UNDP/GEF PROJECT ENTITLED "REDUCING ENVIRONMENTAL STRESS IN THE YELLOW SEA LARGE MARINE ECOSYSTEM"

Report of DATA AND INFORMATION COLLECTION FROM THE REPUBLIC OF KOREA

by

West Sea Fisheries Research Institute

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REVIEW OF DATA AND INFORMATION COLLECTION FROM THE REPUBLIC OF KOREA

1 BACKGROUND

The Yellow Sea is semi closed sea located to the north of the East China Sea. The sea is surrounded by the Republic of Korea (ROK) and the Democratic People's Republic of Korea (DPR KOREA) on the east and by the People's Republic of China (PRC) in the West, fronting the Bohai Bay in the PRC to the northwest. In the south, it is continuous with the East China Sea along the direct line connecting Jeju province, South Korea and the north bank of the Yangtze River, PRC. The Yellow Sea is about 417,000km^2 in an area (NFRDI, 1988, 1996).

The major feature of the Yellow Sea is the relative shallowness of the water. Most of the sea is characterized by an extensive continental shelf. The northern part of the Yellow Sea, the Bohai Bay has an average depth of only 21 m and a maximum depth of 72 m. For the rest of the Yellow Sea, the average depth is 44 m and the maximum depth is 103 m. Major current affecting the Yellow Sea are coastal current and part of the Kuroshio Current. The currents supply fertile nutrients to marine living resources in the Yellow Sea. Biodiversity of fisheries resources is high, with about 450 large species. Commercially important fisheries resources are about 50 species caught by Korean and Chinese fisheries (Lee, 2004; NFRDI, 1996; Yeon, 2001 Unpublished).

It has been generally considered that the Yellow Sea and the East China Sea are separated in terms of Large Marine Ecosystem (LME). However, considering that fish stocks migrate freely between them, the Yellow Sea may not be separated from the East China Sea in terms of the conservation and the management of fishery resources.

Except for some sedentary species, most fished species migrate seasonally for wintering, spawning and feeding. Wintering occurs in deeper water in the southern Yellow and Northern East China seas, and many fishes migrate to coastal areas for spawning and feeding from spring through autumn. Both the Yellow Sea and its coastal zones are thus components of a large ecosystem, and resources in each area have to be managed with this in mind (NFRDI, 1988; Yeon, 2001 Unpublished).

Most commercially valuable fish stocks in the Yellow Sea have been overexploited due to both a continuous increase in fishing capacity in adjacent coastal states and near shore fish habitat deterioration because of large land reclamations, municipal and industrial waste discharges. Korean and Chinese fishermen have increased competitively their fishing effort as their landings have decreased, it has accelerated the depletion of fish stocks in the Yellow Sea (Yeon, 2001 Unpublished).

While traditional fisheries resources in the Yellow Sea show generally decreased and landings of small pelagic fishes have on average increased, a reduction of fish size in the landings suggests that these stocks are also now being significantly impacted (NFRDI, 1996; Yeon, 2001 Unpublished).

According to stock assessments, most demersal fish resources appear to be overexploited, although some short-lived pelagic species like anchovy may have a little room for further exploitation (NFRDI, 1996; Yeon, 2001 Unpublished).

Due to the natural resources decreased, mariculture was considered like to compensate the reduction of the products from the natural resources. At first mariculture products increased, but recently it started decreased, and it has been restricted by the license system etc.

Therefore, it is necessary to establish collaborative management system among the countries to utilize the resources and ocean effectively. However, until now there haven't been any opportunities to carry out comprehensive and partnership studies to understand the Yellow Sea ecosystem and to set up cooperative strategies to reduce the ecosystem

stress in the Yellow Sea associatively among the countries.

Thus, first of all, collection of data and information on fisheries, mariculture and socio-economic issues in ROK and the PRC is conducted through the Yellow Sea Large Marine Ecosystem (YSLME) Project to consider what is going on the sea closely. A Transboundary Diagnosis Analysis (TDA) can be then developed with the available info followed then by the Strategic Action Plan (SAP) between ROK and the PRC. Currently, no information is available to distinguish the landings off the Yellow Sea from those off the East China Sea. However, the Yellow Sea catches have mostly been landed at Yellow Sea-located pots, such as ports in Inchon, Gyeonggi, Chungnam, Jeonbuk and Jeonnam Province. This means that fishery information for the Yellow Sea was obtained from the western ports of Korea.

The major tasks for the data and information collection activity are:

- Reviewing and collecting existing data and information for each parameters as the listed in the agreed data table during Working Group 1, 2
- Providing the locations of available database
- Describing the status of commercial fisheries
- Describing the existing status and trends of mariculture
- Describing the existing national laws and regulations on fisheries and mariculture
- Describing the collected socio-economic data and information
- Listing the gaps in data and information required for understanding changes in the condition of fisheries, mariculture and socio economic

2 DATA AND INFORMATION

2.1 Fisheries Data

We visited a total of 11 institutions including five provincial governments, three research institutes and three universities to collect and investigate data and information related to fisheries resources, and visit websites related to fisheries statistics (Refer Section VIII, Fig. 11).

The commercially important landing data by species and year were collected by Fisheries Statistical Yearbooks and each provincial fisheries data, but, in the case of Jeonnam province (Jeollanam-do), we had to estimate landing data from the two local provincial governments (Mokpo City, Heuksan Gun) belonging to the west sea area of Jeonnam province.

The data of boat number, tonnage and KW were collected by Fisheries Statistical Yearbooks and each provincial fisheries data similarly landing data. In the case of Jeonnam province, they were estimated using the two local provincial governments (Mokpo City, Heuksan Gun) belonging to the west sea area of Jeonnam province.

The total landing rate of commercially important species in ROK by year were collected from Fisheries Statistical Yearbooks and each provincial fisheries data, but, in the case of Jeonnam province, it was estimated using the landing rate data from the two local provincial governments (Mokpo City, Heuksan Gun) belonging to the west sea area of Jeonnam province.

We also adopted the data and information of growth parameters and spawning characteristics by species using the websites, the established research results of National Fisheries Research and Development Institute and three universities.

Data and information of fisheries are easy to get through accessing MOMAF website. However, data or information on total landing and fishing efforts are difficult to get from websites or related institutions.

Although some information on the annual fishing effort data by region are shown in the Fisheries Statistical Yearbooks and a related website, the fishing effort by fisheries, CPUE, biological and ecological data are not shown in any Yearbooks and websites.

So, to solve these problems, we visited related Provincial Government, universities and research institutes focusing on the Yellow Sea, and asked or investigated all accessible information.

The data of species composition, seasonal distribution density by dominant species and ichthyoplankton distribution characteristics in spring by trawl survey were collected and analyzed in survey results performed by West Sea Fisheries Research Institute in May (Table 11~13).

Based on the collected data and information, long term trends of landings of total and by commercially important species and fishing efforts, recently seasonal species composition and distribution density by dominant species and ichtyoplankton were described, and then reviewed fisheries resources conditions in the Yellow sea.

2.2 Socio-economic

Statistical data and information were collected by searching various governmental websites such as the National Statistical Office, the Ministry of Maritime Affairs and Fisheries (Refer Section VIII, Fig. 11).

The numbers of fishing boats were referenced from annual reports on fisheries trend written by the Ministry of Maritime Affairs and Fisheries. The numbers of regional fishing boats were referenced from ”Basic Statically Research in Korean Fisheries” written by the National Statistical Office. Fisheries Income were taken from ”The Static on Fishing Household Economy” written by National Tax Service and Fisheries Income were calculated by subtracting Fishery Production Expense from Gross Fishery Receipts.

The Fishery consumption per capita were assumed by calculating one year assumption by Kg and the data were derived from 「The Table about demand and supply of Korean Food」 written by Korea Rural Economic Institute.

Fishery export and import data were referenced from 2004 annual report by Korea Customs Service and sorted by the order of countries that had the largest quantity and the measurement were in terms of US $1000.

The data of imports and exports were referenced from Korea Customs Service and the report was organized in the order of kind of fishes that had the largest import and export volume.

In economic importance of fisheries, GDP Contribution was assumed by calculating level of contribution of whole GDP versus fisheries using economy statistic system of The Bank of Korea.

Based on the data and information, recent trends were reviewed by items such as numbers of fishing boats, fisheries income, fishery consumption per capita, fishery exports and imports, and economic importance of fisheries.

2.3 Mariculture

We visited a total of 11 institutions including five provincial governments, five Regional Maritime & Fisheries Offices, and interviewed responsible persons in charge and collected data. And also we visit websites related to aquaculture and statistics (Refer Section VIII, Fig. 11).

Data and information of aquaculture production are easy to access in websites or MOMAF. Reliable data or information on licenses (number of farms) and area of marine

farms, however, are not easy to access from websites or related institutions. Although some information on licenses and area of aquaculture farms are shown in websites of MOMAF or Bureau of Statistics, these are mentioning total statistical figures of whole country only and don't classify into different provinces. Moreover, most information on farmed area and aquaculture methods is restricted to last two or three years.

To solve these problems, we visited all Regional Marine Affairs & Fisheries Offices and Provincial Governments bordering the Yellow Sea area and collected all accessible information of last 10 years. To collect these information on Jeonnam province, we had to visit five local provincial governments ("Gun Government") belonging to the west sea area of Jeonnam province (Refer Section VIII, Fig. 11).

3 DATA ANALYSIS AND REVIEW

3.1 Fisheries

3.1.1 Landing trends of the total and by species

The mean total landings of 10 commercially important species from 1986 to 2004 in the West Sea of ROK were shown in the order of anchovy (*Engraulis japonicus*), largehead hairtail (*Trichiurus lepturus*), acetes (*Acetes chinensis* and *A. japonicus*), squids (*Todarodes pacificus*, *Loligo* sp. and *Sepia* sp.), small yellow croaker (*Larimichthys polyactis*), chub mackerel (*Scomber japonicus*), sandlance (*Ammodytes personatus*), Spanish mackerel (*Scomberomorus niphonius*), fleshy prawn (*Fenneropenaeus chinensis*) and Pacific herring (*Clupea pallasii*) (Table 6).

The total landing has been largely decreased since 1987 from 141,992 t to about 63,102 t in 2003, the volume in 2003 was less than a half of it in the mid 1980s (Table 6).

The annual landings of almost commercially important species largely showed gradually decreased trends from early 1990s except anchovy. The landing of anchovy that had the highest level of the species mean annual landings showed the range of 20,000~30,000 t during 1986~1992, and after that it was increased to the level of 46,000 t during 2000~2004. On the contrary, largehead hairtail had the second level of the mean species annual landings showed about 50,000 t during 1986~1991, and then it was dramatically decreased to about 6,000 t during 2000~2004 (Fig. 1, Table 6).

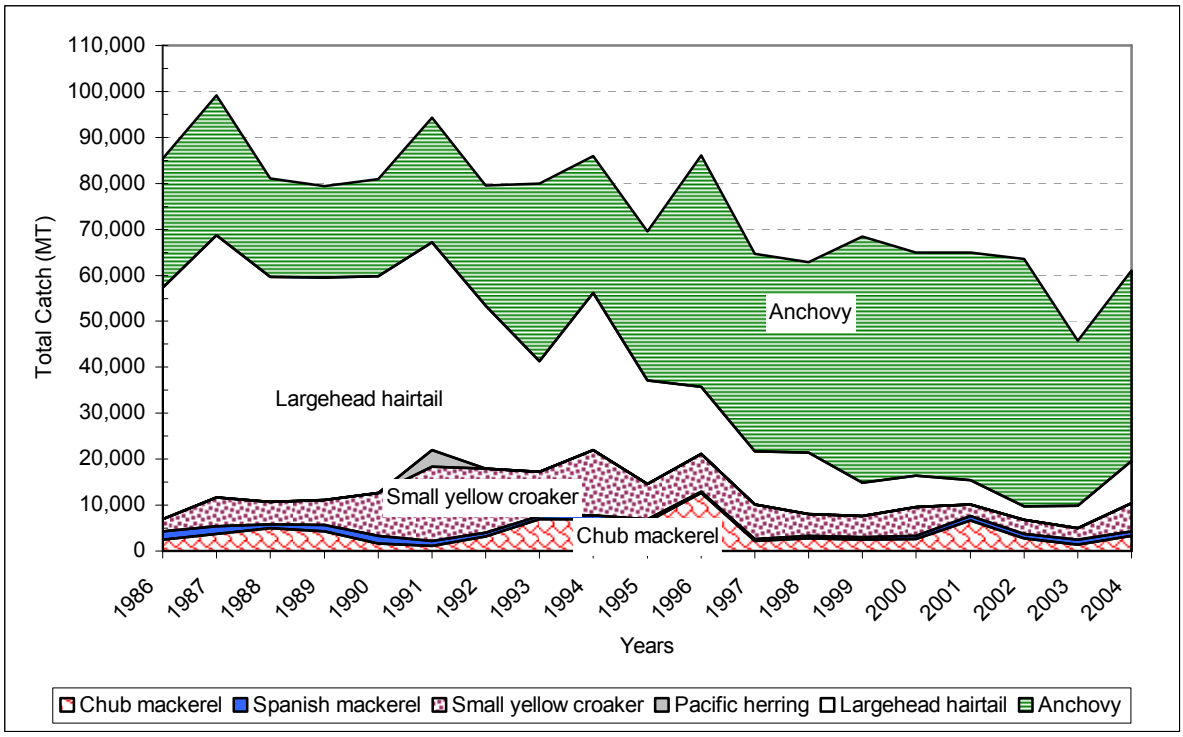
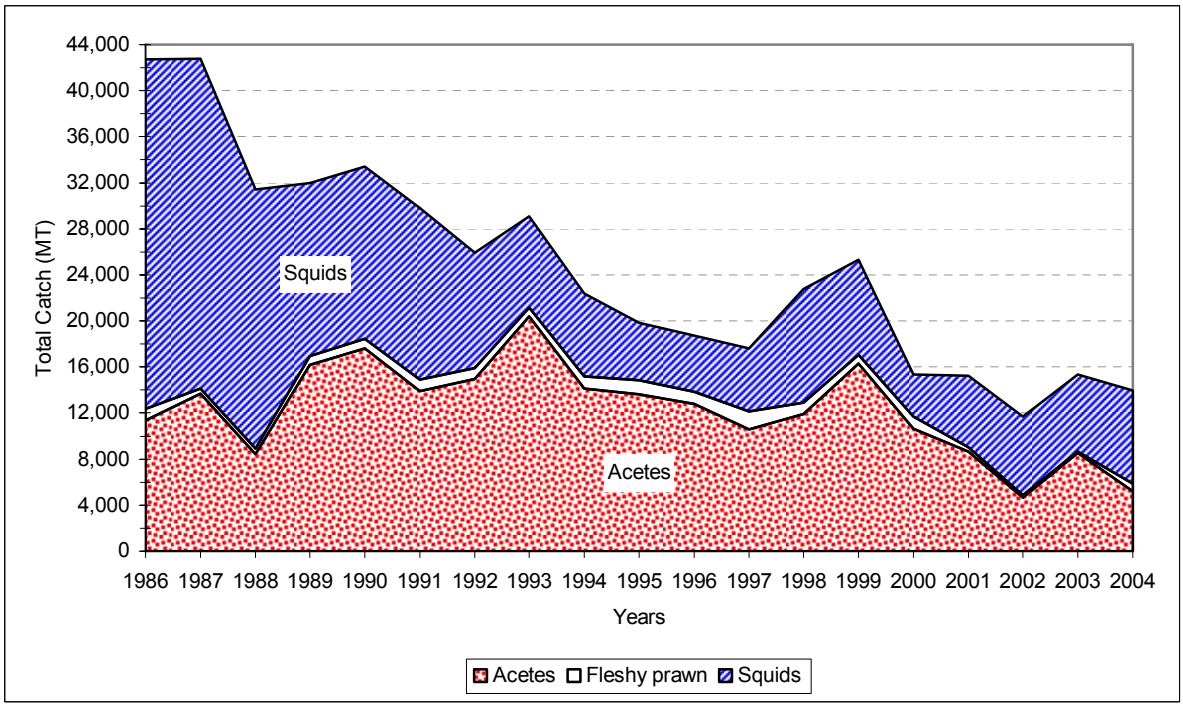


Figure 1. Landing trends of commercially important species in the Yellow Sea, 1986~2004.



.Figure 2. Landing trends of commercially important species in the Yellow Sea, 1986~2004 (Con't)

3.1.2 Trends of fishing efforts

In this repot Number, Tonnage and KW of fishing vessels were considered based on the collect data and information to understand trends of the fishing efforts in Korean fisheries in correspondence to the Yellow Sea.

- Number of fishing boats

  The number of non-powered fishing boats decreased from 7,464 in 1988 to 1384 in 2004. On the other hand the numbers of powered fishing vessels were maintained at about 26,000 from 1986 to 1998, and after that it showed an increasing trend as about 32,000 from 1999 to 2004 (Fig. 2, Table 7). The total number of fishing boats showed a slightly increased trend from 24,621 in 1997 to 33,939 in 2004 (Fig. 2, Table 7).

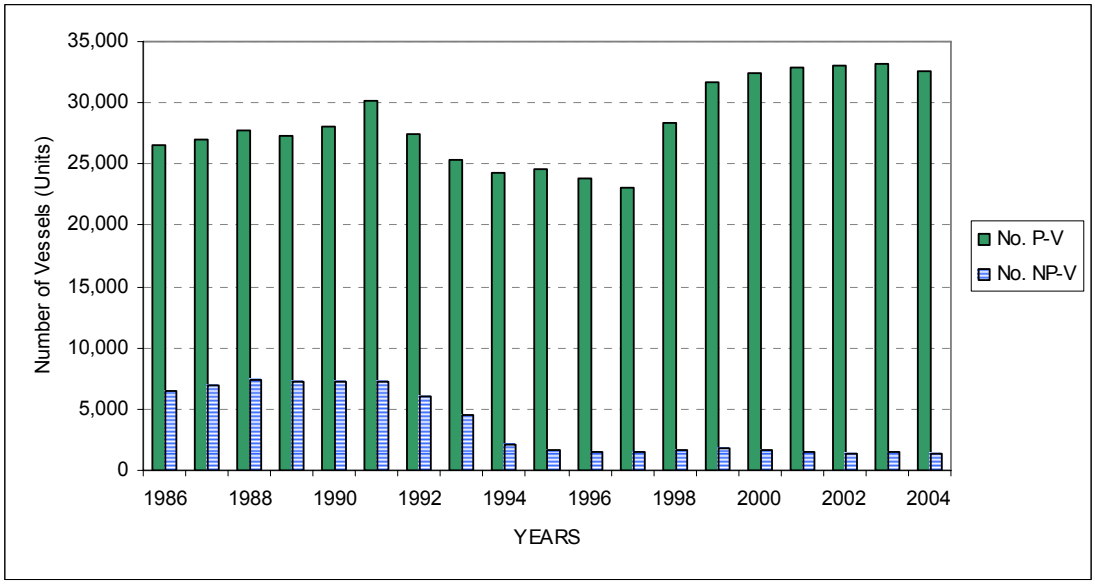


Figure 3. Trends of number of powered and non-powered fishing vessels

- Tonnage of the fishing boats

  The gross tonnage of the total fishing boats appeared a decreased trend from 173,226 in 1988 to 132,305 in 2004 (Table 7). The gross tonnages per boat of two kinds of fishing boats have been decreased since 1994, and in 2004 those were 4.03 and 0.82 for powered and non-powered fishing boats, respectively, and the total gross tonnages of both fishing boats have decreased since 1994 (Figs. 3, 4, Table 7).

- KW of the fishing boats

  However, the power in KW (multiple HP by 0.753) of the fishing boats presents a sharply increasing trend from about 648, 000 in 1986 to 4,012,000 in 2004 (Fig. 3, Table 7).

  According to the above results it was considered that the size of fishing boats became smaller, but the power stronger. That means fishing intensity has been increased even though the number of fishing boats has been maintained stably. The rapid increased trend of KW of the fishing boats might be caused by the improvement of fishing equipments and boat efficiency.

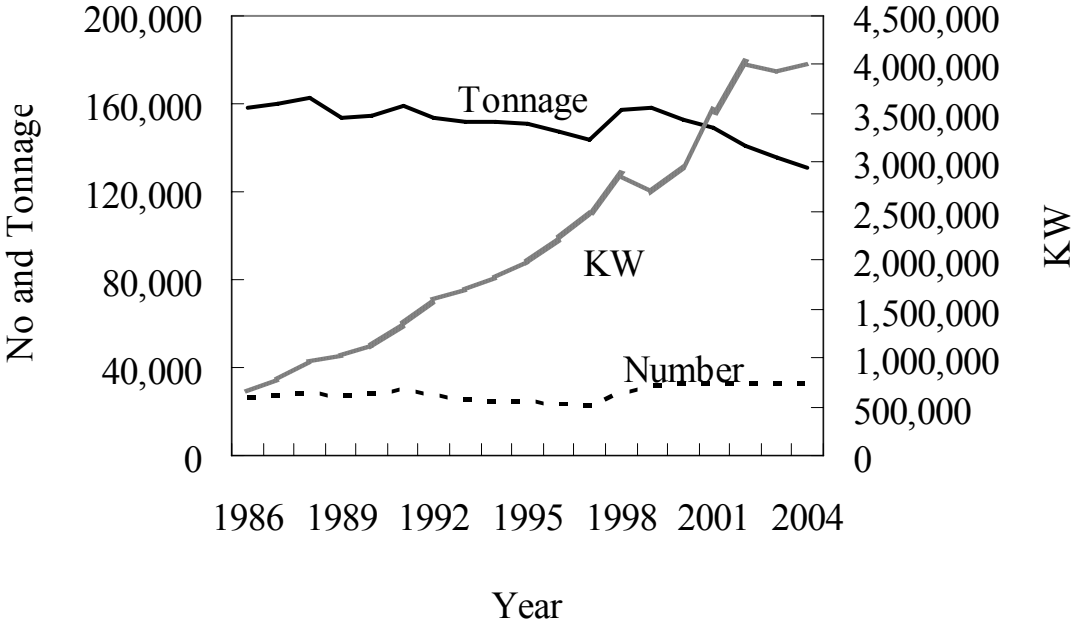


Figure 4. Variations of tonnage, KW and number of powered fishing vessels 1986~2004.

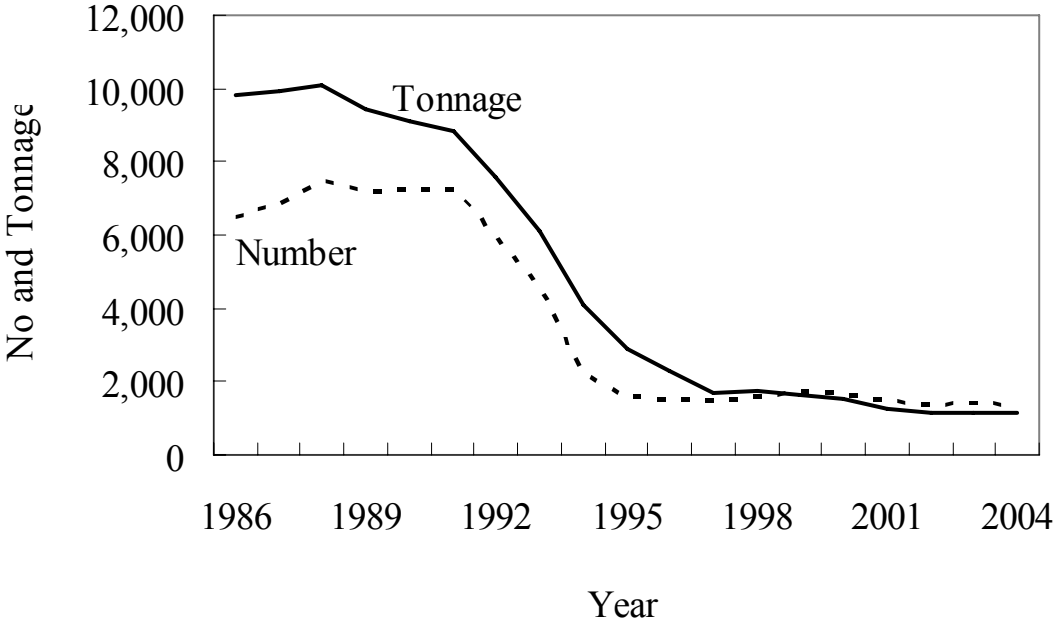


Figure 5. Variations of tonnage and number of non-powered fishing vessels 1986~2004

- Landings of non-powered and powered fishing boats

  The landing of non-powered fishing boats decreased to the very low level, and that of powered fishing boats has been decreased since 1998. The volume of the powered boats was about 130,000 t in 2004 (Fig. 5).

  Based on the results, it is revealed that total mount of landing by South Korean fishermen from the Yellow Sea has been decreased since late of 1990s.

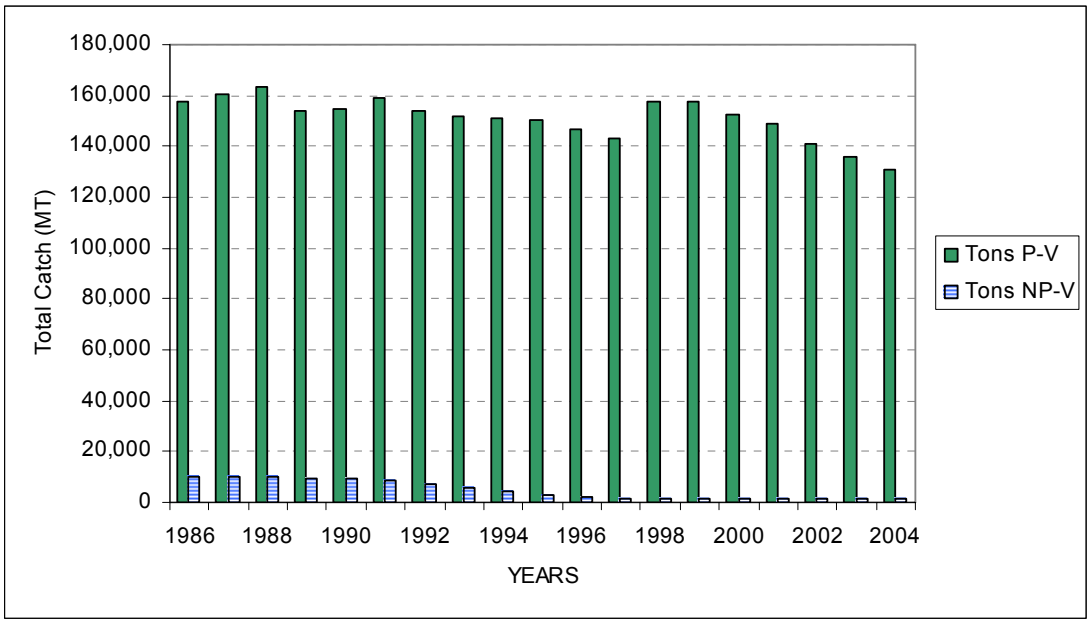


Figure 6. Trends of total landings of powered and non-powered vessels

3.1.3 Changes of species composition in landings

In landing ratio of commercially important 10 species to the total landing off the Yellow Sea, largehead hairtail showed the most dominant species with the highest ratio as 11~13% during 1986~1992, fleshy prawn and Spanish mackerel showed the lowest ratio as 0.3%. The dominant ratio of commercially important 10 species to the total landing off the Yellow Sea was about 32% in average, and it showed a stable level during 1986 through 2004 (Table 8).

Decadal changes of 10 commercially important species composition

In the species composition of 10 commercially important species' landings, largehead hairtail was the most dominant species, representing 41.5% of the total landing of the 10 species in 1980s, and followed by anchovy 20.1%, squids 19.4%, acetes 10.1%, small yellow croaker 3.8%, chub mackerel 3.2%, Spanish mackerel 1.2%, and fleshy prawn 0.5% orderly (Fig. 6).

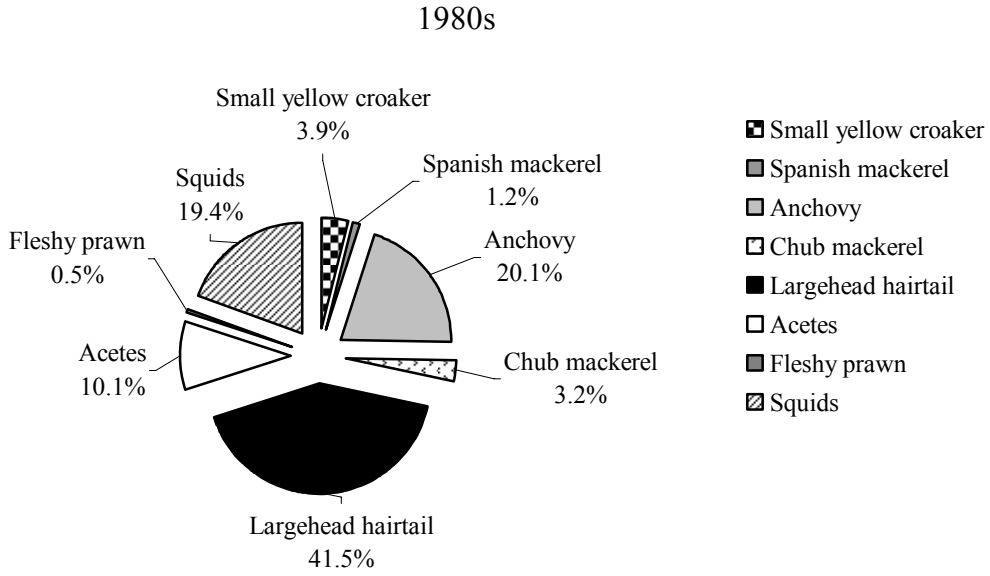


Figure 7. Species composition of 10 commercially important species landing off the Yellow Sea in 1980's.

In 1990s, anchovy was the most dominant species with 37.5% in the 10 species' total landing, and next largehead hairtail 23.8%, acetes 14.4%, small yellow croaker 9.2%, squids 8.5%, chub mackerel 4.7%, fleshy prawn 1.0%, Spanish mackerel 0.7% orderly (Fig. 7).

In 2000s, anchovy was also the most dominant species showing 61.6% of the 10 species' total landing, and then acetes 10.0%, squids 8.6%, largehead hairtail 7.9%, small yellow croaker 5.5%, chub mackerel 4.6%, Spanish mackerel 1.3%, fleshy prawn 0.7% in sequence (Fig. 8).

In the overall tendency of species composition from 1980s to 2000s, the landing ratio of largehead hairtail, which was the largest occupancy in 1980s, has decreased gradually since 1990s. On the other hand, the landing ratio of anchovy was the largest occupancy during 1990s through 2000s.

That means the landing composition has been changed from the large and demersal fishes to the small and pelagic fishes.

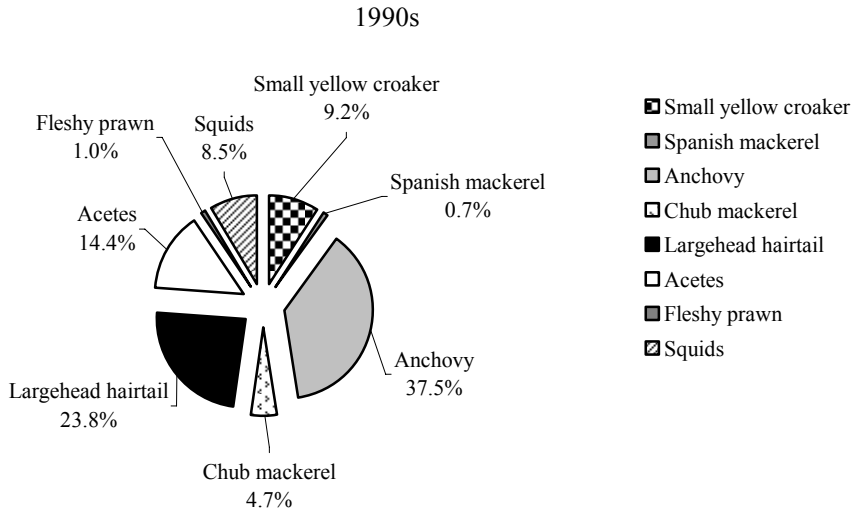


Figure 8. Species composition of 10 commercially important species landing off the Yellow Sea in 1990's.

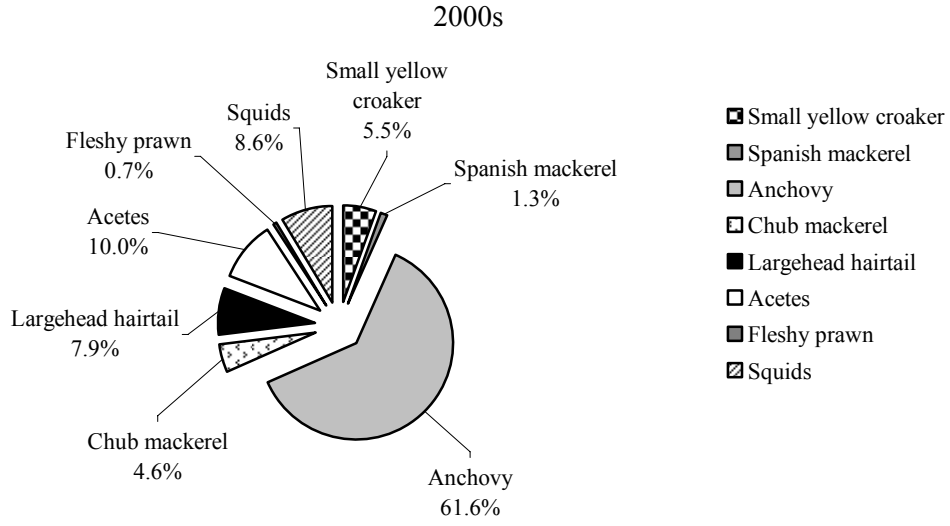


Figure 9. Species composition of 10 commercially important species landing off the Yellow Sea in 2000's.

