresh or chilled, whole	442 902	233 440
China, Hong Kong SAR import	2003	30266	Eels, fresh or chilled, whole	105 887	10 249
China, Hong Kong SAR import	2004	30266	Eels, fresh or chilled, whole	43 056	1 921
China, Hong Kong SAR import	2005	30266	Eels, fresh or chilled, whole	621 235	230 020
China, Hong Kong SAR import	2006	30266	Eels, fresh or chilled, whole	1 459 945	512 630
China, Hong Kong SAR import	2007	30266	Eels, fresh or chilled, whole	1 002 634	272 469
China, Hong Kong SAR import	2008	30266	Eels, fresh or chilled, whole	1 601 036	310 355
China, Hong Kong SAR import	2009	30266	Eels, fresh or chilled, whole	134 692	51 025
China, Hong Kong SAR import	2010	30266	Eels, fresh or chilled, whole	34 284	1 239
China, Hong Kong SAR import	2011	30266	Eels, fresh or chilled, whole	198 259	9 250
China, Hong Kong SAR import	2012	30266	Eels, fresh or chilled, whole	270 667	14 948

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 19. Import Japan (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan import	2001	30266	Eels, fresh or chilled, whole	176 981	22 039
Japan import	2002	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2003	30266	Eels, fresh or chilled, whole	16 034	1 562
Japan import	2004	30266	Eels, fresh or chilled, whole	11 701	1 000
Japan import	2005	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2006	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2007	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2008	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2009	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2010	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2011	30266	Eels, fresh or chilled, whole	NA	NA
Japan import	2012	30266	Eels, fresh or chilled, whole	NA	NA

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 20. Import Korea (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea import	2001	30266	Eels, fresh or chilled, whole	3 661	470
Rep. of Korea import	2002	30266	Eels, fresh or chilled, whole		
Rep. of Korea import	2003	30266	Eels, fresh or chilled, whole	14 897	1 883
Rep. of Korea import	2004	30266	Eels, fresh or chilled, whole	3 875	600
Rep. of Korea import	2005	30266	Eels, fresh or chilled, whole		
Rep. of Korea import	2006	30266	Eels, fresh or chilled, whole		
Rep. of Korea import	2007	30266	Eels, fresh or chilled, whole		
Rep. of Korea import	2008	30266	Eels, fresh or chilled, whole	73	5
Rep. of Korea import	2009	30266	Eels, fresh or chilled, whole		
Rep. of Korea import	2010	30266	Eels, fresh or chilled, whole	81	10

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 21. Import EU-27 (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 import	2001	30266	Eels, fresh or chilled, whole	663 138	115 400
EU-27 import	2002	30266	Eels, fresh or chilled, whole	266 161	68 737
EU-27 import	2003	30266	Eels, fresh or chilled, whole	297 727	42 109
EU-27 import	2004	30266	Eels, fresh or chilled, whole	1 107 235	129 307
EU-27 import	2005	30266	Eels, fresh or chilled, whole	348 078	78 420
EU-27 import	2006	30266	Eels, fresh or chilled, whole	404 177	60 621
EU-27 import	2007	30266	Eels, fresh or chilled, whole	489 209	61 900
EU-27 import	2008	30266	Eels, fresh or chilled, whole	168 310	21 200
EU-27 import	2009	30266	Eels, fresh or chilled, whole	101 493	12 700
EU-27 import	2010	30266	Eels, fresh or chilled, whole	NA	NA
EU-27 import	2011	30266	Eels, fresh or chilled, whole	32 232	1 905
EU-27 import	2012	30266	Eels, fresh or chilled, whole	NA	NA

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 22. Import Italy (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy import	2001	30266	Eels, fresh or chilled, whole	673 061	123 355
Italy import	2002	30266	Eels, fresh or chilled, whole	392 997	69 051
Italy import	2003	30266	Eels, fresh or chilled, whole	390 068	53 412
Italy import	2004	30266	Eels, fresh or chilled, whole	503 913	68 508
Italy import	2005	30266	Eels, fresh or chilled, whole	1 543 594	160 081
Italy import	2006	30266	Eels, fresh or chilled, whole	978 920	102 421
Italy import	2007	30266	Eels, fresh or chilled, whole	634 994	47 339
Italy import	2008	30266	Eels, fresh or chilled, whole	1 161 688	108 657
Italy import	2009	30266	Eels, fresh or chilled, whole	1 638 090	139 081
Italy import	2010	30266	Eels, fresh or chilled, whole	1 432 408	120 683
Italy import	2011	30266	Eels, fresh or chilled, whole	2 024 426	129 012
Italy import	2012	30266	Eels, fresh or chilled, whole	189 971	13 932

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 23. Import Denmark (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark import	2001	30266	Eels, fresh or chilled, whole	2 895 438	454 854
Denmark import	2002	30266	Eels, fresh or chilled, whole	976 580	144 622
Denmark import	2003	30266	Eels, fresh or chilled, whole	919 686	116 963
Denmark import	2004	30266	Eels, fresh or chilled, whole	627 476	65 638
Denmark import	2005	30266	Eels, fresh or chilled, whole	1 558 771	143 666
Denmark import	2006	30266	Eels, fresh or chilled, whole	904 166	81 907
Denmark import	2007	30266	Eels, fresh or chilled, whole	530 627	46 241
Denmark import	2008	30266	Eels, fresh or chilled, whole	648 137	55 280
Denmark import	2009	30266	Eels, fresh or chilled, whole	331 835	36 147
Denmark import	2010	30266	Eels, fresh or chilled, whole	272 763	31 454
Denmark import	2011	30266	Eels, fresh or chilled, whole	134 449	11 195
Denmark import	2012	30266	Eels, fresh or chilled, whole	423 449	29 250

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 24. Import Spain (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain import	2001	30266	Eels, fresh or chilled, whole	8 829 315	563 951
Spain import	2002	30266	Eels, fresh or chilled, whole	10 503 386	699 374
Spain import	2003	30266	Eels, fresh or chilled, whole	7 037 116	434 251
Spain import	2004	30266	Eels, fresh or chilled, whole	8 312 334	453 026
Spain import	2005	30266	Eels, fresh or chilled, whole	13 018 257	222 034
Spain import	2006	30266	Eels, fresh or chilled, whole	7 762 427	190 993
Spain import	2007	30266	Eels, fresh or chilled, whole	7 482 360	345 354
Spain import	2008	30266	Eels, fresh or chilled, whole	1 920 818	285 035
Spain import	2009	30266	Eels, fresh or chilled, whole	1 619 460	192 496
Spain import	2010	30266	Eels, fresh or chilled, whole	1 284 272	131 141
Spain import	2011	30266	Eels, fresh or chilled, whole	1 976 931	166 432
Spain import	2012	30266	Eels, fresh or chilled, whole	824 382	54 328

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

2.9.2. Export and Re-export

Table 25. Export China (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China export	2001	30266	Eels, fresh or chilled, whole	1 932 951	542 848
China export	2002	30266	Eels, fresh or chilled, whole	52 624	16 489
China export	2003	30266	Eels, fresh or chilled, whole	38 860	8 295
China export	2004	30266	Eels, fresh or chilled, whole	NA	NA
China export	2005	30266	Eels, fresh or chilled, whole	418 280	69 835
China export	2006	30266	Eels, fresh or chilled, whole	537 191	129 938
China export	2007	30266	Eels, fresh or chilled, whole	17 464	6 035
China export	2008	30266	Eels, fresh or chilled, whole	1 878	283
China export	2009	30266	Eels, fresh or chilled, whole	4 833	262
China export	2010	30266	Eels, fresh or chilled, whole	114 420	20 520
China export	2011	30266	Eels, fresh or chilled, whole	176 267	27 312
China export	2012	30266	Eels, fresh or chilled, whole	4 366 560	564 175

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 26. Export Hong Kong (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR export	2001	30266	Eels, fresh or chilled, whole	3 889	535
China, Hong Kong SAR export	2003	30266	Eels, fresh or chilled, whole	NA	NA
China, Hong Kong SAR export	2003	30266	Eels, fresh or chilled, whole	38 109	6 125
China, Hong Kong SAR export	2004	30266	Eels, fresh or chilled, whole	14 018	2 000
China, Hong Kong SAR export	2005	30266	Eels, fresh or chilled, whole	20 443	3 180
China, Hong Kong SAR export	2006	30266	Eels, fresh or chilled, whole	48 774	11 284
China, Hong Kong SAR export	2007	30266	Eels, fresh or chilled, whole	63 008	7 478
China, Hong Kong SAR export	2008	30266	Eels, fresh or chilled, whole	133 269	11 078
China, Hong Kong SAR export	2009	30266	Eels, fresh or chilled, whole	17 802	6 062
China, Hong Kong SAR export	2010	30266	Eels, fresh or chilled, whole	NA	NA
China, Hong Kong SAR export	2011	30266	Eels, fresh or chilled, whole	3 854	1 902
China, Hong Kong SAR export	2012	30266	Eels, fresh or chilled, whole	32 964	4 398

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 27. Re-export Hong Kong (30266 – UNdata)

Country or Area	Year	Comm.Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR re-export	2001	30266	Eels fresh or chilled, whole	1 619	250
China, Hong Kong SAR re-export	2002	30266	Eels fresh or chilled, whole	NA	NA
China, Hong Kong SAR re-export	2003	30266	Eels fresh or chilled, whole	38 109	6 125
China, Hong Kong SAR re-export	2004	30266	Eels fresh or chilled, whole	14 018	2 000
China, Hong Kong SAR re-export	2005	30266	Eels fresh or chilled, whole	20 443	318
China, Hong Kong SAR re-export	2006	30266	Eels fresh or chilled, whole	48 774	11 284
China, Hong Kong SAR re-export	2007	30266	Eels fresh or chilled, whole	63 008	7 478
China, Hong Kong SAR re-export	2008	30266	Eels fresh or chilled, whole	133 269	11 078
China, Hong Kong SAR re-export	2009	30266	Eels fresh or chilled, whole	17 802	6 062
China, Hong Kong SAR re-export	2010	30266	Eels fresh or chilled, whole	NA	NA
China, Hong Kong SAR re-export	2011	30266	Eels fresh or chilled, whole	3 854	1 902
China, Hong Kong SAR re-export	2012	30266	Eels fresh or chilled, whole	32 964	4 398

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 28. Export Japan (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan export	2001	30266	Eels, fresh or chilled, whole	14 172	1 159
Japan export	2002	30266	Eels, fresh or chilled, whole	4 454	300
Japan export	2003	30266	Eels, fresh or chilled, whole	5 640	288
Japan export	2004	30266	Eels, fresh or chilled, whole	5 012	61
Japan export	2005	30266	Eels, fresh or chilled, whole	NA	NA
Japan export	2006	30266	Eels, fresh or chilled, whole	NA	NA
Japan export	2007	30266	Eels, fresh or chilled, whole	NA	NA
Japan export	2008	30266	Eels, fresh or chilled, whole	6 202	120
Japan export	2009	30266	Eels, fresh or chilled, whole	NA	NA
Japan export	2010	30266	Eels, fresh or chilled, whole	8 120	264
Japan export	2011	30266	Eels, fresh or chilled, whole	7 008	155
Japan export	2012	30266	Eels, fresh or chilled, whole	24 605	366

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 29. Export Korea (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea export	2001	30266	Eels, fresh or chilled, whole	1 617	291
Rep. of Korea export	2002	30266	Eels, fresh or chilled, whole	2 352	598
Rep. of Korea export	2003	30266	Eels, fresh or chilled, whole	5 472	975
Rep. of Korea export	2004	30266	Eels, fresh or chilled, whole	NA	NA
Rep. of Korea export	2005	30266	Eels, fresh or chilled, whole	16 136	1 580
Rep. of Korea export	2006	30266	Eels, fresh or chilled, whole	6 223	1 062
Rep. of Korea export	2007	30266	Eels, fresh or chilled, whole	NA	NA
Rep. of Korea export	2008	30266	Eels, fresh or chilled, whole	9 094	302
Rep. of Korea export	2009	30266	Eels, fresh or chilled, whole	3 258	174
Rep. of Korea export	2010	30266	Eels, fresh or chilled, whole	939	136
Rep. of Korea export	2011	30266	Eels, fresh or chilled, whole	NA	NA
Rep. of Korea export	2012	30266	Eels, fresh or chilled, whole	2 068	148

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 30. Export EU-27 (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 export	2001	30266	Eels, fresh or chilled, whole	2 647 940	23 911
EU-27 export	2002	30266	Eels, fresh or chilled, whole	1 376 254	7 403
EU-27 export	2003	30266	Eels, fresh or chilled, whole	1 577 937	212 550
EU-27 export	2004	30266	Eels, fresh or chilled, whole	6 658 928	628 384
EU-27 export	2005	30266	Eels, fresh or chilled, whole	11 127	1 152
EU-27 export	2006	30266	Eels, fresh or chilled, whole	6 687	340
EU-27 export	2007	30266	Eels, fresh or chilled, whole	41 192	1 995
EU-27 export	2008	30266	Eels, fresh or chilled, whole	8 608	384
EU-27 export	2009	30266	Eels, fresh or chilled, whole	3 197	145
EU-27 export	2010	30266	Eels, fresh or chilled, whole	2 476	NA
EU-27 export	2011	30266	Eels, fresh or chilled, whole	308 674	10 781
EU-27 export	2012	30266	Eels, fresh or chilled, whole	1 535 964	45 530

