

Scoping Out : Indonesian Blue Swimming Crab Fisheries



Sustainable Fisheries Partnership November 2009

Highlights:

- In 2007, Indonesia contributed to 16.3% or 28 thousands t of total global blue swimming crab landings, making it the third biggest producer of blue swimming crab in the world, following China (41%), and Philippines (20%). Thailand is following closely with total 27.8 thousand t production (FISHSTAT-FAO).¹
- North Java has been the major catching areas for blue swimming crab in Indonesia, contributing to about 28% of total production in period 1990-2006, followed by East Sumatra (21%), South Sulawesi (21%) and Malacca Strait (14%) [MMAF-DG of Capture Fisheries, various years].
- The trend in volume landed by regions in Indonesia show clearly the upward trend up to the mid 90s, and then fluctuated from that point. Starting the year 2000 the fluctuation was more pronounced, and for some regions the trend was clearly declining (*e.g.* Malacca Strait). The patterns of landings have shifted over the years. During the early 1990s, landings from North Java and South Sulawesi dominated, with also significant landings in the Malacca Strait area. During the mid 1990s up to 2000, Malacca Strait and East Sumatra landings gained in volume, while North Java landings were remain stable.
- Blue swimming crab (or locally known as '*rajungan*') has been one of the important fishery export commodities in Indonesia, despite no specific management yet in place to regulate this fishery. The export of blue swimming crab had just started around 1994–1998 due to increase demand from overseas, especially from the United States. Prior to this year, this commodity was only consumed locally and the price was also very low.
- In terms of export value, crab contributes to about 8% of total Indonesian fishery products export, valued at US\$ 178 million in 2007, jumped by 33% from pervious year.² Crab products have been the third biggest fishery product that contributed to total Indonesian export value, following shrimp (46%) and tuna (14%). Total crab export amounted to 21,510 tonnes in 2007. This crab export consists of non frozen crab (82%), canned crab (11%) and frozen crab (7%) [MMAF and JICA 2009].

¹The official FAO data is slightly different from Indonesian government data. MMAF and JICA (2009) shows that total production of blue swimming crab in 2007 reached 30,421 t.

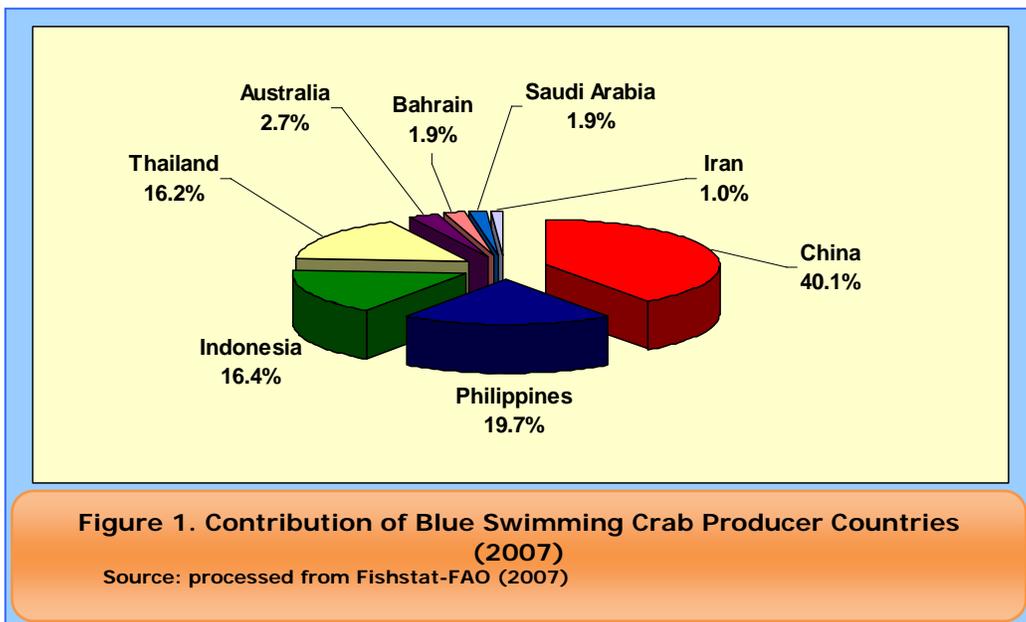
² This number is considerably underestimated; total value export of crab to US only in 2007 was US\$ 169.5 million from 11,043 tonnes crab (Department of Commerce, United States of America).