3.1.4 Survey results by bottom trawl

The annual and seasonal changes of the species composition and distribution density of the dominant species were revealed based on the catches by the bottom trawl conducted in the month of May from 2003 to 2005 in the Korean side of the Yellow Sea by Korean West Sea Fisheries Research Institute, NFRDI's research vessels.

- Annual species composition

Lateolabrax japonicus was the most dominant species representing 29.1% of the total catch in 2003. *Lophius litulon* was the most abundant species comprising 32.4% and 23.7% of the catches in 2004 and 2005, respectively (Table 9).

- Seasonal species composition

In 2003, *Lophius litulon* was the most dominant species showing 17.3% of the total catch in spring. It was followed by *Hemitripterius villosus* (16.6%), *Zoarces gilli* (8.0%), *Gadus macrocephalus* (6.9%), and other species (less than 5%) orderly. On the other hand, *Lateolabrax japonicus* was the most dominant species comprising 38.7% of the total catch in the winter season. It was followed by *Sebastes schlegeli* (21.8%), *Loligo beka* (9.8%), *Liparis tanakai* (3.6%), and other species (less than 3%) consequently. Three species, *L. japonicus, S. schlegel* and *L. beak,* were constituted approximately 70% of the total catch (Table 9).

In 2004, *Lophius litulon* was the most dominant species comprising 37.6% and 28.9% of the total catches in spring and winter seasons, respectively. In spring, the second dominant species was *Hemitripterius villosus* with 10.6%. It was followed by *Hexagrammos otakii* (4.9%), *Cragon affinis* (4.9%), *Squalus megalops* (4.3%), and other species (less than 4%) in order. These above five species were constituted more than 60% of the total catch. In the winter season *Collichthys niveatus* was the second dominant species comprising 11.8%. It was followed by *Liparis tanakai* (9.9%), *Loligo beka* (7.3%), *Sebastes schlegeli* (5.7%), and other species (less than 5%) consequently (Table 9).

In 2005, *Lophius litulon* was also the most dominant species with 18.4% and 31.6% of the total catches in spring and winter seasons, respectively. *Cragon affinis* was ranked as the second dominant species in both seasons showing 14.4% in the spring and 7.2% in the winter catches. In spring season, the third dominant species was *Sebastes schlegeli* comprising 7.2% . It was followed by *Gadus macrocephalus* (6.6%), *Squalus megalops* (5.8%), *Ammodytes personatus* (5.1%), and other species (less than 5%) orderly. In winter season, *Paralichthys olivaceus* was ranked as the third dominant species representing 6.7%. It was followed by *Loligo beka* (6.0%), *Collichthys niveatus* (5.4%), *Oregonia gracilis* (5.3%), and other species (less than 5%) consequently (Table 9).

- Seasonal distribution density of dominant species

In 2003, *Lateolabrax japonicus* occurred at only one station in the winter season. The annual mean density of the species in the study area was 226.4㎏/㎢, the highest density. The annual mean density of *Sebastes schelegeli* was 133.3 ㎏/㎢ and ranged from 4.6 to 2,603.3㎏/㎢. *Loligo beka* appeared at 6 stations, and the mean densities were 2.9 and 114.6㎏/㎢ in spring and winter seasons, respectively. The species which showed the highest mean density among the crustaceans was *Oregonia garacilis* with 23.8 ㎏/㎢ annual mean density. It showed a wide distributed area appearing at more than 8 stations in spring and winter seasons, respectively. According to the species appeared at more than 8 stations in the both seasons, it was considered that the distributional area of the species is relatively wide. *Lophius litulon* and *Hemitripterus villosus* showed high annual mean densities, 47.9 and 42.1㎏/㎢, respectively. *Liparis tanakai* and *Gadus macrocephalus* are dominant cold water species in the Yellow Sea. These species showed comparatively high annual mean densities, 22.8 and 16.5 ㎏/㎢, respectively. *Liparis tanakai* showed comparatively high mean density, 42.3 ㎏/㎢, in winter, but *Gadus macrocephalus* showed it, 26.3㎏/㎢, in spring season (Table 10).

In 2004, *Lophius litulon* showed the highest annual mean density, 157.3 ㎏/㎢, ranged from 8.7 to 694.8 ㎏/㎢ and the widest distribution area. Its seasonal distribution density was not different much between spring and winter. The annual mean density of *Collichthys niveatus* was 36.0 ㎏/㎢ (ranged 0.5~997.8 ㎏/㎢). Its seasonal distribution density (65.3 ㎏/㎢) in winter was higher than it (3.1㎏/㎢) in spring season. It was followed by *Sebastes schelegeli* representing the annual mean density of 32.2 ㎏/㎢, ranged 1.1~515.4 ㎏/㎢. The annual mean density of *Hemitripterus villosus* was 30.6 ㎏/㎢ and the mean density (43.9㎏/㎢) in spring season was higher than two times of that in winter season. The annual mean densities of *Liparis tanakai* and *Loligo beka* were 30.0㎏/㎢ and 28.7㎏/㎢, respectively. The seasonal distribution densities of two species were higher in winter season. *Cragon affinis* was the species that showing the highest annual mean density (21.3 ㎏/㎢) among the crustaceans. It was widely distributed in two seasons, and the seasonal difference of densities was insignificant. *Oregonia gracilis* was also one of the widely distributed crustacean species, and it's annual mean density (21.3 ㎏/㎢) was comparatively high. *Hexagrammos otakii* and *Cleisthenes pinetorum* were high ranked species showing high abundant (Table 10).

In 2005, *Lophius litulon* was the most abundant species. Its annual mean density was 134㎏/㎢, ranged from 3.7 to 988.1㎏/㎢. Its mean density in winter was slightly higher than it in spring. *Cragon affinis* ranked second in the annual mean densities, which was 65.1㎏/㎢. It was caught at the all stations in two seasons. The annual mean density of *Collichthys niveatus* was 28.9㎏/㎢. This species was more widely distributed in winter than in spring, but its mean density in winter season was lower than that in spring season. The distribution area of *Gadus macrocephalus* was restricted in the cold water mass, and this species was caught at 8 and 6 stations in spring and winter, respectively. Its annual mean density was 27.5㎏/㎢, ranged from 2.1㎏/㎢ to 198.6㎏/㎢. *Oregonia gracilis* showed the annual mean density of 26.3 ㎏/㎢ similar to those in 2003 and 2004. *Sebastes schlegeli, Loligo beka and Hemitripterus villosus* showed comparatively high annual mean densities, 24.7, 21.3 and 20.3㎏/㎢, respectively. *Aqualus brevirostris* was caught at only two stations in spring season and its annual mean density was 19.6 ㎏/㎢. *Ammodytes personatus* showed the annual mean density of 18.9㎏/㎢, ranged from 1.2 to 642.1㎏/㎢. Its density in spring season was considerably higher than that in winter season (Table 10).

- Distributional density of fish larvae and eggs

The distributional density of fish larvae and eggs was revealed based on the results of the ichthyoplankton surveys carried out using Korean West Sea Fisheries Research Institute, NFRDI's research vessels in Korean side in the Yellow Sea in the month of May, 2003~2005.

In 2003, 3 species of fish larvae and 1 species of fish eggs were identified. *Sebastes schelegeli* showed the mean density, 4.6 inds/1,000㎥ ranged 4.9~24.0 inds/1,000㎥ at 3 stations. *Engraulis japonicus* caught at only 1 station and its density was 7.5 inds/1,000㎥. Unidentified fish eggs showed the mean density 112.3 inds/1,000㎥ (Table 11).

In 2004, 2 species of fish larvae, *Cleisthenes pinetorum herzensteini* and *Sebastes schelegeli* were identified. The mean densities of these species were very low as 0.1 and 0.4 inds/1,000㎥, respectively. Eggs of *Engraulis japonicus* showed the mean density, 0.6 inds/1,000㎥ ranged 0.9~12.0 inds/1,000㎥ at 4 stations (Table 11).

In 2005, 6 species of fish larvae were identified. Among them, *Engraulis japonicus* showed the highest mean density, as 4.9 inds/1,000㎥ ranged 9.9~37.0 inds/1,000㎥ at 3 stations. *Sebastes schelegeli* caught at 6 stations, so it could be considered that this species was the most widely distributed one in the Korean West Sea in May. *Sebastes vulpes, Liparis* sp., *Limanda herzenstein* and *Lophius litulon* caught separately at only 1 station. Each species' distributional density was very low, less than 1 inds/1,000㎥. The mean density of eggs of *Engraulis japonicus* was 3.8 inds/1,000㎥ ranged 62.7~78.6 inds/1,000㎥ at 3 stations (Table 11).

3.1.5 Growth parameters for commercially important 10 species

The growth parameters including theoretical maximum length (L_∞), growth coefficient (K), theoretical age at length equal 0 (t_0), length-weight relationship ($W=aL^b$) and longevity for 10 commercially important species were shown in Table 12. Some of the parameters are published and some of them are not.

- Small yellow croaker

In the case of small yellow croaker, the growth parameters were estimated as follows: L_∞ was 34.7~36.2cm, K was 0.332~0.376, t_0 was -0.609~-0.593 year, length-weight relationships were 0.004298 $TL^{3.227}$ or 0.0196 $TL^{2.802}$ and longevity was 10 years (Hwang and Choi, 1980; NFRDI, 2005).

- Spanish mackerel

The growth parameters of Spanish mackerel were estimated as follows: the theoretical maximum length (L_∞) was 123.3cm, growth coefficient (K) was 0.196, theoretical age at length equal 0 (t_0) was -2.140 year, length-weight relationship ($W=aL^b$) was $6.577x10^6$ $FL^{3.002}$ and longevity was 8 years (NFRDI, 2005).

- Chub mackerel

The growth parameters of chub mackerel were estimated as follows: the theoretical maximum length (L_∞) was 40.2~51.7cm, growth coefficient (K) was 0.299~0.408, theoretical age at length equal 0 (t_0) was -0.719~0.428 year, length-weight relationship ($W=aL^b$) was $1.756x10^6$ $FL^{3.342}$ or 0.00044 $FL^{3.332}$ or 0.0056 $FL^{3.2537}$ and longevity was 6 years (Ahn, 1971, Choi et al., 2000; NFRDI, 2005).

- Largehead hairtail

The growth parameters of largehead hairtail were estimated as follows: the theoretical maximum length (L_∞) was 45.6~52.3cm, growth coefficient (K) was 0.154~0.408, theoretical age at length equal 0 (t_0) was -1.722~0.440 year, length-weight relationship ($W=aL^b$) was 0.06321 $AL^{2.5456}$ or 0.0323 $AL^{2.7826}$ and longevity was 9 years (Park et al., 1996, 2000; NFRDI, 2005).

3.1.6 Biological data

The reproduction and spawning characteristics including fecundity, optimum temperature (℃), 50% maturity length and spawning season of commercially important 10 species were shown in Table 13.

- Small yellow croaker

The reproduction and spawning characteristics of small yellow croaker were estimated as follows: the fecundity was 3~10x10,000 individuals, optimum spawning temperature was 12~14℃, minimum length at maturity was 19.1cm and spawning season was April ~ June (NFRDI, 2005).

- Spanish mackerel

The reproduction and spawning characteristics of Spanish mackerel were estimated as follows: the fecundity was 50~90x10,000 individuals, optimum spawning temperature was 16~21℃, minimum length at maturity was 78cm and spawning season was April ~ August (Hwang et al., 1977; NFRDI, 2005).

- Anchovy

The reproduction and spawning characteristics of anchovy were estimated as follows: the fecundity was 2.3~31.5x10,000 individuals, optimum spawning temperature was 15~20℃ and spawning season was March ~ October (Lim et al., 1970; Choi and Kim, 1988; Cha, 1990; Kim and Kang, 1992).

- Chub mackerel

The reproduction and spawning characteristics of chub mackerel were estimated as follows: the fecundity was 11~140x10,000 individuals, optimum spawning temperature was 17~18℃, minimum length at maturity was 27.0~28.7cm (fork length) and spawning season was January ~ June (Cha et al., 2002; NFRDI, 2005).

- Largehead hairtail

The reproduction and spawning characteristics of largehead hairtail were estimated as follows: the fecundity was 2~8.5x10,000 individuals, optimum spawning temperature was 18~20℃, minimum length at maturity was 25.7cm (anal length) and spawning season was May~August (NFRDI, 2005).

3.1.7 Seasonal distribution and migration routes of 10 commercially important species in the Yellow Sea

Most of commercially important species except some species inhabit the cold water mass and coastal sedentary species in the Yellow Sea have seasonal migration patterns between the East China and Yellow seas. They usually hibernate in the bordering area, where is affected by the Kuroshio Current, between the East China and Yellow seas, migrate to Korean or Chinese coastal areas for spawning and nursery in spring and go back to the wintering area in autumn (NFRDI, 2005).

- Largehead hairtail, *Trichiurus lepturus*

The species distributed in the Yellow Sea can be divided into two subpopulations according to wintering areas and migration routes; one called as the Northern East China Sea population spends winter in the northern part of the East China Sea as the name shows, and the other one called as the Yellow Sea population overwinters in the west-southern area of Jeju Island adjacent water, and both subpopulations migrate to coasts in the Yellow Sea and East China Sea in spring to spawn and nursery from May to August, and then come back to the wintering grounds in the fall (Fig. 9).

- Chub mackerel, *Scomber japonicus*

Chub mackerel has a wide migration route in the Yellow Sea. The species in the Yellow Sea can be largely divided into two subpopulations based on their wintering grounds and migration routes; one called as the East China Sea population stays over winter in the northern part of the East China Sea, and the other one called as Jeju Island offshore population overwiners in the south-eastern area of Jeju Island offshore. In spring they migrate up to the mid-part of the Yellow Sea and swim back to the wintering and spawning grounds in the autumn. They spawn from March to April in the East China Sea, and from April to May in the Jeju Island (Fig. 10).

- Fleshy prawm, *Fenneropenaeus chinensis*

This species distributes mainly in sandy or muddy bottoms in the Yellow Sea and Bohai Sea. The shrimp population can be divided into two subpopulations based on their breeding areas and migration routes. One is the western coast of the Yellow Sea population, which hatched in the coast of the Bohai Sea and the Yellow Sea. The other is the eastern coast of the Yellow Sea population, which hatched in the Korean western coast. In spring the Korean stock starts to migrate from the southern part of the Yellow Sea, their wintering ground, to Korean western coast, spawns mainly in the coast of Chungcheongnam Province from April to June, and then die. In autumn the new recruits migrate to the wintering ground (Fig. 11).

- Anchovy, *Engraulis japonicus*

This species is a small pelagic species distributed widely in the Yellow Sea, East China Sea and East / Japan Sea. The Yellow Sea population seasonally migrates according to changes of surface water temperature; in spring it migrates to the coastal area along the Korean Peninsula, spawns mainly in the mouth of Keum River from June to August, and in autumn migrates back to the wintering ground in the southern part of the Yellow Sea (Fig. 12).

- Pacific squid, *Todarodes pacificus*

Pacific squid in Korean adjacent waters are divided into three stocks based on their birth seasons; one of them is called as a stock hatched in autumn from October to December, the second one hatched in winter from December to March, and the third one hatched in spring from May to August. Their spawning grounds seemed in the East / Japan Sea or East China Sea, but not identified exactly because of the lack of information (Fig. 13).

- Spanish mackerel, *Scomberomorus niphonius*

The species stays near Jeju Island, where is affected by the warm current, during winter time, starts to swim to the coastal areas for spawning in spring, spawns in muddy bottoms in the relatively shallow coastal areas or in the bays in Korean coast from May to July, and then starts to migrate back to the wintering ground in autumn (Fig. 14).

- Small yellow croaker, *Larimichthys polyactis*

Small yellow croaker, spread widely in the Yellow Sea and East China Sea, can be divided into a number of subpopulations by the migration routes. One of them, which is called as Korean subpopulation, starts to approach to the Korean coast in spring, and migrates northward along the Korean western coast, and then spawns mainly near Chungcheongnam or Hwanghae provinces from April to June, after then migrates offshore and back to the wintering area (Fig. 15).

- Pacific herring, *Clupea pallasii*

This species is known as one of the cold water species and to be divided in two subpopulations in Korean waters; one is the East Sea subpopulation and the other is Yellow Sea subpopulation. The Yellow Sea stock inhabits the clod water mass all year round in the Yellow Sea. They usually migrate to the coasts (during winter time) and offshore (during summer time) as the changes of the season.

- Acetes, *Aectes chinensis* and *A. japonicus*

Those species are a kind of sedentary species. They migrate in and off shore as the change of season. They usually distribute mixed with the two species together along the west coast of Korea.

- Sandlance, *Ammodytes personatus*

This species is not known much in Korea, so it is difficult to mention about the migration of the species. It caught in coastal areas of Chungnam province and Baik-lyeong Island during a very shot period in spring.

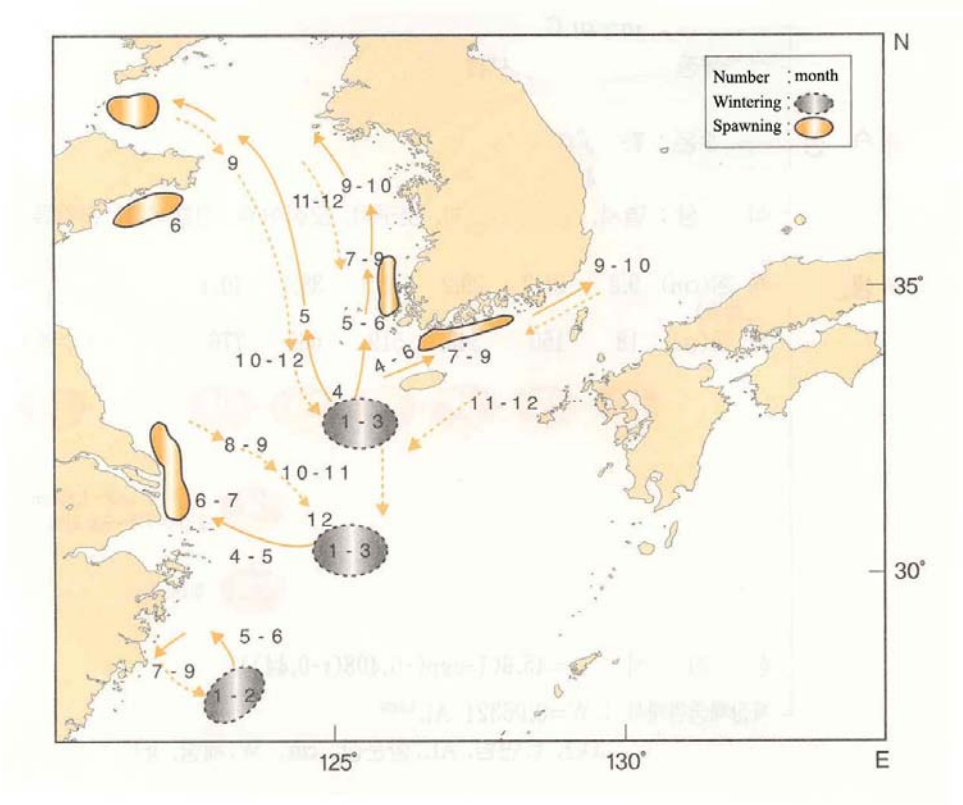


Figure 10. The wintering, spawning sites and migration routes of largehead hairtail (*Trichiurus lepturus*) in the Yellow Sea.

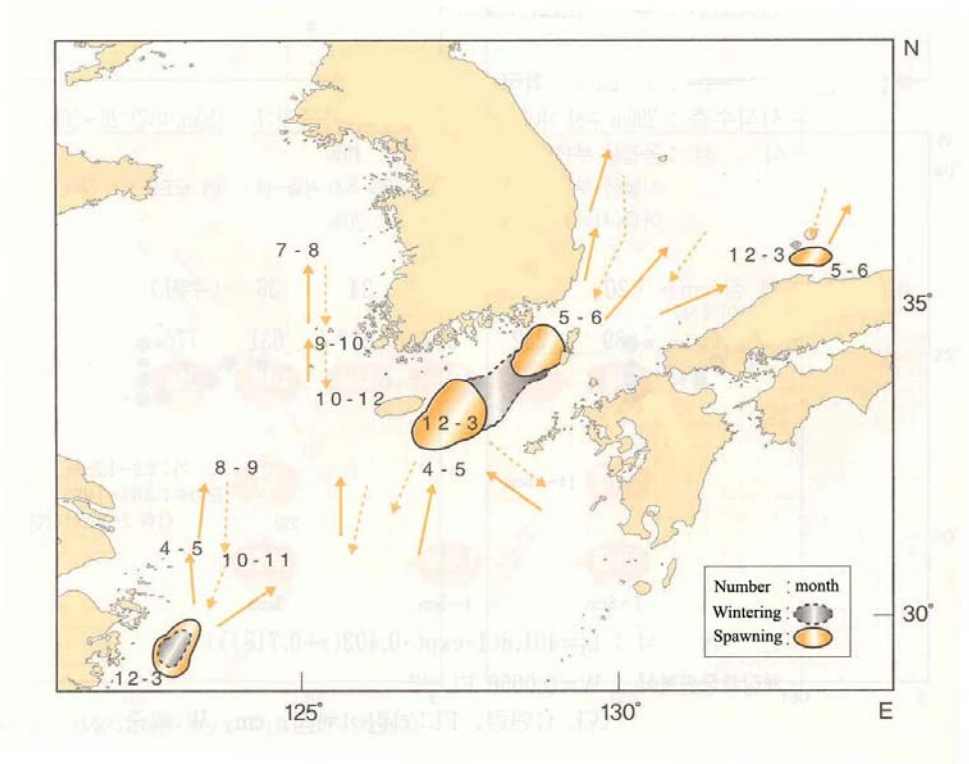


Figure 11. The wintering, spawning sites and migration routes of chub mackerel (*Scomber japonicus*) in the Yellow Sea.

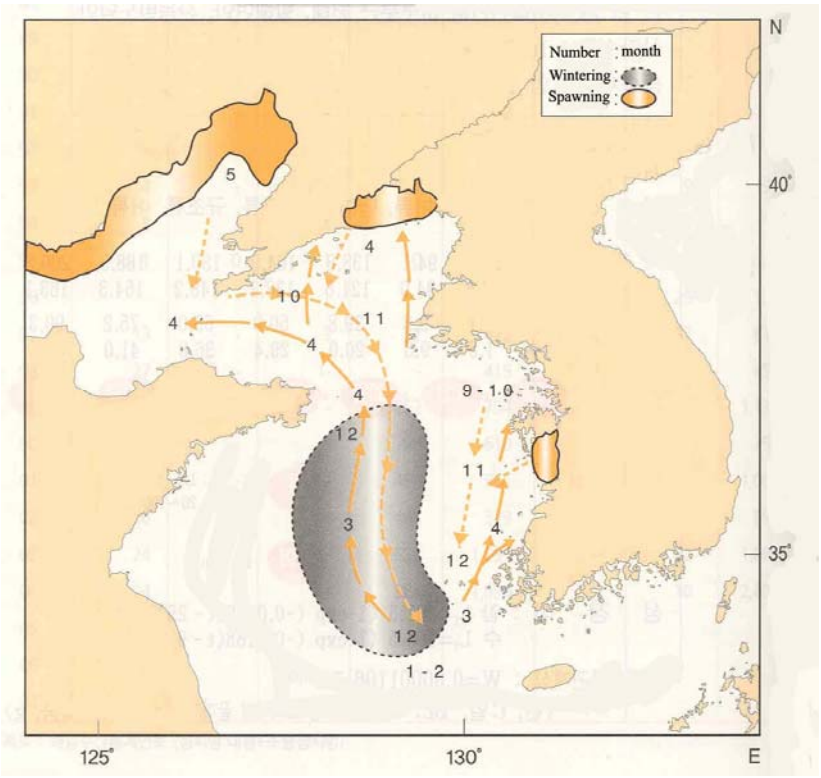


Figure 12. The wintering, spawning sites and migration routes of fleshy prawn (*Fenneropenaeus chinensis*) in the Yellow Sea.

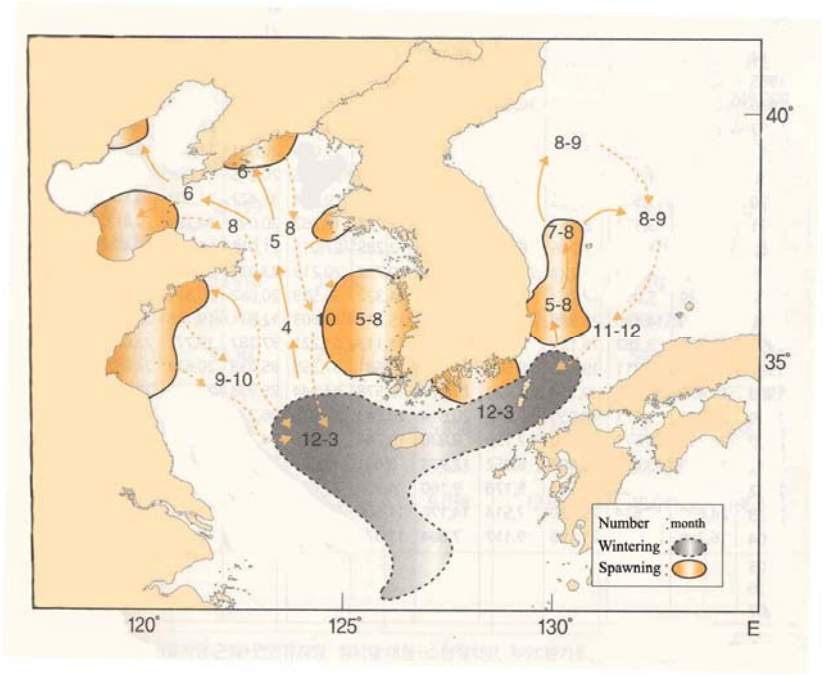


Figure 13. The wintering, spawning sites and migration routes of anchovy (*Engraulis japonicus*) in the Yellow Sea.

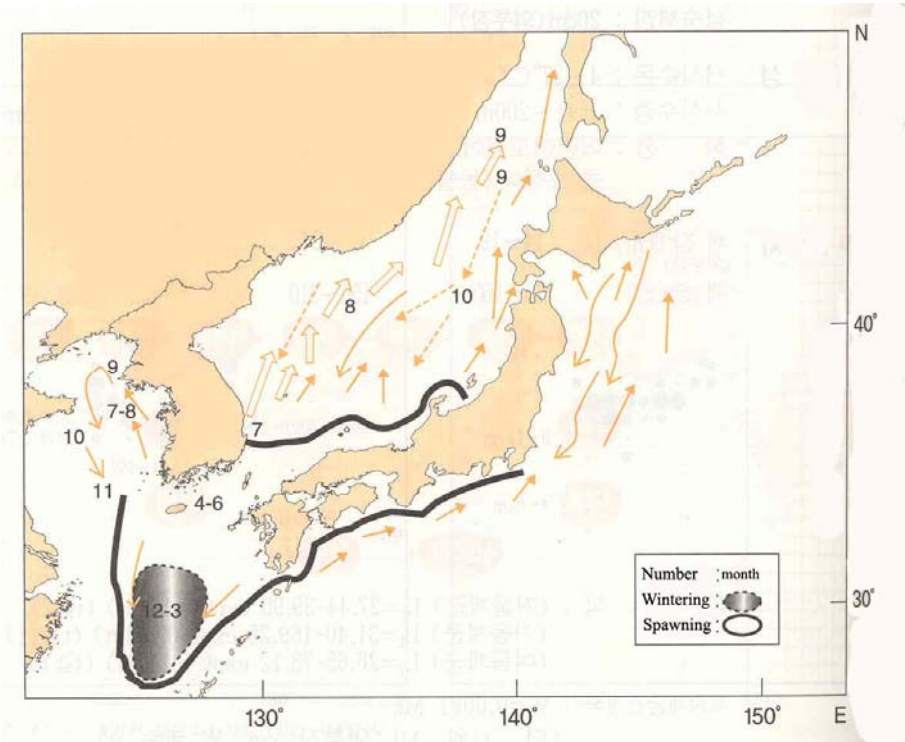


Figure 14. The wintering, spawning sites and migration routes of squid (*Todarodes pacificus*) in the Yellow Sea.

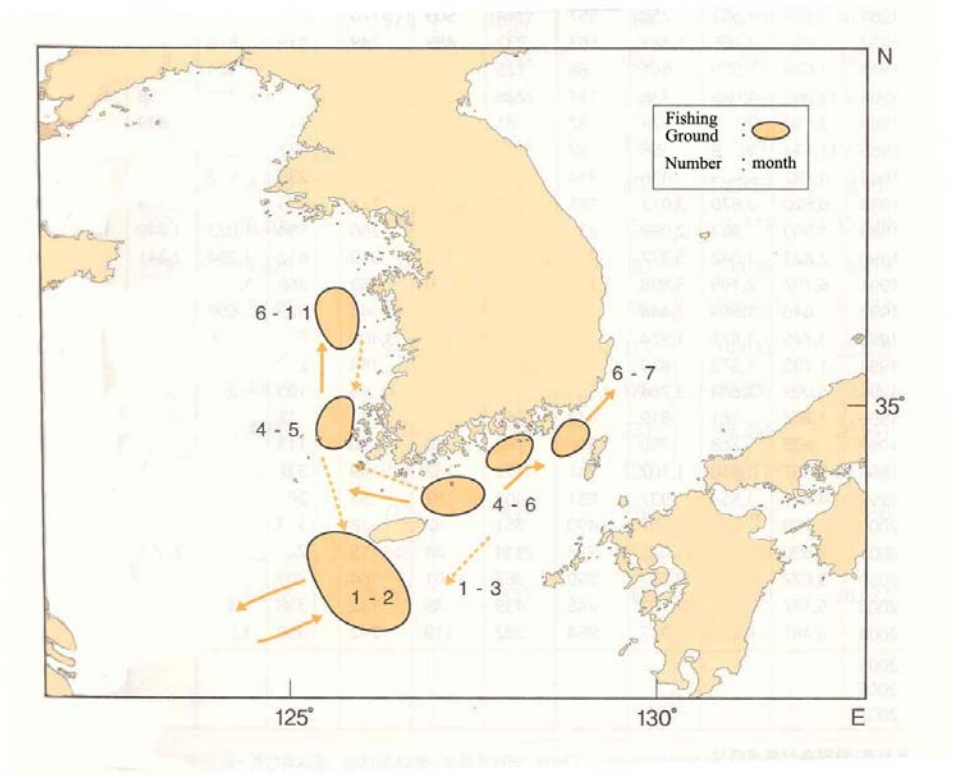


Figure 15. Fishing ground of Spanish mackerel (*Scomberomorus niphonius*) in the Yellow Sea.

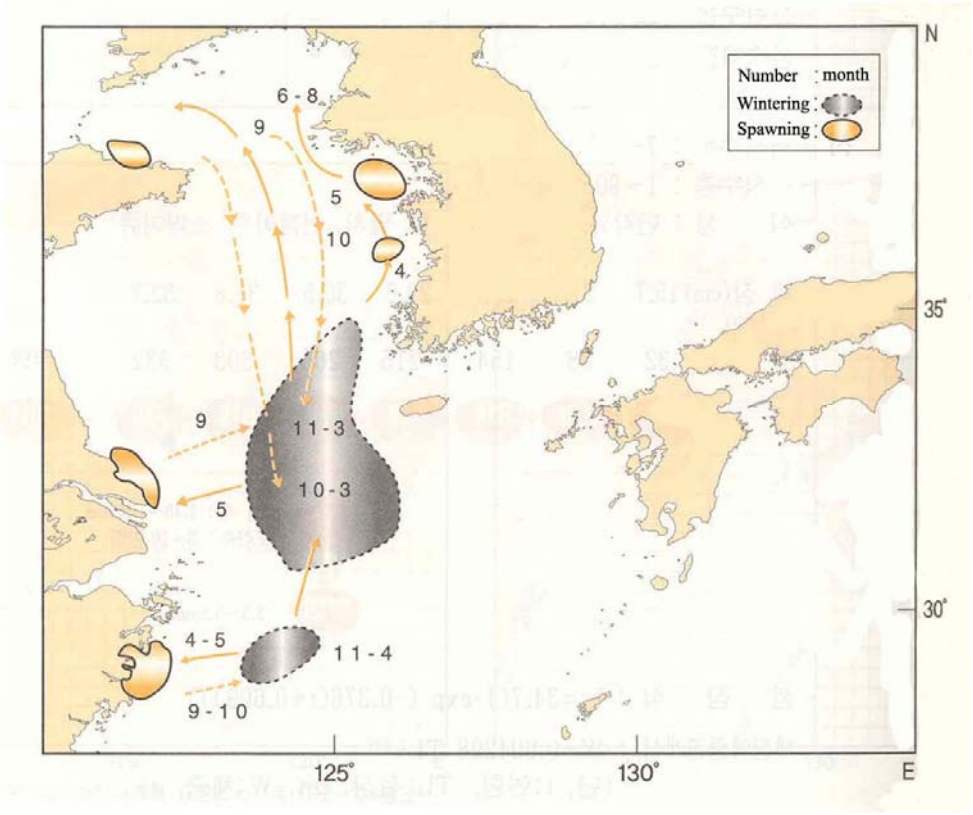


Figure 16. The wintering, spawning sites and migration routes of small yellow croaker (*Larimichthys polyactis*) in the Yellow Sea.