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 31. Export Italy (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy export	2001	30266	Eels, fresh or chilled, whole	58 825	6 647
Italy export	2002	30266	Eels, fresh or chilled, whole	40 851	4 124
Italy export	2003	30266	Eels, fresh or chilled, whole	11 831	1 588
Italy export	2004	30266	Eels, fresh or chilled, whole	5 903	409
Italy export	2005	30266	Eels, fresh or chilled, whole	26 892	1 983
Italy export	2006	30266	Eels, fresh or chilled, whole	8 614	517
Italy export	2007	30266	Eels, fresh or chilled, whole	90 494	7 029
Italy export	2008	30266	Eels, fresh or chilled, whole	17 428	1 038
Italy export	2009	30266	Eels, fresh or chilled, whole	5 823	492
Italy export	2010	30266	Eels, fresh or chilled, whole	6 513	431
Italy export	2011	30266	Eels, fresh or chilled, whole	18 123	854
Italy export	2012	30266	Eels, fresh or chilled, whole	37 233	1 888

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 32. Export Denmark (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark export	2001	30266	Eels, fresh or chilled, whole	2 591 627	287 17
Denmark export	2002	30266	Eels, fresh or chilled, whole	2 911 873	338 65
Denmark export	2003	30266	Eels, fresh or chilled, whole	3 811 342	366 37
Denmark export	2004	30266	Eels, fresh or chilled, whole	3 921 799	298 46
Denmark export	2005	30266	Eels, fresh or chilled, whole	3 409 593	221 655
Denmark export	2006	30266	Eels, fresh or chilled, whole	3 438 168	213 930
Denmark export	2007	30266	Eels, fresh or chilled, whole	3 917 083	225 339
Denmark export	2008	30266	Eels, fresh or chilled, whole	5 663 736	389 147
Denmark export	2009	30266	Eels, fresh or chilled, whole	4 268 912	316 923
Denmark export	2010	30266	Eels, fresh or chilled, whole	4 706 635	374 964
Denmark export	2011	30266	Eels, fresh or chilled, whole	3 149 939	158 707
Denmark export	2012	30266	Eels, fresh or chilled, whole	4 581 991	221 155

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 33. Export Spain (30266 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain export	2001	30266	Eels, fresh or chilled, whole	1 829 530	74 942
Spain export	2002	30266	Eels, fresh or chilled, whole	1 563 332	119 695
Spain export	2003	30266	Eels, fresh or chilled, whole	2 277 166	113 339
Spain export	2004	30266	Eels, fresh or chilled, whole	1 819 743	160 976
Spain export	2005	30266	Eels, fresh or chilled, whole	1 608 640	272 279
Spain export	2006	30266	Eels, fresh or chilled, whole	1 147 465	98 397
Spain export	2007	30266	Eels, fresh or chilled, whole	2 226 982	40 848
Spain export	2008	30266	Eels, fresh or chilled, whole	855 735	46 719
Spain export	2009	30266	Eels, fresh or chilled, whole	1 056 194	44 618
Spain export	2010	30266	Eels, fresh or chilled, whole	630 620	6 700
Spain export	2011	30266	Eels, fresh or chilled, whole	1 039 249	103 960
Spain export	2012	30266	Eels, fresh or chilled, whole	2 664 486	216 216

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

2.10. COMMODITY CODE 30376 (EELS: FROZEN, WHOLE)

Definition of frozen fish, in accordance with FAO Code of practice for Fish and Fisheries Products: products subject to a freezing process sufficient to reduce the temperature of the whole product to a level low enough to preserve the inherent quality of the fish. The facility should be capable of maintaining the temperature of the fish below -18 °C.

Frozen products are usually kept at a temperature of -10 °C (-18 °C seafood). This long-term preservation process maintains the sanitary and organoleptic characteristics of the foodstuff unchanged and delays the oxidation of fats. Bacteria cannot proliferate at such a low temperature and at a low aw value (at -10 °C the percentage of residue water is 18 percent, while at -18 °C, it is equal to 14 percent with an AW value of 0.84 – bacteria growth is inhibited to a great extent at aw values of less than 0.90).

An increase in the preservation time results in an increase in bacteria destruction. The sensitivity of microorganisms to the freezing process therefore depends on various factors: the bacteria strain, the temperature at which the product is frozen, the efficiency and speed of the freezing process, chemical factors of the foodstuff and the health and wholesomeness of the fish stock.

STATISTICAL DATA ANALISYS

A frozen product, for which the cold chain is continuous and in accordance with the FAO Code of Practice for Fish and Fishery Products, can also be sold far from the place the fish is caught. In fact the product is preserved for relatively long periods of time. UN Data available was gathered from 2001 to 2012,

Imports. Imports amounted to USD 10.3 million in 2010, making China the leading importer of frozen product for the home market in Asia. Following a trend of constant growth from 2004 to 2008, in 2010 there was a drop of approximately USD 3.5 million from the previous year (USD 6.19 million). It is to be noted that between 2009 and 2012, following the introduction of European Eel into CITES Appendix, China's imports showed a remarkable decline due to the difficulty in obtaining frozen stock availability.

Hong Kong imported a considerable volume, amounting to USD 6 million in 2009 and USD 5 million in 2010. These figures are approximately 50 percent lower than those relative to China. Note that Hong Kong appears to have started importing in 2008 as, in previous years, very little product had been imported. Imports in Japan and Korea are negligible.

The value of imports by the EU (EU-27) shows approximately USD 16.25 million in 2009 and USD 11.20 million in 2010, figures similar to China's. However, EU import quantities are notably lower than those of the Asian country. Frozen eel imports are irrelevant in Spain and Italy, although Denmark can boast figures similar to those of Hong Kong with a volume of around USD 4.50 million in 2009. EU shows an import trend similar to China, with a noticeable decrease in the years 2011 and 2012, which underlines the effects of the enforcement of international legislation.

Exports. China registered the highest trend values (Table 47) respectively with USD 13.20 million in 2009, 13.80 million in 2010, and reaching the highest figure of USD 26.584 in 2011. Data available about 2012 seems to be unreliable, since they show a drop of over 23.00. The trend in other Asian countries is not only negative, but also irrelevant for statistical purposes both in terms of value and quantity traded.

In the European Union, only Denmark with exports amounting to USD 5.54 million in 2009 and USD 4.00 million in 2010, registered a significant result for outgoing products. Denmark, as a major stakeholder, shows considerable stability, maintaining the same level of exports over the last four years (Table 54). In the other European Union countries, the frozen product is consumed almost entirely on the home market. These figures are confirmed also by the EU-27 report with export volumes of little economic significance.

Un Data are available up to 2012, although it must be noted that data of last year is not consolidated.

FAO FishStat Plus data on the 3-year period 2007-2009 Commodity Code 30376:

Table 34. 030376 Eels (Anguilla spp. frozen) - International export of Fishery Commodities by FAO

Year	2009	2010	2011
Quantity (tonnes)	10 940	10 880	13 061
Value ('000 USD)	39 923	38 267	64 707

Source: FAO FISHSTAT Plus (2014).

Data from United Nations Commodity Trade Statistics Database (UN ComTrade) was obtained from the major global importers with the value of imports and exports for the four years: 2008 to 2011:

Table 35. Importer countries (030376 – COMTRADE)

Country	Value (USD)
China	31 381 000
USA	31 155 000
Poland	30 387 000
Germany	26 905 000
China, Hong Kong SAR	21 256 000
Other Reporters	82 495 000
Total	223 581 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 36. Exporter countries (030376 – COMTRADE)

Country	Value (USD)
China	65 108 000
Canada	16 088 000
Denmark	15 160 000
USA	14 044 000
India	11 234 000
Other Reporters	55 631 000
Total	177 267 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 37. Import years (030376 – COMTRADE)

Year	Value (USD)
2011	42 775 000
2010	49 057 000
2009	58 521 000
2008	73 226 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 38. Export years (030376 – COMTRADE)

Country	Value (USD)
2011	65 654 000
2010	37 513 000
2009	38 350 000
2008	39 726 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

2.10.1. Import

Table 39. Import China (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China import	2001	30376	Eels, frozen, whole	2 371 258	1 850 834
China import	2002	30376	Eels, frozen, whole	1 169 648	1 254 302
China import	2003	30376	Eels, frozen, whole	878 637	664 462
China import	2004	30376	Eels, frozen, whole	1 066 111	1 376 795
China import	2005	30376	Eels, frozen, whole	4 129 342	488 523
China import	2006	30376	Eels, frozen, whole	5 394 041	638 144
China import	2007	30376	Eels, frozen, whole	8 593 887	10 619 173
China import	2008	30376	Eels, frozen, whole	8 706 019	10 028 078
China import	2009	30376	Eels, frozen, whole	10 350 219	9 118 879
China import	2010	30376	Eels, frozen, whole	6 912 528	5 430 168
China import	2011	30376	Eels, frozen, whole	5 412 317	3 497 541
China import	2012	30376	Eels, frozen, whole	6 352 818	2 905 916

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 40. Import Hong Kong (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR import	2001	30376	Eels, frozen, whole	1 309 726	215 284
China, Hong Kong SAR import	2002	30376	Eels, frozen, whole	757 780	221 624
China, Hong Kong SAR import	2003	30376	Eels, frozen, whole	1 654 781	462 663
China, Hong Kong SAR import	2004	30376	Eels, frozen, whole	846 891	352 892
China, Hong Kong SAR import	2005	30376	Eels, frozen, whole	1 301 025	337 931
China, Hong Kong SAR import	2006	30376	Eels, frozen, whole	502 712	149 252
China, Hong Kong SAR import	2007	30376	Eels, frozen, whole	917 944	204 724
China, Hong Kong SAR import	2008	30376	Eels, frozen, whole	2 610 782	537 315
China, Hong Kong SAR import	2009	30376	Eels, frozen, whole	5 979 391	540 046
China, Hong Kong SAR import	2010	30376	Eels, frozen, whole	5 020 455	596 337
China, Hong Kong SAR import	2011	30376	Eels, frozen, whole	7 646 325	1 198 686
China, Hong Kong SAR import	2012	30376	Eels, frozen, whole	2 040 439	420 476

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 41. Import Japan (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan import	2001	30376	Eels, frozen, whole	17 771	117
Japan import	2002	30376	Eels, frozen, whole	48 303	2 233
Japan import	2003	30376	Eels, frozen, whole	57 575	769
Japan import	2004	30376	Eels, frozen, whole	41 253	2 365
Japan import	2005	30376	Eels, frozen, whole	46 777	199
Japan import	2006	30376	Eels, frozen, whole	40 267	129
Japan import	2007	30376	Eels, frozen, whole	29 429	110
Japan import	2008	30376	Eels, frozen, whole	53 891	99
Japan import	2009	30376	Eels, frozen, whole	7 288	810
Japan import	2010	30376	Eels, frozen, whole	NA	NA
Japan import	2011	30376	Eels, frozen, whole	NA	NA
Japan import	2012	30376	Eels, frozen, whole	NA	NA

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 42. Import Korea (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea import	2001	30376	Eels, frozen, whole	43 901	15 330
Rep. of Korea import	2002	30376	Eels, frozen, whole	99 65	17 712
Rep. of Korea import	2003	30376	Eels, frozen, whole	61 700	9 000
Rep. of Korea import	2004	30376	Eels, frozen, whole	78 002	8 976
Rep. of Korea import	2005	30376	Eels, frozen, whole	3 885	510
Rep. of Korea import	2006	30376	Eels, frozen, whole	66 399	24 368
Rep. of Korea import	2007	30376	Eels, frozen, whole	2 744	756
Rep. of Korea import	2008	30376	Eels, frozen, whole	20 050	2 951
Rep. of Korea import	2009	30376	Eels, frozen, whole	47 411	5 336
Rep. of Korea import	2010	30376	Eels, frozen, whole	7 717	1 195
Rep. of Korea import	2011	30376	Eels, frozen, whole	212 235	22 498
Rep. of Korea import	2012	30376	Eels, frozen, whole	320 042	26 946