- United States (US) has been the biggest market for Indonesian crab export, contributing to more than 50% of total crab export from Indonesia, followed by Singapore (17%), Malaysia (10%), Taiwan (7%), European Union (6%), China (5%) and Japan (2%) [MMAF 2005].
- Data from Globefish (2007) shows that in 2004, global prepared and preserved crabs export was about 57 thousands t, valued at US\$ 473 million. China has been the biggest crab supplier for this type of crab product, contributing about 37% of total prepared and preserved crab export in the world, followed by Indonesia with 18% or closed to 10 thousands t, valued at US\$ 41.9 million.
- For 2008, total US crab import from Indonesia was 9,372 tonnes, a decrease by 15% from previous year, which was 11,403 tonnes. However, in term of value, US crab import from Indonesia increase by 6% from US\$ 169 million in 2007 to US\$ 179 million in 2008. Crabmeat swimming contributed to 85% of total US crab import from Indonesia. Other crab products imported to US market from Indonesia were crab and crabmeat NSPF (Not Specified). More than 85% of crab imported to US from Indonesia was in ATC (Air Tight Container) or canned, while another 10% was frozen and other 5% was other preparations (Department of Commerce, United States of America).
- Indonesia is the leading supplier for crabmeat swimming to US market, contributing to 31% of total crabmeat swimming import to US in 2008, followed by China (24.7%), Thailand (13%), Vietnam (11%) and Philippines (7.3%) [NMFS – Foreign Trade Data Base].
- More than 90% of crabmeat swimming exported to US from Indonesia is in ATC. Indonesia's export of crabmeat swimming to US market decreased by 10% from 8,896 tonnes in 2007 to 7,950 tonnes in 2008. However, in terms of value, Indonesia's crabmeat swimming export to US market increase by 10%, from US\$ 141 million in 2007 to US\$ 156,637 in 2008.
- U.S. custom report listed 28 Indonesian crab exporters to U.S. market in 2008. The biggest crab exporters from Indonesia are Phillips Seafoods Indonesia, Tonga Tiur Putra, Windika Utama, Kelola Mina Laut, Mina Global Mandiri, Bumi Menara Internusa, Toba Surimi, Nuansa Citpta Magello, Dahlia Mitra Global and Rex Canning. All together contribute to more than 80% of total crab export from Indonesia to US. In general, the exporters are also playing roles as processors. In 2007, an association of Indonesian Blue Swimming Crab (BSC) Processors (APRI) was formed, with the goal of sustainable procurement from healthy stocks. The members represent over 80% of all crab exported from Indonesia.
- Association (APRI) has undertaken a Marine Stewardship Council (MSC) pre-assessment using MRAG as the assessor in April 2009. Based on the assessment, the Indonesia Blue Swimming Crab is not recommended to move to MSC Full Assessment by now due to: insufficient information of stock status, no sufficient information regard to impacts of this fishery to other species or ecosystem and lack of management.
- A comprehensive population stock assessment is not available for Blue Swimming Crab (BSC) at all geographic scale level (national or sub-national level). Most of biological research have focused on the individual life-cycle of the species, as well as aspects of environmental condition and breeding, all geared toward the improving the potential for BSC culture.
- However, there are some indications that overfishing of blue swimming crab is occurring in some regions. In many landing areas, even small crabs (150 crabs

per kg) are being caught and harvested. Anecdotal evidence indicate that during the late 1990s fishermen in the northern coast of West Java can capture 100-200 kg each day, whereas in 2006 they obtain much less, only 5 to 10 crabs even though they have placed an equivalent of 5 km of netting (Antara, 2006). Similar condition is faced by fishermen in Takalar, South Sulawesi. In 2000 they were able to obtain larger sizes (4-5 crabs per kg), in 2004 the common practice is 7-10 crabs per kg (Kompas, 10 May 2006).