3.2 Socio-economics

To understand South Korean fishery socio-economic status, number and gross tonnage of fishing vessels, number of fishermen, fisheries income, fisheries consumption per capita, exports and imports of fishery products and economic importance of fisheries (GDP Contribution) are given.

3.2.1 Number and gross tonnage of fishing vessels by fishery

The number of distant waters fisheries vessels decreased about 28% from 20000 to 2004. Likewise, Gross tonnage (GT) of the fisheries decreased about 25% during the same period. The number and GT of Off-shore, Coastal Fisheries vessels decreased about 4% and 17%, respectively in 2004 compared to those in 2000 (Figs. 21 ~ 22, Table 14).

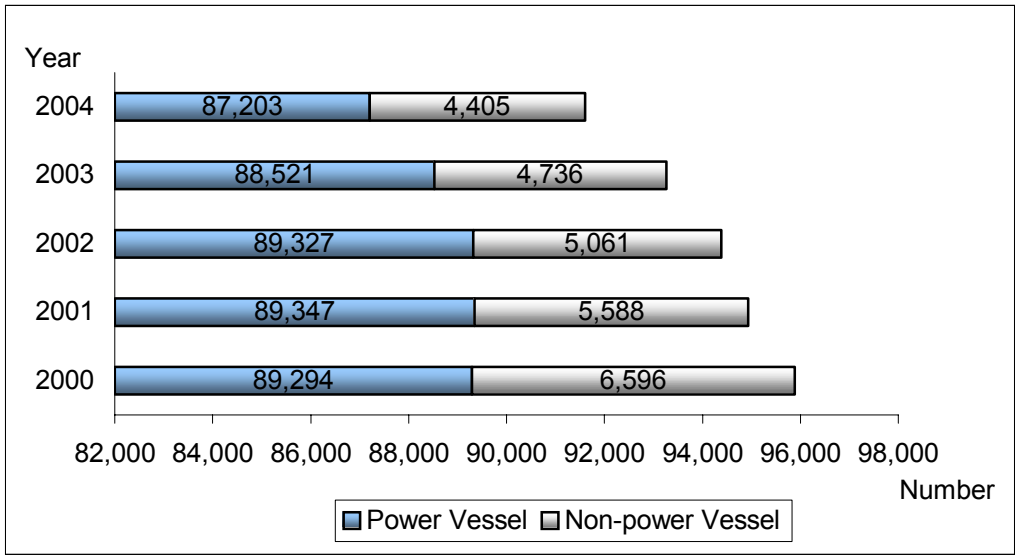


Figure 17. Number of fishing vessels by fishery.
Data source: Director General for Maritime Safety Management

Since 2000, the numbers of non powered and powered fishing vessels showed decreased tendencies. The total number of fishing vessels in South Korea decreased about 4.5% during 2000 through 2004 (Fig. 16, Table 14).

3.2.2 Number and gross tonnage of the fishing boats by province

The numbers of the fishing boats were relatively stable in the all of provinces from 2000 to 20004. GTs in Inchon, Jeonbuk and Jeonnam provinces decreased 16.7%, 39.5% and 11.2%, respectively during 2000 ~ 2004, but it in Gyeonggi and Chungnam provinces increased 35.1% and 13.0% during the same period. The highest number and GT of fishing boats appeared in Jeonnam Province as 36,095 boats and 101,646 GT (Figs. 23~24, Table 14).

3.2.3 Number of fishermen by province

Though the number of fishermen showed decreased trends in almost provinces, but in Gyeonggi Province it was sustainable. The highest number of fishermen appeared in Jeonnam Province (45 thousand individuals in 2004).

As a regional comparison, Incheon City number of fishermen decreased sharply in 40% while in Jeonnam Province it was gradually at 14% from 2000 to 2004, which ranked the first and second levels in decreasing trend (Table 16).

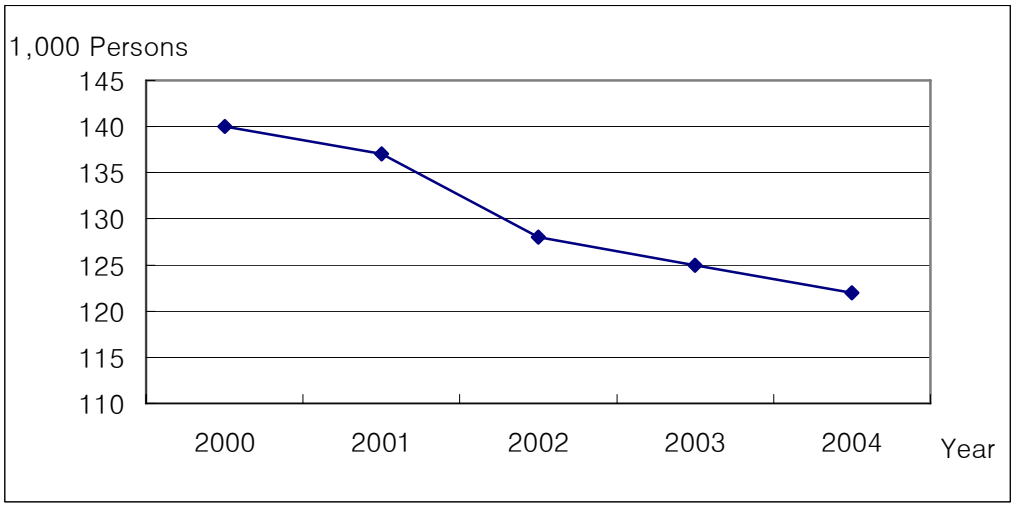


Figure 18. Number of fishermen.

Data source: National Statistical Office, 「Basic Statistical Research in Korean Fisheries」

For last 5 years, the total number of fishermen decreased about 12.9% from 140,000 in 2000 to 122,000 in 2004 (Fig. 18, Table 17).

3.2.4 Fisheries Income

According to the Customs Service the data, South Korean fisheries income was considered, it has been measured based on the unit of 1000won. From 2000 to 2004, fisheries income slightly increased about 18.6% showing annual variations (Table 17).

3.2.5 Fisheries consumption per capita (kg)

The consumption of marine product per person in South Korea has been measured in kg annually. From the year of 2000 to 2003, it increased about 21.4% from 36.8kg to 44.7kg (Table 18).

3.2.6 Exports and imports of fishery products

The total exports of fishery products continuously decreased about 15% from 1,504 millions in US $ in 2000 to 1,279 millions $ in 2004. However, imports of fishery products increased continually about 60.3% from 1,411 millions $ in 2004 to 2,261 millions $ in 2000 (Fig. 18, Table 19).

The exports of marine product decreased, but imports increased over the last 5 years. After the open market for marine products in ROK, the import volumes increased dramatically and this is expected to be continued (Fig. 18).

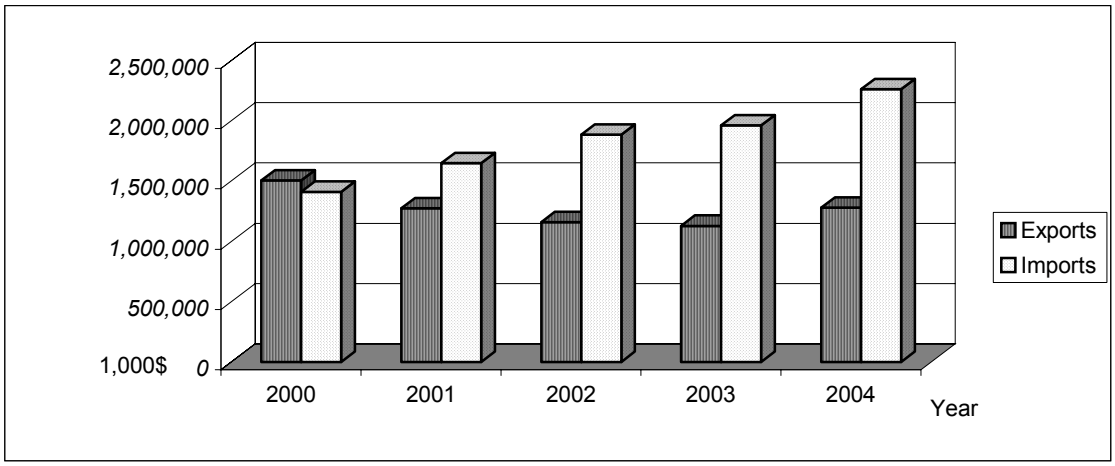


Figure 19. Imports and exports of fishery products
Data source: Korea Customs Service.

3.2.7 Economic importance of fisheries (GDP Contribution)

The ROK Gross Domestic Product (GDP) has been increased over the last 5 years. However, the Figure of GDP for fisheries was on the decrease slope by steps, its contribution showed a tendency to be decreased gradually (Fig. 20).

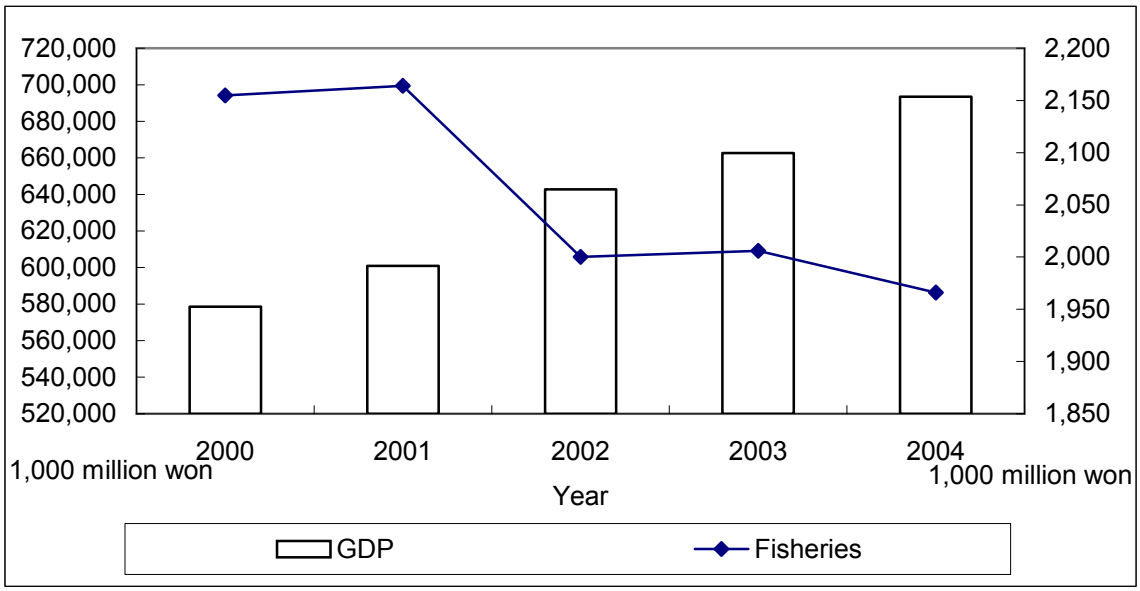


Figure 20. Gross domestic product (GDP) and fisheries.
Data source: The Bank of Korea, Economy Statistics System

The GDP of ROK in 2000 was 578,664 billion won, but it increased about 20% to 693,424 billion won in 2004. However, fisheries industry, GDP decreased 8.8% from 2,155 billion won in 2000 to 1,966 billion won in 2004 (**Fig. 25,** Table 58).

4 STATUS AND TRENDS IN MARICULTURE

4.1 Introduction

According to the reported document, it was around 300 years ago when a commercial aquaculture was first practiced in Korea. A culture of seaweed species, *Porphyra* sp. appeared in estuarine waters on the southern coasts of the peninsula. Pacific oyster, *Crassostrea gigas*, has also hundreds of aquaculture history. The science-based research activities were initiated since 1929 when Jinhae Inland Fisheries Research Institute of National Fisheries Research and Development Institute (NFRDI) was organized, focusing on freshwater finfish including common carp. The aquaculture research activities for freshwater finfish had contributed to the development of mariculture. NFRDI and Bukyong National University played a central role in the mariculture development in Korea. Hatchery-based seed production is primary element for recent aquaculture because advanced aquaculture technology is based on a mass production from hatchery-based seeds. More than ten marine hatcheries which were re-organized as specialized research centers belonging to NFRDI have taken some parts in technical aspects of the hatchery-based seed production technology. Due to the efforts, commercial hatcheries have thrived in Korea, providing fish and shellfish farmers with the seeds for aquaculture.

Aquaculture is poised to become an important source of marine protein that Koreans need presently and in the future. Because the capture fishing industry has peaked and is likely to decline as wild stocks are diminished, aquaculture will become a growing source of seafood products. Already, a considerable percentage of all aquatic products consumed in Korea are coming from aquatic farms. For some species, the production totally comes from aquaculture activities in the country. The aquaculture industry of Korea, however, is not without problems. Outbreaks of diseases and harmful algal blooms in the farming grounds occur annually. However, efforts to get through the problems are continuous, using environmentally sound aquaculture practices. Approach to molecular biology and genetics is of recent interest in the practice of modern aquaculture.

4.2 Production and history of mariculture

Mariculture production in the Yellow Sea (YS) coast of Korea reaches 208 x 10^3, or 22.7% of total national mariculture production in 2004. Of these, seaweeds take a considerable part of total marine aquaculture. The yield of seaweed is 145.9 x 10^3 MT, or 70.1% of the total YS mariculture production. The farmed production of finfish, crustaceans, and molluscs occupy 3.9%, 0.5% and 25.5% respectively. Of the marine farmed production, shellfish are of interest in the Yellow Sea coast of Korea.

4.2.1 Shellfish

Production of shellfish in the YS coast in 2004 reached 53 x 10^3 MT, making up 27.2% of the national shellfish production. Two shellfish species, Pacific oyster and Manila clam have been major bivalves in YS mariculture industry. Production of these two species occupied 91.7% of the total YS shellfish production.

Oyster aquaculture has been a traditional practice and has taken considerable parts of total shellfish production in Korea. For the culture of Pacific oysters, *Crassostrea gigas* seeds are obtained both from wild collection and hatchery. Hatchery based seeds are commercially available from 1990s and now increasing numbers of oyster farms are using the hatchery-based seeds.

Farming grounds of Manila clam, *Ruditapes philippinarum* in the Yellow Sea coast are normally selected sandy-silt or muddy-gravel bottoms from the intertidal zone to

2 meters in depth. Most of farming for Manila clam is in Chungcheongnam-do, Jeollanam-do and Jeollabuk-do. Almost all the seedlings for aquaculture have been caught from wild habitat in Taean, Boryeong, Dangjin and Hongseong in Chungcheongnam-do. Recently, because of reduction in wild seedling resources at natural habitat in Korea, demands for import of juveniles from China and North Korea are being increased. In addition to natural seedling catches, artificial hatchery-based spat producing techniques are already developed by NFRDI, but development of mass producing techniques in the field (for example in dike pond or tidal flat habitat) still remain as a problem to be solved

4.2.2 Finfish

The total farmed finfish production in YS coast reached 8,049 MT in 2004 and occupied comparatively small parts of total mariculture production in the west coast of Korea. Two marine finfish, olive flounder and black rockfish, dominate all the finfish species farmed in Korea. Production of these two species consists of 76.1% of total finfish production. Other minor farmed species are sea bass (*Lateolabrax japonicus*), mullet (*Mugil cephalus*), black sea bream (*Acanthopagrus schlegeli*) and parrot fish (*Oplegnathus faciatus*).

Olive flounder, *Paralichthys olivaceus*, is one of the most important marine species cultured in Korea. Flounder culture is totally based on the hatchery seeds, and is mostly practiced in the flow-through system of land-based facilities. Conditioning strain-good broodstocks for seed production is one of the key issues in the flounder aquaculture. The flounder, together with black rockfish, has been a key marine finfish species cultured in this country since late 1980s. With an aid of the advanced aquaculture technology on this species, particularly on the conditioning technology of the broodstocks in captivity, the production of the species is totally under control. However, some items, such as how to effectively control diseases and how to get better broodstocks are on-going subjects which need continuous research. Although the aquaculture for the olive flounder started from late 1980s, its commercial production was from the beginning of the 1990s in Korea. Soon after the industrialized production, the Korean production exceeded Japanese and maximized by the year 1997, thereafter showing a decreasing trend.

Black rockfish, *Sebastes schlegeli* has been studied since 1986 by NFRDI for aquaculture purpose. Currently, its artificial seedling cultivation method has been established. The rockfish together with olive flounder, occupies leading species farmed in the west coast of Korea.

4.2.3 Seaweeds

Seaweeds have long history of aquaculture and have been important aquatic products in Korea. The seaweed production in YS coast reached 145.9 x 10^3 MT in 2004 and occupied 70.1% of the total mariculture production in the west coast of Korea. The two species, laver (*Porphyra*) and sea mustard (*Undaria*) occupied 92.5% of the total seaweed production. Other minor cultured species are kelp (*Laminaria*), fusiforme (*Hijikia fusiforme*), and green algae (*Enteromopha*).

There are about 16 species of *Porphyra* growing on the coast of Korea. Common cultivated strains of *Porphyra* in Korea are *P. yezoensis, P. tenera* and *P. kuniedae*. History of seaweed culture began with Porphyra in Korea. According to the oldest records on Porphyra the alga was processed by chopping and drying earlier than 1425. Another story, passed from generation to generation, tells that it was in 1623-1649 that Porphyra was cultivated around Taein Island when a fisherman found some floating bamboo twigs with Porphyra attached to them and began his own cultivation by planting bamboo twigs along the sea shore. This bamboo twig

cultivation method was used until 1986 around Taein Island and its vicinity on the south coast. The method is no longer in use.

In Korea there are two forms of Undaria, i.e. southern and northern types. Compared to the southern form, the northern form has a longer stipe with sporophylls arising from the lower region with a deeply divided blade. This morphological character has very important implication for the efficiency of Undaria processing. In the early stages of Undaria cultivation, the selection of morphologically dominant strains for artificial seeding was considered to be important. However, most farmers disregarded this fact after the success with mass production of Undaria. The influence of plant morphology is being seriously reviewed in order to encourage strong competition in Undaria cultivation and marketing. Technology of artificial Undaria seeding was first developed in 1967.

4.2.4 Crustaceans

Crustacean culture in Korea is primarily of penaeid shrimps. Two penaeid shrimps, fleshy prawn (*Fenneropenaeus chinensis*) and Kuruma prawn (*Penaeus japonicus*), have been cultured for decades in western and southern coasts of Korean peninsula. Shrimp farming was initially begun in the 1960s in Korea and the farming industry was developed in the 1980s. Farmed shrimp production has been rapidly increasing since 1990s. More than 90% of shrimp farms are located in the western coast and the rest are along the southern coast.

Two species, fleshy shrimp and Japanese Kuruma shrimp had been cultured before the middle of 1990s, but Kuruma shrimp had not been cultured since the introduction of WSSV (white spot syndrome virus) into Korea in 1993. Pacific white shrimp (*Litopenaeus vannamei*) was firstly introduced from U.S.A. in 2003. NFRDI imported three hundreds of SPF (specific pathogen free) broodstock from Hawaii, U.S.A. in 2003, succeeded with production of post-larvae and grew up to commercial size. For commercial purpose some shrimp hatcheries began to import SPF broodstock from 2004 and the potential of white shrimp farming is expected to rapidly increase in next few years.

5 ANALYSIS OF NATIONAL LAWS AND REGULATION ON FISHERIES AND MARICULTURE

5.1 Rearing of raising fisheries resources

- Marine farming act was drafted in 2002.

In managing source preservation zones for fisheries resources of territory arrangement and usage orders, considerably important areas are managed according to the specifications as the source preservation zones for fisheries resources to protect fishery ecosystem and rear fishery sources eco-friendly.

In fish-farming area cleaning order to improve fishery environment, policies about cleaning of raising Fishery grounds and special supervising fishery are continually under way.

In prevention of fish farming damage by red tide, establishment of governmental general policy about red tide prevention is continually undertaking. And fishermen who were damaged by red tide are supported by the law about agriculture-fishery damaged measures.

5.2 Enhancement of fishery resource

5.2.1 Fish-farming facilities blocked by artificial banks

To enlarge fishery income by aqua-culturing of fishery resource in semi-natural environment facilities, building of unnatural fishing bank facilities were established in 1971, and then has been promoted quickly. Now 56 % of the total planned amount is attained. The total area of the fish-farming facilities along Korean west coastal area was 5,249 ha and the products from the facilities was 38, 343 million won in 2003 (Table 1).

Table 1. Fish –farming facilities blocked by unnatural banks by region

Unit: ha, a million won

Region/City	Area	Amount
Incheon city	32	2,043
Gyeonggi province	528	3,993
Chunnam province	512	2,473
Jeonbuk province	1,115	7,037
Gyungbuk province	428	3,270
Gyungnam province	886	6,171
TOTAL	5,249	38,343

Source: Resource managing part of MOMAF (2003)

5.2.2 Nursery facilities and produced seeds

Until now, 19 national-local fishery nursery facilities along the Korean west coastal area were built. 1,194 millions of the seeds were produced in the facilities. Among them, 126 millions were released in the seas to enhance the natural fisheries resources (Table 2).

Table 2. Released seeds and regional nursery supporting in 2003

	Released amount (1,000 ind.)	Supported amount (1,000 won)		
		TOTAL	National treasury	Local tax
Incheon city	684	554,246	387,972	166,274
Gyeonggi province	910	442,857	240,000	202,857
Chunnam province	247,934	507,277	355,094	152,183
Jeonnam province	27,887	392,434	264,064	128,370
Jeonbuk province	11,998	773,557	541,490	232,067
TOTAL	126,302	4,790,295	3,991,158	799,137

Source: resource managing part of MOMAF

5.2.3 Restructure control of fisheries

- Restructure control of Off-shore, coastal fishery

The main contents of offshore, coastal fishery structure reorganization policy by MOMAF are as follows:

- Reorganizing type of off-shore, costal fisheries
- Reset up the regulation on the closed fishing areas by fishery or local government policy
- Maintenance of optimum fishing intensity for sustainable utility of the fisheries resources
- Maintenance of proper fishing efforts based on limited license and pay-back polices and apply non-fish period by fishery
- Establishing of scientific fishery management system based on accurate stock research and assessment, yield-report system, using named fishing net by fisherman
- Development and diffusion of eco-friendly fishing methods and tools, and reduce human effort to fish
- Reasonable and systemic support for fishermen

- Recovering fishery sources

Community-self fishery management has been applied since February 2001. The communities participated in this scheme have been gradually increased to 122 in 2005 (Table 3).

Table 3. Number and support status of self-management fishery communities

unit: hundred million won

	TOTAL		Incheon city	Gyeong-gi	Chung-nam	Jeon-buk	Jeon-nam	Gyung-buk	Gyung-nam
Number of communities	122		7	3	6	9	38	15	16
Raising status	Number of supported communities	58	4	2	2	3	24	7	5
	Business cost	98	3	3	4	9	36	14	7

Source: resource managing part of MOMAF

TAC (Total Allowable Catch) system was started to be applied to 4 species such as chub mackerel, horse mackerel, red tanner crab and sardine in 1999, after then the management system has been expanded gradually to 9 species in 2003. The status of TAC based fishery management system in 2004 was showed as Table 4. Calculated ABC (Allowable Biological Catch) of chub mackerel was the highest as 120,000 ~ 155,000 t and it of sardine couldn't be estimated because the landing of the species was too law. The allotted volumes as TAC by species were 155,000 t chub mackerel, 10,000 t horse mackerel, 5,000 t sardine, 22,000 t red tanner crab, 1,000 t tanner crab, 8,000 t purplish clam, 2,500 t pen shell clam, 2,150 t top shell and 13,000 t for blue crab. The exhausted rate by species were 97.6% chub

mackerel, 99.3% horse mackerel, almost 0% sardine, 103.4% red tanner crab, 78.0% tanner crab, 57.9% purplish clam, 69.6% pen shell clam, 78.5% top shell and 6.8 for blue crab. The reasons why the exhausted rates were not approximate to 100% or over than it were that the system is still on a base step to be applied in Korean fishery management system, so the government tries to lead the fishermen to participate in the system, therefore the government couldn't set up strong restrictions for the system, other one was that the fishermen tried to landing as much as they want. Therefore, the government is struggle making compromises with the fishermen. The system has been changed positively, so it would be appropriately settle down in Korean fishery management system in the near future.

Table 4. TAC status by species in 2004

unit: ton, %

Species (Order) / Scientific name	ABC	TAC	Exhausted rate
Chub mackerel (Perciformes) ***Scomber japonicus***	120,000~155,000	155,000	97.6
Horse mackerel (Perciformes) ***Trachurus japonicus***	6,800~10,200	10,000	99.3
Sardine (Clupeiformes) ***Sardinops melanostictus***	-	5,000	0.0
Red tanner crab (Decapoda) *Chionoecetes japonicus*	14,000~21,000	22,000	103.4
Tanner crab (Decapoda) ***Chionoecetes opilio***	800~1,000	1,000	78.0
Washington Purplish clam (Veneroida) ***Saxidomus purpurata***	8,019	8,000	57.9
Pen shell clam (Mytilidae) ***Atrina pectinata***	4,877	2,500	69.6
Top shell (Archaeogastropoda) *Ocellatopoma japonica*	1,846~2,335	2,150	78.5
Blue crab (Decapoda) ***Portunus trituberculatus***	13,800	13,000	6.8

Source: resource managing part of MOMAF

5.2.4 Status and revision of fisheries law

- Revision of subordinate fisheries laws

Details of the Preservation Ordinance of Fisheries Resource (Presidential decree No. 18095, 27 August 2003) are as follows:

It is restricted to use more than double gill net in Korean West Sea

It decided standards of 'Net-knot' Size in Coastal Fishery and Inland waters Fishery (Long bag set net & Pound net with the transverse crib)

It set up a Capturing & Picking forbidden period of Chinese mitten crab and Lenok

It settled business license figures such a Class as Large Scale Danish Seine Fisheries of Inshore Fishery

For the transitional measure of Fisheries agreement, it could limit cultivating industry.

TAC Resource Management of Landinging fisheries can takes a Selling or Exchange according to Minister of Maritime Affairs & Fisheries.

By an Enforcement Ordinance of Fisheries Law (Presidential decree No. 18121, 4 November 2003), it expands Qualification criteria of Landinging fisheries transporter and Improved upon the defect of standing system.

By The Relating Rule of Fisheries License & declaration (Ministry of Maritime Affairs &Fisheries decree No. 247, 29 May 2003), the License of Inshore Fishery or Deep-Sea Fishery permitted Fishing Boats can fish in the restricted waters of foreign country.

- Status of raising fishery cultivating law

In an Enforcement Ordinance of Raising Fishery cultivating Law (Presidential decree No. 18052, 15 July 2003), Minister of Maritime Affairs & Fisheries or City & Provincial governor decides method and contents of basic investigation for the Setting of 'Raising Fisheries Developing Plan'.

The Rule of Raising Fishery Cultivating Law (Ministry of Maritime Affairs & Fisheries decree No. 251, 15 July 2003) decides the choice, method and procedure of Fisheries Developing Area.

- Status and revision of others notification

By the Notification about jellyfish discharging net in costal sea Stow net (2003-1, NFRDI Notification), In the Article No.6 (1)-h of fishery resource protection ordinance, to preserve fishing net damage from over-incoming of jellyfish, necessary matters to protect them are arranged to stick discharging net in coastal sea Stow net.

And the Notification about designating type of fishery in TAC system, by 2 of Article No.54 fishery law, the No. 18 of fishery resource protection ordinance, 2 of Article No. 27 (4) and Article No.27 (4), kinds of TAC applicant fishery, designating selling place and managing way of TAC system were arranged.

6 PRELIMINARY GOVERNANCE ANALYSIS

The Yellow Sea is semi closed sea surrounded by South Korea, North Korea and China and located to the north of the East China Sea and connected to the Bohai Bay in northward. Therefore, the sea must be shared among the four countries included some part of Japan. Japan can use the sea with permissions from the countries.

The Yellow Sea is mostly composed of shallowness of the continental shelf water and productive. Biodiversity of fishery resources in the sea is high with about 450 species. Commercially important fishery resources are about 50 species in Korean and Chinese fisheries.

Most of the fishery resources in the Yellow Sea, except some sedentary resources and cold water species, migrate seasonally for wintering, spawning and feeding. After wintering in the southern Yellow Sea and the northern East China Sea, fishes migrate to the coastal area

for spawning and feeding from spring through autumn, and then move back to the wintering area in late autumn. Therefore, the Yellow Sea and its marginal zones, and the coasts of Korea and China, are very important for the fishery of the Yellow Sea.

The fishing efforts have been increased very much, especially the most rapid development of fishing efforts in South Korean fisheries occurred in the power of the boats. Therefore, even though the number of fishing boats decreased, fishing intensity has been increased.

However, most of landings in Korea from the Yellow Sea have been decreased since mid 1980s in general. Species composition of landings has been changed from large size and relatively higher tropic level of demersal species (like small yellow croaker, largehead hairtail) to small and lower tropic level of pelagic fish like anchovy.

Most commercially valuable fish stocks in the Yellow Sea have been overexploited due to both a continuous increase in fishing capacity in adjacent waters and near shore fish habitat deterioration because of large land reclamations, municipal and industrial waste discharges. Korean and Chinese fishermen have increased competitively their fishing effort as their landings decreased, it has accelerated the depletion of fish stocks in the Yellow Sea.

As the landing and fisheries products decreased, imports increased, and then mariculture was considered to compensate the reduction of the products from the natural resources. At first mariculture products increased as the methods developed, but recently it started to be decreased. Mariculture becomes one of the causes of environment problems such as diseases, pollution because of fish food and so on, so it has been restricted by the license (included permission and notification) systems and some of its products are under control.

According to the fisheries products declined, ecosystem health becomes worse and the fishing grounds reduced because exclusive economic zone (EEZ) was declared, Korea acknowledged the importance of the resources conservation and management. In order to cope with this fisheries environment, the Korean government has applied various resource enhancements tactics.

They include protection of spawning grounds, purification and management of coastal areas, exclusion of illegal fishery, releasing fish seeds of artificially hatched relatively sedentary species. Prohibition of targeting particular species in specific areas, seasonal restrictions, and fish size limitation are other types of management strategies. Regulations on fish licensing and mesh size have also been applied for better sustainable production. Simultaneously large meaning of Marine Protected Area and community-self fishery management policies are adopted. The Korean singleness management methods, however, haven’t worked well.

The resources and oceans in the Yellow Sea have been shared among the surrounded countries such as South Korea, North Korea, China and Japan. Therefore, it is necessary to establish appropriate and collaborative management system with the countries together to utilize and preserve the resources and ocean effectively based on cooperative research survey results and ecosystem based management.

7 DATA AND INFORMATION GAPS

To effectively preserve the resources and ocean and reduce the stress in the Yellow Sea, it is necessary to establish collaborative management system among the surrounded countries together. However, until now there haven’t been any opportunities to carry out comprehensive and partnership management system on the fisheries.

To consider appropriate strategies for fisheries resources conservation, it is a base step to understand the Yellow Sea ecosystem. Thus, first of all, collection of data and information on the fisheries, mariculture and socio-economic is carried out, but we found there are some data and information gaps.

7.1 Accuracy fishing sites and catch mount

To analysis stock size and discuss appropriate management way properly, it is necessary to get exact data about where what kind of fish and how much the fishermen catch. There aren't any available exact catch data by fishing sites, because most fishermen want to keep the information on their fisheries as their own knowledge to catch more by themselves in the future. Therefore, it is needed to set up special fishing report systems to get more accurate data.

7.2 Discards

Most of fisheries scientists want to know discard for exact stock assessments, but it is very difficult to get the data for them without any observer systems. In Korea there is an observer system, but it doesn't have enough potentiality to obtain the appropriate data on the fishing boats for precise stock assessments. Now the government recognizes it is necessary to expend the system to get more accuracy data and information. The government is planning it.

7.3 Cooperative survey for fisheries resources

Even though the scientists get commercial fishery dependant data, it is very difficult for them to standardize the fishing efforts among the data form fisheries and countries, it only depends on fishermen's report or landing data, and then the data from each country has its own way, the quality of the data is different. Therefore, it is needed to set up cooperative surveys between Korea and China to calibration the exist data.