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 43. Import EU-27 (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 import	2001	30376	Eels, frozen, whole	13 359 259	2 363 200
EU-27 import	2002	30376	Eels, frozen, whole	5 410 558	1 017 921
EU-27 import	2003	30376	Eels, frozen, whole	5 097 757	850 672
EU-27 import	2004	30376	Eels, frozen, whole	10 521 061	1 497 844
EU-27 import	2005	30376	Eels, frozen, whole	17 614 219	2 369 830
EU-27 import	2006	30376	Eels, frozen, whole	11 090 221	1 357 314
EU-27 import	2007	30376	Eels, frozen, whole	35 502 443	3 758 300
EU-27 import	2008	30376	Eels, frozen, whole	27 775 654	2 850 108
EU-27 import	2009	30376	Eels, frozen, whole	16 250 338	2 062 709
EU-27 import	2010	30376	Eels, frozen, whole	11 220 378	1 169 632
EU-27 import	2011	30376	Eels, frozen, whole	5 447 232	500 981
EU-27 import	2012	30376	Eels, frozen, whole	3 681 008	331 343

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 44. Import Italy (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy import	2001	30376	Eels, frozen, whole	299 277	72 607
Italy import	2002	30376	Eels, frozen, whole	98 322	28 066
Italy import	2003	30376	Eels, frozen, whole	86 906	19 960
Italy import	2004	30376	Eels, frozen, whole	66 871	12 556
Italy import	2005	30376	Eels, frozen, whole	123 130	20 733
Italy import	2006	30376	Eels, frozen, whole	241 044	39 982
Italy import	2007	30376	Eels, frozen, whole	333 362	47 593
Italy import	2008	30376	Eels, frozen, whole	253 092	26 401
Italy import	2009	30376	Eels, frozen, whole	135 191	24 058
Italy import	2010	30376	Eels, frozen, whole	121 707	25 126
Italy import	2011	30376	Eels, frozen, whole	297 040	51 502
Italy import	2012	30376	Eels, frozen, whole	100 041	4 782

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 45. Import Denmark (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark import	2001	30376	Eels, frozen, whole	4 372 568	681 974
Denmark import	2002	30376	Eels, frozen, whole	2 403 932	352 334
Denmark import	2003	30376	Eels, frozen, whole	2 195 528	260 249
Denmark import	2004	30376	Eels, frozen, whole	641 087	59 315
Denmark import	2005	30376	Eels, frozen, whole	926 370	88 085
Denmark import	2006	30376	Eels, frozen, whole	619 960	54 983
Denmark import	2007	30376	Eels, frozen, whole	4 587 209	408 956
Denmark import	2008	30376	Eels, frozen, whole	1 746 393	165 142
Denmark import	2009	30376	Eels, frozen, whole	4 469 820	564 957
Denmark import	2010	30376	Eels, frozen, whole	1 416 973	157 462
Denmark import	2011	30376	Eels, frozen, whole	379 081	25 724
Denmark import	2012	30376	Eels, frozen, whole	724 862	41 498

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 46. Import Spain (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain import	2001	30376	Eels, frozen, whole	264 774	37 002
Spain import	2002	30376	Eels, frozen, whole	322 785	21 275
Spain import	2003	30376	Eels, frozen, whole	409 515	20 425
Spain import	2004	30376	Eels, frozen, whole	567 22	18 673
Spain import	2005	30376	Eels, frozen, whole	964 241	48 727
Spain import	2006	30376	Eels, frozen, whole	780 804	59 974
Spain import	2007	30376	Eels, frozen, whole	1 838 876	36 802
Spain import	2008	30376	Eels, frozen, whole	1 370 103	27 519
Spain import	2009	30376	Eels, frozen, whole	382 026	19 486
Spain import	2010	30376	Eels, frozen, whole	348 115	8 649
Spain import	2011	30376	Eels, frozen, whole	476 371	13 066
Spain import	2012	30376	Eels, frozen, whole	223 429	20 215

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

2.12.2. Export and Re-export

Table 47. Export China (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China export	2001	30376	Eels, frozen, whole	5 510 148	1 489 180
China export	2002	30376	Eels, frozen, whole	826 401	251 055
China export	2003	30376	Eels, frozen, whole	1 625 144	366 110
China export	2004	30376	Eels, frozen, whole	6 355 475	977 615
China export	2005	30376	Eels, frozen, whole	9 147 943	1 743 527
China export	2006	30376	Eels, frozen, whole	6 996 616	2 048 378
China export	2007	30376	Eels, frozen, whole	8 843 056	1 474 661
China export	2008	30376	Eels, frozen, whole	11 541 320	1 579 819
China export	2009	30376	Eels, frozen, whole	13 195 364	1 385 649
China export	2010	30376	Eels, frozen, whole	13 787 290	1 271 945
China export	2011	30376	Eels, frozen, whole	26 584 197	1 754 884
China export	2012	30376	Eels, frozen, whole	3 048 049	387 443

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 48. Export Hong Kong (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR export	2001	30376	Eels, frozen, whole	201 631	109 969
China, Hong Kong SAR export	2002	30376	Eels, frozen, whole	22 143	2 659
China, Hong Kong SAR export	2003	30376	Eels, frozen, whole	365 193	138 802
China, Hong Kong SAR export	2004	30376	Eels, frozen, whole	217 641	95 287
China, Hong Kong SAR export	2005	30376	Eels, frozen, whole	116 947	63 286
China, Hong Kong SAR export	2006	30376	Eels, frozen, whole	17 677	10 252
China, Hong Kong SAR export	2007	30376	Eels, frozen, whole	214 215	39 540
China, Hong Kong SAR export	2008	30376	Eels, frozen, whole	1 742 475	221 820
China, Hong Kong SAR export	2009	30376	Eels, frozen, whole	494 982	136 761
China, Hong Kong SAR export	2010	30376	Eels, frozen, whole	227 384	31 219
China, Hong Kong SAR export	2011	30376	Eels, frozen, whole	1 730 053	622 401
China, Hong Kong SAR export	2012	30376	Eels, frozen, whole	2 040 439	420 476

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 49. Re-export Hong Kong (030376 – UNdata

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR re-export	2001	30376	Eels, frozen, whole	201 631	109 969
China, Hong Kong SAR re-export	2002	30376	Eels, frozen, whole	22 143	2 659
China, Hong Kong SAR re-export	2003	30376	Eels, frozen, whole	365 193	138 802
China, Hong Kong SAR re-export	2004	30376	Eels, frozen, whole	217 641	95 287
China, Hong Kong SAR re-export	2005	30376	Eels, frozen, whole	116 947	63 286
China, Hong Kong SAR re-export	2006	30376	Eels, frozen, whole	17 677	10 252
China, Hong Kong SAR re-export	2007	30376	Eels, frozen, whole	214 215	39 540
China, Hong Kong SAR re-export	2008	30376	Eels, frozen, whole	1 742 475	221 820
China, Hong Kong SAR re-export	2009	30376	Eels, frozen, whole	494 982	136 761
China, Hong Kong SAR re-export	2010	30376	Eels, frozen, whole	227 384	31 219
China, Hong Kong SAR re-export	2011	30376	Eels, frozen, whole	1 730 053	622 401
China, Hong Kong SAR re-export	2012	30376	Eels, frozen, whole	2 040 439	420 476

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 50. Export Japan (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan export	2001	30376	Eels, frozen, whole	64 778	7 745
Japan export	2002	30376	Eels, frozen, whole	28 123	2 221
Japan export	2003	30376	Eels, frozen, whole	15 817	986
Japan export	2004	30376	Eels, frozen, whole	81 203	3 658
Japan export	2005	30376	Eels, frozen, whole	23 478	1 065
Japan export	2006	30376	Eels, frozen, whole	6 412	227
Japan export	2007	30376	Eels, frozen, whole	10 451	440
Japan export	2008	30376	Eels, frozen, whole	19 869	2 815
Japan export	2009	30376	Eels, frozen, whole	8 501	365
Japan export	2010	30376	Eels, frozen, whole	20 798	710
Japan export	2011	30376	Eels, frozen, whole	14 342	180
Japan export	2012	30376	Eels, frozen, whole	8 181	150

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 51. Export Korea (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea export	2001	30376	Eels, frozen, whole	1 028	2 100
Rep. of Korea export	2002	30376	Eels, frozen, whole	NA	NA
Rep. of Korea export	2003	30376	Eels, frozen, whole	65 174	98 498
Rep. of Korea export	2004	30376	Eels, frozen, whole	NA	NA
Rep. of Korea export	2005	30376	Eels, frozen, whole	124 748	59 937
Rep. of Korea export	2006	30376	Eels, frozen, whole	NA	NA
Rep. of Korea export	2007	30376	Eels, frozen, whole	56 540	60 835
Rep. of Korea export	2008	30376	Eels, frozen, whole	51 834	46 661
Rep. of Korea export	2009	30376	Eels, frozen, whole	34 488	24 083
Rep. of Korea export	2010	30376	Eels, frozen, whole	613	73
Rep. of Korea export	2011	30376	Eels, frozen, whole	172 855	39 044
Rep. of Korea export	2012	30376	Eels, frozen, whole	75 437	11 142

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 52. Export EU-27 (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 export	2001	30376	Eels, frozen, whole	345 023	33 331
EU-27 export	2002	30376	Eels, frozen, whole	540 020	57 459
EU-27 export	2003	30376	Eels, frozen, whole	379 240	35 33
EU-27 export	2004	30376	Eels, frozen, whole	385 105	30 033
EU-27 export	2005	30376	Eels, frozen, whole	492 329	44 348
EU-27 export	2006	30376	Eels, frozen, whole	547 548	91 710
EU-27 export	2007	30376	Eels, frozen, whole	620 868	48 643
EU-27 export	2008	30376	Eels, frozen, whole	138 272	24 140
EU-27 export	2009	30376	Eels, frozen, whole	112 732	19 999
EU-27 export	2010	30376	Eels, frozen, whole	348 416	27 533
EU-27 export	2011	30376	Eels, frozen, whole	1 286 411	93 969
EU-27 export	2012	30376	Eels, frozen, whole	2 050 367	156 985

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 53. Export Italy (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy export	2001	30376	Eels, frozen, whole	242	33
Italy export	2002	30376	Eels, frozen, whole	1 171	384
Italy export	2003	30376	Eels, frozen, whole	4 923	5 623
Italy export	2004	30376	Eels, frozen, whole	3 264	2 581
Italy export	2005	30376	Eels, frozen, whole	698	584
Italy export	2006	30376	Eels, frozen, whole	1 329	1 123
Italy export	2007	30376	Eels, frozen, whole	499	387
Italy export	2008	30376	Eels, frozen, whole	1 013	732
Italy export	2009	30376	Eels, frozen, whole	463	352
Italy export	2010	30376	Eels, frozen, whole	11 846	563
Italy export	2011	30376	Eels, frozen, whole	15 940	1 015
Italy export	2012	30376	Eels, frozen, whole	10 826	696

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 54. Export Denmark (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark export	2001	30376	Eels, frozen, whole	3 557 186	466 616
Denmark export	2002	30376	Eels, frozen, whole	3 084 479	417 063
Denmark export	2003	30376	Eels, frozen, whole	2 899 035	316 696
Denmark export	2004	30376	Eels, frozen, whole	1 994 096	160 191
Denmark export	2005	30376	Eels, frozen, whole	2 083 873	153 895
Denmark export	2006	30376	Eels, frozen, whole	2 066 782	187 661
Denmark export	2007	30376	Eels, frozen, whole	2 718 113	188 297
Denmark export	2008	30376	Eels, frozen, whole	1 471 499	111 556
Denmark export	2009	30376	Eels, frozen, whole	5 539 351	651 981
Denmark export	2010	30376	Eels, frozen, whole	4 015 325	423 065
Denmark export	2011	30376	Eels, frozen, whole	3 957 766	296 914
Denmark export	2012	30376	Eels, frozen, whole	4 433 202	262 233

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 55. Export Spain (030376 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain export	2001	30376	Eels, frozen, whole	242 197	9 975
Spain export	2002	30376	Eels, frozen, whole	176 131	14 422
Spain export	2003	30376	Eels, frozen, whole	105 770	10 252
Spain export	2004	30376	Eels, frozen, whole	166 931	56 708
Spain export	2005	30376	Eels, frozen, whole	695 772	156 44
Spain export	2006	30376	Eels, frozen, whole	250 274	50 481
Spain export	2007	30376	Eels, frozen, whole	282 963	39 991
Spain export	2008	30376	Eels, frozen, whole	224 501	58 981
Spain export	2009	30376	Eels, frozen, whole	70 467	10 880
Spain export	2010	30376	Eels, frozen, whole	83 908	14 789
Spain export	2011	30376	Eels, frozen, whole	122 908	16 208
Spain export	2012	30376	Eels, frozen, whole	3 247	799

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

2.11. COMMODITY CODE 30549 (EELS: SMOKED)

Smoked fish. The definition of smoked fish, in accordance with FAO Code of Practice for Fish and Fisheries Products (according to the first edition of the FAO Code which is under development):

Smoking is not exactly a method of preserving food, but more of a complementary method used with other foodstuffs preservation technologies. It is widely used to add flavor to foodstuffs, and involves leaving the product in smoke produced by burning various types of wood (also aromatized).

The smoking process modifies the organoleptic properties of the foodstuff, leaving the surface of the product dry. This type of procedure can have consequences at a toxic-health level, as the combustion produces polycyclic aromatics (IPA or PHA) with a lipophilic action, and therefore potentially oncogenic. The water activity value for smoked products is around 0.95 aw.