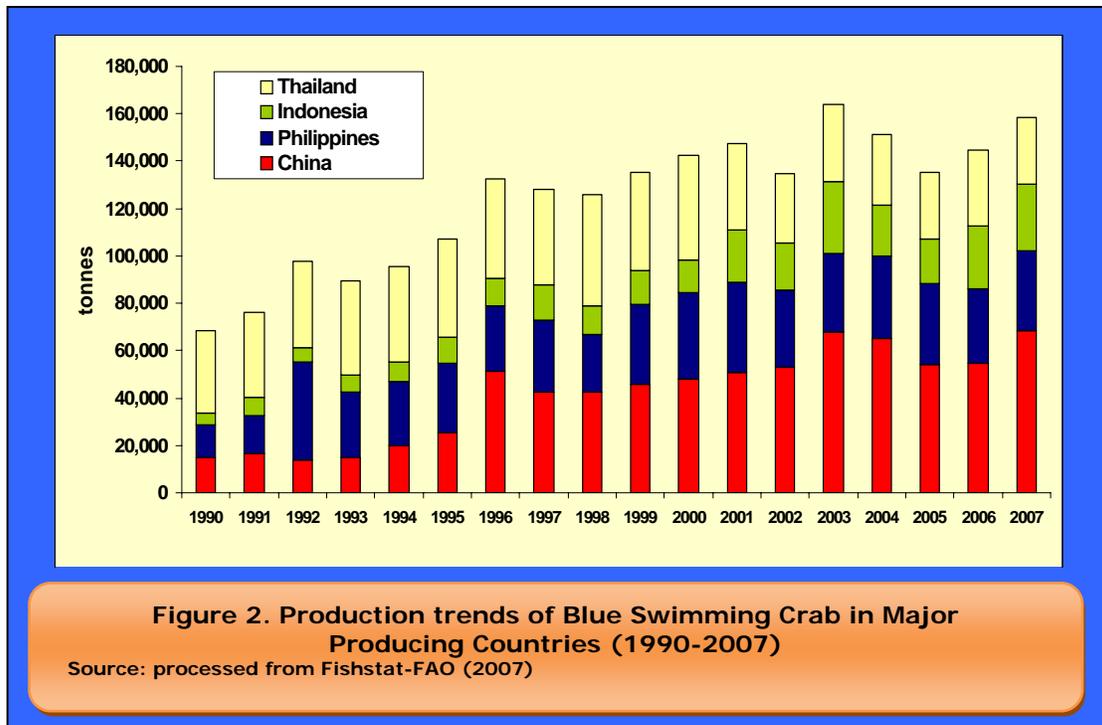
- Declining composition can also be seen at the exporter or wholesale buyer level. The special and, most notably, lump meats have increased in proportion of total meats being processed. This is a rough indication that meats are coming from smaller sized crabs, which, in turn, show that harvests consist of roughly smaller sized crabs than in previous years.
- In Indonesia, the crab is mostly caught by the collapsible traps and bottom gillnets. In terms of ratio of bycatch, the composition is similar between using gillnets or traps. In both gears, blue swimming crabs contribute 30% of total catch, while bycatch make up the remaining 70%. In terms of number of bycatch species caught, bottom gillnets catch more species than trap. In trap, almost all the bycatch species that are not used by the fishers are thrown back to the sea, therefore these species have relatively high survival rates. In bottom gillnets, the fishers discard their bycatch on shore upon landing, at this point, discards have a low chance of surviving.
- However, although relatively small in size, the use of draggers such as baby trawlers or shallow bottom mini trawls in blue swimming crab fishery has also been increasing and becoming serious concerns, especially in North Java. The main negative environmental impact from the use of trawls is the large amount of bycatch it generates; an additional negative impact is the dredging of the ocean floor.

Indonesian Blue Swimming Crab Contribution to World Landings



In 2007, Indonesia contributed to 16.4% or 28 thousands t of total global blue swimming crab (BSC) landings, placed Indonesia as the third biggest BSC producing country, following China (40%) and Philippines (20%) based on official FAO data – *Figure 1*.

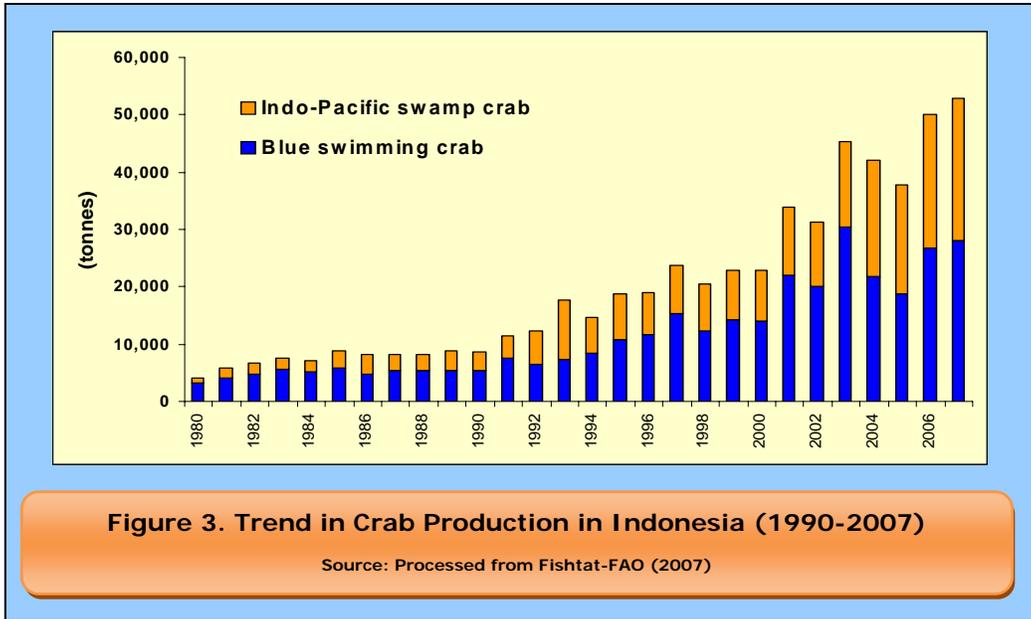
In general, blue swimming crab production experienced upward trend in period 1990 to 2003. Total production of four major producing countries peaked to 163,843 t in 2003. However, since 2004, the global productions tend to decline, although it started to rebound again in 2006 and the production amounted to just over 158,000 t in 2007.