7.4 Socio-economic data format

There was some point of difference about static system management between Korea and China. Korean static system has more detailed data and information, but China system barely has requested data because of the difference from managing static system. So we modified the data format of socio-economic department in the 2nd RWG meeting.

7.5 Total production of marine farmed organisms

Production of farmed animals and seaweeds were investigated for seafood sold or distributed through the assignment sale of the Fisheries Cooperative. When farmed production sold directly on local farms is included, total production will increase up to about 10-30% depending on the species.

Changes in total production of marine farmed organisms from the west coast during last 10 years are compared with that of total national mariculture production. Total national production of freshwater is compared with mariculture production.

7.6 Aquaculture area of marine farms

There are three types of permission regulation for aquaculture farms in Korea, i.e. licensed, permitted and notified farms. The licensed farms are legally permitted until 1997 and the regulation of permission and notification had begun since 1998. Therefore data of aquaculture area include licensed farms only until 1997 and include three types of farms (license, permission and notification) from 1998.

Collective farms are another type of permission. This is very huge in size and belongs to a village or cooperative association of fisheries. These types of farms culture mainly shellfish or shellfish/seaweeds. There are little data on area of collective farms during 1995 – 2000. Therefore the available data on the area is included from 2001 to 2004.

7.7 Aquaculture methods (habitats) of marine farmed organisms

Data on the area for aquaculture methods is based on the aquaculture area of marine farms, i.e. data on area of each culture method include licensed farms only before 1998 and include licensed, permitted or notified farms from 1998 to 2004. Data on collective farms are same to the aquaculture area of marine farms.

- FINFISH

Finfish are cultured by land based tank or outdoor pond methods.

- CRUSTACEANS

Crustaceans (shrimp) are cultured from outdoor ponds only. There are various methods in shellfish culture. Hanging culture method is applied to scallops, oysters, abalones and mussels. Bottom culture method is applied to clams, oysters and abalones. Cage culture and land based tank culture methods are applied to abalones only. Data on the area for each culture method of shellfish is available in 2004 only.

- SEAWEEDS

Seaweeds are mainly cultured by floating net or long-lined method in the bay or open sea.

- SEA CUCUMBER

Culture of sea cucumbers is recently developed in the west coast of Korea. Polychaetes (bloodworms) are mainly cultured in ponds and very few in land based facilities. Sea urchins is not cultured in the west coast but released in the east coast to improve wild resources.

Collective farms are cultured by short-necked clam, abalone or seaweeds. Polyculture of seaweeds (*Laminaria* sp.) with abalone is sometimes carried out in collective farms. However short-necked clam is cultured in most collective farms.

The farmed area was investigated for the legally permitted farms only. When illegal farms are included, total figures will increase up to about 10% depending on the species.

8 PRELIMINARY CAUSAL CHAIN ANALYSIS

Problem	Impacts	Immediate Causes (Technical)	Underlying cause	Root cause	Governance	Priority rank (H, M, L)	Trans-boundary?	If yes, priority rank (H, M, L)
Decline in CONDITIONS of Many Commercially Important Fishery Species	*Reduction in tropic level, Reduction in overall size of some commercially valuable species, Change in composition of species*	Over-exploitation of target species	Insufficient management and control of fisheries activities, Over-Capacity of fishing fleets, Illegal Fishing, Insufficient monitoring and enforcement, weak scientific-based knowledge on status of stocks	Increasing demand for marine resources due to rapid population and economic expansion	Insufficient legal instruments at national and regional levels, insufficient implementation of national regulatory instruments; lack of regional harmonization of regulations. Insufficient knowledge and infrastructure base	H	Y	H
Uncontrolled Aquaculture Practices	*Damage to coastal natural habitat; damage to environmental quality, Introduction of pathogens, increase in disease outbreak*	*Over-intensive aquaculture activities and Over-exploitation of natural habitats, Introduction of foreign species*	Increasing mariculture activities, Effect of mariculture activities on surrounding habitats	Increasing demand for marine resources (mariculture products) due to rapid population and economic expansion	Inadequate legal instruments at national and regional levels, inadequate implementation of national regulatory instruments; lack of regional harmonization of regulations. Inadequate knowledge and infrastructure base	H	Y	H
Inadequate Capacity to Assess Ecosystem	*Incapacity to adequately manage activities and management resources, and mitigate effects*	Insufficient information and environmental impact assessments	Insufficient knowledge and infrastructure base	Poor regional coordination, communication and collaboration, insufficient financing mechanisms and support	Insufficient understanding and associated policies	M	Y	M

9 SUMMARY

The Yellow Sea is a highly productive sea consisted of mostly continental shelf, so it is used as spawning and nursery grounds by the fisheries resources. Therefore, the sea is impacted very intensively due to land-based activities.

Most commercial important species in the Yellow Sea showed seasonal distribution pattern and migration routes excluding some species inhabit the cold water mass and sedentary species in the coasts.

The total landing of Korea was shown the highest level in mid-80s, after that time it was gradually decreased until the recent year. And the landing of almost commercially important species except anchovy also showed gradually decreasing trends. The ratio of Yellow Sea/Total landing is about 20% in recent years.

Although the fishing vessels and KW were increased, the tonnage was decreased in recent years. The CPUE (landing / boats, HP) are decreased sharply in recent years, but the landing / GT maintained some stable condition.

In species composition the dominant species was changed from large demersal species to small pelagic species as decades passed by.

According to the socio-economic statistical data, most items are decreased during last 5 years. The import of marine product increased more than export and that decreased contribution of marine industry to GDP, it showed the task of Korea fishery industry.

Production of farmed animals and seaweeds were investigated for seafood sold or distributed through the assignment sale of the Fisheries Cooperative.

There are three types of permission regulation for aquaculture farms in Korea, i.e. licensed, permitted and notified farms. The licensed farms are legally permitted until 1997 and the regulation of permission and notification had begun since 1998.

Finfish are cultured by land based tank or outdoor pond methods. Crustaceans (shrimp) are cultured from outdoor ponds only.

There are various methods in shellfish culture. Hanging culture method is applied to scallops, oysters, abalones and mussels. Bottom culture method is applied to clams, oysters and abalones. Cage culture and land based tank culture methods are applied to abalones only. Seaweeds are mainly cultured by floating net or long-lined method in the bay or open sea.

Culture of sea cucumbers is recently developed in the west coast of Korea. Polychaetes (bloodworms) are mainly cultured in ponds and very few in land based facilities. Sea urchins is not cultured in the west coast but released in the east coast to improve wild resources.

Collective farms are cultured by short-necked clam, abalone or seaweeds. Polyculture of seaweeds (*Laminaria* sp.) with abalone is sometimes carried out in collective farms. However short-necked clam is cultured in most collective farms.

In the Korea domestic law part, we can find the law about rearing of raising fishery, formation of fishery resource and fishery structure control. Also, there was some revision in the Preservation Ordinance of Fisheries Resource, Statute of Raising Fishery cultivating Law and jellyfish discharging net in coastal sea Stow net.

We established policies as stated in Table 1, such as reformation of types of industry, adjustment of fishery zone, maintenance of fishery skill, maintenance of appropriate fishery boat power, constructing of scientific fishery controlling system, building of environmental friendly fishing environment, and introduction of new fishing technique.

Table 5. Sustainable fishery policy

Strategy plan	Details
1. Reformation of industrial types	-Categorization should be modified (Types of fishery and naming)
2. Adjustment of fishery zone	-Modification of fishing prohibition zone
3. Maintenance of fishery skill	-Restriction of shipping volume -Limit of the power in institute at certain point
4. Maintenance of appropriate fishery boat power	-Modify the number of fishing certificate
5. Constructing scientific fishery controlling system	-Real name system of fishing implements -Scientific research and evaluation of near coastal line
6. Building of environmental friendly fishing environment, and introduction of new fishing technique	-Adoption of VMS -Development of fish exit instrument

The resources and oceans in the Yellow Sea have been used among the surrounded countries such as South Korea, North Korea, China and Japan, together. Therefore, it is needed to set up appropriate and collaborative management systems among the countries to share and preserve the resources and ocean effectively based on the cooperative surveys between Korea and China.

10 LOCATION OF DATA & INFO AND ACCESS TO THE SITE BY THE PUBLIC

Fisheries

- Agriculture, Fisheries and Forest Bureau, Incheon city Government for the fishing effort (No, tonnage and HP of boats) data in Incheon city
- Agriculture, Fisheries and Forest Bureau, Gyeonggi Provincial Government for the fishing effort (No, tonnage and HP of boats) data in Gyeonggi province
- Agriculture, Fisheries and Forest Bureau, Chungnam provincial Government for the fishing effort (No, tonnage and HP of boats) data in Chungnam province (Chungchungnam-do)
- Agriculture, Fisheries and Forest Bureau, Jeonbuk provincial Government for the fishing effort (No, tonnage and HP of boats) data in Jeonbuk province
- Agriculture, Fisheries and Forest Bureau, Jeonnam provincial Government for the landing and fishing effort (No, tonnage and HP of boats) data in Jeonnam province focused on Mokpo-city and Sinan-gun
- National Fisheries Research and Development Institute (NFRDI) in Busan for the CPUE by fisheries, biological and ecological data of each species
- South Sea Fisheries Research Institute in Yeosu for the CPUE by fisheries, biological and ecological data each species
- **West** Sea Fisheries Research Institute in Inchon for the CPUE by fisheries, biological and ecological data each species
- Bukyong, Yeosu and Mokpo National Universities for some analyzing methods, biological and ecological data of each species in Busan, Yeosu and Mokpo

Socio-economic

- The Ministry of Maritime Affairs and Fisheries, Fishery Trend Annual Report
- The Ministry of Maritime Affairs and Fisheries, Marine Product Supply-Demand and Price Annual Report
- The National Statistical Office, Fisheries Statistical Analysis
- The National Statistical Office, Fisheries Household Economy Statistical Analysis
- The Bank of Korea, Economy Statistic System
- Korea Rural Economic Institute, The Table about demand and supply of Korean Food
- The Customs Service, Import and Export Statistics

Mariculture

- Aquaculture Development Division, Ministry of Maritime Affairs & Fisheries for total marine farmed production in Korea
- Fisheries Management Division, Incheon Regional Maritime Affairs & Fisheries Office for the status of licenses and area of marine farmed organisms in Incheon city
- Fisheries Management Division, Pyeongtaek Regional Maritime Affairs & Fisheries Office for the status of licenses and area of marine farmed organisms in Gyeonggi province
- Fisheries Management Division, Daesan Regional Maritime Affairs & Fisheries Office for the status of licenses and area of marine farmed organisms in Chungnam province

- Fisheries Management Division, Gunsan Regional Maritime Affairs & Fisheries Office for the status of licenses and area of marine farmed organisms in Jeonbuk province
- Fisheries Management Division, Mokpo Regional Maritime Affairs & Fisheries Office
- Agriculture, Fisheries & Forest Bureau, Incheon city Government for the status of licenses and area of marine farmed organisms in Incheon city
- Agriculture, Fisheries & Forest Bureau, Gyeonggi provincial Government for the status of licenses and area of marine farmed organisms in Gyeonggi province
- Agriculture, Fisheries & Forest Bureau, Chungnam provincial Government for the status of licenses and area of marine farmed organisms in Chungnam province
- Agriculture, Fisheries & Forest Bureau, Jeonbuk province Provincial Government for the status of licenses and area of marine farmed organisms in Jeonbuk province
- Agriculture, Fisheries & Forest Bureau, Jeonnam provincial Government for the status of licenses and area of marine farmed organisms in Jeonnam province with focus on Younggwang-gun, Muan-gun, Hampyeong-gun, Sinan-gun and Mokpo City.
- Area for data collection is shown in Fig. 11. Four provinces of five investigated, i.e. Incheon city, Gyeonggi province, Chungnam province, Jeonbuk province, are located in the west coast. However Jeonnam province has both coast of south and west. Five local sub-provinces of Jeonnam, i.e. Younggwang-gun, Muan-gun, Hampyeong-gun, Sinan-gun and Mokpo City, located in the west coast are included to this data collection.

Access to Websites

In Korea, there are several websites to be accessed by public, which are:

http://www.momaf.go.kr/: public

http://kosis.nso.go.kr/: not public

http://infofishnet.co.kr/: public

http://fs.fips.go.kr/: public

http://www.bok.or.kr: public

They disseminate some of data or **information** on fisheries **statistics** such as landings by species, fishery and region, number of fishing boats, gross tonnage and horse power of fishing vessels, and aqua-farming *ect*.

11 DATA AND INFORMATION TABLE

11.1 Area for data collection

The data and information were collected and analyzed from each institute (National Fisheries Research and Development Institute, South Sea Fisheries Research Institute), National Federation of Fisheries Cooperatives (Incheon city, Gyeonggi province, Chungnan province, Jeonbuk province, Jeonnam province), universities (Pukyong, Yeosu and Mokpo National University, Kyoung Sang University) and local government (Incheon city, Gyeonggi province, Chungnan province, Jeonbuk province, part of Jeonnam province) corresponding to the Yellow Sea (Fig. 20).

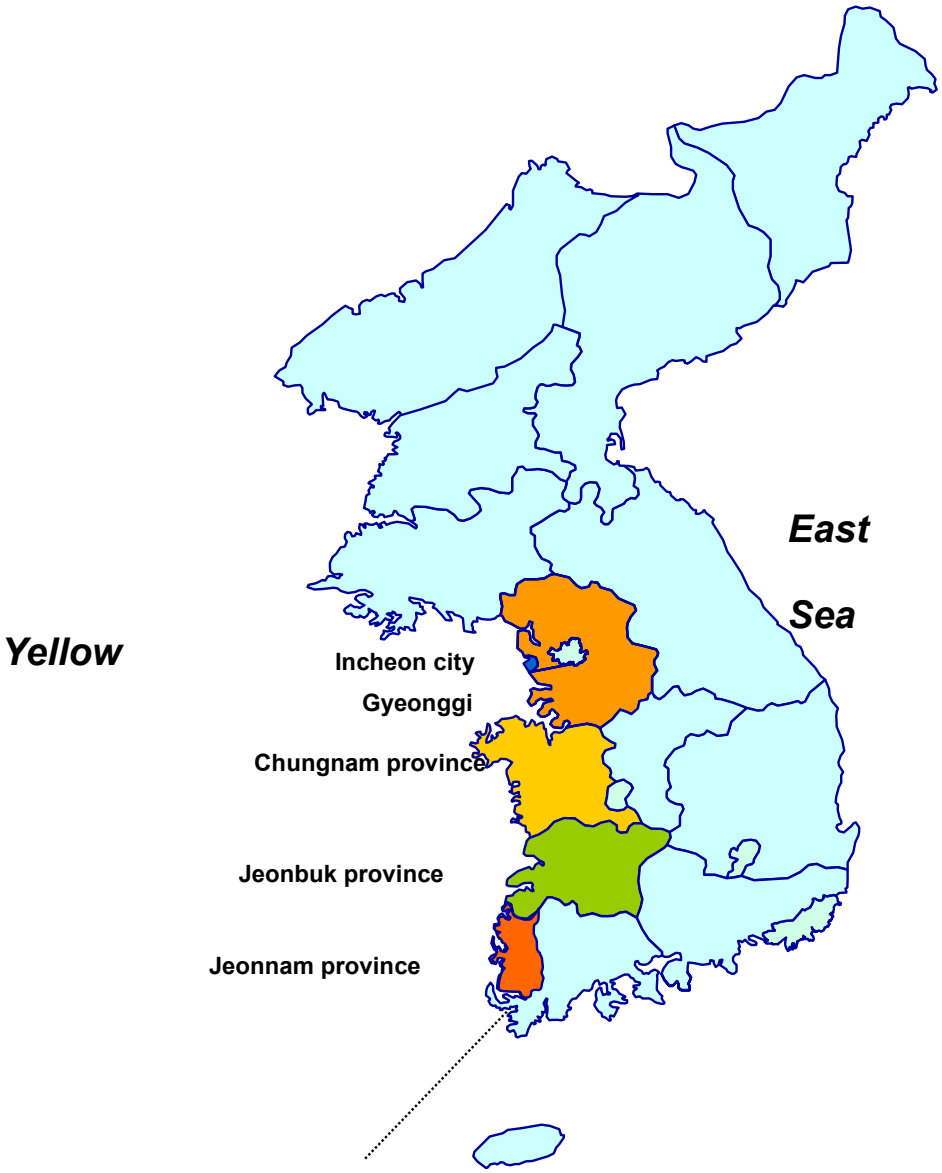


Figure 21. Map showing five provinces bordering the Yellow Sea coast of south Korea. Only five sub-provinces of Jeonnam province belong to the Yellow Sea coast (see red area).

11.2 Collected data and information on fisheries

11.2.1 Collected data and information on Fisheries

- Landing trends of the total and by species

Table 6. Landings (in metric ton) by commercially important 10 species and total, 1986~2004

Year	Small yellow croaker	Spanish mackerel	Anchovy	Chub mackerel	Largehead hairtail	Pacific herring	Sandlance	Acetes	Fleshy prawn	Squids	Total
1986	2,601	1,862	28,007	2,466	50,382	17	0	11,375	964	30,404	128,077
1987	6,243	1,685	30,519	3,798	56,940	14	0	13,712	437	28,646	141,992
1988	4,777	856	21,472	5,049	48,984	2	0	8,417	517	22,466	112,537
1989	5,404	1,382	19,831	4,379	48,374	14	0	16,192	775	15,029	111,379
1990	9,369	1,643	21,101	1,635	47,201	12	1	17,627	833	14,957	114,378
1991	16,182	1,101	27,108	1,107	45,275	3,531	10	13,936	972	14,903	124,123
1992	13,887	869	26,046	3,187	35,515	1	101	14,940	954	10,054	105,552
1993	9,616	648	38,701	6,933	24,065	0	91	20,411	784	7,881	109,127
1994	14,189	801	29,747	7,018	34,145	0	280	14,111	1,078	7,209	108,575
1995	7,713	617	32,486	6,339	22,430	0	1,334	13,609	1,227	5,014	90,767
1996	8,204	228	50,392	12,641	14,671	0	1,054	12,827	1,018	4,903	105,936
1997	7,559	343	42,900	2,292	11,525	3	896	10,576	1,562	5,484	83,138
1998	4,709	627	41,422	2,732	13,378	9	0	11,916	974	9,874	85,639
1999	4,600	543	53,533	2,471	7,314	0	6	16,309	738	8,295	93,807
2000	6,266	739	48,446	2,587	6,846	0	11,956	10,662	1,044	3,637	92,181
2001	2,595	930	49,427	6,684	5,285	2	328	8,632	420	6,182	80,483
2002	2,988	988	53,808	2,831	2,919	9	2,118	4,659	207	6,816	77,341
2003	2,462	1,035	35,899	1,459	4,910	0	2,003	8,530	123	6,683	63,102
2004	6,110	1,002	41,477	3,330	9,195	2	222	5,182	702	8,065	75,283
Mean	7,130	942	36,438	4,154	25,755	190	1,074	12,296	807	11,395	100,180

- Trends of fishing efforts

Table 7. Number, tonnage and power (in KW) of fishing vessels, 1986~2004

Year	Powered Vessel				Non-powered Vessel			Total		
	No.	Tons	KW	Tons/ Vessel	No.	Tons	Tons/ Vessel	No.	Tons	Tons/ Vessel
1986	26,596	157,880	648,509	5.94	6,518	9,798	1.50	33,114	167,678	5.06
1987	26,992	160,348	783,403	5.94	6,865	9,937	1.45	33,857	170,285	5.03
1988	27,752	163,139	956,536	5.88	7,464	10,087	1.35	35,216	173,226	4.92
1989	27,363	153,956	1,018,517	5.63	7,192	9,426	1.31	34,554	163,382	4.73
1990	27,989	154,663	1,123,631	5.53	7,265	9,119	1.26	35,253	163,782	4.65
1991	30,198	159,391	1,349,654	5.28	7,232	8,857	1.22	37,430	168,248	4.50
1992	27,478	153,734	1,590,288	5.59	5,969	7,584	1.27	33,446	161,318	4.82
1993	25,400	151,959	1,691,061	5.98	4,561	6,127	1.34	29,960	158,086	5.28
1994	24,337	151,435	1,824,897	6.22	2,175	4,082	1.88	26,512	155,518	5.87
1995	24,632	150,485	1,975,893	6.11	1,593	2,913	1.83	26,225	153,399	5.85
1996	23,895	146,916	2,237,559	6.15	1,528	2,309	1.51	25,423	149,225	5.87
1997	23,157	143,347	2,499,224	6.19	1,464	1,704	1.16	24,621	145,051	5.89
1998	28,324	157,348	2,865,357	5.56	1,601	1,756	1.10	29,924	159,104	5.32
1999	31,627	157,899	2,703,058	4.99	1,753	1,612	0.92	33,380	159,510	4.78
2000	32,386	152,276	2,963,581	4.70	1,705	1,519	0.89	34,091	153,795	4.51
2001	32,872	148,909	3,514,806	4.53	1,476	1,270	0.86	34,348	150,179	4.37
2002	32,993	140,692	4,014,356	4.26	1,390	1,160	0.83	34,383	141,852	4.13
2003	33,136	135,677	3,924,244	4.09	1,443	1,138	0.79	34,579	136,815	3.96
2004	32,555	131,171	4,011,878	4.03	1,384	1,134	0.82	33,939	132,305	3.90
Mean	28,404	151,117	2,194,550	5.40	3,714	4,817	1.23	32,118	155,935	4.85

- Changes of species composition in landings

Table 8. Commercially important 10 species' composition in Korean total landing off the Yellow Sea from 1986 to 2004

Year	Small yellow croaker	Spanish mackerel	Anchovy	Chub mackerel	Largehead hairtail	Pacific herring	Sandlance	Acetes	Fleshy prawn	Squids	Total
1986	0.57	0.41	6.15	0.54	11.07	0.00	0.00	2.50	0.21	6.68	28.13
1987	1.46	0.39	7.14	0.89	13.31	0.00	0.00	3.21	0.10	6.70	33.20
1988	1.19	0.21	5.34	1.26	12.18	0.00	0.00	2.09	0.13	5.59	27.98
1989	1.39	0.36	5.11	1.13	12.46	0.00	0.00	4.17	0.20	3.87	28.69
1990	2.41	0.42	5.43	0.42	12.14	0.00	0.00	4.53	0.21	3.85	29.41
1991	4.04	0.27	6.77	0.28	11.31	0.88	0.00	3.48	0.24	3.72	31.01
1992	4.23	0.26	7.94	0.97	10.82	0.00	0.03	4.55	0.29	3.06	32.16
1993	2.73	0.18	10.99	1.97	6.84	0.00	0.03	5.80	0.22	2.24	31.00
1994	4.14	0.23	8.67	2.05	9.95	0.00	0.08	4.11	0.31	2.10	31.65
1995	2.61	0.21	11.00	2.15	7.59	0.00	0.45	4.61	0.42	1.70	30.72
1996	2.81	0.08	17.27	4.33	5.03	0.00	0.36	4.40	0.35	1.68	36.30
1997	2.85	0.13	16.17	0.86	4.34	0.00	0.34	3.99	0.59	2.07	31.34
1998	1.67	0.22	14.68	0.97	4.74	0.00	0.00	4.22	0.35	3.50	30.36
1999	1.70	0.20	19.83	0.92	2.71	0.00	0.00	6.04	0.27	3.07	34.75
2000	2.49	0.29	19.27	1.03	2.72	0.00	4.76	4.24	0.42	1.45	36.67
2001	1.14	0.41	21.75	2.94	2.33	0.00	0.14	3.80	0.18	2.72	35.42
2002	1.38	0.46	24.83	1.31	1.35	0.00	0.98	2.15	0.10	3.14	35.69
2003	1.09	0.46	15.87	0.64	2.17	0.00	0.89	3.77	0.05	2.95	27.90
2004	2.90	0.48	19.70	1.58	4.37	0.00	0.11	2.46	0.33	3.83	35.75
Mean	2.25	0.30	12.84	1.38	7.23	0.05	0.43	3.90	0.26	3.36	32.01

- Survey results by bottom trawl

Table 9. Annual and seasonal species composition by bottom trawl survey in Korean side of the Yellow Sea from 2003 to 2005

Major species	2003								
	Spring			Winter			Total		
	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)
1	*Lophius litulon*	39,415	17.3	*Lateloabrax japonicus*	268,280	38.7	*Lateloabrax japonicus*	268,280	29.1
2	*Hemitripterus villosus*	37,757	16.6	*Sebastes schlegeli*	150,846	21.8	*Sebastes schlegeli*	158,017	17.2
3	*Zoarces gilli*	18,147	8.0	*Loligo beka*	68,000	9.8	*Loligo beka*	69,735	7.6
4	*Gadus macrocephalus*	15,570	6.9	*Liparis tanakai*	25,078	3.6	*Lophius litulon*	56,770	6.2
5	*Hexagrammos otakii*	10,835	4.8	*Oregonia gracilis*	19,195	2.8	*Hemitripterus villosus*	49,888	5.4
6	*Crangon affinis*	9,277	4.1	*Lophius litulon*	17,355	2.5	*Oregonia gracilis*	28,245	3.1
7	*Oregonia gracilis*	9,050	4.0	*Hexagrammos otakii*	16,236	2.3	*Hexagrammos otakii*	27,071	2.9
8	*Collichthys niveatus*	7,652	3.4	*Larimichthys ployactis*	14,690	2.1	*Liparis tanakai*	25,534	2.8
9	*Sebastes schlegeli*	7,171	3.2	*Hemitripterus villosus*	12,131	1.7	*Zoarces gilli*	19,504	2.1
10	*Conger myriaster*	6,513	2.9	*Okamejei kenojei*	11,188	1.6	*Gadus macrocephalus*	18,423	2.0

Major species	2004								
	Spring			Winter			Total		
	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)
1	*Lophius litulon*	148,538	37.6	*Lophius litulon*	171,120	28.9	*Lophius litulon*	319,658	32.4
2	*Hemitripterus villosus*	42,019	10.6	*Collichthys niveatus*	70,170	11.8	*Collichthys niveatus*	73,100	7.4
3	*Sebastes schlegeli*	31,492	8.0	*Liparis tanakai*	58,588	9.9	*Sebastes schlegeli*	65,530	6.6
4	*Hexagrammos otakii*	19,502	4.9	*Loligo beka*	43,515	7.3	*Hemitripterus villosus*	62,189	6.3
5	*Crangon affinis*	19,393	4.9	*Sebastes schlegeli*	34,038	5.7	*Liparis tanakai*	60,881	6.2
6	*Squalus megalops*	17,060	4.3	*Oregonia gracilis*	26,638	4.5	*Loligo beka*	58,296	5.9
7	*Loligo beka*	14,781	3.7	*Cleisthenes pinetorum*	23,945	4.0	*Crangon affinis*	43,202	4.4
8	*Oregonia gracilis*	12,800	3.2	*Crangon affinis*	23,809	4.0	*Oregonia gracilis*	39,438	4.0
9	*Gadus macrocephalus*	12,102	3.1	*Hemitripterus villosus*	20,170	3.4	*Hexagrammos otakii*	30,095	3.0
10	*Cancer spp.*	6,065	1.5	*Larimichthys ployactis*	10,593	1.8	*Cleisthenes pinetorum*	26,319	2.7

Major species	2005								
	Spring			Winter			Total		
	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)	Species	Catch(g)	Ratio(W,%)
1	*Lophius litulon*	109,665	18.4	*Lophius litulon*	127,919	31.6	*Lophius litulon*	237,584	23.7
2	*Crangon affinis*	86,045	14.4	*Crangon affinis*	29,072	7.2	*Crangon affinis*	115,117	11.5
3	*Sebastes schlegeli*	43,095	7.2	*Paralichthys olivaceus*	26,939	6.7	*Collichthys niveatus*	51,112	5.1
4	*Gadus macrocephalus*	39,100	6.6	*Loligo beka*	24,158	6.0	*Gadus macrocephalus*	48,576	4.9
5	*Squalus megalops*	34,570	5.8	*Collichthys niveatus*	21,990	5.4	*Oregonia gracilis*	46,497	4.6
6	*Ammodytes personatus*	31,052	5.1	*Oregonia gracilis*	21,277	5.3	*Sebastes schlegeli*	43,679	4.4
7	*Collichthys niveatus*	29,122	4.9	*Cleisthenes pinetorum*	16,519	4.1	*Loligo beka*	37,564	3.8
8	*Oregonia gracilis*	25,220	4.2	*Liparis tanakai*	13,735	3.4	*Hemitripterus villosus*	35,803	3.6
9	*Hemitripterus villosus*	22,847	3.8	*Hemitripterus villosus*	12,956	3.2	*Squalus megalops*	34,570	3.5
10	*Engraulis japonicus*	17,994	3.0	*Gadus macrocephalus*	9,476	2.3	*Ammodytes personatus*	33,340	3.3

Table 10. Annual and seasonal density distribution of species by bottom trawl survey in Korean side of the Yellow Sea from 2003 to 2005

Major Species	2003							
	Spring			Winter			Total	
	Mean	Range	Occurrence	Mean	Range	Occurrence	Mean	Range
Lateloabrax japonicus	-	-	-	452.0	~14,34.0	1/10	226.4	~14,340
Sebastes schlegeli	12.1	4.6~54.4	5/10	254.2	7.5~2,603.3	6/10	133.3	4.6~2,603.3
Loligo beka	2.9	0.9~11.3	6/10	114.6	0.4~527.7	6/10	58.8	0.4~255.8
Lophius litulon	66.6	43.1~244.2	6/10	42.3	6.2~214.4	7/10	47.9	6.2~244.2
Hemitripterus villosus	63.8	2.4~336.0	5/10	20.4	15.7~88.2	6/10	42.1	2.4~336.0
Oregonia gracilis	30.7	1.5~255.8	8/10	32.3	1.3~183.3	9/10	23.8	1.3~255.8
Liparis tanakai	0.8	0.1~4.7	7/10	42.3	6.2~214.4	7/10	22.8	0.1~214.4
Zoarces gilli	30.7	1.5~255.8	5/10	2.3	0.4~7.1	9/10	21.5	0.4~255.8
Gadus macrocephalus	26.3	2.7~154.1	5/10	4.8	1.6~27.8	5/10	16.5	1.6~154.1
Larimichthys ployactis	2.6	1.3~14.8	5/10	24.8	2.5~135.3	5/10	15.5	1.3~135.3

Major Species	2004							
	Spring			Winter			Total	
	Mean	Range	Occurrence	Mean	Range	Occurrence	Mean	Range
Lophius litulon	155.1	21.7~694.8	16/17	159.2	8.7~693.7	14/17	157.3	8.7~694.8
Collichthys niveatus	3.1	0.5~36.4	7/17	65.3	0.5~997.8	13/17	36.0	0.5~997.8
Sebastes schlegeli	32.9	8.7~140.0	11/17	31.7	1.1~515.4	6/17	32.2	1.1~515.4
Hemitripterus villosus	43.9	4.8~276.7	14/17	18.8	1.7~130.6	9/17	30.6	1.7~276.7
Liparis tanakai	2.4	0.1~11.6	13/17	54.5	12.0~328.6	12/17	30.0	0.1~328.6
Loligo beka	15.4	0.3~173.5	15/17	40.5	0.1~278.1	11/17	28.7	0.1~278.1
Crangon affinis	20.3	0.2~162.3	16/17	22.1	0.8~126.3	17/17	21.3	0.2~162.3
Oregonia gracilis	13.4	1.5~68.8	12/17	24.8	0.4~110.5	17/17	19.4	0.4~110.5
Hexagrammos otakii	20.4	1.4~87.8	9/17	9.9	2.1~117.6	6/17	14.8	1.4~117.6
Cleisthenes pinetorum	2.5	1.5~16.0	6/17	22.3	0.9~167.2	12/17	12.9	0.9~167.2

Major Species	2005							
	Spring			Winter			Total	
	Mean	Range	Occurrence	Mean	Range	Occurrence	Mean	Range
Lophius litulon	121.1	9.3~432.9	14/17	148.4	3.7~988.1	12/16	134.4	3.7~988.1
Crangon affinis	95.0	1.1~360.6	17/17	33.7	1.0~181.0	16/16	65.1	1.0~360.6
Collichthys niveatus	32.1	0.1~304.8	9/17	25.5	0.2~140.6	12/16	28.9	0.1~304.8
Gadus macrocephalus	43.2	3.3~198.6	8/17	11.0	2.1~64.0	6/16	27.5	2.1~198.6
Oregonia gracilis	27.8	0.3~128.9	17/17	24.7	0.3~100.3	14/16	26.3	0.3~128.9
Sebastes schlegeli	47.6	10.5~513.5	14/17	0.7	1.4~6.3	3/16	24.7	1.4~513.5
Loligo beka	14.8	0.1~58.4	16/17	28.0	0.2~223.7	13/16	21.3	0.1~223.7
Hemitripterus villosus	25.2	0.0~149.0	13/17	15.0	0.0~59.8	9/16	20.3	0.0~149.0
Aqualus brevirostris	38.2	37.3~537.8	2/18	-	-	-	19.6	37.3~537.8
Ammodytes personatus	34.3	1.2~642.1	5/19	2.7	2.7~77.7	2/16	18.9	1.2~642.1

Table 11. Seasonal distribution density in number of fish larvae and eggs by icthyo-plankton survey in Korean side of the Yellow Sea from 2003 to 2005

Major Species	2003					
	Larvae			Eggs		
	Mean	Range	Occurrence	Mean	Range	Occurrence
Engraulis japonicus	0.8	7.5	1/10	9.0	100	1/10
Sebastes schelegeli	4.6	4.9~24.0	3/10			
Limanda herzenstein	0.8	7.1	1/17			
unidentified sp.				112.3	1,037	1/10

Major Species	2004					
	Larvae			Eggs		
	Mean	Range	occurrence	Mean	Range	Occurrence
Engraulis japonicus				0.6	0.9~12	4/17
Cleisthenes pinetorum herzensteini	0.1	1.0	1/17			
Sebastes schelegeli	0.4	1.0~2.7	4/17			
unidentified sp.				16.9	5.0~204.7	2/17

Major Species	2005					
	Larvae			Eggs		
	Mean	Range	Occurrence	Mean	Range	Occurrence
Engraulis japonicus	4.9	9.9~37.0	3/17	3.8	26.7~78.6	2/17
Sebastes schelegeli	1.0	1.5~8.2	6/17			
Sebastes vulpes	0.2	6.6	1/17			
Liparis Sp.	0.2	2.6	1/17			
Limanda herzenstein	0.4	8.6	1/17			
Lophius litulon	0.1	3.3	1/17			
unidentified sp.	0.1	3.3	1/17	214.4	1.2~4,372	7/17

- Growth parameters for commercially important 10 species

Table 12. Growth parameters for commercially important 10 species

Species		Growth Pattern					References
Common Name	Scientific Name	L_∞ (cm)	k	t_0	$W=aL^b$	Longevity (in year)	
small yellow croaker	*Larimichthys polyactis*	34.7	0.376	-0.609	$0.004298\ TL^{3.227}$	10	NFRDI, 2005
		36.2	0.332	-0.593	$0.0196\ TL^{2.802}$	NA	Hwang and Choi, 1980
Spanish mackerel	*Scomberomorus niphonius*	123.3	0.196	-2.140	$6.577\ FL^{3.002}x10^{-6}$	8	NFRDI, 2005
anchovy	*Engraulis japonicus*	NA	0.38mm/day	0.37	NA	1	Cha, 1990
chub mackerel	*Scomber japonicus*	40.2	0.403	-0.718	$0.0056\ FL^{3.2537}$	6	NFRDI, 2005
		51.7	0.299	-0.428	$0.00044\ FL^{3.332}$	6	Choi et al., 2000
		40.2	0.408	-0.719	$1.756\ FL^{3.342}x10^{-6}$	NA	Ahn, 1971
largehead hairtail	*Trichiurus lepturus*	45.6	0.408	0.440	$0.06321\ AL^{2.5456}$	9	NFRDI, 2005
		50.5	0.162	-1.722	$0.0323\ AL^{2.7826}$	NA	Park et al., 1996
		52.3	0.154	-1.496	NA	NA	Park et al., 2000
Pacific herring	*Clupea pallasii*	NA	NA	NA	NA	NA	-
sandlance	*Ammodytes personatus*	NA	NA	NA	NA	NA	-
acetes	*Acetes chinensis* and *A. japonicus*	F:13.5	0.69	0	$0.004\ TL^{3.1692}$	NA	Oh and Jeong, 2002
		M:10.4	0.84	0	$0.007\ TL^{2.9407}$		
fleshy prown	*Fenneropenaeus chinensis*	F: 20.1	0.018	25 days	$0.0000111\ BL^{3.002}$	360 days	NFRDI, 2005
		M: 16.4	0.017	9 days			
common squids	*Todarodes pacificus*	27.4~31.4	0.147~0.189	NA	$0.0091\ ML^{3.2472}$	1	NFRDI, 2005

NA represents No data Available.