STATISTICAL DATA ANALISYS

Smoking eel improves the quality of the meat and its flavour, and, at the same time, keeps the food healthy. After smoking, eels are often canned for exporting.

There is no data on this Commodity Code in the UN Data database, so EUROSTAT 2010 data was used to illustrate imports into and within EU Member States. EU-27 import data was also used from 2001 to 2008. Both in terms of value and quantity, trade tables 61 and 62 are not relevant.

Data on smoked eel (cumulative) for the period 2007 – 2009 relevant to **Commodity Code 030549** (other Fish, including fillets, smoked) in the **FAO FishStat Plus** database reported below:

Table 56. 030549 Eels (Anguilla spp. Smoked) - International exports of fishery commodities by FAO

Year	2009	2010	2011
Quantity (tonnes)	10 940	10 880	13 061
Value (‘000 USD)	39 923	38 267	64 707

Source: FAO FISHSTAT Plus (2014).

Data from United Nations Commodity Trade Statistics Database **(UN Comtrade**) was obtained from the major Global Importers with the value of imports and exports in the last four years, from 2008 to 2011(other fish, including fillets, smoked, **not only Eels**):

Table 57. Importer countries (030549 – COMTRADE)

Country	Value (USD)
Germany	410 235 000
Japan	199 047 000
USA	170 065 000
Belgium	82 241 000
Italy	78 255 000
Other Reporters	474 566 000
Total	1 414 413 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 58. Exporters countries (030549 – COMTRADE)

Country	Value (USD)
Denmark	289 806 000
Poland	220 854 000
Chile	168 721 000
Turkey	109 095 000
Thailand	76 628 000
Other Reporters	547 950 000
Total	1 413 056 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 59. Import years (030549 – COMTRADE)

Year	Value (USD)
2011	391 431 000
2010	347 744 000
2009	338 733 000
2008	336 503 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 60. Export years (030549 – COMTRADE)

Year	Value (USD)
2011	380 047 000
2010	357 622 000
2009	330 190 000
2008	345 196 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 61. Smoked eels import from outside EU Member States

Country or Area	Year	Comm. Code	Commodity	Trade ('000 Euro)	Weight (kg)
EU-27 imports	2001	30549	Eels, smoked	100	18 800
EU-27 imports	2002	30549	Eels, smoked	100	10 000
EU-27 imports	2003	30549	Eels, smoked	NA	2 700
EU-27 imports	2004	30549	Eels, smoked	100	6 100
EU-27 imports	2005	30549	Eels, smoked	100	4 400
EU-27 imports	2006	30549	Eels, smoked	NA	9 600
EU-27 imports	2007	30549	Eels, smoked	NA	9 400
EU-27 imports	2008	30549	Eels, smoked	100	20 900
	2009	30549	Eels, smoked	NA	NA
	2010	30549	Eels, smoked	NA	NA

Source: EUROSTAT (2010).

Table 62. Smoked eels within the EU Member States

Country or Area	Year	Comm. Code	Commodity	Trade ('000 Euro)	Weight (kg)
EU-27	2001	30549	Eels, smoked	5 600	553 800
EU-27	2002	30549	Eels, smoked	8 200	726 500
EU-27	2003	30549	Eels, smoked	8 000	745 400
EU-27	2004	30549	Eels, smoked	9 700	644 600
EU-27	2005	30549	Eels, smoked	9 600	530 500
EU-27	2006	30549	Eels, smoked	7 500	406 300
EU-27	2007	30549	Eels, smoked	5 600	263 700
EU-27	2008	30549	Eels, smoked	5 200	324 600
	2009	30549	Eels, smoked	NA	NA
	2010	30549	Eels, smoked	NA	NA

Source: EUROSTAT (2010).

2.12. COMMODITY CODE 30192 (EELS: LIVE)

In accordance with FAO first edition of Code of practice for Fish and Fisheries Products, the definition of Live Eel has not been finalized yet.

Live Eel. The live product must be caught and stored to be sent to markets or distribution centres as quickly as possible, without causing excessive stress for the fish. The product must be in a good state of health without skin damage or the evident presence of ectoparasites. Eels are usually sold live, as they can live for a long time out of water.

STATISTICAL DATA ANALISYS

By definition, live fish, must be sold as close as possible to the place where it is caught (even though *Anguilla* spp. can survive for a long time out of the water). We can therefore assume to a greater extent that the data refer to the European eel (*Anguilla anguilla*) for the European market, and the Japanese eel (*Anguilla japonica)* and subtropical species for the Asian market. The following tables illustrate data relative to macrogeographical areas, including EU-27 data, with the focus on major stakeholders.

Imports. As for imports into Asian countries**,** there was a notable drop for China in 2009, while figures were stable in the previous period from 2003 to 2008. Hong Kong peaked in 2008 before levelling out at positive values. Japan registered the highest imports at USD 431 million for 2011 (the highest ever).

European imports were significantly lower both in terms of value and quantities. Apparently most of the trade was between Member States. Italian imports are positive at USD 10.60 million in 2012, making Italy one of the leading countries of the European Union (Table 73).

Exports. Chinese exports in 2012 reached USD 156 million, making China the major player in the Asian block – although this figure is much lower than the all-time high of USD 182 million of 2008. Apparently, the major end markets are Japan and Hong Kong, as can be seen from the figures on imports. The data on Japanese exports indicate minimal figures.

Data on exports from Hong Kong are interesting, when considered with RE-Export data, they show a considerable outgoing volume for 2010 amounting to around USD 23 million.

In Europe, Denmark leads the way with USD 14 million in exports, a figure which is a far cry from the USD 22 million reached in 2005 and the USD 21.5 million in 2008. In the ensuing years, there was a remarkable contraction of exports that went down to USD 13 million.
It is to be noted that for this segment, and in particular for the macro-Asian area, it is impossible to establish the percentage of live product that doesn't belong to the *Anguilla japonica* species. These species presumably belonging to tropical eel species found locally in this fishing area (FAO Fishing Area 61 and adjacent zones), which are considered of little commercial value, such as the New Zealand eel (*Anguilla dieffebachii*) or long-finned eel *(Anguilla reinhardtii*). UN Data are only available up to 2012, although it must be noted that data on this last year are not consolidated.

FAO FishStat Plus data on the three years 2007–2009 – Commodity Code 30192:

Table 63. 030192 Eels (*Anguilla* spp. Live) - International export of Fishery Commodities by FAO

Year	2009	2010	2011
Quantity (tonnes)	33 243	36 932	28 548
Value ('000 USD)	307 679	417 111	461 702

Source: FAO FISHSTAT Plus (2014).

Data from United Nations Commodity Trade Statistics Database (UN Comtrade) was obtained from the major global importers with the value of imports and exports in from 2008 to 2011:

Table 64. Importer countries (030192 – COMTRADE)

Country	Value (USD)
Japan	1 367 852 000
Rep. of Korea	257 619 000
China, Hong Kong SAR	95 383 000
Netherland	70 251 000
Germany	54 177 000
Other Reporters	177 358 000
Total	2 022 644 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 65. Exporters countries (030192 – COMTRADE)

Country	Value (USD)
China	593 784 000
Other Asian countries	344 811 000
France	104 174 000
Denmark	67 441 000
Netherlands	53 993 000
Other Reporters	299 113 000
Total	1 463 319 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 66. Import years (030192 – COMTRADE)

Year	Value (USD)
2011	594 220 000
2010	572 637 000
2009	301 177 000
2008	554 609 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE).

Table 67. Export years (030192 – COMTRADE)

Country	Value (USD)
2011	419 559 000
2010	403 391 000
2009	292 011 000
2008	348 356 000

Source: United Nations Commodity Trade Statistic Database (COMTRADE)

2.12.1. Import

Table 68. Import China (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China import	2001	30192	Eels, live	5 478 214	73 931
China import	2002	30192	Eels, live	10 506 517	112 557
China import	2003	30192	Eels, live	5 373 071	64 191
China import	2004	30192	Eels, live	5 062 546	155 294
China import	2005	30192	Eels, live	7 314 737	226 275
China import	2006	30192	Eels, live	6 369 152	249 799
China import	2007	30192	Eels, live	7 529 198	252 139
China import	2008	30192	Eels, live	6 563 631	229 052
China import	2009	30192	Eels, live	2 319 766	218 834
China import	2010	30192	Eels, live	4 190 971	256 220
China import	2011	30192	Eels, live	2 382 318	245 578
China import	2012	30192	Eels, live	1 983 610	88 355

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 69. Import Hong Kong (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR import	2001	30192	Eels, live	20 779 699	
China, Hong Kong SAR import	2002	30192	Eels, live	16 937 289	1 930 655
China, Hong Kong SAR import	2003	30192	Eels, live	15 027 468	2 099 893
China, Hong Kong SAR import	2004	30192	Eels, live	16 974 867	1 604 971
China, Hong Kong SAR import	2005	30192	Eels, live	15 570 363	1 726 871
China, Hong Kong SAR import	2006	30192	Eels, live	10 938 067	1 691 399
China, Hong Kong SAR import	2007	30192	Eels, live	18 358 753	3 376 521
China, Hong Kong SAR import	2008	30192	Eels, live	27 756 834	4 161 834
China, Hong Kong SAR import	2009	30192	Eels, live	19 582 078	3 166 712
China, Hong Kong SAR import	2010	30192	Eels, live	21 573 544	3 025 453
China, Hong Kong SAR import	2011	30192	Eels, live	26 471 214	1 269 382
China, Hong Kong SAR import	2012	30192	Eels, live	42 582 529	2 779 093

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 70. Import Japan (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan import	2001	30192	Eels, live	113 695 481	17 375 779
Japan import	2002	30192	Eels, live	159 323 358	20 886 468
Japan import	2003	30192	Eels, live	207 982 365	24 053 350
Japan import	2004	30192	Eels, live	295 405 205	26 604 701
Japan import	2005	30192	Eels, live	357 856 392	23 560 334
Japan import	2006	30192	Eels, live	265 846 280	20 241 018
Japan import	2007	30192	Eels, live	250 890 775	21 302 445
Japan import	2008	30192	Eels, live	336 370 709	15 898 951
Japan import	2009	30192	Eels, live	190 859 662	12 087 496
Japan import	2010	30192	Eels, live	409 623 590	14 855 344
Japan import	2011	30192	Eels, live	430 998 288	9 667 756
Japan import	2012	30192	Eels, live	387 448 521	4 685 775

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 71. Import Korea (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea import	2001	30192	Eels, live	33 612 164	5 496 779
Rep. of Korea import	2002	30192	Eels, live	37 808 354	5 112 650
Rep. of Korea import	2003	30192	Eels, live	30 997 337	3 886 579
Rep. of Korea import	2004	30192	Eels, live	46 096 996	4 737 959
Rep. of Korea import	2005	30192	Eels, live	39 309 785	1 526 693
Rep. of Korea import	2006	30192	Eels, live	31 056 388	2 052 584
Rep. of Korea import	2007	30192	Eels, live	24 552 025	434 024
Rep. of Korea import	2008	30192	Eels, live	77 540 336	2 647 617
Rep. of Korea import	2009	30192	Eels, live	15 424 303	155 718
Rep. of Korea import	2010	30192	Eels, live	77 527 004	3 036 232
Rep. of Korea import	2011	30192	Eels, live	87 128 332	490 694
Rep. of Korea import	2012	30192	Eels, live	84 419 323	146 592

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 72. Import EU-27 (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 import	2001	30192	Eels, live	6 416 947	1 010 746
EU-27 import	2002	30192	Eels, live	5 449 116	934 800
EU-27 import	2003	30192	Eels, live	6 274 302	970 306
EU-27 import	2004	30192	Eels, live	7 868 283	951 430
EU-27 import	2005	30192	Eels, live	7 895 583	824 924
EU-27 import	2006	30192	Eels, live	7 689 255	839 038
EU-27 import	2007	30192	Eels, live	7 640 265	780 996
EU-27 import	2008	30192	Eels, live	8 120 500	800 237
EU-27 import	2009	30192	Eels, live	5 653 117	580 172
EU-27 import	2010	30192	Eels, live	4 871 822	489 634
EU-27 import	2011	30192	Eels, live	5 492 532	428 027
EU-27 import	2012	30192	Eels, live	3 944 167	285 005

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 73. Import Italy (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy import	2001	30192	Eels, live	5 846 718	892 456
Italy import	2002	30192	Eels, live	5 008 696	740 745
Italy import	2003	30192	Eels, live	7 394 828	890 234
Italy import	2004	30192	Eels, live	8 150 042	718 547
Italy import	2005	30192	Eels, live	9 058 545	732 14
Italy import	2006	30192	Eels, live	9 381 774	767 075
Italy import	2007	30192	Eels, live	8 911 916	747 160
Italy import	2008	30192	Eels, live	8 168 492	711 431
Italy import	2009	30192	Eels, live	6 769 194	640 911
Italy import	2010	30192	Eels, live	9 599 890	1 159 116
Italy import	2011	30192	Eels, live	10 374 619	942 979
Italy import	2012	30192	Eels, live	10 611 531	731 616