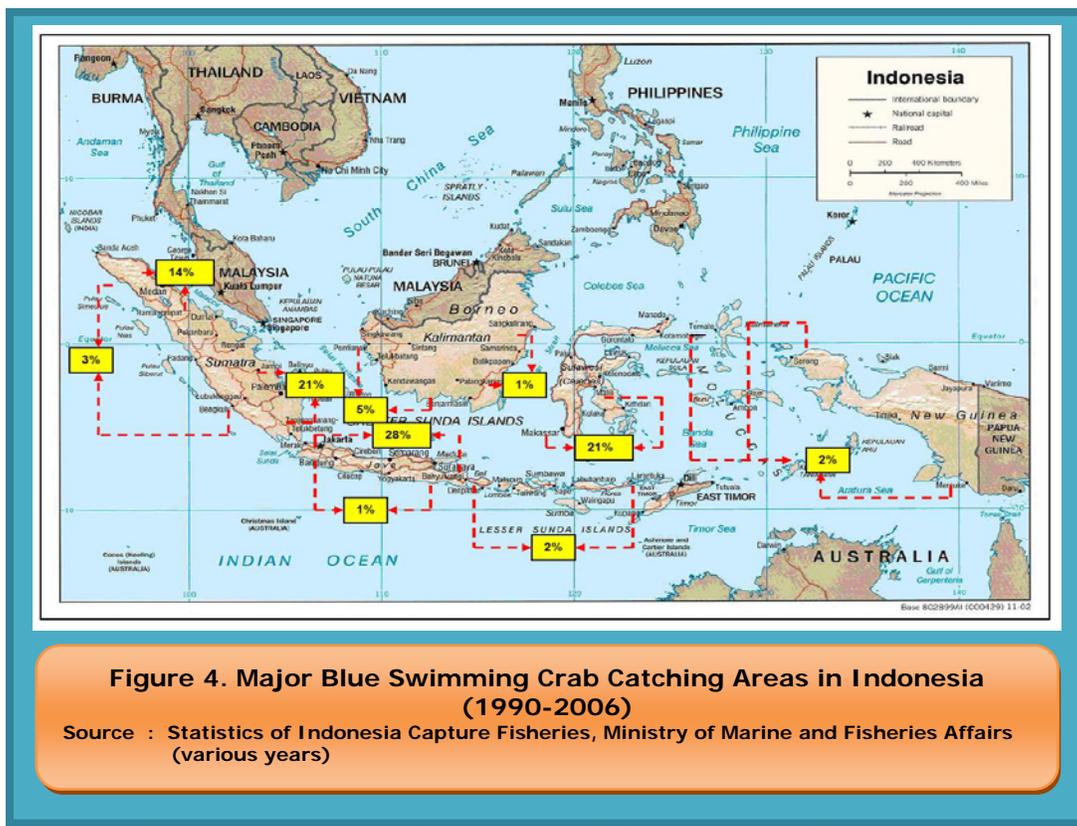
History of Blue Swimming Crab Fishery in Indonesia

There are two main crab species commercially captured in Indonesia, namely blue swimming crab (*Portunus pelagicus*) and Indo-pacific swamp crab or also known as mud crab (*Scylla serrata*). In 2007, total crab production in Indonesia reached 52,880 tonnes. Blue swimming crab contributed the biggest portion of total crab harvested from Indonesia with 53% where mud crab contributed about 47%– *Figure 3*.

Blue swimming crab (or locally known as '*rajungan*') has been one of the important export commodities from fishery sector in Indonesia. The export of blue swimming crab has just started in 1994-1998 due to increase demand from overseas, especially from the United States of America. First export of blue swimming crab to U.S. market from Indonesia started in 1994 by PT. Phillips Seafood Indonesia. Before this year, this commodity was only consumed locally and the price was also very low. In Indonesia, the crab is mostly caught by the collapsible traps and gillnets.