- Biological data

Table 13. Reproduction and spawning characteristics of commercially important 10 species

Species		Reproduction				References
Common Name	Scientific Name	Fecundity (× 10,000)	Optimum temp. (℃)	Min. length at maturity (cm)	Season	
small yellow croaker	*Larimichthys polyactis*	3~10	12~14	19.1	Apr.~Jun	NFRDI, 2005
Spanish mackerel	*Scomberomorus niphonius*	50~90	16~18	78	Apr.~Jun	NFRDI, 2005
		NA	16~21	NA	late June.~late Aug.	Hwang et al., 1977
anchovy	*Engraulis japonicus*	2.3~31.5	15~20	NA	Mar.~Aug. Mar.~Oct. Mar.~Aug.	Kim and Kang, 1992 Lim et al., 1970 Choi and Kim, 1988 Cha, 1990
chub mackerel	*Scomber japonicus*	30~140	17~18	27.0(FL)	Jan.~Mar.	NFRDI, 2005
		11~57	NA	28.7(FL)	Mar.~Jun.	Cha et al., 2002
largehead hairtail	*Trichiurus lepturus*	2~8.5	18~20	25.7(AL)	May~Aug. (Jul.)	NFRDI, 2005
		1.5~23	NA	22.5(AL)	May~Sep. (Jun)	Park et al., 1998
		NA	NA	25.6(AL)	May~Sep.	Cha et al., 2004
Pacific herring	*Clupea pallasii*	NA	NA	NA	NA	-
sandlance	*Ammodytes personatus*	NA	NA	NA	NA	-
acetes	*Acetes chinensis* and *A. japonicus*	NA	18	4.08(TL)	Jun.~Sep.(Jul.~Sep.)	Oh and Jeong, 2002
fleshy prown	*Fenneropenaeus chinensis*	20~120	16	F: 19.6(BL) M: 14.8(BL)	Apr.~Jun. (May)	NFRDI, 2005
common squids	*Todarodes pacificus*	30~50	10~21	20(ML)	Winter : Jan.~Mar. Summer : Jun.~Aug. Autumn : Sep.~Nov.	NFRDI, 2005

NA represents No data Available.

11.2.2 Collected data and information on Socio-economic

- Fishing vessels by fishery

Table 14. Number and gross tonnage of fishing vessels and tons by fishery from 2000 to 2004

(unit: vessels, ton)

		2000	2001	2002	2003	2004
Total	Number	95,890	94,935	94,388	93,257	91,608
	Power Vessel	89,294	89,347	89,327	88,521	87,203
	Non-power Vessel	6,596	5,588	5,061	4,736	4,405
	GT	923,099	884,853	816,563	754,439	724,980
	Power Vessel	917,963	880,467	812,629	750,763	721,398
	Non-power Vessel	5,136	4,386	3,934	3,676	3,582
Distant Waters Fisheries	Number	597	568	543	517	491
	GT	349,420	335,552	318,855	273,086	261,237
Off-shore, Coastal Fisheries	Number	68,629	67,990	67,411	66,698	66,063
	GT	397,868	386,181	362,163	344,992	330,203

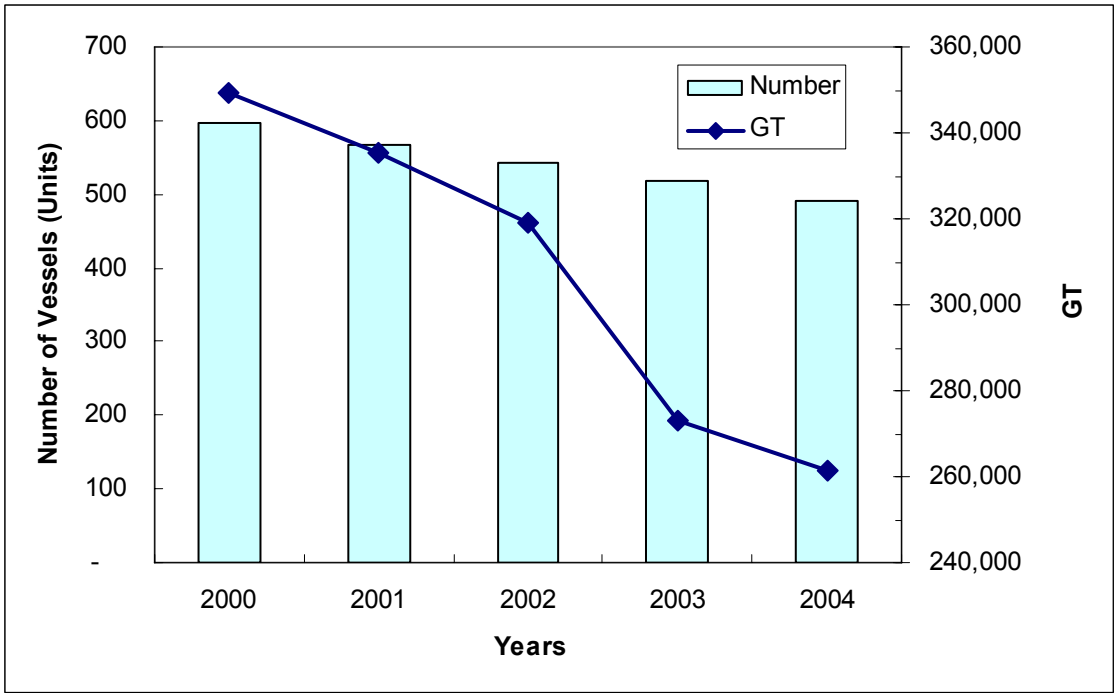


Figure 22. Fluctuation of fishing vessel number and GT in the distance water fisheries.

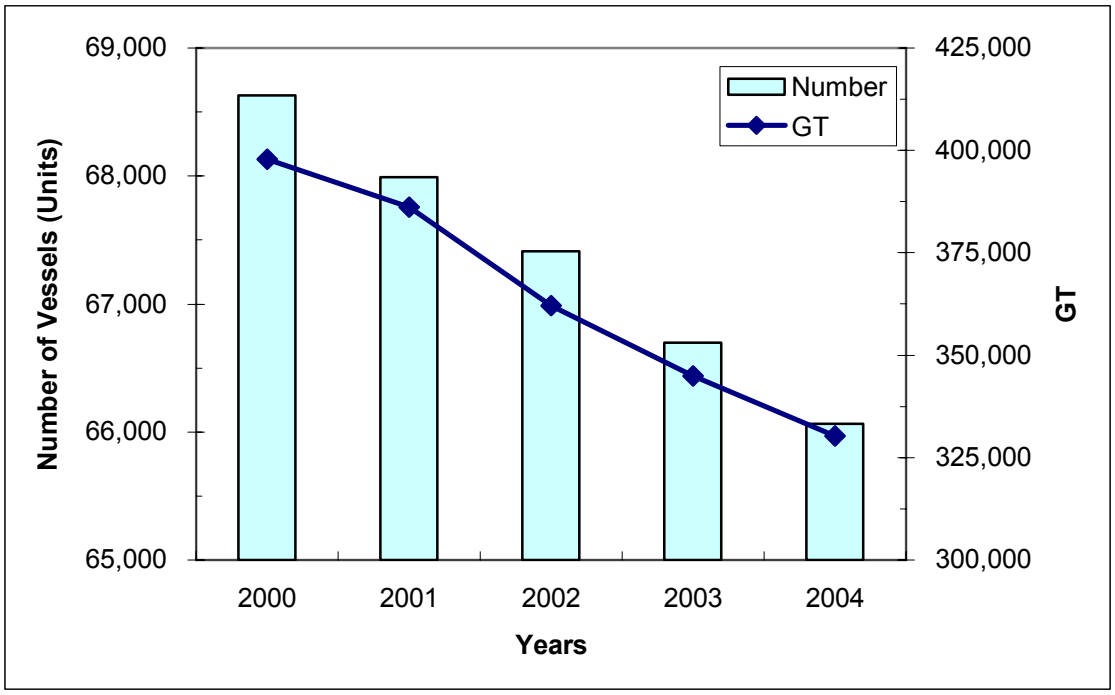


Figure 23. Fluctuation of fishing vessel number and GT in the off shore coastal fisheries.

- Vessels by province

Table 15. Total vessels and tons by provinces from 2000 to 2004

(unit: vessels, ton)

		2000	2001	2002	2003	2004
Incheon	Number	2,357	2,369	2,396	2,450	2,386
	GT	45,399	43,922	41,459	40,349	37,800
Gyeonggi	Number	2,202	2,196	2,209	2,335	2,336
	GT	3,440	3,489	3,819	4,301	4,648
Chungnam	Number	6,643	6,695	6,620	6,585	6,517
	GT	19,666	21,161	21,808	22,006	22,231
Jeonbuk	Number	4,979	4,936	4,844	4,792	4,652
	GT	27,772	26,164	20,268	18,504	16,803
Jeonnam	Number	35,820	36,303	36,628	36,834	36,095
	GT	115,036	110,884	108,997	103,309	101,646

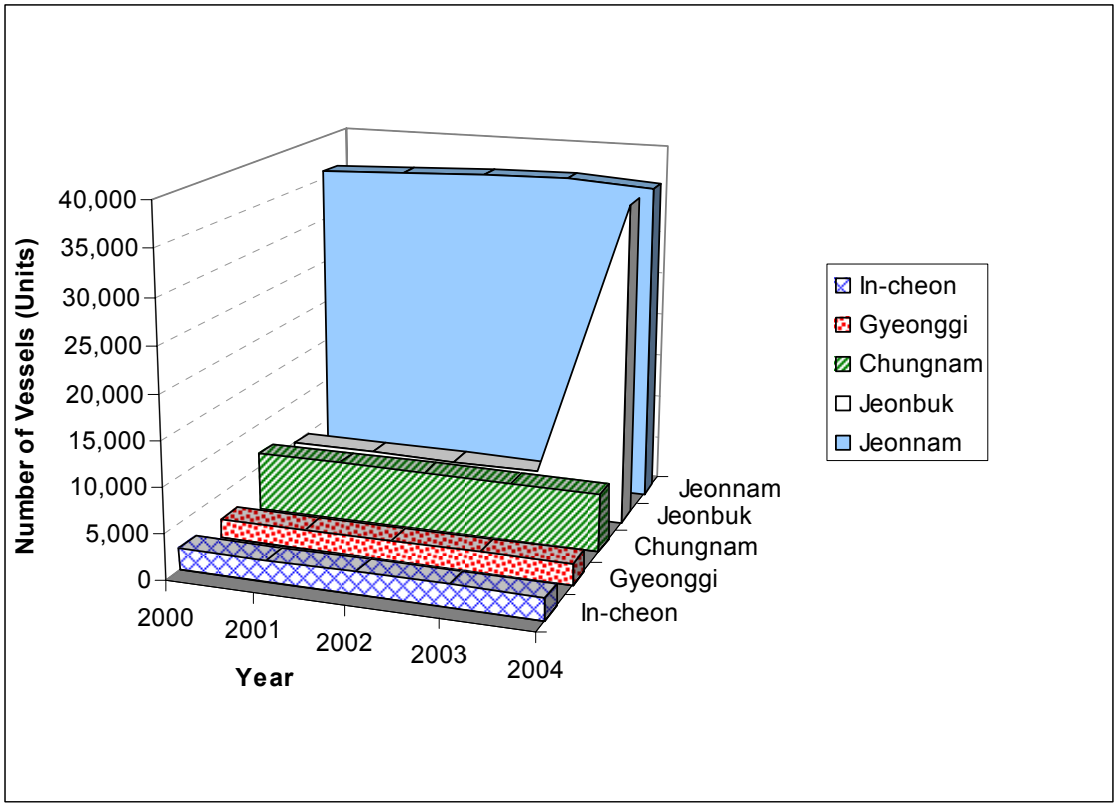


Figure 24. Distribution of fishing vessel number in the Yellow Sea areas of Korean provinces.

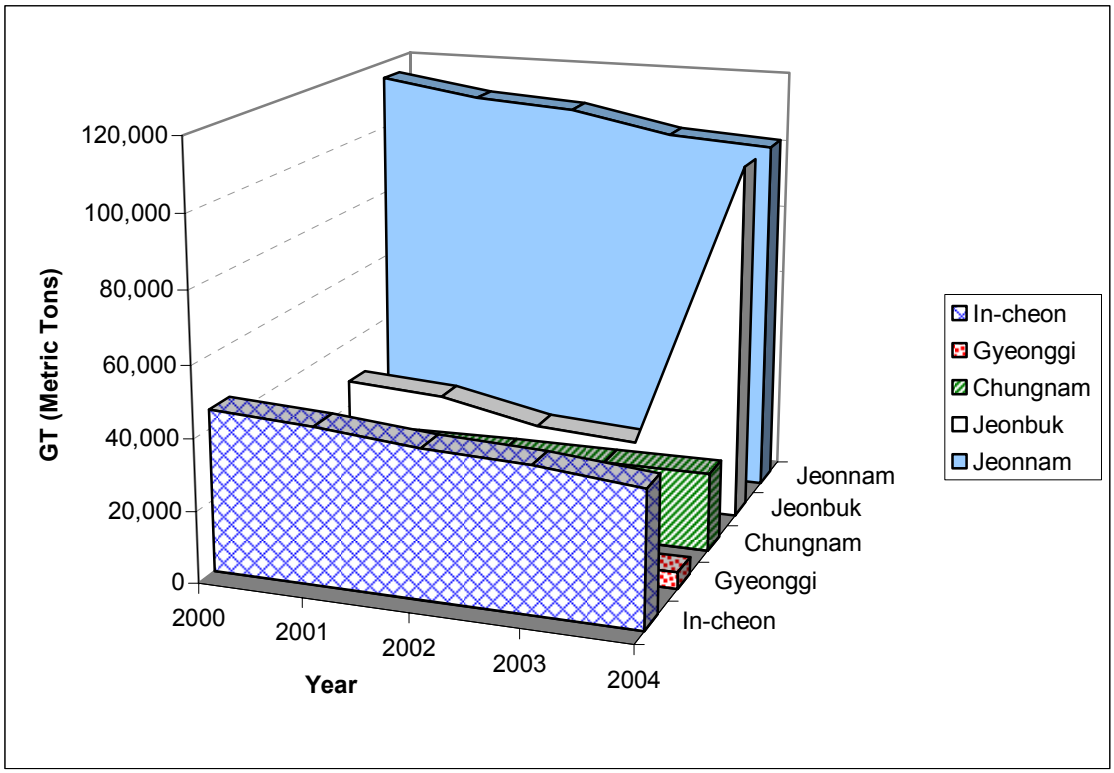


Figure 25. Distribution of GTs in the Yellow Sea areas of Korean provinces.

- Number of fishermen by province

Table 16. Number of fishermen by provinces from 2000 to 2004

(unit: 1,000 persons)

		2000	2001	2002	2003	2004
No. of Persons whole country		140	137	128	125	122
Province	Incheon	5	5	4	4	3
	Gyeonggi	3	3	3	3	3
	Chungnam	17	17	17	17	16
	Jeonbuk	8	9	7	7	7
	Jeonnam	52	51	46	45	45

Source: National Statistical Office, 「Basic Statical Research in Korean Fisheries」

- Fisheries income

Table 17. Fisheries incomes from 2000 to 2004 (unit: 1,000 won)

	2000	2001	2002	2003	2004
Fisheries Income	10,078	11,087	10,165	10,741	11,959

- Fisheries consumption per capita (kg)

Table 18. Fisheries consumption per capita from 2000 to 2004 (unit: kg/year)

	2000	2001	2002	2003	2004
Total	36.8	42.9	44.5	44.7	NA

NA: No data Available.

- Exports and imports of fishery products

Table 19. The exports and imports of fishery products form 2000 to 2004 (unit: 1,000$)

	2000	2001	2002	2003	2004
Exports	1,504,470	1,273,619	1,160,435	1,129,385	1,278,638
Imports	1,410,598	1,648,372	1,884,417	1,961,145	2,261,356

- Economic importance of fisheries (GDP Contribution)

Table 20. The GDP contribution of fishery products form 2000 to 2004 (unit: thousand million won, %)

	2000	2001	2002	2003	2004
GDP	578,664	600,866	642,748	662,655	693,424
Fisheries	2,155	2,164	2,000	2,006	1,966
GDP Contribution	0.4	0.4	0.3	0.3	0.3

Source: The Bank of Korea, Economy Statics System

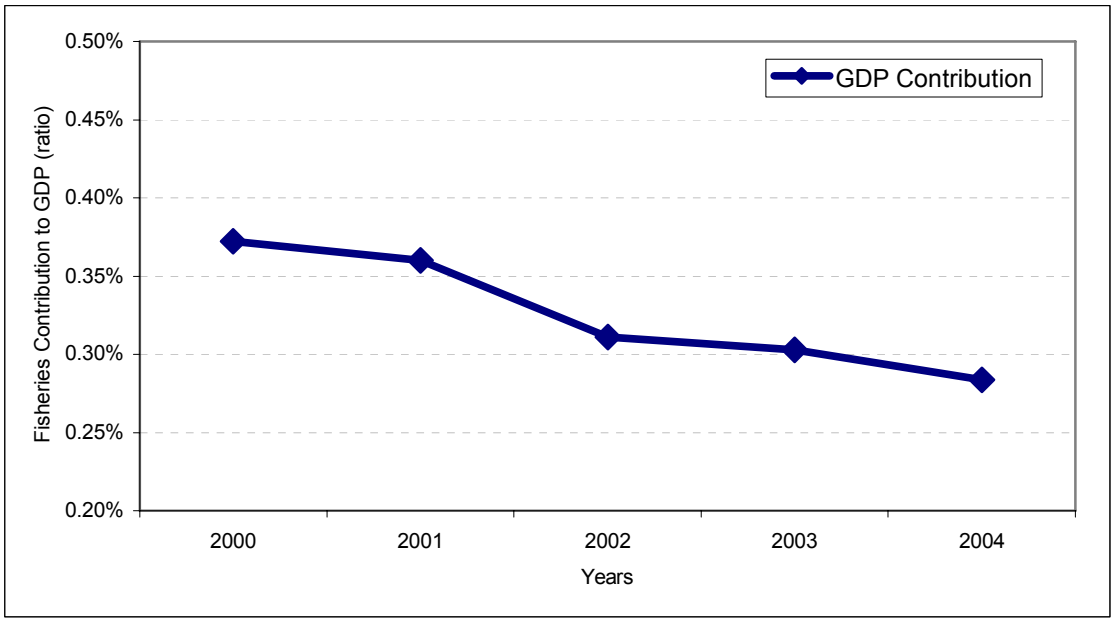


Figure 26. Variation of fisheries GDP contribution to total GDP of Korea.

11.2.3 Collected data and information on mariculture

- Annual total production of marine farmed organisms from 1995 to 2004

Table 21. Total production of marine farmed organisms in 1995

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	96		1	3	280.3	380.3
	Lateolabrax spp.		9	30	-	3.0	42.0
	Epinephelus septemfasciatus					0.3	0.3
	Acanthopagrus schlegelii					2.3	2.3
	Oplegnathus fasciatus			2		-	2.0
	Pagrus major					0.3	0.3
	Other sea breams				-	0.5	0.5
	Miichthys miiuy					-	-
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					2.8	2.8
	Takifugu spp.					-	-
	Sebastes schlegeli	3		66	-	42.8	111.8
	Other rock fishes			132	4	0.3	136.3
	Muguil spp.		23		-	2.8	25.8
	Pleurogrammus azonus			14		-	14.0
	Konosirus punctatus				-	-	-
	Stephanolepis sp.,*Thamnaconus* sp.					-	-
	Other finfishes					-	-
	subtotal	99	32	245	7	335.0	718.0
Crustaceans	*Fenneropenaeus chinensis*	24	24	289	1	14.8	352.8
	Marsupenaeus japonicus			25		0.3	25.3
	subtotal	24	24	314	1	15.1	378.1
Shellfish	*Crassostrea gigas*	2,809		9,315		5,128.3	17,252.3
	Rapana venosa					-	-
	Haliotis discus hannai	6		44	1	2.5	53.5
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis				-	16.3	16.3
	Mactra chinensis					-	-
	Scapharca subcrenata	6			-	2,917.3	2,923.3
	Solen spp.				-	1,792.3	1,792.3
	Ruditapes philippinarum			5,992	99	1,238.5	7,329.5
	Meretrix lusoria				39	-	39.0
	Atrina pectinata					-	-
	Scapharca broughtonii					93.3	93.3
	Mactra veneriformis				476		476.0
	Mytilus spp.					7,301.8	7,301.8
	Other shellfish				4	-	4.0
	subtotal	2,821	-	15,351	619	18,490.1	37,281.1
Seaweeds	*Porphyra* spp.	1,307	1,136	14,035	16,132	35,147.5	67,757.5
	Laminaria japonica					5,733.8	5,733.8
	Undaria pinnatifida					93,658.3	93,658.3
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					9,419.8	9,419.8
	Enteromorpha spp.					817.3	817.3
	Other seaweed					-	-
	subtotal	1,307	1,136	14,035	16,132	144,776.5	177,386.5
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-			-	-
total(mt)		4,251	1,192	29,945	16,759	163,616.7	215,763.7

Table 22. Total production of marine farmed organisms in 1996

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	106		117	-	604.0	827.0
	Lateolabrax spp.		6		-	4.3	10.3
	Epinephelus septemfasciatus			2		-	2.0
	Acanthopagrus schlegelii					0.5	0.5
	Oplegnathus fasciatus			1		-	1.0
	Pagrus major					-	-
	Other sea breams				-	-	-
	Miichthys miiuy					-	-
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					0.3	0.3
	Takifugu spp.					-	-
	Sebastes schlegeli	1		341	-	39.0	381.0
	Other rock fishes			7	-	4.0	11.0
	Muguil spp.		9		-	4.5	13.5
	Pleurogrammus azonus			19		-	19.0
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					-	-
	Other finfishes					-	-
	subtotal	107	15	487	-	656.5	1,265.5
Crustaceans	*Fenneropenaeus chinensis*	139	54	133	-	12.8	338.8
	Marsupenaeus japonicus					1.3	1.3
	subtotal	139	54	133	-	14.1	340.1
Shellfish	*Crassostrea gigas*			8,865		4,844.3	13,709.3
	Rapana venosa					-	-
	Haliotis discus hannai	2		21	-	1.5	24.5
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis				-	6.8	6.8
	Mactra chinensis					-	-
	Scapharca subcrenata				-	741.5	741.5
	Solen spp.				-	1,710.8	1,710.8
	Ruditapes philippinarum			7,624	92	1,038.5	8,754.5
	Meretrix lusoria				17	-	17.0
	Atrina pectinata					-	-
	Scapharca broughtonii					65.0	65.0
	Mactra veneriformis				178		178.0
	Mytilus spp.					9,840.3	9,840.3
	Other shellfish				-	-	-
	subtotal	2	-	16,510	287	18,248.6	35,047.6
Seaweeds	*Porphyra* spp.	1,270		9,612	9,764	34,422.3	55,068.3
	Laminaria japonica					8,066.0	8,066.0
	Undaria pinnatifida					73,614.0	73,614.0
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					5,763.5	5,763.5
	Enteromorpha spp.					628.3	628.3
	Other seaweed					1.0	1.0
	subtotal	1,270	-	9,612	9,764	122,495.0	143,141.0
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-			-	-
total(mt)		1,518	69	26,742	10,051	141,414.2	179,794.2

Table 23. Total production of marine farmed organisms in 1997

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	108		138	-	2,428.3	2,674.3
	Lateolabrax spp.		1		-	13.8	14.8
	Epinephelus septemfasciatus					0.5	0.5
	Acanthopagrus schlegelii			10		-	10.0
	Oplegnathus fasciatus			9		-	9.0
	Pagrus major					4.8	4.8
	Other sea breams				-	-	-
	Miichthys miiuy					-	-
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					0.8	0.8
	Takifugu spp.					-	-
	Sebastes schlegeli	1	201	789	-	773.5	1,764.5
	Other rock fishes				-	1.8	1.8
	Muguil spp.		8		-	43.0	51.0
	Pleurogrammus azonus			2		-	2.0
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					-	-
	Other finfishes			3		-	3.0
	subtotal	109	210	951	-	3,266.3	4,536.3
Crustaceans	*Fenneropenaeus chinensis*	600	430	324	107	18.0	1,479.0
	Marsupenaeus japonicus					-	-
	subtotal	600	430	324	107	18.0	1,479.0
Shellfish	*Crassostrea gigas*			5,031		5,494.3	10,525.3
	Rapana venosa					-	-
	Haliotis discus hannai	4		1	1	0.3	6.3
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis				-	-	-
	Mactra chinensis					-	-
	Scapharca subcrenata				-	384.5	384.5
	Solen spp.				-	1,645.0	1,645.0
	Ruditapes philippinarum			7,703	-	739.8	8,442.8
	Meretrix lusoria				-	-	-
	Atrina pectinata				-	-	-
	Scapharca broughtonii					15.3	15.3
	Mactra veneriformis						-
	Mytilus spp.					8,853.0	8,853.0
	Other shellfish				-	-	-
	subtotal	4	-	12,735	1	17,132.0	29,872.0
Seaweeds	*Porphyra* spp.	446	129	9,964	9,999	27,043.5	47,581.5
	Laminaria japonica					7,762.0	7,762.0
	Undaria pinnatifida					105,898.5	105,898.5
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					8,617.5	8,617.5
	Enteromorpha spp.					882.3	882.3
	Other seaweed					-	-
	subtotal	446	129	9,964	9,999	150,203.8	170,741.8
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus	-	-	-	-	-	-
	subtotal	-	-	-	-	-	-
total(mt)		1,159	769	23,974	10,107	170,620.0	206,629.0

Table 24. Total production of marine farmed organisms in 1998

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	10		55	-	1,763.8	1,828.8
	Lateolabrax spp.				-	38.5	38.5
	Epinephelus septemfasciatus					-	-
	Acanthopagrus schlegelii			36		0.5	36.5
	Oplegnathus fasciatus			19		-	19.0
	Pagrus major					3.3	3.3
	Other sea breams				-	10.3	10.3
	Miichthys miiuy					-	-
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					0.3	0.3
	Takifugu spp.					-	-
	Sebastes schlegeli			989	-	1,348.0	2,337.0
	Other rock fishes				-	7.8	7.8
	Muguil spp.		9	37	-	6.8	52.8
	Pleurogrammus azonus					-	-
	Konosirus punctatus				-	-	-
	Stephanolepis sp. *Thamnaconus* sp.					-	-
	Other finfishes			3		-	3.0
	subtotal	10	9	1,139	-	3,179.0	4,337.0
Crustaceans	*Fenneropenaeus chinensis*	92	322	288	-	35.3	737.3
	Marsupenaeus japonicus						-
	subtotal	92	322	288	-	35.3	737.3
Shellfish	*Crassostrea gigas*	9		6,510		2,281.8	8,800.8
	Rapana venosa					-	-
	Haliotis discus hannai				-	0.3	0.3
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis			24	9	-	33.0
	Mactra chinensis					-	-
	Scapharca subcrenata				-	1,086.0	1,086.0
	Solen spp.				13	13.8	26.8
	Ruditapes philippinarum			7,022	4,616	795.8	12,433.8
	Meretrix lusoria				-	-	-
	Atrina pectinata					47.5	47.5
	Scapharca broughtonii					0.5	0.5
	Mactra veneriformis						-
	Mytilus spp.					1,438.3	1,438.3
	Other shellfish				-	-	-
	subtotal	9	-	13,556	4,638	5,663.8	23,866.8
Seaweeds	*Porphyra* spp.	1,080	826	13,949	16,465	38,244.8	70,564.8
	Laminaria japonica					1,644.8	1,644.8
	Undaria pinnatifida					53,739.0	53,739.0
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					6,245.3	6,245.3
	Enteromorpha spp.					1,053.8	1,053.8
	Other seaweed					488.0	488.0
	subtotal	1,080	826	13,949	16,465	101,415.5	133,735.5
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus			5		-	5.0
	subtotal	-	-	5	-	-	5.0
total(mt)		1,191	1,157	28,937	21,103	110,293.6	162,681.6