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 74. Import Denmark (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark import	2002	30192	Eels, live	7 768 254	1 250 497
Denmark import	2003	30192	Eels, live	10 316 424	1 050 382
Denmark import	2004	30192	Eels, live	14 053 384	1 189 495
Denmark import	2005	30192	Eels, live	15 750 421	1 135 219
Denmark import	2006	30192	Eels, live	11 753 059	919 826
Denmark import	2007	30192	Eels, live	9 197 057	605 161
Denmark import	2008	30192	Eels, live	7 068 417	635 686
Denmark import	2009	30192	Eels, live	5 358 446	358 741
Denmark import	2010	30192	Eels, live	4 458 595	294 696
Denmark import	2011	30192	Eels, live	6 460 693	299 933
Denmark import	2012	30192	Eels, live	5 853 625	212 427

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 75. Import Spain (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain import	2001	30192	Eels, live	6 697 418	114 832
Spain import	2002	30192	Eels, live	5 552 872	183 841
Spain import	2003	30192	Eels, live	6 164 702	173 816
Spain import	2004	30192	Eels, live	7 841 747	158 360
Spain import	2005	30192	Eels, live	8 457 527	104 424
Spain import	2006	30192	Eels, live	5 348 310	103 165
Spain import	2007	30192	Eels, live	6 088 121	103 791
Spain import	2008	30192	Eels, live	11 408 069	160 217
Spain import	2009	30192	Eels, live	4 704 789	125 592
Spain import	2010	30192	Eels, live	4 136 462	47 526
Spain import	2011	30192	Eels, live	4 557 135	54 667
Spain import	2012	30192	Eels, live	2 999 383	44 219

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

2.12.2. Export and Re-Export

Table 76. Export China (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China export	2001	30192	Eels, live	34 286 001	6 446 705
China export	2002	30192	Eels, live	28 342 846	5 337 453
China export	2003	30192	Eels, live	58 631 440	9 733 890
China export	2004	30192	Eels, live	124 675 986	14 972 520
China export	2005	30192	Eels, live	164 288 363	14 237 083
China export	2006	30192	Eels, live	146 956 078	14 201 653
China export	2007	30192	Eels, live	93 410 260	10 448 745
China export	2008	30192	Eels, live	182 603 835	14 370 228
China export	2009	30192	Eels, live	120 490 859	10 592 782
China export	2010	30192	Eels, live	132 184 422	8 674 383
China export	2011	30192	Eels, live	158 505 705	5 638 345
China export	2012	30192	Eels, live	155 815 888	3 845 555

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 77. Export Hong Kong (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR export	2001	30192	Eels, live	17 128 078	3 017 712
China, Hong Kong SAR export	2002	30192	Eels, live	12 831 805	753 644
China, Hong Kong SAR export	2003	30192	Eels, live	11 392 452	420 216
China, Hong Kong SAR export	2004	30192	Eels, live	3 726 016	443 111
China, Hong Kong SAR export	2005	30192	Eels, live	4 034 211	190 841
China, Hong Kong SAR export	2006	30192	Eels, live	4 116 549	157 827
China, Hong Kong SAR export	2007	30192	Eels, live	3 712 794	152 903
China, Hong Kong SAR export	2008	30192	Eels, live	10 547 829	240 943
China, Hong Kong SAR export	2009	30192	Eels, live	7 778 106	240 831
China, Hong Kong SAR export	2010	30192	Eels, live	11 861 612	420 361
China, Hong Kong SAR export	2011	30192	Eels, live	15 115 472	430 069
China, Hong Kong SAR export	2012	30192	Eels, live	13 994 714	280 665

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 78. Re-export Hong Kong (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
China, Hong Kong SAR re-export	2001	30192	Eels, live	17 128 078	3 017 712
China, Hong Kong SAR re-export	2002	30192	Eels, live	12 831 805	753 644
China, Hong Kong SAR re-export	2003	30192	Eels, live	11 392 452	420 216
China, Hong Kong SAR re-export	2004	30192	Eels, live	3 726 016	443 111
China, Hong Kong SAR re-export	2005	30192	Eels, live	4 034 211	190 841
China, Hong Kong SAR re-export	2006	30192	Eels, live	4 116 549	157 827
China, Hong Kong SAR re-export	2007	30192	Eels, live	3 712 794	152 903
China, Hong Kong SAR re-export	2008	30192	Eels, live	10 547 829	240 943
China, Hong Kong SAR re-export	2009	30192	Eels, live	7 252 934	239 449
China, Hong Kong SAR re-export	2010	30192	Eels, live	11 588 095	419 525
China, Hong Kong SAR re-export	2011	30192	Eels, live	15 115 472	430 069
China, Hong Kong SAR re-export	2012	30192	Eels, live	13 994 714	280 665

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 79. Export Japan (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Japan export	2001	30192	Eels, live	64 629	3 074
Japan export	2002	30192	Eels, live	230 137	6 534
Japan export	2003	30192	Eels, live	6 606 525	74 656
Japan export	2004	30192	Eels, live	6 696 969	54 769
Japan export	2005	30192	Eels, live	15 485 614	2 259 354
Japan export	2006	30192	Eels, live	12 723 512	94 868
Japan export	2007	30192	Eels, live	8 868 363	58 900
Japan export	2008	30192	Eels, live	4 862 520	33 996
Japan export	2009	30192	Eels, live	7 778 766	71 214
Japan export	2010	30192	Eels, live	4 123 646	27 722
Japan export	2011	30192	Eels, live	5 030 231	36 475
Japan export	2012	30192	Eels, live	5 278 856	10 385

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 80. Export Korea (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Rep. of Korea export	2001	30192	Eels, live	1 822 385	273 459
Rep. of Korea export	2002	30192	Eels, live	1 309 272	2 654
Rep. of Korea export	2003	30192	Eels, live	6 407 163	879 066
Rep. of Korea export	2004	30192	Eels, live	10 427 093	22 265
Rep. of Korea export	2005	30192	Eels, live	123 807	3 207
Rep. of Korea export	2006	30192	Eels, live	1 437 079	5 767
Rep. of Korea export	2007	30192	Eels, live	8 709	1 068
Rep. of Korea export	2008	30192	Eels, live	245 858	480
Rep. of Korea export	2009	30192	Eels, live	590 203	4 750
Rep. of Korea export	2010	30192	Eels, live	100 879	483
Rep. of Korea export	2011	30192	Eels, live	1 043 388	28 566
Rep. of Korea export	2012	30192	Eels, live	4 746 521	79 866

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 81. Export EU-27 (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
EU-27 export	2001	30192	Eels, live	14 572 164	2 186 619
EU-27 export	2002	30192	Eels, live	19 437 294	116 107
EU-27 export	2003	30192	Eels, live	21 403 383	96 102
EU-27 export	2004	30192	Eels, live	31 060 904	64 304
EU-27 export	2005	30192	Eels, live	68 000 151	77 002
EU-27 export	2006	30192	Eels, live	18 738 399	37 844
EU-27 export	2007	30192	Eels, live	42 383 297	71 003
EU-27 export	2008	30192	Eels, live	38 814 763	59 701
EU-27 export	2009	30192	Eels, live	4 301 650	15 721
EU-27 export	2010	30192	Eels, live	18 082 716	24 204
EU-27 export	2011	30192	Eels, live	1 105 750	6 925
EU-27 export	2012	30192	Eels, live	2 133	137

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 82. Export Italy (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Italy export	2001	30192	Eels, live	3 615 833	541 647
Italy export	2002	30192	Eels, live	2 435 027	397 205
Italy export	2003	30192	Eels, live	2 357 707	298 241
Italy export	2004	30192	Eels, live	2 345 356	224 434
Italy export	2005	30192	Eels, live	1 759 065	146 833
Italy export	2006	30192	Eels, live	2 435 387	179 007
Italy export	2007	30192	Eels, live	2 068 470	156 393
Italy export	2008	30192	Eels, live	1 550 466	115 467
Italy export	2009	30192	Eels, live	1 239 779	117 496
Italy export	2010	30192	Eels, live	1 776 847	177 902
Italy export	2011	30192	Eels, live	2 742 012	197 619
Italy export	2012	30192	Eels, live	1 668 389	96 635

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

Table 83. Export Denmark (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Denmark export	2001	30192	Eels, live	11 925 052	1 836 081
Denmark export	2002	30192	Eels, live	14 121 503	2 316 570
Denmark export	2003	30192	Eels, live	18 369 485	2 407 065
Denmark export	2004	30192	Eels, live	19 163 282	1 888 422
Denmark export	2005	30192	Eels, live	22 397 169	1 958 303
Denmark export	2006	30192	Eels, live	23 848 240	2 060 198
Denmark export	2007	30192	Eels, live	22 426 852	1 883 207
Denmark export	2008	30192	Eels, live	21 535 697	1 870 683
Denmark export	2009	30192	Eels, live	17 496 136	1 667 767
Denmark export	2010	30192	Eels, live	14 147 426	1 366 822
Denmark export	2011	30192	Eels, live	13 822 010	963 213
Denmark export	2012	30192	Eels, live	13 091 344	894 602

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database

Table 84. Export Spain (030192 – UNdata)

Country or Area	Year	Comm. Code	Commodity	Trade (USD)	Weight (kg)
Spain export	2001	30192	Eels, live	12 347 964	217 659
Spain export	2002	30192	Eels, live	8 811 740	240 319
Spain export	2003	30192	Eels, live	5 502 189	193 524
Spain export	2004	30192	Eels, live	15 756 564	192 996
Spain export	2005	30192	Eels, live	22 199 102	153 041
Spain export	2006	30192	Eels, live	7 532 477	136 992
Spain export	2007	30192	Eels, live	9 829 588	167 679
Spain export	2008	30192	Eels, live	13 512 789	293 062
Spain export	2009	30192	Eels, live	3 563 906	586 339
Spain export	2010	30192	Eels, live	5 919 334	200 846
Spain export	2011	30192	Eels, live	4 047 545	238 553
Spain export	2012	30192	Eels, live	2 570 998	30 880

Source: UNdata, United Nations Statistic Division, Commodity Trade Statistics Database.

3. MARKETING OF EEL AS A SEAFOOD (AN OVERVIEW)

Eel species are harvested and marketed globally for human consumption. They are distributed both live and refrigerated and prepared according to local traditions including marinated and grilled in Japan, or smoked and stewed in northern Europe and North America**.**

While eel is closely linked to local customs in terms of consumption, it has an established presence and interest in global trade. The variety of eel found in the European and Asian markets extends beyond the species of greatest commercial interest. The eel traded is identified by Commodity Codes, includes eel that is live, fresh or chilled, frozen, or prepared as a marinated, salted, dried, smoked and canned product.

This section presents a snapshot of various global markets and their characteristics.

Italy

Food balance sheet of fish and fish contribution to protein supply: average 25 kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009*).

The consumption of eel meat in Italy is linked to regional culinary traditions, especially in the north and east areas of the country with lakes and streams, which are ideal inland water habitats. At retail, most eels are sold live or fresh, directly in fish markets or through major distribution chains, in particular for traditional feasts. Eaten as a typical dish, it is served in steaks prepared on the basis of traditional local recipes of, for example, the Tuscan region or near Venice.

Eel is quite hard to obtain due to the non-uniformity of the fish, the type of sale (live), the high price and the difficulties involved in its preparation and consumption compared with other fish product types both farmed and caught in the wild.

Saltwater sea bream and gilthead, and freshwater trout, salmon and Nile perch are sold by major distribution chains as vacuum-packed fillets, which are easy to prepare and offered at a very competitive price. The retail price at the time of writing was around EUR 10.5 per kg).

Eel – is sold whole, making it quite unsuitable for small portions or slices for daily consumption.

Supply chains follows two lines:

- producer – local market (live or fresh) – final customer.
- producer – supermarket (live, fresh, marinated, etc.) – final customer.

The biggest wholesale fish market in Italy is in Milan, in terms of quantity, quality and the freshness of the products sold. In addition, Venice and Chioggia have Adriatic Sea fish markets of notable importance.

Fish consumption in Italy was around 25 kg per capita in 2007. Fresh seafood, the main product group purchased by Italian families, accounted for 50 percent of purchases, followed by frozen seafood (23 percent) and canned seafood (20 percent). Due to the increasing consumption and declining domestic supply, Italy is a net importer of seafood. Eel is mostly sold as a live product and typically consumed as a speciality dish at Christmas.