North Java has been the major catching areas for blue swimming crab in Indonesia, contributing to about 28% of total production in period 1990-2006, followed by East Sumatra (21%), South Sulawesi (21%) and Malacca Strait (14%) – *Figure 4.*



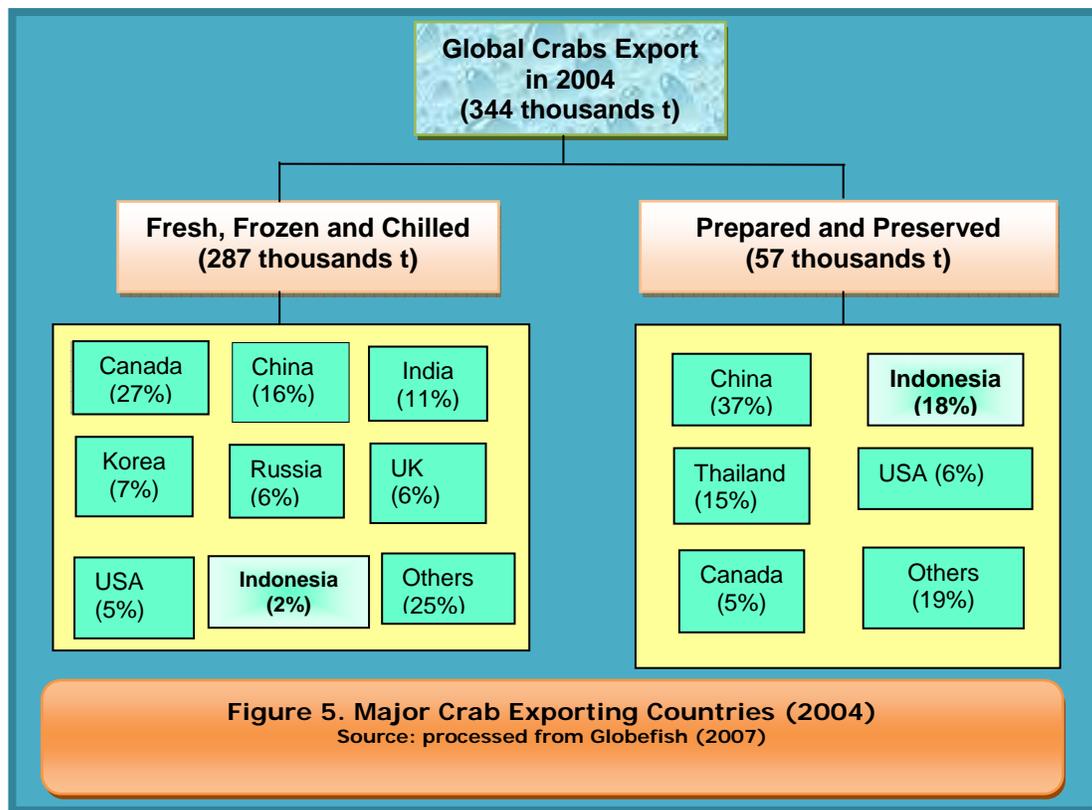
Contribution of Blue Swimming Crab in Indonesian Export Value

In terms of export values, crab contributed to about 8% of total Indonesian fishery products export, valued at USD 178 million in 2007, jumped by 33% from previous year. Crab products have been the third biggest fishery product that contributes to total Indonesian export value, following shrimp (46%) and tuna (14%). Total crab export amounted to 21,510 t in 2007. This crab export consists of non frozen crab (82%), canned crab (11%) and frozen crab (7%) [MMAF and JICA 2009].

United States (US) has been the biggest market for Indonesian crab export, contributing to more than 50% of total crab export from Indonesia, followed by Singapore (17%), Malaysia (10%), Taiwan (7%), European Union (6%), China (5%) and Japan (2%) [MMAF 2006].

Indonesian Crabs at Global Market

Data from Globefish (2007) shows total global fresh, frozen and chilled crabs export in 2004 was amounted to 287 thousands t, valued at US\$ 1.7 billion. Canada has been the biggest fresh, frozen and chilled crab exporting country (contributing about 27% of total crab export in the world), followed by China (16%), India (11%), Korea (7%), Russia (6%) and UK (6%). Meanwhile Indonesia just contributed about 2% of global fresh, frozen and chilled crab export in 2004 with 4,400 t crab export, valued at US\$ 24.7 million – *Figure 5*.