Table 25. Total production of marine farmed organisms in 1999

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	153		67	-	1,305.5	1,525.5
	Lateolabrax spp.				-	22.5	22.5
	Epinephelus septemfasciatus					1.0	1.0
	Acanthopagrus schlegelii			62		3.8	65.8
	Oplegnathus fasciatus			106		-	106.0
	Pagrus major					17.0	17.0
	Other sea breams				-	8.0	8.0
	Miichthys miiuy					0.8	0.8
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					0.5	0.5
	Takifugu spp.					3.8	3.8
	Sebastes schlegeli			798	-	802.3	1,600.3
	Other rock fishes				-	148.5	148.5
	Muguil spp.			24	-	48.3	72.3
	Pleurogrammus azonus					-	-
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					0.8	0.8
	Other finfishes					-	-
	subtotal	153	-	1,057	-	2,362.5	3,572.5
Crustaceans	*Fenneropenaeus chinensis*	182	226	433	8	66.5	915.5
	Marsupenaeus japonicus					-	-
	subtotal	182	226	433	8	66.5	915.5
Shellfish	*Crassostrea gigas*			8,552		3,645.0	12,197.0
	Rapana venosa					-	-
	Haliotis discus hannai				-	-	-
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis			3	-	-	3.0
	Mactra chinensis					-	-
	Scapharca subcrenata				-	362.5	362.5
	Solen spp.				-	-	-
	Ruditapes philippinarum			6,664	4,175	665.5	11,504.5
	Meretrix lusoria				-	-	-
	Atrina pectinata					276.0	276.0
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					1,886.8	1,886.8
	Other shellfish				-	2.5	2.5
	subtotal	-	-	15,219	4,175	6,838.3	26,232.3
Seaweeds	*Porphyra* spp.	967	1,398	9,082	19,250	40,314.3	71,011.3
	Laminaria japonica					5,315.5	5,315.5
	Undaria pinnatifida			15		45,972.5	45,987.5
	Gelidium amansii					4.0	4.0
	Gigartina spp.					0.5	0.5
	Codium fragile					-	-
	Hizikia fusiforme					5,665.8	5,665.8
	Enteromorpha spp.					1,201.5	1,201.5
	Other seaweed					48.3	48.3
	subtotal	967	1,398	9,097	19,250	98,522.3	129,234.3
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus			2		-	2.0
	subtotal	-	-	2	-	-	2.0
total(mt)		1,302	1,624	25,808	23,433	107,789.6	159,956.6

Table 26. Total production of marine farmed organisms in 2000

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	124		14	-	728.8	866.8
	Lateolabrax spp.			2	-	32.8	34.8
	Epinephelus septemfasciatus					0.3	0.3
	Acanthopagrus schlegelii			55		22.5	77.5
	Oplegnathus fasciatus			87		-	87.0
	Pagrus major					16.0	16.0
	Other sea breams				-	13.5	13.5
	Miichthys miiuy			10		1.8	11.8
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					5.8	5.8
	Takifugu spp.					-	-
	Sebastes schlegeli			524	-	511.5	1,035.5
	Other rock fishes				-	22.3	22.3
	Muguil spp.	78		28	86	77.5	269.5
	Pleurogrammus azonus					-	-
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					1.8	1.8
	Other finfishes					-	-
	subtotal	202	-	720	86	1,434.3	2,442.3
Crustaceans	*Fenneropenaeus chinensis*	154	251	553	-	49.0	853.0
	Marsupenaeus japonicus					-	-
	subtotal	154	251	553	-	49.0	853.0
Shellfish	*Crassostrea gigas*	390		9,224		2,522.0	12,136.0
	Rapana venosa					2.3	2.3
	Haliotis discus hannai			1	-	1.8	2.8
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis			46	-	-	46.0
	Mactra chinensis					-	-
	Scapharca subcrenata				-	165.5	165.5
	Solen spp.				-	0.5	0.5
	Ruditapes philippinarum	56		8,538	3,490	854.5	12,938.5
	Meretrix lusoria				-	-	-
	Atrina pectinata					499.5	499.5
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					1,200.0	1,200.0
	Other shellfish				3	0.5	3.5
	subtotal	446	-	17,809	3,493	5,246.5	26,994.5
Seaweeds	*Porphyra* spp.	637	550	5,306	17,125	23,113.8	46,094.8
	Laminaria japonica					3,322.5	3,322.5
	Undaria pinnatifida			5		45,402.5	45,407.5
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					2,912.3	2,912.3
	Enteromorpha spp.					1,050.8	1,050.8
	Other seaweed					68.3	68.3
	subtotal	637	550	5,311	17,125	75,870.0	98,856.0
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus			1		-	1.0
	subtotal	-	-	1		-	1.0
total(mt)		1,439	801	24,394	20,704	82,599.8	129,146.8

Table 27. Total production of marine farmed organisms in 2001

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	167		1	-	1,448.0	1,616.0
	Lateolabrax spp.	2			1	71.0	74.0
	Epinephelus septemfasciatus					3.3	3.3
	Acanthopagrus schlegelii			112		19.0	131.0
	Oplegnathus fasciatus			13		-	13.0
	Pagrus major					28.0	28.0
	Other sea breams				-	2.5	2.5
	Miichthys miiuy					4.3	4.3
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata			3		0.3	3.3
	Takifugu spp.					-	-
	Sebastes schlegeli			482	-	819.8	1,301.8
	Other rock fishes				-	11.5	11.5
	Muguil spp.	93	30	64	4	26.5	124.5
	Pleurogrammus azonus					0.8	0.8
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					0.8	0.8
	Other finfishes			6		-	6.0
	subtotal	262	30	681	5	2,435.5	3,320.5
Crustaceans	*Fenneropenaeus chinensis*	154	280	659	30	239.5	1,208.5
	Marsupenaeus japonicus					-	-
	subtotal	154	280	659	30	239.5	1,208.5
Shellfish	*Crassostrea gigas*	221		8,344		2,051.3	10,616.3
	Rapana venosa					-	-
	Haliotis discus hannai				-	5.0	5.0
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis			25	-	-	25.0
	Mactra chinensis					1.5	1.5
	Scapharca subcrenata				-	932.5	932.5
	Solen spp.				-	-	-
	Ruditapes philippinarum	45		11,449	2,909	250.3	14,653.3
	Meretrix lusoria				-	-	-
	Atrina pectinata					309.0	309.0
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					1,866.0	1,866.0
	Other shellfish				-	-	-
	subtotal	266	-	19,818	2,909	5,415.5	28,408.5
Seaweeds	*Porphyra* spp.	186	571	7,767	18,775	30,937.3	58,050.3
	Laminaria japonica					3,676.5	3,676.5
	Undaria pinnatifida			484		36,620.5	37,104.5
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					1,716.3	1,716.3
	Enteromorpha spp.					1,199.5	1,199.5
	Other seaweed					0.3	0.3
	subtotal	186	571	8,251	18,775	74,150.3	101,747.3
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-			-	-
total(mt)		868	881	29,409	21,719	82,240.8	134,684.8

Table 28. Total production of marine farmed organisms in 2002

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	185			-	1,826.0	2,011.0
	Lateolabrax spp.			71	2	121.0	194.0
	Epinephelus septemfasciatus					7.8	7.8
	Acanthopagrus schlegelii			374		18.3	392.3
	Oplegnathus fasciatus			60		-	60.0
	Pagrus major					26.0	26.0
	Other sea breams				-	5.3	5.3
	Miichthys miiuy					1.0	1.0
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					6.8	6.8
	Takifugu spp.					0.5	0.5
	Sebastes schlegeli			768	4	1,579.0	2,351.0
	Other rock fishes				-	2.5	2.5
	Muguil spp.	24	44	271	225	271.0	835.0
	Pleurogrammus azonus					-	-
	Konosirus punctatus				-	-	-
	Stephanolepis sp.; *Thamnaconus* sp.					-	-
	Other finfishes			32		-	32.0
	subtotal	209	44	1,576	231	3,865.0	5,925.0
Crustaceans	*Fenneropenaeus chinensis*	68	38	961	-	83.0	1,150.0
	Marsupenaeus japonicus					-	-
	subtotal	68	38	961	-	83.0	1,150.0
Shellfish	*Crassostrea gigas*	534		10,458		2,659.8	13,651.8
	Rapana venosa					-	-
	Haliotis discus hannai				-	14.8	14.8
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis	189		30	-	-	219.0
	Mactra chinensis					-	-
	Scapharca subcrenata				-	93.5	93.5
	Solen spp.				-	-	-
	Ruditapes philippinarum	288		6,153	3,083	179.0	9,703.0
	Meretrix lusoria				-	1.0	1.0
	Atrina pectinata					144.3	144.3
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					1,676.3	1,676.3
	Other shellfish				-	-	-
	subtotal	1,011	-	16,641	3,083	4,768.6	25,503.6
Seaweeds	*Porphyra* spp.	378	939	5,897	22,519	40,379.0	70,112.0
	Laminaria japonica					5,220.3	5,220.3
	Undaria pinnatifida			127		50,754.5	50,881.5
	Gelidium amansii					1.0	1.0
	Gigartina spp.					-	-
	Codium fragile					18.0	18.0
	Hizikia fusiforme					2,751.0	2,751.0
	Enteromorpha spp.					2,113.3	2,113.3
	Other seaweed					42.8	42.8
	subtotal	378	939	6,024	22,519	101,279.8	131,139.8
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-			-	-
total(mt)		1,666	1,021	25,202	25,833	109,996.3	163,718.3

Table 29. Total production of marine farmed organisms in 2003

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	49			-	2,419.8	2,468.8
	Lateolabrax spp.			45	-	145.5	190.5
	Epinephelus septemfasciatus					0.8	0.8
	Acanthopagrus schlegelii			309		39.0	348.0
	Oplegnathus fasciatus			400		-	400.0
	Pagrus major					26.8	26.8
	Other sea breams				-	14.5	14.5
	Miichthys miiuy					-	-
	Sciaenops ocellatus					-	-
	Seriola quinqueradiata					-	-
	Takifugu spp.					1.0	1.0
	Sebastes schlegeli		15	1,970	3	2,257.8	4,245.8
	Other rock fishes			23	-	4.3	27.3
	Muguil spp.	35	43	743	126	89.8	1,036.8
	Pleurogrammus azonus					-	-
	Konosirus punctatus				-	-	-
	Stephanolepis sp. *Thamnaconus* sp.					-	-
	Other finfishes	1		1		4.3	6.3
	subtotal	85	58	3,491	129	5,003.3	8,766.3
Crustaceans	*Fenneropenaeus chinensis*	76	19	519	59	411.0	1,084.0
	Marsupenaeus japonicus						-
	subtotal	76	19	519	59	411.0	1,084.0
Shellfish	*Crassostrea gigas*	432		7,461		18,505.0	26,398.0
	Rapana venosa					-	-
	Haliotis discus hannai				-	258.8	258.8
	Chlamys farreri nipponensis					-	-
	Cyclina sinensis	8		181	-	-	189.0
	Mactra chinensis					-	-
	Scapharca subcrenata			3	-	549.8	552.8
	Solen spp.				-	0.5	0.5
	Ruditapes philippinarum	544		15,551	9,233	133.5	25,461.5
	Meretrix lusoria			1	-	-	1.0
	Atrina pectinata					195.8	195.8
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					901.3	901.3
	Other shellfish				-	-	-
	subtotal	984	-	23,197	9,233	20,544.6	53,958.6
Seaweeds	*Porphyra* spp.	443	3,843	10,144	16,762	36,525.8	67,717.8
	Laminaria japonica					5,988.5	5,988.5
	Undaria pinnatifida			980		41,557.3	42,537.3
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					-	-
	Hizikia fusiforme					8,412.0	8,412.0
	Enteromorpha spp.					116.3	116.3
	Other seaweed					-	-
	subtotal	443	3,843	11,124	16,762	92,599.8	124,771.8
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-			-	-
total(mt)		1,588	3,920	38,331	26,183	118,558.6	188,580.6

Table 30. Total production of marine farmed organisms in 2004

(unit: M/T)

Kind	species	Province					TOTAL
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	
Finfish	*Paralichthys olivaceus*	65			8	2,243.5	2,316.5
	Lateolabrax spp.			28	7	91.3	126.3
	Epinephelus septemfasciatus				-	2.0	2.0
	Acanthopagrus schlegelii			191	-	31.3	222.3
	Oplegnathus fasciatus			343	-	-	343.0
	Pagrus major				-	29.3	29.3
	Other sea breams				-	73.0	73.0
	Miichthys miiuy				-	-	-
	Sciaenops ocellatus				-	-	-
	Seriola quinqueradiata				-	0.3	0.3
	Takifugu spp.			3		2.3	5.3
	Sebastes schlegeli		54	2,094	7	1,657.8	3,812.8
	Other rock fishes				-	3.0	3.0
	Muguil spp.	26	106	483	271	83.8	969.8
	Pleurogrammus azonus					-	-
	Konosirus punctatus	5			104	18.0	127.0
	Stephanolepis sp.*Thamnaconus* sp.			16		-	16.0
	Other finfishes	3				-	3.0
	subtotal	99	160	3,158	397	4,235.3	8,049.3
Crustaceans	*Fenneropenaeus chinensis*	36	26	637	81	399.0	1,179.0
	Marsupenaeus japonicus					-	-
	subtotal	36	26	637	81	399.0	1,179.0
Shellfish	*Crassostrea gigas*	1,004		9,933		12,542.8	23,479.8
	Rapana venosa					-	-
	Haliotis discus hannai				-	306.5	306.5
	Chlamys farreri nipponensis					0.3	0.3
	Cyclina sinensis			79	-	-	79.0
	Mactra chinensis					-	-
	Scapharca subcrenata				-	2,695.3	2,695.3
	Solen spp.				-	-	-
	Ruditapes philippinarum	29		14,889	10,096	204.0	25,218.0
	Meretrix lusoria				-	-	-
	Atrina pectinata					499.3	499.3
	Scapharca broughtonii					-	-
	Mactra veneriformis						-
	Mytilus spp.					813.0	813.0
	Other shellfish				-	-	-
	subtotal	1,033	-	24,901	10,096	17,061.0	53,091.0
Seaweeds	*Porphyra* spp.	344	3,688	14,684	15,731	45,744.0	80,191.0
	Laminaria japonica					5,293.3	5,293.3
	Undaria pinnatifida			335		54,351.5	54,686.5
	Gelidium amansii					-	-
	Gigartina spp.					-	-
	Codium fragile					9.5	9.5
	Hizikia fusiforme					5,702.8	5,702.8
	Enteromorpha spp.					12.5	12.5
	Other seaweed					-	-
	subtotal	344	3,688	15,019	15,731	111,113.5	145,895.5
Others	*Halocynthia roretzi*					-	-
	Stichopus japonicus					-	-
	subtotal	-	-	-	-	-	-
total(mt)		1,512	3,874	43,715	26,305	132,808.8	208,214.8

- Changes in total production of marine farmed organisms for last 10 years

Table 31. Changes of total production of marine farmed organisms from 1995 to 2004

(unit: M/T)

kind	species	1995		1996		1997		1998		1999		2000	
		YS	Total	YS	Total	YS	Total	YS	Total	YS	Total	YS	Total
Finfish	*Paralichthys olivaceus*	380.3	6733.0	827.0	8861.0	2674.3	26274.0	1828.8	22277.0	1525.5	21368.0	866.8	14127.0
	Lateolabrax spp.	42.0	193.0	10.3	266.0	14.8	703.0	38.5	940.0	22.5	797.0	34.8	605.0
	Epinephelus septemfasciatus	0.0	2.0	2.0	9.0	0.5	5.0	0.0	1.0	1.0	5.0	0.3	6.0
	Acanthopagrus schlegelii	2.3	9.0	0.5	2.0	10.0	12.0	36.5	51.0	65.8	92.0	77.5	221.0
	Oplegnathus fasciatus	2.0	0.0	1.0	0.0	9.0	0.0	19.0	0.0	106.0	0.0	87.0	0.0
	Pagrus major	0.0	25.0	0.0	27.0	4.8	115.0	3.3	146.0	17.0	176.0	16.0	412.0
	Other sea breams	0.5	16.0	0.0	14.0	0.0	30.0	10.3	134.0	8.0	186.0	13.5	386.0
	Miichthys miiuy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	16.0	11.8	51.0
	Sciaenops ocellatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Seriola quinqueradiata	2.8	159.0	0.0	116.0	0.8	302.0	0.0	266.0	0.5	236.0	5.8	494.0
	Takifugu spp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	15.0	0.0	2.0
	Sebastes schlegeli	111.8	985.0	381.0	1922.0	1764.5	11069.0	2337.0	12544.0	1600.3	9459.0	1035.5	8473.0
	Other rock fishes	136.3	174.0	11.0	114.0	1.8	245.0	7.8	231.0	148.5	721.0	22.3	225.0
	Muguil spp.	25.8	34.0	13.5	27.0	51.0	201.0	52.8	106.0	72.3	347.0	269.5	968.0
	Pleurogrammus azonus	14.0	14.0	19.0	19.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
	Konosirus punctatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Stephanolepis sp.; *Thamnaconus s*	0.0	0.0	0.0	7.0	0.0	126.0	0.0	619.0	0.8	35.0	1.8	9.0
	Other finfish	0.0	16.0	0.0	18.0	3.0	37.0	3.0	8.0	0.0	0.0	0.0	7.0
	subtotal	**718.0**	**8360.0**	**1265.5**	**11402.0**	**4536.3**	**39121.0**	**4337.0**	**37323.0**	**3572.5**	**33453.0**	**2442.3**	**25986.0**
Crusta-ceans	*Fenneropenaeus chinensis*	352.8	404.0	338.8	377.0	1479.0	1533.0	737.3	846.0	915.5	1142.0	853.0	1158.0
	Marsupenaeus japonicus	25.3	34.0	1.3	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	other crustacean	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	38.0	0.0	0.0
	subtotal	**378.1**	**438.0**	**340.1**	**382.0**	**1479.0**	**1537.0**	**737.3**	**846.0**	**915.5**	**1180.0**	**853.0**	**1158.0**
Shellfish	*Crassostrea gigas*	17252.3	191156.0	13709.3	185339.0	10525.3	200973.0	8800.8	175926.0	12197.0	177259.0	12136.0	177079.0
	Rapana venosa	0.0	87.0	0.0	20.0	0.0	33.0	0.0	1.0	0.0	1.0	2.3	9.0
	Haliotis discus hannai	53.5	61.0	24.5	84.0	6.3	7.0	0.3	3.0	0.0	377.0	2.8	20.0
	Chlamys farreri nipponensis	0.0	59.0	0.0	102.0	0.0	637.0	0.0	360.0	0.0	3.0	0.0	2371.0
	Cyclina sinensis	16.3	66.0	6.8	27.0	0.0	5.0	33.0	33.0	3.0	2.0	46.0	46.0
	Mactra chinensis	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2511.0	0.0	1.0
	Scapharca subcrenata	2923.3	13027.0	741.5	4473.0	384.5	2843.0	1086.0	5041.0	362.5	0.0	165.5	820.0
	Solen spp.	1792.3	7169.0	1710.8	6843.0	1645.0	6585.0	26.8	68.0	0.0	16135.0	0.5	0.0
	Ruditapes philippinarum	7329.5	15260.0	8754.5	18478.0	8442.8	13958.0	12433.8	17178.0	11504.5	17.0	12938.5	17927.0
	Meretrix lusoria	39.0	122.0	17.0	47.0	0.0	47.0	0.0	0.0	0.0	1104.0	0.0	0.0
	Atrina pectinata	0.0	51.0	0.0	3.0	0.0	22.0	47.5	190.0	276.0		499.5	1998.0
	Scapharca broughtonii	93.3	9357.0	65.0	20166.0	15.3	13156.0	0.5	23029.0	0.0	8550.0	0.0	10618.0
	Mactra veneriformis	476.0	478.0	178.0	183.0	0.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mytilus spp.	7301.8	75353.0	9840.3	70058.0	8853.0	63572.0	1438.3	17785.0	1886.8	15042.0	1200.0	11713.0
	Other shellfish	4.0	6.0	0.0	915.0	0.0	15.0	0.0	140.0	2.5	30.0	3.5	6.0
	subtotal	**37281.1**	**312252.0**	**35047.6**	**306738.0**	**29872.0**	**301873.0**	**23866.8**	**239754.0**	**26232.3**	**221031.0**	**26994.5**	**222608.0**
Seaweeds	*Porphyra* spp.	67757.5	192960.0	55068.3	166199.0	47581.5	140236.0	70564.8	191578.0	71011.3	205706.0	46094.8	130488.0
	Laminaria japonica	5733.8	27295.0	8066.0	35640.0	7762.0	33466.0	1644.8	7931.0	5315.5	25447.0	3322.5	14160.0
	Undaria pinnatifida	93658.3	386819.0	73614.0	305813.0	105898.5	431872.0	53739.0	239742.0	45987.5	213706.0	45407.5	212429.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	16.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0	0.0	0.0
	Codium fragile	0.0	2.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	43.0	0.0	164.0
	Hizikia fusiforme	9419.8	37679.0	5763.5	23054.0	8617.5	34470.0	6245.3	24993.0	5665.8	22679.0	2912.3	11654.0
	Enteromorpha spp.	817.3	4344.0	628.3	8272.0	882.3	7794.0	1053.8	5298.0	1201.5	5873.0	1050.8	5288.0
	Other seaweeds	0.0	0.0	1.0	4.0	0.0	5.0	488.0	227.0	48.3	200.0	68.3	273.0
	subtotal	**177386.5**	**649099.0**	**143141.0**	**538990.0**	**170741.8**	**647843.0**	**133735.5**	**469769.0**	**129234.3**	**473672.0**	**98856.0**	**374456.0**
Others	*Halocynthia roretzi*	0.0	22626.0	0.0	13093.0	0.0	22318.0	0.0	8177.0	0.0	11845.0	0.0	2336.0
	Stichopus japonicus	0.0	1.0	0.0	0.0	0.0	0.0	5.0	0.0	2.0	0.0	1.0	0.0
	others	0.0	3675.0	0.0	4205.0	0.0	2442.0	0.0	21361.0	0.0	24071.0	0.0	26829.0
	subtotal	**0.0**	**26302.0**	**0.0**	**17298.0**	**0.0**	**24760.0**	**5.0**	**29538.0**	**2.0**	**35916.0**	**1.0**	**29165.0**
total		**215763.7**	**996451.0**	**179794.2**	**874810.0**	**206629.0**	**1015134.0**	**162681.6**	**777230.0**	**159956.6**	**765252.0**	**129146.8**	**653373.0**

Table 31. Continued

kind	species	2001		2002		2003		2004		total (Yellow Sea)	total
		YS	Total	YS	Total	YS	Total	YS	Total		
Finfish	*Paralichthys olivaceus*	1616.0	16426.0	2011.0	23348.0	2468.8	34533.0	2316.5	32141.0	16514.8	206088.0
	Lateolabrax spp.	74.0	873.0	194.0	2006.0	190.5	2778.0	126.3	1850.0	747.5	11011.0
	Epinephelus septemfasciatus	3.3	20.0	7.8	39.0	0.8	101.0	2.0	36.0	17.8	224.0
	Acanthopagrus schlegelii	131.0	275.0	392.3	685.0	348.0	1084.0	222.3	1379.0	1286.0	3810.0
	Oplegnathus fasciatus	13.0	0.0	60.0	0.0	400.0	0.0	343.0	0.0	1040.0	0.0
	Pagrus major	28.0	641.0	26.0	960.0	26.8	4417.0	29.3	3988.0	151.3	10907.0
	Other sea breams	2.5	94.0	5.3	234.0	14.5	1287.0	73.0	1430.0	127.5	3811.0
	Miichthys miiuy	4.3	45.0	1.0	19.0	0.0	7.0	0.0	0.0	17.8	138.0
	Sciaenops ocellatus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Seriola quinqueradiata	3.3	95.0	6.8	186.0	0.0	114.0	0.3	45.0	20.5	2013.0
	Takifugu spp.	0.0	63.0	0.5	29.0	1.0	14.0	5.3	48.0	10.5	171.0
	Sebastes schlegeli	1301.8	9254.0	2351.0	16550.0	4245.8	23771.0	3812.8	19576.0	18941.3	113603.0
	Other rock fishes	11.5	76.0	2.5	86.0	27.3	167.0	3.0	132.0	371.8	2171.0
	Muguil spp.	124.5	1415.0	835.0	3898.0	1036.8	4093.0	969.8	3596.0	3450.8	14685.0
	Pleurogrammus azonus	0.8	3.0	0.0	0.0	0.0	0.0	0.0	0.0	35.8	38.0
	Konosirus punctatus	0.0	0.0	0.0	0.0	0.0	0.0	127.0	181.0	127.0	181.0
	Stephanolepis sp.; *Thamnaconus s*	0.8	3.0	0.0	0.0	0.0	3.0	16.0	19.0	19.3	821.0
	Other finfish	6.0	14.0	32.0	33.0	6.3	24.0	3.0	55.0	53.3	212.0
	subtotal	**3320.5**	**29297.0**	**5925.0**	**48073.0**	**8766.3**	**72393.0**	**8049.3**	**64476.0**	**42932.5**	**369884.0**
Crusta-ceans	*Fenneropenaeus chinensis*	1208.5	2081.0	1150.0	1403.0	1084.0	2324.0	1179.0	2426.0	9297.9	13694.0
	Marsupenaeus japonicus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.6	39.0
	other crustacean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0
	subtotal	**1208.5**	**2081.0**	**1150.0**	**1403.0**	**1084.0**	**2324.0**	**1179.0**	**2426.0**	**9324.5**	**13775.0**
Shellfish	*Crassostrea gigas*	10616.3	174117.0	13651.8	182229.0	26398.0	238326.0	23479.8	239270.0	148766.3	1941674.0
	Rapana venosa	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0		154.0
	Haliotis discus hannai	5.0	29.0	14.8	85.0	258.8	1065.0	306.5	1260.0	672.3	2991.0
	Chlamys farreri nipponensis	0.0	66.0	0.0	5.0	0.0	23.0	0.3	173.0	0.3	3799.0
	Cyclina sinensis	25.0	25.0	219.0	219.0	189.0	189.0	79.0	79.0	617.0	691.0
	Mactra chinensis	1.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2519.0
	Scapharca subcrenata	932.5	3842.0	93.5	413.0	552.8	2440.0	2695.3	10849.0	9937.3	43748.0
	Solen spp.	0.0	0.0	0.0	0.0	0.5	2.0	0.0	0.0	5175.8	36802.0
	Ruditapes philippinarum	14653.3	16433.0	9703.0	10652.0	25461.5	27494.0	25218.0	27570.0	136439.3	164967.0
	Meretrix lusoria	0.0	26.0	1.0	5.0	1.0	167.0	0.0	127.0	58.0	1645.0
	Atrina pectinata	309.0	1240.0	144.3	577.0	195.8	783.0	499.3	1997.0	1971.3	6861.0
	Scapharca broughtonii	0.0	7359.0	0.0	4745.0	0.0	4696.0	0.0	3134.0	174.0	104810.0
	Mactra veneriformis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	654.0	680.0
	Mytilus spp.	1866.0	13653.0	1676.3	13201.0	901.3	15785.0	813.0	20409.0	35776.8	316571.0
	Other shellfish	0.0	279.0	0.0	302.0	0.0	93.0	0.0	21.0	10.0	1807.0
	subtotal	**28408.5**	**217078.0**	**25503.6**	**212433.0**	**53958.6**	**291063.0**	**53091.0**	**304889.0**	**340255.8**	**2629719.0**
Seaweeds	*Porphyra* spp.	58050.3	167909.0	70112.0	209995.0	67717.8	193553.0	80191.0	228554.0	634149.0	1827178.0
	Laminaria japonica	3676.5	17506.0	5220.3	24873.0	5988.5	25259.0	5293.3	22510.0	52023.0	234087.0
	Undaria pinnatifida	37104.5	175490.0	50881.5	242135.0	42537.3	198172.0	54686.5	261574.0	603514.5	2667752.0
	Gelidium amansii	0.0	0.0	1.0	4.0	0.0	0.0	0.0	0.0	5.0	20.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0
	Codium fragile	0.0	7.0	18.0	72.0	0.0	53.0	9.5	142.0	27.5	491.0
	Hizikia fusiforme	1716.3	6865.0	2751.0	11016.0	8412.0	33661.0	5702.8	22814.0	57206.0	228885.0
	Enteromorpha spp.	1199.5	5760.0	2113.3	9291.0	116.3	1355.0	12.5	1154.0	9075.3	54429.0
	Other seaweeds	0.3	1.0	42.8	171.0	0.0	1.0	0.0	0.0	648.5	882.0
	subtotal	**101747.3**	**373538.0**	**131139.8**	**497557.0**	**124771.8**	**452054.0**	**145895.5**	**536748.0**	**1356649.3**	**5013726.0**
Others	*Halocynthia roretzi*	0.0	4603.0	0.0	9613.0	0.0	3116.0	0.0	6349.0	0.0	104076.0
	Stichopus japonicus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	1.0
	others	0.0	29230.0	0.0	12440.0	0.0	5295.0	0.0	2827.0	0.0	132375.0
	subtotal	**0.0**	**33833.0**	**0.0**	**22053.0**	**0.0**	**8411.0**	**0.0**	**9176.0**	**8.0**	**236452.0**
total		**134684.8**	**655827.0**	**163718.3**	**781519.0**	**188580.6**	**826245.0**	**208214.8**	**917715.0**	**1749170.1**	**8263556.0**

- Overview of marine farmed production for last 10 years

Table 32. Changes in total production of major farmed species from 1995 to 2004

(unit: M/T)

kind	species	1995		1996		1997		1998		1999		2000	
		YS	Total	YS	Total	YS	Total	YS	Total	YS	Total	YS	Total
Finfish	*Paralichthys olivaceus*	380.3	6733.0	827.0	8861.0	2674.3	26274.0	1828.8	22277.0	1525.5	21368.0	866.8	14127.0
	Sebastes schlegelii	111.8	985.0	381.0	1922.0	1764.5	11069.0	2337.0	12544.0	1600.3	9459.0	1035.5	8473.0
	other finfish	226.0	633.0	57.5	619.0	97.5	1778.0	171.3	0.0	446.8	2626.0	540.0	3386.0
	subtotal	**718.0**	**29297.0**	**1265.5**	**11402.0**	**4536.3**	**39121.0**	**4337.0**	**37323.0**	**3572.5**	**33453.0**	**2442.3**	**25986.0**
Crusta-ceans	*Fenneropenaeus chinensis*	352.8	404.0	338.8	377.0	1479.0	1533.0	737.3	846.0	915.5	1142.0	853.0	1158.0
	Penaeus japonicus	25.3	34.0	1.3	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	other crustacean	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	38.0	0.0	0.0
	subtotal	**378.1**	**438.0**	**340.1**	**382.0**	**1479.0**	**1537.0**	**737.3**	**846.0**	**915.5**	**1180.0**	**853.0**	**1158.0**
Shellfish	*Crassostrea gigas*	17252.3	191156.0	13709.3	185339.0	10525.3	200973.0	8800.8	175926.0	12197.0	177259.0	12136.0	177079.0
	Ruditapes philippinarum	7329.5	15260.0	8754.5	18478.0	8442.8	13958.0	12433.8	17178.0	11504.5	17.0	12938.5	17927.0
	other shellfish	12699.3	105836.0	12583.8	102921.0	10904.0	86942.0	2632.3	46650.0	2530.8	43755.0	1917.8	27602.0
	subtotal	**37281.1**	**312252.0**	**35047.6**	**306738.0**	**29872.0**	**301873.0**	**23866.8**	**239754.0**	**26232.3**	**221031.0**	**26994.5**	**222608.0**
Seaweeds	*Porphyra* spp.	67757.5	192960.0	55068.3	166199.0	47581.5	140236.0	70564.8	191578.0	71011.3	205706.0	46094.8	130488.0
	Undaria pinnatifida	93658.3	386819.0	73614.0	305813.0	105898.5	431872.0	53739.0	239742.0	45987.5	213706.0	45407.5	212429.0
	other seaweed	15970.8	69320.0	14458.8	66978.0	17261.8	75735.0	9431.8	38449.0	12235.5	54260.0	7353.8	31539.0
	subtotal	**177386.5**	**649099.0**	**143141.0**	**538990.0**	**170741.8**	**647843.0**	**133735.5**	**469769.0**	**129234.3**	**473672.0**	**98856.0**	**374456.0**
others	*Synthina roretzi*	0.0	22626.0	0.0	13093.0	0.0	22318.0	0.0	8177.0	0.0	11845.0	0.0	2336.0
	Stichopus japonicus	0.0	1.0	0.0	0.0	0.0	0.0	5.0	0.0	2.0	0.0	1.0	0.0
	others	0.0	3675.0	0.0	4205.0	0.0	2442.0	0.0	21361.0	0.0	24071.0	0.0	26829.0
	subtotal	**0.0**	**26302.0**	**0.0**	**17298.0**	**0.0**	**24760.0**	**5.0**	**29538.0**	**2.0**	**35916.0**	**1.0**	**29165.0**
total		**215763.7**	**1017388.0**	**179794.2**	**874810.0**	**206629.0**	**1015134.0**	**162681.6**	**777230.0**	**159956.6**	**765252.0**	**129146.8**	**653373.0**