Venice fish market. A statistical survey on European eel sales in the Venice fish market (wholesale market) during August – October 2012 found:

European eel adult size (imported product) average price from EUR 11.00 to EUR 20.00
European eel adult size (Italian national product) average price from EUR 9.00 to EUR 20.90
European eel adult size (Italian local product) average price from EUR 8.76 to EUR 16.00
European eel small-medium size (imported product) average price from EUR 7.50 to EUR 20.00
European eel small-medium size (Italian local product) average price from n/a to EUR 20.00

Chioggia seafood market. A statistical survey on *Anguilla anguilla* sales in the Chioggia wholesale seafood market for the end of November 2012 found:

European eel medium size (Italian national product) average price from. EUR 10.00 to EUR 19.95

European eel medium size, whole (Adriatic Sea, local) average price EUR 15.00 (no fluctuation)

National retail supermarket price for live eel averaged EUR 25.00/kg, according to October 2012 statistical survey, with weight ranging from 0.5 to 1 kg. No data on other eel products currently available.

Germany

Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply: average 15 kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009*).

In North European countries, processed fishery products are of significant commercial importance. In Germany alone they are processed in numerous ways by processing facilities, smoking being a widely used technique. Smoking is one of the traditional techniques used to preserve eel meat. However, fresh eel is not very popular in Germany.

According to numerous reports, over 75 percent of the German eel market is smoked high value, derived from European eel from the Baltic Sea and has a high fat content. Smoking improves the quality of the meat and its flavour, and also preserves the product. Due to their organoleptic properties, eels from other areas are of lower value due to their

low fat content. In Germany, the eels sold for smoking are around 300–600 g which is larger than the standard 120–180 g size sold in Denmark or Holland.

Evaluating the Globefish Commodity Update Report, eel trade and the eel market in Germany play a marginal role in the global economy of the fish market. Smoked eel is the only segment of relevance, mainly due to tradition.

France

Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply: average 34 kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009*).

France is one of the most important seafood markets in Europe, with high per capita fish consumption. The national market supplies over 70 percent of seafood consumption. France is a big consumer of scallops and oysters. These products are essentially traditional and seasonal, e.g. scallops are mainly consumed in December (as is Italy, but with a different impact in terms of domestic market share).

According to numerous reports and authors on the seafood market, eel trade does not seem to be of great importance for the French market. In fact, all French eel production is exported to Spain and Italy.

Spain

Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply: average 43.0 kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009*).

Consumer expenditures for fish and seafood products have increased in recent years with a high level of seafood consumption, equal to 43 kg per capita. Demersal fish such as flounder, and pelagic fish are the main types of seafood consumed in Spain. Seafood is consumed in a variety of ways but mostly whole, fresh and frozen. Prepared products, with the exception of canned tuna, are less popular and therefore less important for the economy. Fresh fish is mostly consumed at home, while frozen seafood is consumed at the restaurant.

The fish commodities exported by Spain are tuna, pelagic specimens and molluscs.

The supply chain is similar to that of the other southern European countries such as Italy, with consumers purchasing seafood from the supermarket and hypermarket, abandoning traditional local markets (typical of the eel trade) in favour of large-scale retail. Fried glass eel is very popular in Spain where it is a typical national dish.

Most of the product is marketed in Spain by frozen food distributors, who organize their supply chain in the national sea food processing sector – one of the largest in the EU (Globefish, 2008). According to ANFACO-CECOPESCA, around 150 companies operate in the sector, with particular emphasis on canned tuna.

Eel is a traditional market segment with small but stable share.

In the MERCABARNA Market, in February 2012, smoked European eel, small size 100 g packet, was sold for EUR 4.2/kg.

An exhaustive list of Spanish seafood operators (importers, exporters, farmers and distributors) is available in Globefish, Volume 96 "The Seafood Market in Spain".

China

Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply: average 32.0 Kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009*).

China is a major eel aquaculture producer, not only because of growing domestic demand, but also due to the high demand from other countries such as Japan.

Eels are certainly one of the 700 species of freshwater species of great economic importance in terms of inland water fishery resources. However, since the 1960s, inland fishery resources have decreased considerably due to over-fishing, land losses caused by urbanization and growing pollution.

Eels (mostly *Anguilla japonica*) have around a 1 percent share of the Chinese fish market (Globefish, 2004). Most national eel farming facilities and processing plants export only to Japan due to high demand. The major export areas are the East Asian region (Japan and South Korea) and the European Union (mainly Italy, France and Spain).

Export of eel in all forms, including live and roasted (in particular) and of processed products to Japan and Korea, is of great relevance for this market segment.

In 2002, roasted eel accounted for a volume of around 67 000 tonnes, worth USD 590 million. Kabayaki fried eel also has a high impact on exports to Japan. The average price for eel exported from Guangdong Province to Japan in 2008 was USD 26.0 kg.

Market

In general, the Chinese prefer live seafood, followed by frozen fish and then canned. Less than 5 percent of total aquaculture production is treated or processed for local or overseas markets. For this reason and due to the high eel quotations, most national production is exported. Of the 32 kg per capita of fish consumption, only a small part is eel consumption, indicating that eel farming in China is almost exclusively for export.

Japan

Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply: average 54.0 kg per capita – data refer to 2007 (*Source FAO-FIPS, 2009).*

According to FAO, Japan is the biggest eel market. In fact, Japan has the largest fish market in the world, located in the Tsukiji district close to Tokyo. Its aquaculture sector cannot meet the high demand for eel.

Japanese eel is sold at different prices according to the fish origin: lake, river or pond.

The price fluctuations are determined by the seasonal nature of the product, and the availability of eels of a commercial size (not only *Anguilla japonica* but also *Anguilla anguilla*). According to Japanese tradition, eels are consumed during July and August, a period during which eel dishes are the most expensive seafood. The product varies according to the concentration of fatty acids, which again depends on its diet.

In Japan, the average price of live eel (no data on whether *Anguilla anguilla* or *Anguilla japonica*, or both) rose 50 percent during the first half of 2012.

Markets
Imports of live eels for human consumption amount to 400 tonnes, worth JPY 1 247 million in the last analysed period. Imports from China dropped by around 35 percent in volume and an average of 2 percent in value from the previous year, while those from Taiwan Province of China to China dropped 70 percent in volume and 55 percent in value.

Around 90 percent of eel (all *Anguilla* spp.*)* consumed in Japan is consumed as *kabayaki*, a Japanese dish prepared using 100–200 g eels. The eel is marinated in soy sauce and then steamed or grilled.

Considering that this seafood fish market is the most important, and given the significant decrease in the number of wild specimens available, it would be best to change this situation, with greater focus on eel issues, promoting the consumption and cultivation of large specimens.

4. REGULATIONS

4.1. CONVENTION ON INTERNATIONAL TRADE OF ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The Washington Convention on International Trade of Endangered Species (CITES) regulates trade in terms of exportation, re-exportation, importation, transit, transfer and detention for any reason, of some endangered animal and plant species.

Established in 1975 and administered by United Nations Environment Programme (UNEP), Member Countries (Parties) currently number 169. CITES regulates the international trade of approximately 30 000 species, of which approximately 25 000 are plant species. These species are listed in three appendices. Each country has its own management authority.

On 1 January 1984, the EU implemented the CITES regulations with legislation which is stricter for some species than the actual CITES regulations.

Regulation (EC) 338/1997 (Protection of wild flora and fauna species through trade control) was followed by other regulations and significant modifications to define the species to protect in detail, classifying the same in various annexes.

The following EU regulations are currently in force:

Council Regulation (EC) 338/1997 on the protection of species of wild fauna and flora by regulating trade therein.
Commission Regulation (EC) 407/2009 (annexes of Regulation 338/97 with the lists of the protected wild flora and fauna species), that repealing and replacing the (EC) 318/2008.
Commission Regulation (EC) 865/2006 (indicating the method of application of the Council Regulation (EC) 338/97.
Commission Regulation (EC) 100/2008 (with modifications and integrations of Regulation (EC) 865/2006).
Commission Regulation (EC) 359/2009 (suspending the introduction in the EU of some wild fauna and flora species and annulling Commission Regulation 1037/2007 and Regulation 811/2008.
Council Regulation (EC) 1100/2007 (establishing measures for the recovery of the stock of the European eel on 18 September 2007).

4.2. COUNCIL REGULATION (EC) 1100/2007

The EU Member States adopted Council Regulation (EC) No. 1100/2007, establishing measures for the recovery of European eel stock *(Anguilla anguilla*, Linneo, 1758). This rule includes measures for the EU Member States concerning the restocking of European eels and, in particular, special requirements to increase the number of eels measuring less than 12 cm in length through the implementation of an eel management plan. This Regulation established guidelines for the exploitation of the European eel in community and transboundary water, in costal lagoons, in estuaries and rivers that flow into the sea (art. 1).

It requires all Member States to identify the river basins in their national territory that constitute natural habitats for the eels (freshwater eel in natural habitat).

***Eel Management Plan*.** For each habitat, Member States need to prepare an eel management plan. The main goal of the Eel Management Plan is to reduce anthropogenic mortalities to let around 40 percent of the silver eel biomass escape to the sea. Each document shall contain a detailed description of the present eel population situation in the river basin. In the Eel Management Plan, each Member State shall also implement measures to decrease eel losses caused by non-fishery factors, including hydroelectric turbines and biological predators. An Eel Management Plan may contain the following measures: restocking of specimens, reducing commercial fishing activity (legal and illegal), certain measures related to aquaculture, and the elimination of predators (art. 2). The reduction in catches may be replaced in whole or in part by immediate measures concerning other anthropogenic loss factors (art. 5). The measures concerning restocking eels of less than 12 cm are in art. 7.

4.3. PROTECTED SPECIES

The list of CITES protected species (formally referred to as *Specimens*) are periodically revised (dynamic lists).

The various species are listed in three appendices on the basis of the level of protection required.

- Appendix I includes protected species in the strictest sense, actually in danger of extinction. Trade is forbidden, use may be allowed in exceptional circumstances.
- Appendix II includes protected species, which are not in imminent danger of extinction. These species are subject to control (trade must be compatible with survival of the same and is subject to authorization through CITES certification).
- Appendix III includes species protected by single member states (typically in states that attempt to protect special endemic species)

Various species can be added or cancelled from Appendices I and II or moved from one appendix to another only after joint Party decisions in conferences held by member states using proposal procedures.

Species in Appendix III can only be included or cancelled from the list by unilateral decision of the relevant country.

APPENDIX I
Permission to import must be requested from the state authorities. This is only given if the species in question is not traded for commercial purposes but for the purpose of protecting the species – the same is valid for re-exportation requests.

Permission is only given if the animal was obtained with legal means.

In the case of live animals or plants, the effects of stress during transportation must be kept to a minimum.

APPENDIX II

An export or re-export certificate is required from the state authorities.

The certificate can only be issued if the species in question was obtained legally, through acknowledged channels and the marketing of the same cannot endanger the species.

The re-exportation certificate can only be issued if the species was imported in compliance with Convention regulations. In the case of live animals or plants, transportation must be organized to limit risks for survival, and in consideration of the wellbeing of the same.

CLASS ACTINOPTERYGII (FISHES)		
ANGUILLIFORMES		
Anguillidae Freshwater eels		
	Anguilla anguilla (Entry into force delayed 18 months, i.e. until 13 March 2009)	

Source: www.cites.org

APPENDIX III

In the case of trade from a state, which has included animals or vegetable species in Appendix III, permission must be given by the Authorities of said state.

This permission will only be given if the species were obtained through legal and authorized channels and again trying to minimize the risk of injury or damage during the various phases of shipment. Exceptions those above articles can be summed up as follows:

- species in transit and shipped using transhipping
- species acquired before inclusion in the CITES lists
- species which are part of private collections
- animals bred in captivity
- plants grown using artificial techniques
- organisms used in scientific research
- for circus animals

Roughly 5 000 animals species and 2 800 plant species are protected by CITES against exploitation and trade.

The various species are listed in Appendices. These include taxonomic groups such as primates, cetaceans, turtles, parrots, coral, and orchids. In certain cases also subspecies, or the same species from different geographical areas (for example the population of a certain species only in one country), are included.

There are roughly 15 fish species (*specimens*) in Appendix I, and 71 species in *Appendix II*, of these, the European eel (*Anguilla anguilla*, Linnaeus 1758) in *Appendix II*.

4.4. IUCN RED LIST OF THREATENED SPECIES

IUCN Red List of Threatened Species was established in 1948 and represents the most extensive database of information and data on the conservation status of plant and animal species around the world.

The list is compiled by the International Union for the Conservation of Nature and Natural Resources (IUCN), which is the entity responsible.

The IUCN Red List is based on precise criteria to assess the extinction risk of thousands of species and subspecies. The IUCN Red List of Threatened Species is produced annually and grades the threat of species that have been evaluated by its assessment criteria.

Some 30 percent of all fish species recently assessed by the World Conservation Union were designated in threatened categories. Species are classified as:

- extinct (EX)
- extinct in the wild (EW)
- critically endangered (CR)
- endangered (EN)
- vulnerable (VU)
- lower risk/conservation dependent (LR/CD)
- near threatened (NT)
- least concern (LC)
- data deficient (DD), when data are inconclusive

Freshwater fish are particularly vulnerable due to their habitat, while marine fish (excluding anadromous species) are less threatened than freshwater fish (Akcakaya, 2004).