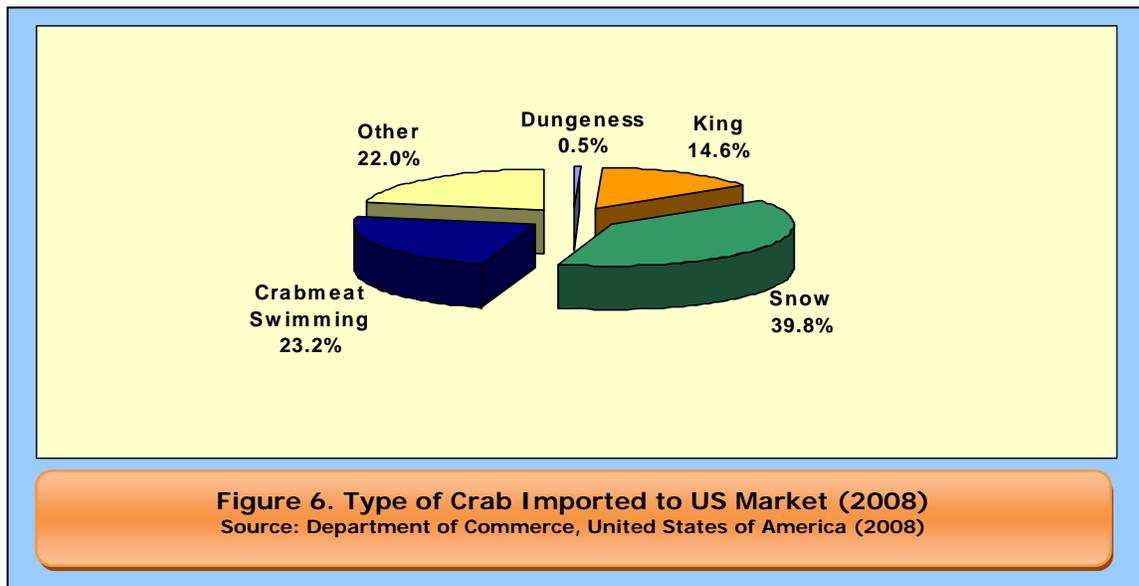


In 2004, global prepared and preserved crabs export was about 57 thousands t, valued at US\$ 473 million. China has been the biggest crab exporting country, contributing about 37% of total prepared and preserved crab export in the world, followed by Indonesia with 18% or totaled 9,800 t, valued at US\$ 41.9 million. Thailand followed with 15% contribution. Meanwhile, United States and Canada contributed to 6% and 5% of total global prepared and preserved crab export respectively. All together, they contributed more than 80% of total crab export in the world – *Figure 5*.

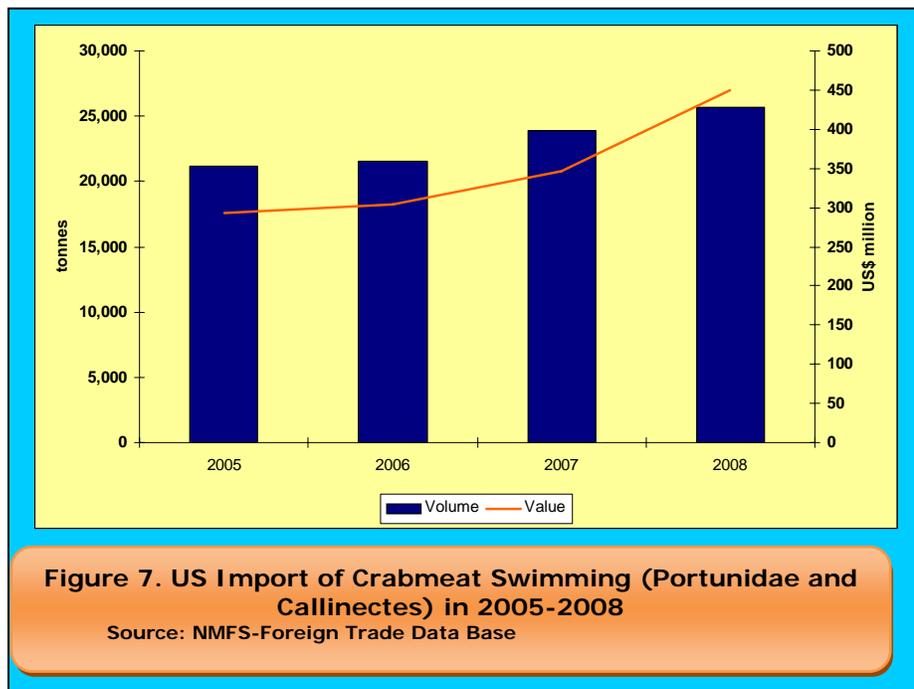
Indonesian Blue Swimming Crab at US Market