Table 32. Continued

kind	species	2001		2002		2003		2004		total (Yellow Sea)	total (country)
		YS	Total	YS	Total	YS	Total	YS	Total		
Finfish	*Paralichthys olivaceus*	1616.0	16426.0	2011.0	23348.0	2468.8	34533.0	2316.5	32141.0	16514.8	206088.0
	Sebastes schlegelii	1301.8	9254.0	2351.0	16550.0	4245.8	23771.0	3812.8	19576.0	18941.3	113603.0
	other finfish	402.8	3617.0	1563.0	8175.0	2051.8	14089.0	1920.0	12759.0	7476.5	47682.0
	subtotal	**3320.5**	**29297.0**	**5925.0**	**48073.0**	**8766.3**	**72393.0**	**8049.3**	**64476.0**	**42932.5**	**390821.0**
Crusta-ceans	*Fenneropenaeus chinensis*	1208.5	2081.0	1150.0	1403.0	1084.0	2324.0	1179.0	2426.0	9297.9	13694.0
	Penaeus japonicus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.6	39.0
	other crustacean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0
	subtotal	**1208.5**	**2081.0**	**1150.0**	**1403.0**	**1084.0**	**2324.0**	**1179.0**	**2426.0**	**9324.5**	**13775.0**
Shellfish	*Crassostrea gigas*	10616.3	174117.0	13651.8	182229.0	26398.0	238326.0	23479.8	239270.0	148766.3	1941674.0
	Ruditapes philippinarum	14653.3	16433.0	9703.0	10652.0	25461.5	27494.0	25218.0	27570.0	136439.3	164967.0
	other shellfish	3139.0	26528.0	2148.8	19552.0	2099.1	25243.0	4393.3	38049.0	55046.6	523078.0
	subtotal	**28408.5**	**217078.0**	**25503.6**	**212433.0**	**53958.6**	**291063.0**	**53091.0**	**304889.0**	**340255.8**	**2629719.0**
Seaweeds	*Porphyra* spp.	58050.3	167909.0	70112.0	209995.0	67717.8	193553.0	80191.0	228554.0	634149.0	1827178.0
	Undaria pinnatifida	37104.5	175490.0	50881.5	242135.0	42537.3	198172.0	54686.5	261574.0	603514.5	2667752.0
	other seaweed	6592.5	30139.0	10146.3	45427.0	14516.8	60329.0	11018.0	46620.0	118985.8	518796.0
	subtotal	**101747.3**	**373538.0**	**131139.8**	**497557.0**	**124771.8**	**452054.0**	**145895.5**	**536748.0**	**1356649.3**	**5013726.0**
others	*Synthina roretzi*	0.0	4603.0	0.0	9613.0	0.0	3116.0	0.0	6349.0	0.0	104076.0
	Stichopus japonicus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	1.0
	others	0.0	29230.0	0.0	12440.0	0.0	5295.0	0.0	2827.0	0.0	132375.0
	subtotal	**0.0**	**33833.0**	**0.0**	**22053.0**	**0.0**	**8411.0**	**0.0**	**9176.0**	**8.0**	**236452.0**
total		**134684.8**	**655827.0**	**163718.3**	**781519.0**	**188580.6**	**826245.0**	**208214.8**	**917715.0**	**1749170.1**	**8284493.0**

Table 33. Overview of farmed production for last 10 years

		total production(M/T)				ratio	ratio %
year	kind	YS	TFW	TSW	TFW+TSW	%(YS/TSW)	(YS/(TFW+TSW
1995	finfish	718.0	28,057.0	8,360.0	36,417.0	8.59	1.97
	crustacean	378.1	218.0	438.0	656.0	86.32	57.64
	shellfish	37,281.0	933.0	312,252.0	313,185.0	11.94	11.90
	seaweed	177,386.5	5.0	649,099.0	649,104.0	27.33	27.33
	others	0.0	15.0	26,302.0	26,317.0	0.00	0.00
	total	**215,763.6**	**29,228.0**	**996,451.0**	**1,025,679.0**	**21.65**	**21.04**
1996	finfish	1,265.5	29,049.0	11,402.0	40,451.0	11.10	3.13
	crustacean	340.1	120.0	382.0	502.0	89.03	67.75
	shellfish	35,047.6	1,019.0	306,738.0	307,757.0	11.43	11.39
	seaweed	143,141.0	11.0	538,990.0	539,001.0	26.56	26.56
	others	0.0	49.0	17,298.0	17,347.0	0.00	0.00
	total	**179,794.2**	**30,248.0**	**874,810.0**	**905,058.0**	**20.55**	**19.87**
1997	finfish	4,536.3	30,746.0	39,121.0	69,867.0	11.60	6.49
	crustacean	1,479.0	140.0	1,537.0	1,677.0	96.23	88.19
	shellfish	29,872.0	806.0	301,873.0	302,679.0	9.90	9.87
	seaweed	170,741.8	1.0	647,843.0	647,844.0	26.36	26.36
	others	0.0	103.0	24,760.0	24,863.0	0.00	0.00
	total	**206,629.0**	**31,796.0**	**1,015,134.0**	**1,046,930.0**	**20.35**	**19.74**
1998	finfish	4,337.0	25,624.0	37,323.0	62,947.0	11.62	6.89
	crustacean	737.3	121.0	846.0	967.0	87.15	76.25
	shellfish	23,866.8	1,040.0	239,754.0	240,794.0	9.95	9.91
	seaweed	133,735.5	5.0	469,769.0	469,774.0	28.47	28.47
	others	5.0	62.0	29,538.0	29,600.0	0.02	0.02
	total	**162,681.6**	**26,852.0**	**777,230.0**	**804,082.0**	**20.93**	**20.23**
1999	finfish	3,572.5	16,300.0	33,453.0	49,753.0	10.68	7.18
	crustacean	915.5	136.0	1,180.0	1,316.0	77.58	69.57
	shellfish	26,232.3	1,302.0	221,031.0	222,333.0	11.87	11.80
	seaweed	129,234.3	4.0	473,672.0	473,676.0	27.28	27.28
	others	2.0	104.0	35,916.0	36,020.0	0.01	0.01
	total	**159,956.6**	**17,846.0**	**765,252.0**	**783,098.0**	**20.90**	**20.43**
2000	finfish	2,442.3	19,614.0	25,986.0	45,600.0	9.40	5.36
	crustacean	853.0	114.0	1,158.0	1,272.0	73.66	67.06
	shellfish	26,994.5	675.0	222,608.0	223,283.0	12.13	12.09
	seaweed	98,856.0	8.0	374,456.0	374,464.0	26.40	26.40
	others	1.0	174.0	29,165.0	29,339.0	0.00	0.00
	total	**129,146.8**	**20,585.0**	**653,373.0**	**673,958.0**	**19.77**	**19.16**
2001	finfish	3,320.5	16,932.0	29,297.0	46,229.0	11.33	7.18
	crustacean	1,208.5	78.0	2,081.0	2,159.0	58.07	55.97
	shellfish	28,408.5	1,027.0	217,078.0	218,105.0	13.09	13.03
	seaweed	101,747.3	0.0	373,538.0	373,538.0	27.24	27.24
	others	0.0	104.0	33,833.0	33,937.0	0.00	0.00
	total	**134,684.8**	**18,141.0**	**655,827.0**	**673,968.0**	**20.54**	**19.98**
2002	finfish	5,925.0	16,280.0	48,073.0	64,353.0	12.33	9.21
	crustacean	1,150.0	77.0	1,403.0	1,480.0	81.97	77.70
	shellfish	25,503.6	2,049.0	212,433.0	214,482.0	12.01	11.89
	seaweed	131,139.5	0.0	497,557.0	497,557.0	26.36	26.36
	others	0.0	105.0	22,053.0	22,158.0	0.00	0.00
	total	**163,718.3**	**18,511.0**	**781,519.0**	**800,030.0**	**20.95**	**20.46**
2003	finfish	8,766.3	17,399.0	72,393.0	89,792.0	12.11	9.76
	crustacean	1,084.0	127.0	2,324.0	2,451.0	46.64	44.23
	shellfish	53,958.6	2,016.0	291,063.0	293,079.0	18.54	18.41
	seaweed	124,771.8	0.0	452,054.0	452,054.0	27.60	27.60
	others	0.0	138.0	8,411.0	8,549.0	0.00	0.00
	total	**188,580.6**	**19,680.0**	**826,245.0**	**845,925.0**	**22.82**	**22.29**
2004	finfish	8,049.3	20,415.0	64,476.0	84,891.0	12.48	9.48
	crustacean	1,179.0	78.0	2,426.0	2,504.0	48.60	47.08
	shellfish	53,091.0	4,670.0	304,889.0	309,559.0	17.41	17.15
	seaweed	145,895.5	0.0	536,748.0	536,748.0	27.18	27.18
	others	0.0	136.0	9,176.0	9,312.0	0.00	0.00
	total	**208,214.8**	**25,299.0**	**917,715.0**	**943,014.0**	**22.69**	**22.08**
grand total		1,749,170.1	238,186.0	8,263,556.0	8,501,742.0	211.16	205.28

Remark: TSW: Total national production of mariculture
TFW: Total national production of fresh water
YS: Regional production of mariculture of Yellow Sea

Table 34. Overview of marine farmed production for last 10 years

	Year										
Kind	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**total**
Finfish	718	1265.5	4536.3	4337	3572.5	2442.3	3320.5	5925	8766.3	8049.3	42932.7
Crustacean	378.1	340.1	1479	737.3	915.5	853	1208.5	1150	1084	1179	9324.5
Shellfish	37281.1	35047.6	29872	23866.8	26232.3	26994.5	28408.5	25503.6	53958.6	53091	340256
Seaweed	177387	143141	170742	133736	129234	98856	101747	131140	124772	145896	1356650
Others	0	0	0	5	2	1	0	0	0	0	8
Total	215764	179794	206629	162682	159957	129147	134685	163718	188581	208215	1749171

Table 35. Production ratio of marine farmed organisms (kinds) for last 10 years

	Year										
Kind	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**total**
Finfish(%)	0.3	0.7	2.2	2.7	2.2	1.9	2.5	3.6	4.6	3.9	2.5
Crustacean(%)	0.2	0.2	0.7	0.5	0.6	0.7	0.9	0.7	0.6	0.6	0.5
Shellfish(%)	17.3	19.5	14.5	14.7	16.4	20.9	21.1	15.6	28.6	25.5	19.5
Seaweed(%)	82.2	79.6	82.6	82.2	80.8	76.5	75.5	80.1	66.2	70.1	77.6
Total(%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total(mt)	215764	179794	206629	162682	159957	129147	134685	163718	188581	208215	1749171

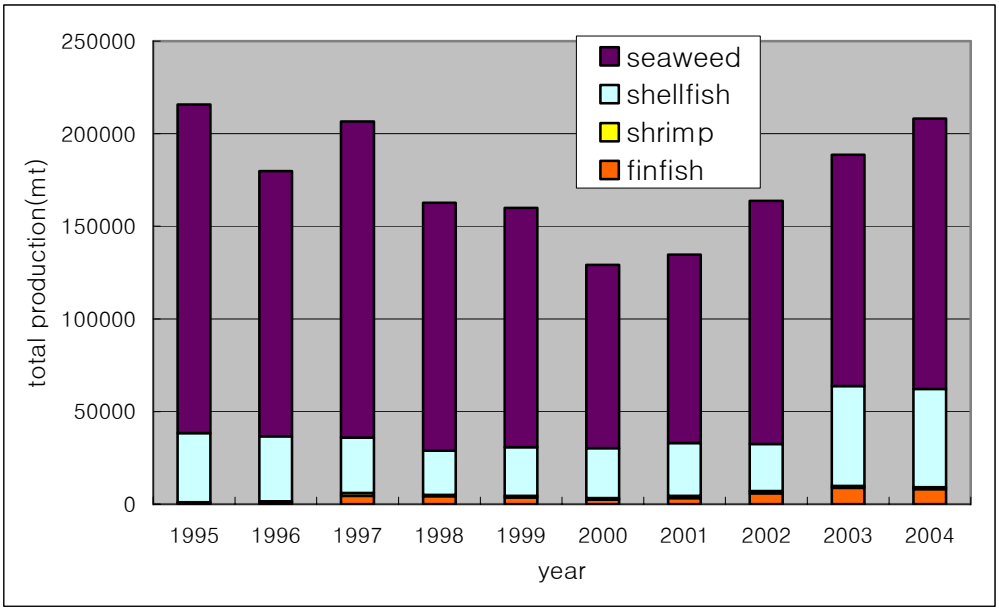


Figure 27. Overview of marine farmed production in the west coast of Korea for last 10 years (unit: M/T).

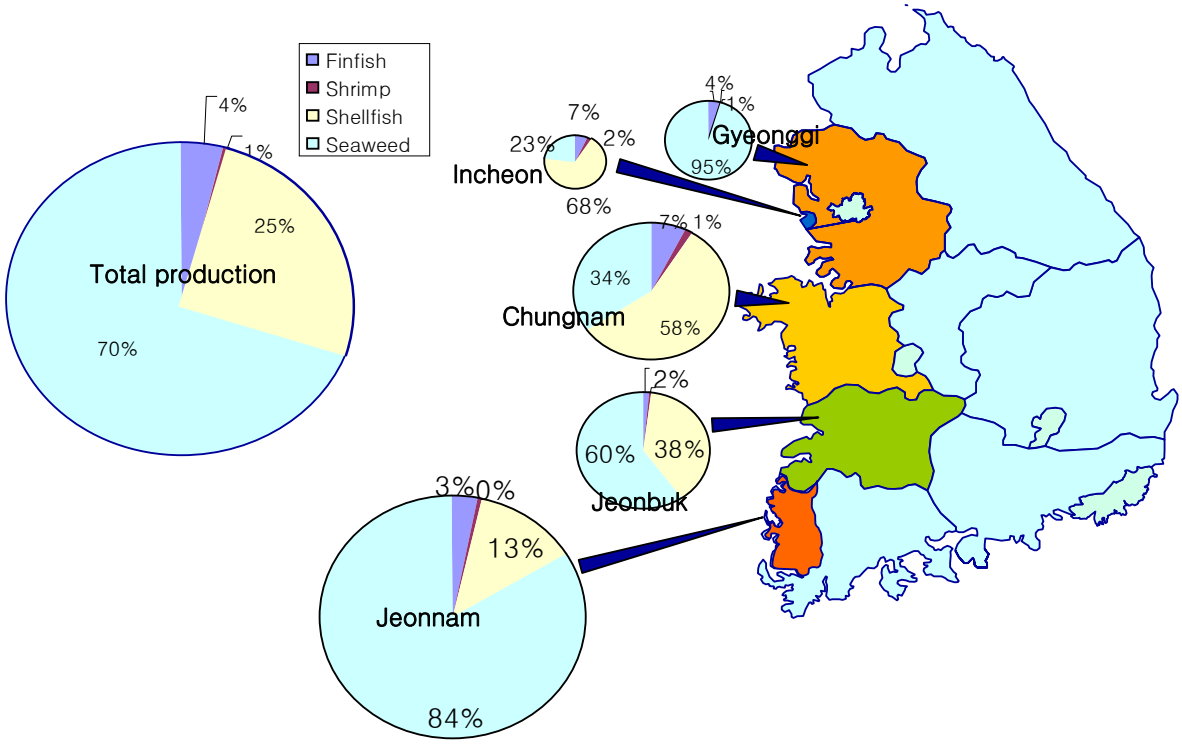


Figure 28. Production ratio of marine farmed organisms from the west coast of Korea in 2004.

- Annual variation of aquaculture area in marine farms from 1995 to 2004

Table 36. Aquaculture area of marine farmed species in the west coast of Korea in 1995

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	108.0	4.0	291.0	278.0	322.0	1003.0
Crustacean	*Fenneropenaeus chinensis*	95.0	18.0	951.0	64.0	21.0	1149.0
	subtotal	95.0	18.0	951.0	64.0	21.0	1149.0
Shellfish	*Crassostrea gigas*	42.0	72.0	684.0	124.0	530.0	1452.0
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	123.0	0.0	363.0	124.0	24.0	634.0
	Chlamys farreri nipponensis	10.0	0.0	0.0	0.0	2.0	12.0
	Cyclina sinensis	160.0	23.0	86.0	560.0	40.0	869.0
	Mactra chinensis	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca subcrenata	0.0	10.0	235.0	217.0	185.0	647.0
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	36.0	195.0	971.0	3365.0	315.0	4882.0
	Meretrix lusoria	0.0	0.0	87.0	0.0	144.0	231.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	64.0	0.0	140.0	35.0	0.0	239.0
	Mactra veneriformis	0.0	0.0	0.0	233.0	0.0	233.0
	Mytilus spp.	0.0	0.0	145.0	130.0	0.0	275.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	435.0	300.0	2711.0	4788.0	1240.0	9474.0
Seaweed	*Porphyra* spp.	814.0	719.0	4388.0	5097.0	8677.0	19695.0
	Laminaria japonica	20.0	0.0	0.0	30.0	7.0	57.0
	Undaria pinnatifida	2.0	0.0	22.0	40.0	168.0	232.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	105.0	105.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	32.0	32.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	836.0	719.0	4410.0	5167.0	8989.0	20121.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	21.0	95.0	0.0	116.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	40.0	0.0	28.0	68.0
	Others	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	0.0	0.0	61.0	95.0	28.0	184.0
Collective farms	shellfish	ND	ND	ND	ND	ND	ND
	subtotal	ND	ND	ND	ND	ND	ND
Total		**1474.0**	**1041.0**	**8424.0**	**10392.0**	**10600.0**	**31931.0**

Statisics includes licensed area only. Area of permission and notification is not included.
Area of collective farms is not included.

Table 37. Aquaculture area of marine farmed species in the west coast of Korea in 1996

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	111.0	4.0	270.0	359.0	361.0	1105.0
Crustacean	*Fenneropenaeus chinensis*	211.0	27.0	955.0	135.0	30.0	1358.0
	subtotal	211.0	27.0	955.0	135.0	30.0	1358.0
Shellfish	*Crassostrea gigas*	47.0	66.0	662.0	114.0	783.0	1672.0
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	118.0	0.0	309.0	137.0	16.0	580.0
	Chlamys farreri nipponensis	20.0	417.0	20.0	28.0	8.0	493.0
	Cyclina sinensis	170.0	23.0	478.0	99.0	144.0	914.0
	Mactra chinensis	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca subcrenata	0.0	10.0	261.0	178.0	208.0	657.0
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	36.0	195.0	945.0	2208.0	144.0	3528.0
	Meretrix lusoria	0.0	0.0	51.0	0.0	0.0	51.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	84.0	0.0	120.0	70.0	20.0	294.0
	Mactra veneriformis	0.0	0.0	0.0	185.0	0.0	185.0
	Mytilus spp.	0.0	0.0	60.0	140.0	0.0	200.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	475.0	711.0	2906.0	3159.0	1323.0	8574.0
Seaweed	*Porphyra* spp.	708.0	719.0	3445.0	4360.0	8823.0	18055.0
	Laminaria japonica	20.0	0.0	0.0	30.0	7.0	57.0
	Undaria pinnatifida	26.0	0.0	42.0	10.0	135.0	213.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	152.0	152.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	64.0	64.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	754.0	719.0	3487.0	4400.0	9181.0	18541.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	21.0	95.0	0.0	116.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	40.0	0.0	28.0	68.0
	Others	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	0.0	0.0	61.0	95.0	28.0	184.0
Collective farms	shellfish	ND	ND	ND	ND	ND	ND
	subtotal	ND	ND	ND	ND	ND	ND
Total		**1551.0**	**1461.0**	**7679.0**	**8148.0**	**10923.0**	**29762.0**

Statisics includes licensed area only. Area of permission and notification is not included.
Area of collective farms is not included.

Table 38. Aquaculture area of marine farmed species in the west coast of Korea in 1997

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	75.0	36.0	283.0	361.0	387.8	1142.8
Crustacean	*Fenneropenaeus chinensis*	223.0	0.0	780.0	77.0	19.0	1099.0
	subtotal	223.0	0.0	780.0	77.0	19.0	1099.0
Shellfish	*Crassostrea gigas*	95.0	56.0	704.0	109.0	796.0	1760.0
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	132.0	0.0	328.0	154.0	11.0	625.0
	Chlamys farreri nipponensis	20.0	0.0	0.0	40.0	20.0	80.0
	Cyclina sinensis	260.0	23.0	80.0	453.0	65.0	881.0
	Mactra chinensis	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca subcrenata	0.0	10.0	256.0	148.0	169.5	583.5
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	36.0	165.0	1092.0	1552.0	442.5	3287.5
	Meretrix lusoria	0.0	0.0	51.0	40.0	114.0	205.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	114.0	0.0	120.0	440.0	28.0	702.0
	Mactra veneriformis	0.0	0.0	0.0	0.0	0.0	0.0
	Mytilus spp.	0.0	0.0	60.0	150.0	0.0	210.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	657.0	254.0	2691.0	3086.0	1646.0	8334.0
Seaweed	*Porphyra* spp.	788.0	779.0	3844.0	2825.0	9369.0	17605.0
	Laminaria japonica	20.0	0.0	0.0	30.0	8.0	58.0
	Undaria pinnatifida	27.0	0.0	42.0	10.0	136.0	215.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	167.0	167.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	54.0	54.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	835.0	779.0	3886.0	2865.0	9734.0	18099.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	9.0	0.0	0.0	9.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	40.0	0.0	27.5	67.5
	Others	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	0.0	0.0	49.0	0.0	27.5	76.5
Collective farms	shellfish	ND	ND	ND	ND	ND	ND
	subtotal	ND	ND	ND	ND	ND	ND
Total		**1790.0**	**1069.0**	**7689.0**	**6389.0**	**11814.3**	**28751.3**

Statisics includes licensed area only. Area of permission and notification is not included.
Area of collective farms is not included.

Table 39. Aquaculture area of marine farmed species in the west coast of Korea in 1998

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	41.0	33.0	285.0	402.0	433.8	1194.8
Crustacean	*Fenneropenaeus chinensis*	231.0	0.0	783.0	123.0	19.0	1156.0
	subtotal	231.0	0.0	783.0	123.0	19.0	1156.0
Shellfish	*Crassostrea gigas*	123.0	80.0	749.0	109.0	795.3	1856.3
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	
	Haliotis discus hannai	132.0	34.0	341.0	238.0	47.0	792.0
	Chlamys farreri nipponensis	20.0	0.0	0.0	40.0	50.0	110.0
	Cyclina sinensis	310.0	23.0	85.0	448.0	85.0	951.0
	Mactra chinensis	0.0	46.0	0.0	0.0	0.0	46.0
	Scapharca subcrenata	0.0	10.0	226.0	212.0	169.5	617.5
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	61.0	0.0	1149.0	1406.0	544.0	3160.0
	Meretrix lusoria	0.0	0.0	51.0	40.0	0.0	91.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	114.0	145.0	140.0	440.0	28.0	867.0
	Mactra veneriformis	0.0	0.0	0.0	0.0	143.5	143.5
	Mytilus spp.	0.0	0.0	60.0	150.0	0.0	210.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	760.0	338.0	2801.0	3083.0	1862.3	8844.3
Seaweed	*Porphyra* spp.	770.0	338.0	3791.0	2814.0	9490.0	17203.0
	Laminaria japonica	20.0	0.0	0.0	30.0	8.0	58.0
	Undaria pinnatifida	27.0	0.0	47.0	10.0	131.0	215.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	167.0	167.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	54.0	54.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	817.0	338.0	3838.0	2854.0	9850.0	17697.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	9.0	0.0	0.0	9.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	40.0	0.0	27.5	67.5
	Others	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	0.0	0.0	49.0	0.0	27.5	76.5
Collective farms	shellfish	ND	ND	ND	ND	ND	ND
	subtotal	ND	ND	ND	ND	ND	ND
Total		**1849.0**	**709.0**	**7756.0**	**6462.0**	**12192.6**	**28968.6**

Statisics includes all types of farms(licensed, permitted and notified farms).
Area of collective farms is not included.

Table 40. Aquaculture area of marine farmed species in the west coast of Korea in 1999

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	77.0	30.0	251.0	405.0	489.1	1252.1
Crustacean	*Fenneropenaeus chinensis*	221.0	0.0	647.0	73.0	19.0	960.0
	subtotal	221.0	0.0	647.0	73.0	19.0	960.0
Shellfish	*Crassostrea gigas*	120.0	71.0	735.0	118.0	820.1	1864.1
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	
	Haliotis discus hannai	140.0	0.0	346.0	227.0	39.0	752.0
	Chlamys farreri nipponensis	20.0	4.0	0.0	40.0	42.0	106.0
	Cyclina sinensis	310.0	0.0	91.0	471.0	85.0	957.0
	Mactra chinensis	0.0	46.0	0.0	0.0	0.0	46.0
	Scapharca subcrenata	0.0	10.0	226.0	327.0	166.5	729.5
	Solen spp.	0.0	0.0	0.0	0.0	0.0	90.0
	Ruditapes philippinarum	64.0	145.0	1209.0	1392.0	636.0	3446.0
	Meretrix lusoria	0.0	0.0	51.0	40.0	0.0	91.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	119.0	0.0	130.0	510.0	35.0	794.0
	Mactra veneriformis	0.0	0.0	0.0	0.0	154.0	154.0
	Mytilus spp.	0.0	0.0	50.0	70.0	0.0	120.0
	Other shellfish	0.0	30.0	0.0	60.0	0.0	90.0
	subtotal	773.0	306.0	2838.0	3255.0	1977.6	9149.6
Seaweed	*Porphyra* spp.	746.0	338.0	3733.0	2544.0	9445.0	16806.0
	Laminaria japonica	20.0	0.0	0.0	30.0	30.0	80.0
	Undaria pinnatifida	27.0	0.0	117.0	0.0	131.0	275.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	190.0	190.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	39.0	39.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	793.0	338.0	3850.0	2574.0	9835.0	17390.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	13.0	0.0	0.0	13.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	30.0	0.0	15.0	45.0
	Others	0.0	0.0	1.0	0.0	0.0	1.0
	subtotal	0.0	0.0	44.0	0.0	15.0	59.0
Collective farms	shellfish	ND	ND	ND	ND	ND	ND
	subtotal	ND	ND	ND	ND	ND	ND
Total		**1864.0**	**674.0**	**7630.0**	**6307.0**	**12335.7**	**28810.7**

Statisics includes all types of farms(licensed, permitted and notified farms).
Area of collective farms is not included.

Table 41. Aquaculture area of marine farmed species in the west coast of Korea in 2000

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	174.0	28.0	267.0	169.0	518.3	1156.3
Crustacean	*Fenneropenaeus chinensis*	98.0	6.0	636.0	281.0	19.0	1040.0
	subtotal	98.0	6.0	636.0	281.0	19.0	1040.0
Shellfish	*Crassostrea gigas*	278.0	101.0	800.0	80.0	820.8	2079.8
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	160.0	61.0	350.0	294.0	39.0	904.0
	Chlamys farreri nipponensis	85.0	0.0	0.0	40.0	42.0	167.0
	Cyclina sinensis	355.0	0.0	91.0	476.0	85.0	1007.0
	Mactra chinensis	0.0	56.0	0.0	0.0	0.0	56.0
	Scapharca subcrenata	0.0	10.0	226.0	380.0	173.5	789.5
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	76.0	145.0	1236.0	1381.0	717.0	3555.0
	Meretrix lusoria	39.0	0.0	51.0	80.0	0.0	170.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	139.0	0.0	140.0	510.0	43.0	832.0
	Mactra veneriformis	0.0	0.0	0.0	60.0	154.0	214.0
	Mytilus spp.	0.0	0.0	35.0	20.0	0.0	55.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	1132.0	373.0	2929.0	3321.0	2074.3	9829.3
Seaweed	*Porphyra* spp.	583.0	430.0	3714.0	2523.0	9393.0	16643.0
	Laminaria japonica	20.0	0.0	0.0	0.0	52.0	72.0
	Undaria pinnatifida	47.0	0.0	117.0	0.0	131.0	295.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	0.0	212.5	212.5
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	39.0	39.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	650.0	430.0	3831.0	2523.0	9827.5	17261.5
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	13.0	0.0	0.0	13.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	30.0	0.0	0.0	30.0
	Others	0.0	0.0	1.0	0.0	0.0	1.0
	subtotal	0.0	0.0	44.0	0.0	0.0	44.0
Collective farms	shellfish	ND	ND	ND	ND	13037.4	13037.4
	subtotal	ND	ND	ND	ND	13037.4	13037.4
Total		**2054.0**	**837.0**	**7707.0**	**6294.0**	**12439.1**	**29331.1**

Statisics includes all types of farms(licensed, permitted and notified farms).
Area of collective farms is not included.

Table 42. Aquaculture area of marine farmed species in the west coast of Korea in 2001

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	187.2	28.0	290.3	176.8	577.2	1259.5
Crustacean	*Fenneropenaeus chinensis*	201.2	121.6	667.4	384.5	45.9	1420.6
	subtotal	201.2	121.6	667.4	384.5	45.9	1420.6
Shellfish	*Crassostrea gigas*	567.0	29.0	782.0	104.0	788.8	2270.8
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	171.2	64.0	353.3	236.0	46.0	870.5
	Chlamys farreri nipponensis	89.0	2.0	0.0	30.0	45.0	166.0
	Cyclina sinensis	390.0	0.0	104.0	480.0	85.0	1059.0
	Mactra chinensis	0.0	20.0	0.0	0.0	0.0	20.0
	Scapharca subcrenata	0.0	10.0	197.0	391.0	156.5	754.5
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	117.0	20.0	1449.0	1377.0	702.0	3665.0
	Meretrix lusoria	30.0	0.0	51.0	40.0	0.0	121.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	169.0	0.0	170.0	550.0	53.0	942.0
	Mactra veneriformis	20.0	0.0	0.0	60.0	154.0	234.0
	Mytilus spp.	0.0	0.0	37.0	50.0	0.0	87.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	1553.2	145.0	3143.3	3318.0	2030.3	10189.8
Seaweed	*Porphyra* spp.	534.0	370.0	3411.0	2625.0	9388.0	16328.0
	Laminaria japonica	22.0	0.0	0.0	0.0	52.0	74.0
	Undaria pinnatifida	47.0	0.0	139.0	0.0	131.0	317.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	0.0	10.0	212.5	222.5
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	44.0	44.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	603.0	370.0	3550.0	2635.0	9827.5	16985.5
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	31.0	0.0	0.0	31.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	25.0	0.0	5.0	30.0
	Others	0.0	125.0	1.0	0.0	0.0	126.0
	subtotal	0.0	125.0	57.0	0.0	5.0	187.0
Collective farms	shellfish	1274.0	519.0	3993.0	1190.0	13624.0	20600.0
	subtotal	1274.0	519.0	3993.0	1190.0	13624.0	20600.0
Total		**3818.6**	**1308.6**	**11701.0**	**7704.3**	**26109.9**	**50642.4**

Statisics includes all types of farms(licensed, permitted and notified farms).

Table 43. Aquaculture area of marine farmed species in the west coast of Korea in 2002

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	339.5	29.2	286.4	112.1	608.7	1375.9
Crustacean	*Fenneropenaeus chinensis*	63.7	242.2	744.0	407.6	214.5	1672.0
	subtotal	63.7	242.2	744.0	407.6	214.5	1672.0
Shellfish	*Crassostrea gigas*	572.0	186.0	800.0	89.0	834.0	2481.0
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	207.9	0.0	367.3	239.0	90.1	904.3
	Chlamys farreri nipponensis	85.0	2.0	0.0	10.0	39.0	136.0
	Cyclina sinensis	410.0	0.0	110.0	480.0	85.0	1085.0
	Mactra chinensis	0.0	56.0	0.0	0.0	0.0	56.0
	Scapharca subcrenata	0.0	61.0	197.0	386.0	108.0	752.0
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	117.0	177.0	1555.0	1433.0	702.0	3984.0
	Meretrix lusoria	30.0	0.0	51.0	40.0	0.0	121.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	169.0	0.0	170.0	605.0	45.0	989.0
	Mactra veneriformis	20.0	0.0	0.0	60.0	154.0	234.0
	Mytilus spp.	0.0	0.0	37.0	30.0	0.0	67.0
	Other shellfish	0.0	21.0	0.0	0.0	0.0	21.0
	subtotal	1610.9	503.0	3287.3	3372.0	2057.1	10830.3
Seaweed	*Porphyra* spp.	528.0	904.0	3176.0	2410.0	9383.0	16401.0
	Laminaria japonica	50.0	0.0	22.0	0.0	62.0	134.0
	Undaria pinnatifida	47.0	0.0	144.0	0.0	128.0	319.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	10.0	10.0	193.0	213.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	45.0	45.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	625.0	904.0	3352.0	2420.0	9811.0	17112.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	31.0	0.0	0.0	31.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	25.0	0.0	5.0	30.0
	Others	0.0	43.0	1.0	0.0	0.0	44.0
	subtotal	0.0	43.0	57.0	0.0	5.0	105.0
Collective farms	shellfish	1131.0	853.0	4329.0	1204.0	13624.0	21141.0
	subtotal	1131.0	853.0	4329.0	1204.0	13624.0	21141.0
Total		**3770.1**	**2574.4**	**12055.7**	**7515.7**	**26320.3**	**52236.2**

Statisics includes all types of farms(licensed, permitted and notified farms).