Indeed there are no documented cases of saltwater species going extinct as a result of human activities (Robert and Hawkins, 1999). However over fishing has caused local extirpation and some marine fish population have declined within a few generation (Reynolds *et al*., 2001).

The European eel, *Anguilla anguilla* is among the new additions to the 2008 IUCN Red List of Threatened Species.

Anguilla anguilla was classified as critically endangered (CR) in the 2008 Red List because its small population has suffered dramatic declines (around 90 percent of wild

juvenile stock) in recent years due to human impact. All the other eel species suitable for commercial purposes (*A. japonica*, *A. rostrata*, etc.) are listed as last concern (LC) or not evaluated.

4.5. UNITED STATES OF AMERICA LEGISLATIVE ASPECTS

Regulation of Aquaculture in the United Stated of America.

Regulation of aquaculture in the USA is both at the federal and state level. At the federal level, the most important agencies are the Food and Drug Administration (FDA), the Department of Agriculture (USDA) and the Environmental Protection Agency (EPA). Each one regulates a specific part of the aquaculture sector. The FDA covers all matters concerning food and safety regulations and drug approval. However, there are other agencies at the federal level involved in aquaculture activities: Centre for Veterinary Medicine in the FDA, the Animal and Plants Health inspection Service (APHIS) in the USDA, (APHIS), and the US Fish and Wildlife Service (FWS) of the Department of the Interior. At the federal level, aquaculture, is defined by the National Aquaculture Act of 1980. Regarding the eel market, some laws are involved with a different purpose. This study analyses two in particular: the Lacey Act and the Endangered Species Act (ESA).

4.5.1. Wildlife – Fish Regulation. The Lacey Act

The Lacey Act is a conservation law that prohibits the transportation of illegally captured or endangered animals across state borders. It was the first federal law for protecting wildlife, and is still in effect, though it has been revised and amended several times: 1969, 1981, 1989 and 2008. It is mainly applied to prevent the importation or spread of potentially dangerous and non-native species, such as the eel swim bladder parasite *Anguillicola crassum.*

The Lacey Act is administered by the U.S. Departments of the Interior, Commerce and Agriculture through their respective agencies. These include the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Animal and Plant Health Inspection Service (APHIS).

Selected definitions

Fish or wildlife includes: wild animals dead or alive, including wild mammals, birds, reptiles, amphibians, fish, molluscs, crustacean, arthropods, coelenterates or other invertebrates, and including any part, product, egg or offspring.

Import includes: land on, bring into or introduce into any place subject to U.S. jurisdiction. Plant or plants: a wild member of the plant kingdom, including roots, seeds and other parts (but not common food crops) indigenous to a state and either listed on an appendix to the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or under a state conservation status.

Prohibitions on activities: This Act makes it illegal to import, export, transport, sell, receive, acquire or purchase fish, wildlife or plants taken, possessed, transported or sold in violation of a federal law, treaty, regulation or Indian tribal law. It is also illegal for a

person to import, export, transport, sell, receive, acquire or purchase in interstate or foreign commerce: fish or wildlife taken, possessed, transported or sold in violation of a state law, state regulation or foreign law; plants taken, possessed, transported or sold in violation of a state law or regulation. The Act also makes it illegal to possess within the special maritime and territorial jurisdiction of the U.S.: fish or wildlife taken, possessed, transported or sold in violation of a state law, state regulation, foreign law or Indian tribal law; plants taken, possessed, transported or sold in violation of a state law or regulation.

4.5.2. Federal laws related to wildlife control: Endangered Species Act (ESA)

Several agencies are involved in the regulation of the wildlife control industry. The major agencies involved are the U.S. Fish and Wildlife Service (FWS) and the U.S. Environmental Protection Agency (EPA) and the Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), which provides federal leadership in addressing wildlife damage issues, but doesn't have a regulatory role. All the U.S agencies help manage wildlife to reduce damage to agriculture and natural resources, to minimize risks to human health and safety, and to help protect endangered and threatened species.

The Endangered Species Act protects animal species that are listed by the federal government as "endangered" or "threatened". These species, in fact, cannot be killed, harmed or collected except under some carefully described circumstances, and then, only with permits.

Two sections, 7 and 9, are the most important. Section 7 applies not to private parties but to federal agencies and Section 9 makes it illegal for anyone to "take" a listed animal, and this includes significantly modifying its habitat. The procedures for listing a species are in Section 4 of this law, an "endangered" species is one that is "in danger of extinction" throughout all or a significant portion of its range. Congress refined these definitions into five criteria, any one of which will justify listing: impacts to the species' habitat or range, overuse of the species by humans, disease or predators, inadequacy of existing legal protection, or "other natural or man-made factors" affecting the species' continued existence. When the agency determines that a species is endangered or threatened, it must designate the species' "critical habitat". The critical habitat includes the areas within the geographic area occupied by the species, whose physical or biological features are "essential to the conservation of the species" and which may require special management considerations or protection. Most states have their own state endangered species laws and their lists of species based on state law, and there are many specific-state lists on endangered species.

The Fish and Wildlife Service (FWS) reviewed the status of the American eel (*Anguilla rostrata*) in 2007 and found that Endangered Species Act protection for this species was not warranted. All available information about the eel population from Greenland south along the North America coast to Brazil in South America show that declines of eel population in some areas had not put the overall population in danger of extinction. The FWS received another more comprehensive document in 2010 to extend the protection at the federal level to the American eel. This paper presents new and substantial environmental data and information that provides the beginning of the review of the

species status. New information indicates that changes in ocean conditions and the correlation of the climate change may be negatively impacting the *Anguilla rostrata* breeding rates.

At the regional level, the Government of Ontario, Canada, also banned commercial American eel fishing in Lake Ontario and the upper St. Lawrence River. Other eel fisheries activities (maybe *Anguilla anguilla*) continue in various parts of Canada.

4.6. JAPANESE LEGISLATION FOR *ANGUILLA* SPP. MARKET

There is no legal definition of aquaculture in Japan. However, its Fisheries Law defines fishery as "an industry which carries on gathering, taking or culturing of aquatic animals and plants".

The Japanese Government is a member of the following international organizations: World Trade Organization (WTO), Southeast Asian Fisheries Development Center (SEAFDEC), Convention on Biological Diversity (CBD) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Japanese law concerning the eel market (mainly European and Japanese eels) defines different levels and involves different agencies. It depends on whether the issues are related to trade or are related to health regulations and the protection of endangered species. Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of the Environment (MOE) is in charge of any other aspects (animal health legislation, welfare and wildlife legislation) are the two Government bodies involved.

- **The MAFF:** Ministry of Agriculture, Forestry and Fisheries
  The Ministry administrates any matters related to agricultural, forestry and fisheries products, from production to consumption and also regulates rural development and promotes the welfare of rural inhabitants in order to achieve a stable food supply and sound development of the agriculture, forestry and fisheries industries, and upgrade the welfare of rural inhabitants (however in practice many tasks have been delegated to the local governments).
- **The MOE**: Ministry of the Environment
  The Ministry has developed Guidelines for Local Biodiversity Strategy, and New Technology to Help Restore Coral Reefs. It cooperates in campaigns for reducing waste and has an important role in the climate change policy. The Ministry also has published Measures to Be Taken against Invasive Alien Species.

4.6.1. Law on the Protection of Fisheries Resources (Act No. 78 of 1996)

This Law is primarily aimed at preventing the spread of fish disease to Japan through the import of marine aquatics animals for use in aquaculture. The Ministry of Agriculture, Forestry and Fisheries (MAFF**),** has the necessary expertise regarding this law. The most interesting section of this law covers Import Quarantine of Aquatic Animals for different purpose (Article 13-2 - 13-5).

Other laws include the Fisheries Basic Act (Act No. 89 of 2001), and the Law of Maintenance of Sustainable Aquaculture Production (Act No. 51 of 1999).

Fisheries Basic Act (Act No 89 of 2001)
The aims of this Act are to control water quality, and protect and provide nursery grounds of aquatic animals, in order to conserve and improve the environment for fish. The Fisheries Basic Act provides measures for the conservation and management of living aquatic resources, research and study of living aquatic resources, and promotion of production of aquatic animals.

Law of Maintenance of Sustainable Aquaculture Production (Act No. 51 of 1999).
This Act aims to assure sustainable aquaculture production by taking measures to promote the improvement of aquaculture areas, and by taking measures to prevent the spread of certain infectious diseases in farm-raised aquatic organisms.

The MAFF establishes the basic policy for the sustainable aquaculture production. This Act also provides for: obligations of persons engaged in aquaculture to report specified diseases, restrictions on the movement of farm-raised aquatic animals, and compensation for losses caused by specified diseases..

4.6.2. Wildlife protection system

There are still many problems regarding wildlife trade in Japan, mainly because the present laws regulating wildlife trade are insufficient to curb illegal trade and do not provide sufficient deterrents, even if many laws have been revised. Law No. 75 of 1992 remains defective and ineffective (www.panda.org).

To protect wildlife and preserve endangered species, it is important to protect habitat, regulate hunting, prevent illegal killing and implement any other measures necessary. The wildlife protection system of Japan preserves wildlife by enforcing the Wildlife Protection and Hunting Law and the Law for the Conservation of Endangered Species of Wild Flora and Fauna.

4.6.3. Law for the Conservation of Endangered Species of Wild Fauna and Flora (LCES) in Japan (1992, Law No. 75)

Japan became a member of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1980. In Japan, the Ministry of International Trade and Industry is the Management Authority, while the Environment Agency and the Ministry for Agriculture, Forestry and Fisheries (MAFF) are the Scientific Authorities. The Japanese Government applies the Customs Law and the Foreign Exchange and Foreign Trade Control Law for border control relating to CITES. Japan also controls the transfer of CITES Appendix I specimens within the country under the Law for the Conservation of Endangered Species of Wild Fauna and Flora (1992, Law n. 75).

Objectives. The Law for the Conservation of Endangered Species of Wild Fauna and Flora recognizes the importance of wild fauna and flora as essential to life. Its objectives are to ensure the conservation of endangered species of wild fauna and flora and as a result contribute to the conservation of natural surroundings for present and future generations.

Definitions. “National endangered species” (NES) refers only to the endangered species that are native to Japan, while "international endangered species" (IES) are those species listed in Appendix I of CITES or species listed as protected species in any of the bilateral migratory bird agreements/conventions with the United States of America, Australia, China or the Russian Federation. At the moment, Japanese eel (*Anguilla japonica*) or other Indo-Pacific eel species are not included in this list.

The National Guidelines for Conservation of Endangered Species. Adopted by the Japanese Government, the National Guidelines for the Conservation of Endangered Species include the fundamental concept of and basic methodology for protection of organisms, protection and rehabilitation of natural habitats, and maintenance of viable population for the conservation of endangered species.

Prohibition on Acquisition and Transfer of Endangered Species. Hunting, taking, killing or injuring any living NES specimens is prohibited unless a permit has been granted by the Director-General of the Environment Agency. The transfer of NES or IES organisms, whether dead or alive, for commercial or non-commercial purposes, and including whole organisms, parts or derivatives, is forbidden except in the following cases: a) when permission to transfer for specific purposes has been granted by the Director-General of the Environment Agency; b) if the NES is exempt from the provisions of the law; c) if the specific IES parts or products (manufactured in Japan) are exempt from the provision of the law; and d) if the IES organisms have been designated or when specific materials have been previously registered.

Regulations on Transfer of IES Parts. Parties that intend to transfer certain IES parts (non-processed) within the country must first register these at the Japan Wildlife Research Centre. The IES parts can be registered if a) they have been produced from captive-bred animals or artificially propagated plants or b) they were obtained before the CITES measures came into force. If the IES parts have not been registered in this manner, the Director-General of the Environment Agency must issue permission to transfer the IES parts for specific purposes. Registered entities may issue management cards to indicate the legality of the parts they handle. Furthermore, entities engaged in manufacturing final products made of specified materials with properly filed management cards may place on each product a mark issued by the Director-General of the Agency, relevant ministers, or designated public organizations.

4.6.4 Other Indo-Pacific Legislation on the Eel (Australia and New Zealand)

Australia. According to Queensland authorities that have managed the eel fishery since 1990, freshwater eels are the only eel species that may be taken for trade in Queensland freshwaters. The targets are two Indo-Pacific eel species:

- long-finned eel (*Anguilla reinhardtii*);
- short-finned eel (*Anguilla australis australis*).

There is a minimum size limit of 30 cm for each adult specimen, and juvenile eels may be sold to authorized aquaculture enterprises for growing only. Exporting juvenile eels is not permitted. Adult eel catch is exported as live product to Southeast Asia – mainly to

China and Taiwan Province of China (almost certainly long-fin eels, *Anguilla reinhardtii*).

The Queensland commercial eel fishery is operated in accordance with the Fisheries Act, 1994 and the Fisheries Regulation 2008.

New Zealand. New Zealand's freshwater environment supports a number of species that are used and valued in different ways. For this reason, the Ministry of Fisheries has developed a National Fisheries Plan (NFP) for Freshwater.