U.S. per capita consumption of fish and shellfish was 16.0 pounds (edible meat) in 2008. This total was 0.3 pounds less than the 16.3 pounds consumed in 2007. Per capita consumption of fresh and frozen finfish accounted for 6.2 pounds while fresh and frozen shellfish consumption was 5.6 pounds per capita. U.S. imports of edible fishery products in 2008 were valued at \$14.2 billion, \$0.5 billion more than in 2007. The quantity of edible imports was 2.37 million tonnes, a decrease of 54 thousand tonnes (0.4 percent) from the quantity imported in 2007. Shellfish contributed to over 50% of total import value, valued at US\$ 7.3 billion. Crab was the second biggest imported shellfish product, after shrimp, contributing to 18% of total shellfish import volume or 110.7 thousand tonnes in 2008, valued at US\$ 1.36 billion.

About 70% of crabs imported to United States are in the form of fresh and frozen, and canned crab contributed to almost 30%. The favored species in the U.S. market are the red king crab (*Paralithodes camtschaticus*), the snow or queen crab (*Chionoecetes* spp., in particular: *C. bairdi*, *C. opilio* and *C. tanneri*), the blue swimming crab (*Portunus pelagicus*), the blue crab (*Callinectes sapidus*) and the Dungeness crab (*Cancer magister*) [Urner Barry Publication 2008].



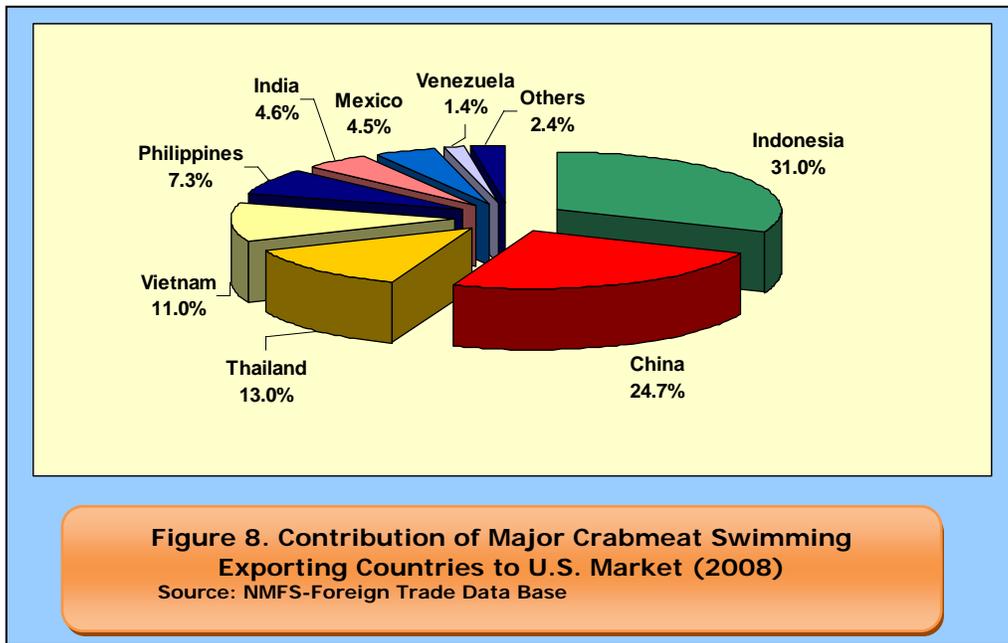
Data from Department of Commerce, United States of America (2008) shows that in term of volume, crabmeat swimming (Portunidae and Callinectes) was the second biggest imported crab to United States, after snow crab, contributing to 23% of total volume of crab import, amounted to 25,652 t in 2008 – *Figure 6*. More than 90% of crabmeat swimming is imported in canned.



In general, US crabmeat swimming has showed the upward trend. In 2008, US crabmeat swimming increased by 7% in term of volume, compared to previous year. However, in term of value, the increase was 30%. Average unit value of crabmeat swimming has increased by 21%, from US\$ 14.5 per kilo in 2007 to US\$ 17.5 per kilo in 2008 (NMFS Foreign Trade Data Base) – *Figure 7*.