Table 44. Aquaculture area of marine farmed species in the west coast of Korea in 2003

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	165.6	22.1	297.4	492.3	598.5	1575.9
Crustacean	*Fenneropenaeus chinensis*	217.0	184.0	435.0	418.0	194.3	1448.3
	subtotal	217.0	184.0	435.0	418.0	194.3	1448.3
Shellfish	*Crassostrea gigas*	184.0	185.0	697.0	89.0	834.0	1989.0
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	173.1	64.0	376.5	243.3	134.5	991.4
	Chlamys farreri nipponensis	85.0	2.0	10.0	10.0	47.0	154.0
	Cyclina sinensis	285.0	61.0	120.0	436.0	85.0	987.0
	Mactra chinensis	0.0	56.0	0.0	0.0	0.0	56.0
	Scapharca subcrenata	0.0	0.0	185.0	386.0	108.0	679.0
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	393.0	247.0	1737.0	1432.0	676.0	4485.0
	Meretrix lusoria	90.0	0.0	51.0	40.0	0.0	181.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	253.0	0.0	158.0	615.0	45.0	1071.0
	Mactra veneriformis	0.0	0.0	34.0	60.0	154.0	248.0
	Mytilus spp.	0.0	0.0	37.0	30.0	0.0	67.0
	Other shellfish	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	1463.1	615.0	3405.5	3341.3	2083.5	10908.4
Seaweed	*Porphyra* spp.	579.0	834.0	3041.0	2436.0	9221.0	16111.0
	Laminaria japonica	56.0	0.0	22.0	0.0	59.0	137.0
	Undaria pinnatifida	69.0	0.0	180.0	0.0	128.0	377.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	10.0	10.0	193.0	213.0
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	45.0	45.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	704.0	834.0	3253.0	2446.0	9646.0	16883.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	19.0	19.0
	Stichopus japonicus	0.0	0.0	23.0	0.0	0.0	23.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	0.0	0.0	5.0	5.0
	Others	0.0	0.0	12.0	1.0	0.0	13.0
	subtotal	0.0	0.0	35.0	1.0	24.0	60.0
Collective farms	shellfish	1591.0	2788.0	4650.0	1204.0	13738.0	23971.0
	subtotal	1591.0	2788.0	4650.0	1204.0	13738.0	23971.0
Total		**4140.7**	**4443.1**	**12075.9**	**7902.6**	**26284.3**	**54846.6**

Statisics includes all types of farms(licensed, permitted and notified farms).

Table 45. Aquaculture area of marine farmed species in the west coast of Korea in 2004

(unit: ha)

Kind	species	Province					
		Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish	subtotal	219.8	33.7	302.9	85.3	555.1	1196.8
Crustacean	*Fenneropenaeus chinensis*	99.3	139.6	752.6	398.4	252.5	1642.4
	subtotal	99.3	139.6	752.6	398.4	252.5	1642.4
Shellfish	*Crassostrea gigas*	488.0	188.0	728.0	89.0	834.5	2327.5
	Rapana venosa	0.0	0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	192.2	61.0	394.3	195.0	312.1	1154.6
	Chlamys farreri nipponensis	95.0	30.0	11.0	10.0	57.0	203.0
	Cyclina sinensis	280.0	61.0	140.0	455.0	85.0	1021.0
	Mactra chinensis	0.0	46.0	0.0	0.0	0.0	46.0
	Scapharca subcrenata	0.0	0.0	145.0	386.0	118.0	649.0
	Solen spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	112.0	247.0	1445.0	1306.0	676.0	3786.0
	Meretrix lusoria	90.0	0.0	51.0	40.0	0.0	181.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	258.0	0.0	168.0	615.0	0.0	1041.0
	Mactra veneriformis	0.0	0.0	18.0	60.0	154.0	232.0
	Mytilus spp.	0.0	0.0	40.0	20.0	0.0	60.0
	Other shellfish	0.0	0.0	0.0	0.0	3.0	3.0
	subtotal	1515.2	633.0	3140.3	3176.0	2239.6	10704.1
Seaweed	*Porphyra* spp.	427.0	799.0	3155.0	2552.0	9108.0	16041.0
	Laminaria japonica	83.0	0.0	27.0	0.0	155.5	265.5
	Undaria pinnatifida	49.0	0.0	180.0	0.0	118.0	347.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	0.0	0.0	10.0	10.0	192.5	212.5
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	0.0	0.0	0.0	0.0	47.0	47.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	559.0	799.0	3372.0	2562.0	9621.0	16913.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0
	Stichopus japonicus	0.0	0.0	25.0	50.0	0.0	75.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	0.0	0.0	0.0	0.0	0.0	0.0
	Others	16.2	0.0	6.0	12.5	7.5	42.2
	subtotal	16.2	0.0	31.0	62.5	7.5	117.2
Collective farms	shellfish	1638.0	3621.0	4576.0	1361.0	13945.0	25141.0
	subtotal	1638.0	3621.0	4576.0	1361.0	13945.0	25141.0
Total		**4047.5**	**5226.3**	**12174.8**	**7645.2**	**26620.7**	**55714.5**

Statisics includes all types of farms(licensed, permitted and notified farms).

- Changes in aquaculture area of marine farmed species for last 10 years

Table 46, Aquaculture area of marine farmed species in the west coast of Korea for last 10 years (unit: ha)

Kind	species	years									
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Finfish	subtotal	1003.0	1105.0	1142.8	1194.8	1252.1	1156.3	1259.5	1375.9	1575.9	1196.8
Crustacean	*Fenneropenaeus chinensis*	1149.0	1358.0	1099.0	1156.0	960.0	1040.0	1420.6	1672.0	1448.3	1642.4
	subtotal	1149.0	1358.0	1099.0	1156.0	960.0	1040.0	1420.6	1672.0	1448.3	1642.4
Shellfish	*Crassostrea gigas*	1452.0	1672.0	1760.0	1856.3	1864.1	2079.8	2270.8	2481.0	1989.0	2327.5
	Rapana venosa	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
	Haliotis discus hannai	634.0	580.0	625.0	792.0	752.0	904.0	870.5	904.3	991.4	1154.6
	Chlamys farreri nipponensis	12.0	493.0	80.0	110.0	106.0	167.0	166.0	136.0	154.0	203.0
	Cyclina sinensis	869.0	914.0	881.0	951.0	957.0	1007.0	1059.0	1085.0	987.0	1021.0
	Mactra chinensis	0.0	0.0	0.0	46.0	46.0	56.0	20.0	56.0	56.0	46.0
	Scapharca subcrenata	647.0	657.0	583.5	617.5	729.5	789.5	754.5	752.0	679.0	649.0
	Solen spp.	0.0	0.0	0.0	0.0	90.0	0.0	0.0	0.0	0.0	0.0
	Ruditapes philippinarum	4882.0	3528.0	3287.5	3160.0	3446.0	3555.0	3665.0	3984.0	4485.0	3786.0
	Meretrix lusoria	231.0	51.0	205.0	91.0	91.0	170.0	121.0	121.0	181.0	181.0
	Atrina pectinata	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Scapharca broughtonii	239.0	294.0	702.0	867.0	794.0	832.0	942.0	989.0	1071.0	1041.0
	Mactra veneriformis	233.0	185.0	0.0	143.5	154.0	214.0	234.0	234.0	248.0	232.0
	Mytilus spp.	275.0	200.0	210.0	210.0	120.0	55.0	87.0	67.0	67.0	60.0
	Other shellfish	0.0	0.0	0.0	0.0	90.0	0.0	0.0	21.0	0.0	3.0
	subtotal	9474.0	8574.0	8334.0	8844.3	9149.6	9829.3	10189.8	10830.3	10908.4	10704.1
Seaweed	*Porphyra* spp.	19695.0	18055.0	17605.0	17203.0	16806.0	16643.0	16328.0	16401.0	16111.0	16041.0
	Laminaria japonica	57.0	57.0	58.0	58.0	80.0	72.0	74.0	134.0	137.0	265.5
	Undaria pinnatifida	232.0	213.0	215.0	215.0	275.0	295.0	317.0	319.0	377.0	347.0
	Gelidium amansii	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gigartina spp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Codium fragile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hizikia fusiforme	105.0	152.0	167.0	167.0	190.0	212.5	222.5	213.0	213.0	212.5
	Enteromorpha spp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sargassum fulvellum	32.0	64.0	54.0	54.0	39.0	39.0	44.0	45.0	45.0	47.0
	Other seaweeds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	subtotal	20121.0	18541.0	18099.0	17697.0	17390.0	17261.5	16985.5	17112.0	16883.0	16913.0
Others	*Halocynthia roretzi*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	0.0
	Stichopus japonicus	116.0	116.0	9.0	9.0	13.0	13.0	31.0	31.0	23.0	75.0
	Styela clava	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	polychaetes	68.0	68.0	67.5	67.5	45.0	30.0	30.0	30.0	5.0	0.0
	Others	0.0	0.0	0.0	0.0	1.0	1.0	126.0	44.0	13.0	42.2
	subtotal	184.0	184.0	76.5	76.5	59.0	44.0	187.0	105.0	60.0	117.2
Collective farms	shellfish	ND	ND	ND	ND	ND	ND	20600.0	21141.0	23971.0	25141.0
	subtotal	ND	ND	ND	ND	ND	ND	20600.0	21141.0	23971.0	25141.0
	Total	**31931.0**	**29762.0**	**28751.3**	**28968.6**	**28810.7**	**29331.1**	**50642.4**	**52236.2**	**54846.6**	**55714.5**

Table 47. Summary of aquaculture area in the west coast of Korea for last 10 years

(unit: ha)

Kind	Year									
	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Finfish	1003.0	1105.0	1142.8	1194.8	1252.1	1156.3	1259.5	1375.86	1575.9	1196.8
Crustacean	1149.0	1358.0	1099.0	1156.0	960.0	1040.0	1420.6	1672.0	1448.3	1642.4
Shellfish	9474.0	8574.0	8334.0	8844.3	9149.6	9829.3	10189.8	10830.3	10908.4	10704.1
Seaweed	20121.0	18541.0	18099.0	17697.0	17390.0	17261.5	16985.5	17112.0	16883.0	16913.0
Others	184.0	184.0	76.5	76.5	59.0	44.0	187.0	105.0	60.0	117.2
Collective farms	ND	ND	ND	ND	ND	ND	20600.0	21141.0	23971.0	25141.0
Total	**31931.0**	**29462.0**	**28751.3**	**28968.6**	**28810.7**	**29331.1**	**50642.4**	**52236.2**	**54846.6**	**55714.5**

- Annual change of aquaculture methods (habitats) of marine farmed organisms from 1995 to 2004

Table 48. Aquaculture methods of the west coast of Korea in 1995 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	**Gyeonggi**	**Chungnam**	**Jeonbuk**	**Jeonnam**	**total**
Finfish		Land-based tank culture						
		Pond culture	105.0	1.0	217.0	258.0	241.0	822.0
		Cage culture	3.0	3.0	74.0	20.0	81.0	181.0
		Other methods						
		subtotal	108.0	4	291	278	322	1003
Crustacean		Pond culture	95.0	18.0	951.0	64.0	21.0	1149
		subtotal	95	18	951	64	21	1149
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	435.0	300.0	2711.0	4788.0	1240.0	9474
Seaweed		Floating net method	814.0	719.0	4388.0	5097.0	8677.0	19695.0
		Long-lined method	22.0	0.0	22.0	70.0	175.0	289.0
		Other methods	0.0	0.0	0.0	0.0	137.0	137.0
		subtotal	836.0	719.0	4410.0	5167.0	8989.0	20121.0
Others	Sea cucumber	Pond culture	0.0	0.0	21.0	95.0	0.0	116.0
	Polychaetes	Pond culture	0.0	0.0	40.0	0.0	28.0	68.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	0.0	0.0	0.0	0.0
		subtotal	0.0	0.0	61.0	95.0	28.0	184.0
Collective farms		Bottom culture	ND	ND	ND	ND	13790.0	13790.0
		subtotal	ND	ND	ND	ND	13790.0	13790.0
Total			**1474.0**	**1041.0**	**8424.0**	**10392.0**	**24390.0**	**45721.0**

Note. Local government collected data on total area of shellfish, not each shellfish species except 2004. In 2004 only, they have data on farmed area of each shellfish species

Table 49. Aquaculture methods of the west coast of Korea in 1996 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture						
		Pond culture	105.0	1.0	205.0	337.0	280.0	928.0
		Cage culture	6.0	3.0	65.0	22.0	81.0	177.0
		Other methods						
		subtotal	111.0	4.0	270.0	359.0	361.0	1105.0
Crustacean		Pond culture	211.0	27.0	955.0	135.0	30.0	1358.0
		subtotal	211.0	27.0	955.0	135.0	30.0	1358.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	475.0	711.0	2906.0	3159.0	1323.0	8574.0
Seaweed		Floating net method	708.0	719.0	3445.0	4360.0	8823.0	18055.0
		Long-lined method	46.0	0.0	42.0	40.0	142.0	270.0
		Other methods	0.0	0.0	0.0	0.0	216.0	216.0
		subtotal	754	719	3487	4400	9181	18541.0
Others	Sea cucumber	Pond culture	0.0	0.0	21.0	95.0	0.0	116.0
	Polychaetes	Pond culture	0.0	0.0	40.0	0.0	28.0	68.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	0.0	0.0	0.0	0.0
		subtotal	0.0	0.0	61.0	95.0	28.0	184.0
Collective farms		Bottom culture	ND	ND	ND	ND	11933.0	11933.0
		subtotal	ND	ND	ND	ND	11933.0	11933.0
Total			**1551.0**	**1461.0**	**7679.0**	**8148.0**	**22856.0**	**41695.0**

Table 50. Aquaculture methods of the west coast of Korea in 1997 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture						
		Pond culture	69.0	27.0	211.0	340.0	293.0	940.0
		Cage culture	6.0	9.0	72.0	21.0	94.8	202.8
		Other methods						
		subtotal	75.0	36.0	283.0	361.0	387.8	1142.8
Crustacean		Pond culture	223.0	0.0	780.0	77.0	19.0	1099.0
		subtotal	223.0	0.0	780.0	77.0	19.0	1099.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	657.0	254.0	2691.0	3086.0	1646.0	8334.0
Seaweed		Floating net method	788.0	779.0	3844.0	2825.0	9369.0	17605.0
		Long-lined method	47.0	0.0	42.0	40.0	144.0	273.0
		Other methods	0.0	0.0	0.0	0.0	221.0	221.0
		subtotal	835.0	779.0	3886.0	2865.0	9734.0	18099.0
Others	Sea cucumber	Pond culture	0.0	0.0	9.0	0.0	0.0	9.0
	Polychaetes	Pond culture	0.0	0.0	40.0	0.0	27.5	67.5
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	0.0	0.0	0.0	0.0
		subtotal	0.0	0.0	49.0	0.0	27.5	76.5
Collective farms		Bottom culture	ND	ND	ND	ND	12376.0	12376.0
		subtotal	ND	ND	ND	ND	12376.0	12376.0
Total			**1790.0**	**1069.0**	**7689.0**	**6389.0**	**24190.3**	**41127.3**

Table 51. A**quaculture** methods of the **west coast of Korea** in 1998 **(unit: ha)**

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture						
		Pond culture	35.0	27.0	211.0	376.0	351.6	1000.6
		Cage culture	6.0	6.0	74.0	26.0	82.2	194.2
		Other methods						
		subtotal	41.0	33.0	285.0	402.0	433.8	1194.8
Crustacean		Pond culture	231.0	0.0	783.0	123.0	19.0	1156.0
		subtotal	231.0	0.0	783.0	123.0	19.0	1156.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	760.0	338.0	2801.0	3083.0	1862.3	8844.3
Seaweed		Floating net method	770.0	338.0	3791.0	2814.0	9490.0	17203.0
		Long-lined method	47.0	0.0	47.0	40.0	139.0	273.0
		Other methods	0.0	0.0	0.0	0.0	221.0	221.0
		subtotal	817.0	338.0	3838.0	2854.0	9850.0	17697.0
Others	Sea cucumber	Pond culture	0.0	0.0	9.0	0.0	0.0	9.0
	Polychaetes	Pond culture	0.0	0.0	40.0	0.0	27.5	67.5
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	0.0	0.0	0.0	0.0
		subtotal	0.0	0.0	49.0	0.0	27.5	76.5
Collective farms		Bottom culture	ND	ND	ND	ND	12067.0	12067.0
		subtotal	ND	ND	ND	ND	12067.0	12067.0
Total			**1849.0**	**709.0**	**7756.0**	**6462.0**	**24259.6**	**41035.6**

Table 52. Aquaculture methods of the west coast of Korea in 1999 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture						
		Pond culture	62.0	27.0	156.0	386.0	377.6	1008.6
		Cage culture	15.0	3.0	95.0	19.0	111.5	243.5
		Other methods						0.0
		subtotal	77.0	30.0	251.0	405.0	489.1	1252.1
Crustacean		Pond culture	221.0	0.0	647.0	73.0	19.0	960.0
		subtotal	221.0	0.0	647.0	73.0	19.0	960.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	773.0	306.0	2838.0	3255.0	1977.6	9149.6
Seaweed		Floating net method	746.0	338.0	3733.0	2544.0	9445.0	16806.0
		Long-lined method	47.0	0.0	117.0	30.0	161.0	355.0
		Other methods	0.0	0.0	0.0	0.0	229.0	229.0
		subtotal	793.0	338.0	3850.0	2574.0	9835.0	17390.0
Others	Sea cucumber	Pond culture	0.0	0.0	13.0	0.0	0.0	13.0
	Polychaetes	Pond culture	0.0	0.0	30.0	0.0	15.0	45.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	1.0	0.0	0.0	1.0
		subtotal	0.0	0.0	44.0	0.0	15.0	59.0
Collective farms		Bottom culture	ND	ND	ND	ND	12557.0	12557.0
		subtotal	ND	ND	ND	ND	12557.0	12557.0
Total			**1864.0**	**674.0**	**7630.0**	**6307.0**	**24892.7**	**41367.7**

Table 53. Aquaculture methods of the west coast of Korea in 2000 (unit: ha**)**

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture						
		Pond culture	167.0	21.0	167.0	156.0	377.5	888.5
		Cage culture	7.0	7.0	100.0	13.0	140.8	267.8
		Other methods						
		subtotal	174.0	28.0	267.0	169.0	518.3	1156.3
Crustacean		Pond culture	98.0	6.0	636.0	281.0	19.0	1040.0
		subtotal	98.0	6.0	636.0	281.0	19.0	1040.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	1132.0	373.0	2929.0	3321.0	2074.3	9829.3
Seaweed		Floating net method	583.0	430.0	3714.0	2523.0	9393.0	16643.0
		Long-lined method	67.0	0.0	117.0	0.0	183.0	367.0
		Other methods	0.0	0.0	0.0	0.0	251.5	251.5
		subtotal	650.0	430.0	3831.0	2523.0	9827.5	17261.5
Others	Sea cucumber	Pond culture	0.0	0.0	13.0	0.0	0.0	13.0
	Polychaetes	Pond culture	0.0	0.0	30.0	0.0	0.0	30.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	1.0	0.0	0.0	1.0
		subtotal	0.0	0.0	44.0	0.0	0.0	44.0
Collective farms		Bottom culture	ND	ND	ND	ND	13037.4	13037.4
		subtotal	ND	ND	ND	ND	13037.4	13037.4
Total			**2054.0**	**837.0**	**7707.0**	**6294.0**	**25476.5**	**42368.5**

Table 54. Aquaculture methods of the west coast of Korea in 2001 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture	1.8	0.0	0.5	2.6	15.2	20.1
		Pond culture	178.4	21.0	173.8	158.2	418.2	949.6
		Cage culture	7.0	7.0	116.0	16.0	143.8	289.8
		Other methods						
		subtotal	187.2	28.0	290.3	176.8	577.2	1259.5
Crustacean		Pond culture	201.2	121.6	667.4	384.5	45.9	1420.6
		subtotal	201.2	121.6	667.4	384.5	45.9	1420.6
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	1553.2	145.0	3143.3	3318.0	0.0	8159.5
Seaweed		Floating net method	534.0	370.0	3411.0	2625.0	9388.0	16328.0
		Long-lined method	69.0	0.0	139.0	0.0	183.0	391.0
		Other methods	0.0	0.0	0.0	10.0	256.5	266.5
		subtotal	603.0	370.0	3550.0	2635.0	9827.5	16985.5
Others	Sea cucumber	Pond culture	0.0	0.0	31.0	0.0	0.0	31.0
	Polychaetes	Pond culture	0.0	0.0	25.0	0.0	5.0	30.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	125.0	1.0	0.0	0.0	126.0
		subtotal	0.0	125.0	57.0	0.0	5.0	187.0
Collective farms		Bottom culture	1274.0	519.0	3993.0	1190.0	13624.0	20600.0
		subtotal	1274.0	519.0	3993.0	1190.0	13624.0	20600.0
Total			**3818.6**	**1308.6**	**11701.0**	**7704.3**	**24079.6**	**48612.1**

Table 55. Aquaculture methods of the west coast of Korea in 2002 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture	2.4	0.4	0.5	2.1	24.0	29.4
		Pond culture	332.1	21.8	166.8	95.0	439.8	1055.5
		Cage culture	5.0	7.0	119.0	15.0	145.0	291.0
		Other methods						
		subtotal	339.5	29.2	286.3	112.1	608.7	1375.9
Crustacean		Pond culture	63.7	242.2	744.0	407.6	214.5	1672.0
		subtotal	63.7	242.2	744.0	407.6	214.5	1672.0
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	1610.9	503.0	3287.3	3372.0	2057.1	10830.3
Seaweed		Floating net method	528.0	904.0	3176.0	2410.0	9383.0	16401.0
		Long-lined method	97.0	0.0	166.0	0.0	190.0	453.0
		Other methods	0.0	0.0	10.0	10.0	238.0	258.0
		subtotal	625.0	904.0	3352.0	2420.0	9811.0	17112.0
Others	Sea cucumber	Pond culture	0.0	0.0	31.0	0.0	0.0	31.0
	Polychaetes	Pond culture	0.0	0.0	25.0	0.0	5.0	30.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	43.0	1.0	0.0	0.0	44.0
		subtotal	0.0	43.0	57.0	0.0	5.0	105.0
Collective farms		Bottom culture	1131.0	853.0	4329.0	1204.0	13624.0	21141.0
		subtotal	1131.0	853.0	4329.0	1204.0	13624.0	21141.0
Total			**3770.1**	**2574.4**	**12055.6**	**7515.7**	**26320.3**	**52236.2**

Table 56. Aquaculture methods of the west coast of Korea in 2003 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture	0.6	0.0	0.4	1.3	24.8	27.1
		Pond culture	160.0	15.1	179.0	455.0	427.8	1236.9
		Cage culture	5.0	7.0	118.0	36.0	146.0	312.0
		Other methods						
		subtotal	165.6	22.1	297.4	492.3	598.5	1575.9
Crustacean		Pond culture	217.0	184.0	435.0	418.0	194.3	1448.3
		subtotal	217.0	184.0	435.0	418.0	194.3	1448.3
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	ND	ND	ND	ND	ND	ND
		Bottom culture(clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND
		cage culture(abalone)	ND	ND	ND	ND	ND	ND
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND
		subtotal	1463.1	615.0	3405.5	3341.3	2083.5	10908.4
Seaweed		Floating net method	579.0	834.0	3041.0	2436.0	9221.0	16111.0
		Long-lined method	125.0	0.0	202.0	0.0	187.0	514.0
		Other methods	0.0	0.0	10.0	10.0	238.0	258.0
		subtotal	704.0	834.0	3253.0	2446.0	9646.0	16883.0
Others	Sea cucumber	Pond culture	0.0	0.0	23.0	0.0	0.0	23.0
	Polychaetes	Pond culture	0.0	0.0	0.0	0.0	5.0	5.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	12.0	1.0	19.0	32.0
		subtotal	0.0	0.0	35.0	1.0	24.0	60.0
Collective farms		Bottom culture	1591.0	2788.0	4650.0	1204.0	13738.0	23971.0
		subtotal	1591.0	2788.0	4650.0	1204.0	13738.0	23971.0
Total			**4140.7**	**4443.1**	**12075.9**	**7902.6**	**26284.3**	**54846.6**

Table 57. Aquaculture methods of the west coast of Korea in 2004 (unit: ha)

Kind		Habitat(methods)	Province					
			Incheon	Gyeonggi	Chungnam	Jeonbuk	Jeonnam	total
Finfish		Land-based tank culture	0.1	0.4	0.4	0.3	23.6	24.8
		Pond culture	214.7	26.3	184.5	77.0	387.2	889.7
		Cage culture	5.0	7.0	118.0	8.0	144.3	282.3
		Other methods						
		subtotal	219.8	33.7	302.9	85.3	555.1	1196.8
Crustacean		Pond culture	99.3	139.6	752.6	398.4	252.5	1642.4
		subtotal	99	140	753	398	252.5	1642.4
Shellfish		Hanging culture (scallop, oyester, abalone, mussel etc)	187.0	163.0	313.0	10.0	191.5	864.5
		Bottom culture(clam, oyster, abalone etc)	1309.0	470.0	2822.0	3165.0	1883.5	9649.5
		cage culture(abalone)	19.0	0.0	5.0	1.0	137.0	162.0
		Land-based tank culture(abalone)	0.2	0.0	0.3	0.0	27.6	28.1
		subtotal	1515	633	3140	3176	2239.6	10704.1
Seaweed		Floating net method	427.0	799.0	3155.0	2552.0	9108.0	16041.0
		Long-lined method	132.0	0.0	207.0	0.0	273.5	612.5
		Other methods	0.0	0.0	10.0	10.0	239.5	259.5
		subtotal	559	799	3372	2562	9621.0	16913.0
Others	Sea cucumber	Pond culture	0.0	0.0	25.0	50.0	0.0	75.0
	Polychaetes	Pond culture	0.0	0.0	0.0	0.0	0.0	0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0
	Others		16.2	0.0	6.0	12.5	7.4	42.1
		subtotal	16	0	31	63	7.4	117.1
Collective farms		Bottom culture	1638.0	3621.0	4576.0	1361.0	13945.0	25141.0
		subtotal	1638	3621	4576	1361	13945.0	25141.0
Total			**4047.5**	**5226.3**	**12174.8**	**7645.2**	**26620.6**	**55714.4**

- Changes of aquaculture methods of marine farmed organisms during last 10 years

Table 58. Overview of aquaculture methods (habitats) in the west coast of Korea for last 10 years (unit: ha)

Kind		Habitat(methods)	Year										
			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	total
Finfish		Land-based tank culture							20.1	29.4	27.1	24.8	101.3
		Pond culture	822.0	928.0	940.0	1000.6	1008.6	888.5	949.6	1055.5	1236.9	889.7	9719.3
		Cage culture	181.0	177.0	202.8	194.2	243.5	267.8	289.8	291.0	312.0	282.3	2441.4
		Other methods											
		subtotal	1003.0	1105.0	1142.8	1194.8	1252.1	1156.3	1259.5	1375.9	1575.9	1196.8	12262.1
Crustacean		Pond culture	1149.0	1358.0	1099.0	1156.0	960.0	1040.0	1420.6	1672.0	1448.3	1642.4	12945.3
		subtotal	1149.0	1358.0	1099.0	1156.0	960.0	1040.0	1420.6	1672.0	1448.3	1642.4	12945.3
Shellfish		Hanging culture (scallop, oyester, abalone, mussel)	ND	ND	ND	ND	ND	ND	ND	ND	ND	864.5	864.5
		Bottom culture (clam, oyster, abalone etc)	ND	ND	ND	ND	ND	ND	ND	ND	ND	9649.5	9649.5
		cage culture(abalone)	ND	ND	ND	ND	ND	ND	ND	ND	ND	162.0	162.0
		Land-based tank culture(abalone)	ND	ND	ND	ND	ND	ND	ND	ND	ND	28.1	28.1
		subtotal	9474.0	8574.0	8334.0	8844.3	9149.6	9829.3	10189.8	10830.3	10908.4	10704.1	96837.8
Seaweed		Floating net method	19695.0	18055.0	17605.0	17203.0	16806.0	16643.0	16328.0	16401.0	16111.0	16041.0	170888.0
		Long-lined method	289.0	270.0	273.0	273.0	355.0	367.0	391.0	453.0	514.0	612.5	3797.5
		Other methods	137.0	216.0	221.0	221.0	229.0	251.5	266.5	258.0	258.0	259.5	2317.5
		subtotal	20121.0	18541.0	18099.0	17697.0	17390.0	17261.5	16985.5	17112.0	16883.0	16913.0	177003.0
Others	Sea cucumber	Pond culture	116.0	116.0	9.0	9.0	13.0	13.0	31.0	31.0	23.0	75.0	436.0
	Polychaetes	Pond culture	68.0	68.0	67.5	67.5	45.0	30.0	30.0	30.0	5.0	0.0	411.0
	sea urchin	Bottome culture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Others		0.0	0.0	0.0	0.0	1.0	1.0	126.0	44.0	32.0	42.1	246.1
		subtotal	184.0	184.0	76.5	76.5	59.0	44.0	187.0	105.0	60.0	117.1	1093.1
Collective farms		Bottom culture	13790.0	11933.0	12376.0	12067.0	12557.0	13037.4	20600.0	21141.0	23971.0	25141.0	166613.4
		subtotal	13790.0	11933.0	12376.0	12067.0	12557.0	13037.4	20600.0	21141.0	23971.0	25141.0	166613.4
Total			**45721.0**	**41695.0**	**41127.3**	**41035.6**	**41367.7**	**42368.5**	**50642.4**	**52236.2**	**54846.6**	**55714.4**	**466754.7**

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13 ANNEX

13.1 Persons for Data Collection:

- Fisheries

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- Mariculture

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- Socio-economic

Dr. Gab Yong Jeong and Hyo Jung Kim, Korean Maritime Institute

Dr. Do Hun Kim, NFRDI

Dr. Gyu Jin Seok, MOMAF

13.2 List of species names in Korean

- Fisheries

Table 59. List of fish species name of Korean fisheries

Kind	Scientific Name	Common Name	Korean Name	Chinese Name
Fish	*Larimichthys polyactis*	Small yellow croaker	참조기	
	Scomberomorus niphonius	Spanish mackerel	삼치	
	Engraulis japonicus	Anchovy	멸치	
	Scomber japonicus	Chub mackerel	고등어	
	Trichiurus lepturus	Largehead hairtail	갈치	
	Clupea pallasii	Pacific herring	청어	
	Ammodytes personatus	Sandlance	까나리	
	Acetes chinensis And *A. japonicus*	Acetes	젓새우	
	Fenneropenaeus chinensis	Fleshy prawn	대하	
	Todarodes pacificus, *Loligo* sp. And *Sepia* sp.	Squids	오징어	

- Mariculture

Table 60. List of fish species name of Korean mariculture

Kind	Scientific name	common name	Korean name	Chinese name
Fish	*Paralichthys olivaceus*	oliver founder	넙 치 류	
	Lateolabrax spp.	sea bass	농어류	
	Epinephelus septemfasciatus	seven-band grouper	능 성 어	
	Acanthopagrus schlegelii	black sea bream	감 성 돔	
	Oplegnathus fasciatus	rock bream	돌 돔	
	Pagrus major	red sea bream	참 돔	
	Other sea breams	other sea bream	기타돔류	
	Miichthys miiuy	brown croaker	민 어	
	Sciaenops ocellatus	red drum	홍 민 어	
	Seriola quinqueradiata	yellow tail	방 어	
	Takifugu spp.	puffers	복 어 류	
	Sebastes schlegeli	jacopever	조피볼락	
	Other rock fishes	other rock fishes	기타볼락	
	Mugil spp.	mullets	숭 어 류	
	Pleurogrammus azonus	Atka mackerel	임연수어	
	Konosirus punctatus	dotted gizzard shad	전 어	
	Stephanolepis sp.; Thamnaconus sp	file fishes	쥐 치 류	
	Other fishes	other fishes	기타어류	
			subtotal	
Crustaceans	*Fenneropenaeus chinensis*	Fleshy prawn	대하	
	Marsupenaeus japonicus	Kuruma prawn	보리새우	
			subtotal	
Shellfish	*Crassostrea gigas*	Pacific oyester	굴	
	Rapana venosa	Murex shell	소라고둥	
	Haliotis discus hannai	abalone	전 복	
	Chlamys farreri nipponensis	scallop	가 리 비	
	Cyclina sinensis	Venus clam	가 무 락	
	Mactra chinensis	Chinese mactra	개량조개	
	Scapharca subcrenata	granular ark	고 막	
	Solen spp.	Gould's jacknife clam	맛 류	
	Ruditapes philippinarum	short necked clam	바 지 락	
	Meretrix lusoria	hard clam	백 합	
	Atrina pectinata	comb pen shell	키 조 개	
	Scapharca broughtonii	ark shell	피 조 개	
	Mactra veneriformis	surf clam	동 죽	
	Mytilus spp.	hard shelled mussel	홍 합	
	Others	other shellfishes	기타패류	
			subtotal	
Seaweeds	*Porphyra spp.*	laver	김류	
	Laminaria japonica	kelp	다시마류	
	Undaria pinnatifida	sea mustard	미 역	
	Gelidium amansii	Agar agar	우무가사리	
	Gigartina spp.	other agars	기타가사리	
	Codium fragile	sea staghorn	청 각	
	Hizikia fusiforme	fusiforme	톳	
	Enteromorpha spp.	sea lattuce	파 래	
	Sargassum fulvellum	gulf weed	모자반	
	Others	other seaweeds	기타해조류	
			subtotal	
Others	*Halocynthia roretzi*	sea squirt	우렁쉥이	
	Stichopus japonicus	sea cucumber	해삼	
	Styela clava	tunicates	미더덕	
		polychaetes	갯지렁이	