All native freshwater eel species (*Anguilla dieffenbachiii* and *Anguilla australis*) are under the Quota Management System, which establishes a catch limit for certain fish species.

The Fisheries Act of 1996 is the relevant legislation in force and the NFP role includes the stock and fishing activities that are managed under this Act. The primary fisheries are for two freshwater eel species: short-fin eel (*Anguilla australis*) and long-fin eel (*Anguilla dieffenbachiidieffenbachia*). The Australasian long-fin (*Anguilla reinhardtii)* is relatively uncommon.

4.6.5. Illegal trade and food fraud

Illegal trade is defined as the clandestine trade in goods or other products for which trade is regulated or prohibited by policies (at a national or international level) for limitation and control.

Illegal trade is standard practice in the trade of eels, as can be seen in numerous international documents and reports. In particular, the live eel black market (glass eels) has increased due to lack of availability for farming, caused mainly by limited trade associated with the listing in the Annex II of the CITES legislation.

Only listing *Anguilla anguilla* in CITES may produce false information, in particular for processed (not-whole) products. False labeling of such products is well known in Japan or China but also in Italy.

There are substitutions of species of less value, in particular those of the Congridae family, *Conger conger* (Linnaeus, 1758).

Bio piracy is the illegal appropriation of wildlife, micro-organisms, plants and animals and the traditional cultural knowledge that accompanies it.

Bio piracy is a violation of an international agreement and the corresponding domestic regulations (if they exist).

Poaching continues to represent a threat for controllers; the capture of protected species has become widespread.

4.7. SWOT ANALYSIS TOOL

SWOT analysis is a strategic tool often used by private sector businesses and non-governmental organizations. Normally it is formed by a matrix with four sections, which represent internal and external factors, in the present situation and in the close future.
Internal factors:

- The ***strengths****:* a resource of the system that it can use to reach its objectives (in the present).
- The ***weaknesse****s:* an internal limit of the system that prevents reaching the objectives (in the present).

External factors:

- The ***opportunities:*** a favorable situation external to the system, which favors the strategy (environment in the future).
- The ***threats***: an unfavorable situation in the external environment, which potentially hinders the strategy (the environment in the future).

The identification phase of the SWOT is crucial for the subsequent decision making. In fact, it is a key element of strategic choice.

We decided to use this tool to analyze the eel situation, under all aspects other than biology, resilience, human impact, environment and the future concerning the sustainability of the international market.

- ***Strength****s*: strong adaptability and tolerance to different water parameters, adaptable to artificial diet, high rate of survival in captivity, good growth rate
- ***Weaknesses***: only few species have commercial interest, particularly vulnerable due to their very long life cycle, susceptibility to many diseases and high farming temperature. Significant differences in the growth rates of specimens, high cost of the artificial food, cases of cannibalism among specimens, escapes from farm.
- ***Opportunities***: potential new controlled reproductive technologies, life cycle is not yet fully investigated, if regulated at international level the trade becomes sustainable, international legislation.
- ***Threats*****:** essential food for many predators, trade in eels provide a source of income for people mainly in Asian and European countries, over fishing, pollution, natural mortality, modified natural habitats due to human impacts, natural parasites, impact of invasive species, illegal trade, poaching.

Table 85. SWOT matrix

INTERNAL			
Strengths	• Strong adaptability and tolerance to different water parameters • Easy to keep • Adaptable to artificial diet • High rate of survival in captivity • Good growth rate • Highly productive and well-tested rearing methods	• Only few species of commercial interest • Particularly vulnerable due to their very long lifecycle • Susceptible to many diseases • High farming temperature • Significant differences in the growth rates between specimens • High cost of artificial food • Cases of cannibalism among specimens • Escapes from farm	Weaknesses

EXTERNAL			
Opportunities	• Potential new reproductive controlled technologies • Lifecycle is not yet fully investigated • If regulated at international level, the trade becomes sustainable • International legislation	• Essential food for many predators • Eel trade provides a source of income for people, mainly in Asian and European countries • Over fishing • Pollution, natural mortality • Modified natural habitats due to human impacts • Parasites • Impact of invasive species • Illegal trade • Poaching	Threats

SWOT ANALISYS SUMMARY

From an analysis of the SWOT matrix, it is clear that at present, the *threats* due to the external pressure are very important. The increased human activities, and the increasing demand for the international market are the causes of the dramatic decline of wild population of Japanese as well as European eels.

At the moment, the international legislation seems unable to reverse the negative trend and European eel is currently regulated by law.

Only new breeding techniques (without use of wild stock), and a greater compliance and enforcement against illegal trade, such as through an international agreement, can resolve this situation.

Developed by Pierluigi Monticini.

5. REFERENCES

Akacakaya H.R. 2004. Species Conservation and Management, Oxford University Press Inc.

Barnabe G. 1989. Aquaculture Vol.2, Ellis Horwood Publishing, New York USA, pp. 756–785.

Cataudella S. & Bronzi P. 2001**.** Acquacoltura responsabile, verso le produzioni acquatiche del terzo millennio, Unimar – Uniprom, Roma, pp.508-517.

Cockum E. 1980**,** Zoologia 2nd Italian Edition, Piccin Editore Padova, ITALY, pp. 330, 601 – 610.

Colavita G. 2008. Igiene e Tecnologie degli alimenti di Origine animale, Le Point Veterinarie ITALIE SRL, Milan pp. 80-83, , 269–272.

Costa F. 1991. Atlante dei pesci dei Mari Italiani, Mursia Editore spa, pp. 24–25.

Crook V. 2010. Trade in Anguilla species, with a focus on recent trade in European eel A. *anguilla*, A TRAFFIC Report for the European Commission.

D'Ancona U. 1960. *Trattato di Zoologia* 2nd Italian Edition, UTET, Torino ITALY, pp. 382–959.

FAO-FIPS. 2009. Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply, World by continent, FAO Rome.

Ghittino P. 1983. *Tecnologia e Patologia in Acquacoltura* Vol. 1, Tipografia Emilio Bono Torino, pp. 53, 71, 350, 408.

Globefish. 2008. The Seafood Market in Spain, Globefish Research Programme FAO Rome.

Globefish. 2004. Fishery Industry in China, Globefish Research Programme FAO Rome

Jordan D. 1923. A Classification of Fishes, Including Families and Genera, Stanford University, California USA, p. 130.

Manzoni P. & Tepedino V. 2008. *Grande Enciclopedia illustrata dei pesci*, Euro-fishmarket srl, Trebbo di Reno Bologna, pp. 121–122.

Melotti P. & Giordani G. 1984. Elementi di Acquacoltura Edizioni Agricole Calderini Bologna, pp. 337–351.

Monticini P. 2012. Commercial values of Anguilla anguilla at a European and national level, IL PESCE Magazine N. 3/2012 Edizioni Pubblicità Italia srl, 41100 Modena (MO), pp. 83–91.

Noga J. 1999. Fish Diseases, Diagnosis and Treatment, Blackwell Publishing, USA pp.166- 167–168.

Paperna I. 1996. Parasites, Infections and Diseases of Fishes in Africa, an Update. CIFA Technical Paper 31, Food Agriculture Organization Rome Italy, pp.157 – 159.

Reynolds J.D. & Jennings S. & Dulvy N.K. 2001. Cited in **Akacakaya H.R.** 2004. Species Conservation and Management, Oxford University Press Inc. p.195.

Richard D. 2005. Fisiologia degli Animali, Zanichelli Editore spa, Bologna ITALY,pp. 159–490.

Robert & Hawkins. 1999. Cited in **Akacakaya H.R.** 2004, Species Conservation and Management, Oxford University Press Inc.p.195.

Saroglia M. & Ingle E. 1992. Tecniche di Acquacoltura Edizioni Agricole Calderini Bologna, pp. 150–156.

Thorpe J.E. 2003. The Eel, Fifth Edition, Blackwell Science and The Fisheries Society of the British Isles, Blackwell Publishing Ed. UK.

Tortonese E. 1970. Fauna d Italia, OSTEICHTHYES (pesci ossei) parte prima, Edizioni Calderini Bologna, pp.303–307.

Trentini M. 1997. Appunti di zoologia generale e speciale veterinaria. Bologna Edizioni Nautilus, pp. 71–76. 198–203.

Van den Thillart G. & Rankin C. & Dufour S. 2009. Spawning Migration of the European Eel: Reproduction Index, a Useful Tool for Conservation Management, Springer Verlag.

6. WEBLIOGRAPHY

- www.fao.org/fishery/culturedspecies/Anguilla_anguilla/en
- http://it.wikipedia.org/wiki/Anguilla_anguilla
- www.fishbase.org/summary/Anguilla-anguilla.html
- http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:248:0017:0023:EN:PDF
- www.cites.org/eng/app/appendices.php
- www.globefish.org
- http://it.wikipedia.org/wiki/Analisi_SWOT
- www.traffic.org/trade/
- www.iucnredlist.org/details/60344/0
- www.ices.dk/indexfla.asp
- www.fao.org/fishery/shared/faolextrans.jsp?xp_ISIS_MFN=066684&xp_faoLexLang=E&xp_lang=en
- www.fao.org/fishery/legalframework/nalo_japan/en
- http://comtrade.un.org/db/default.aspx
- http://it.wikipedia.org/wiki/Analisi_SWOT
- www.panda.org
- www.fao.org/FI/STAT/summary/FBS_bycontinent.pdf
- www.fao.org/FI/STAT/summary/b-1.pdf

GLOBEFISH MARKET RESEARCH PROGRAMME

Vol 116	The European market for bivalves other than mussels (53p.)	May-14	€ 30
Vol 115	The European market for mussels (65p.)	Apr-14	€ 30
Vol 114	Eel (*Anguilla* spp.): Production and trade (78p.) *	Jul-14	---
Vol 113	Exchange rates and the seafood trade (43p.) *	Jan-14	€ 30
Vol 112	By-products of tuna processing (48p.)	Jul-13	€ 30
Vol 111	Technical guide to fish canning (69p.)	May-13	€ 30
Vol 110	Innovative uses of fisheries by-products (53p.)	Feb-13	€ 30
Vol 109	Seafood markets in Southern Africa: Potential of regional trade and aquaculture development (53p.)	Jan-13	€ 30
Vol 108	Risks and benefits of seafood consumption (29p.) *	Jan-13	€ 30
Vol 107	El eco-etiquetado de productos pesqueros en España (56p.)	Sep-12	€ 30
Vol 106	El mercado de productos pesqueros en España: Efectos de la crisis en la producción y el consumo (73p.)	Aug-12	€ 30
Vol 105	The European market for shrimp: Trade interactions in the import of warm water and coldwater shrimp to the main European shrimp markets (39p.)	Aug-12	€ 30
Vol 104	The French market for seafood (48p.)	Aug-11	€ 30
Vol 103	Turbot - Production technology and markets (31p.)	Feb-11	€ 30
Vol 102	The Ornamental Fish trade (134p.)	Nov-10	€ 40
Vol 101	Markets for Tilapia (37p.)	Jun-10	€ 30
Vol 100	Importance of APEC in world fisheries and aquaculture (34p.)	Mar-10	€ 30
Vol 99	VietNam Seafood from waterland (124p.)	Mar-10	€ 30
Vol 98	The Seafood market in Greece (33p.)	Mar-10	€ 30
Vol 97	Private standards in fisheries and aquaculture (64p.)	Apr-09	€ 30
Vol 96	The Seafood market in Spain (59p.)	Nov-08	€ 30

**** Free electronic version available at www.globefish.org/globefish-research-programme.html***

****

ORDER FORM
COPIES ARE AVAILABLE FROM:

FAO - GLOBEFISH - Fisheries and Aquaculture Policy and Economics Division
Viale delle Terme di Caracalla, 00153 Rome, Italy
Tel: (39-06) 570 52692 - Fax: (39-06) 570 53020 - Email: GLOBEFISH_PUB@fao.org - http://www.globefish.org

20% DISCOUNT IS OFFERED IF YOU ORDER TWO OR MORE COPIES

I would like to order _____ copy(ies) of the following GRPs _____ €_____

☐ By bank cheque/draft in €_____ payable to GLOBEFISH (see address above)

☐ By credit card:
Card No: _____ ☐ Visa ☐ Mastercard

Expiry date: _____ Signature: _____

☐ Bank transfer to: FAO Trust Fund (EUR), HSBC Bank Plc, 8 Canada Square, London E14 5HQ, UK
A/C No: 67115083 (Swift Code MIDLGB22) - IBAN GB04MIDL40051567115083, referencing GLOBEFISH

Name: _____ Company: _____

Street Address: _____

City and Postcode: _____ Country: _____

Tel: _____ Fax: _____ E-mail: _____

Food and Agriculture Organization of the United Nations
Products, Trade and Marketing Service
Viale delle Terme di Caracalla
00153 Rome, Italy
Tel.: +39 06 5705 4744
Fax: +39 06 5705 3020
www.globefish.org