For 2008, total US crab import from Indonesia was 9,372 tonnes, a decrease by 15% from previous year, which was 11,403 tonnes. However, in term of value, US crab import from Indonesia increase by 6% from US\$ 169 million in 2007 to US\$ 179 million in 2008. Crabmeat swimming contributed to 85% of total US crab import from Indonesia. Other crab products imported to US market from Indonesia were crab and crabmeat NSPF (Not Specified). More than 85% of crab imported to US from Indonesia was in ATC (Air Tight Container) or canned, while another 10% was frozen and other 5% was other preparations.

Indonesia is the leading supplier for crabmeat swimming to US market, contributing to 31% of total crabmeat swimming import to US in 2008, followed by China (24.7%), Thailand (13%), Vietnam (11%) and Philippines (7.3%) [NMFS – Foreign Trade Data Base] – *Figure 8*.

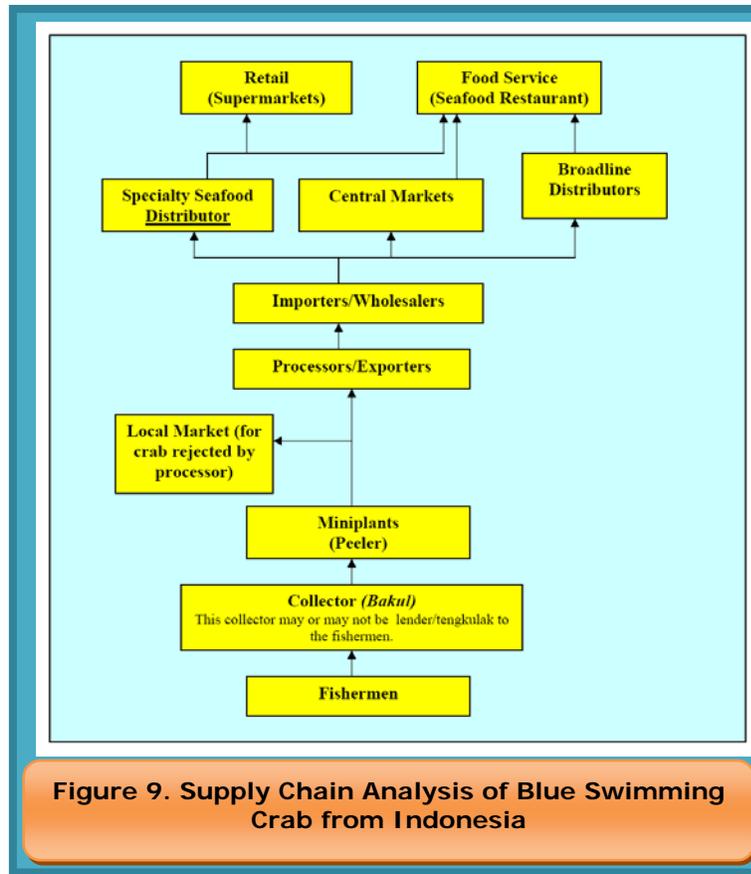


More than 90% of crabmeat swimming exported to US from Indonesia is in ATC (Air Tight Container). Indonesia's export of crabmeat swimming to US market decreased by 10% from 8,896 tonnes in 2007 to 7,950 tonnes in 2008. However, in term of value, Indonesia's crabmeat swimming export to US market increased by 10%, from US\$ 141 million in 2007 to US\$ 156,637 in 2008.

Indonesia Blue Swimming Crab Supply Chain

In general, four components are involved in the blue swimming crab fishery. These are: 1) fishermen; 2) collector (*bakul*); 3) miniplant/peeler; 4) processor/exporter; 5) distributor/central market; 6) retail/supermarket/seafood restaurant – *Figure 9*.

Fishermen sell the crabs to bakul, who plays the role as the collector, which may or may not be lender or *tengkulak* to the fishermen. Then bakul sells the crabs to miniplants. Bakul(s) usually take Rp 3-4k margin profit upon raw material (RM); Rp 5-10k if already boiled (*rebus*). From the time the crab is caught to the time it enters the packer's/exporter's plants should not (and usually is not) more than 48 hours.



U.S. custom report listed 28 Indonesian crab exporters to U.S. market in 2008. The biggest crab exporters from Indonesia are Phillips Seafoods Indonesia, Tonga Tiur Putra, Windika Utama, Kelola Mina Laut, Mina Global Mandiri, Bumi Menara Internusa, Toba Surimi, Nuansa Citpta Magello, Dahlia Mitra Global and Rex Canning. All together contribute to more than 80% of total crab export from Indonesia to US. In general, the exporters are also playing roles as processors. In 2007, an association of Indonesian Blue Swimming Crab (BSC) Processors (APRI) was formed, with the goal of sustainable procurement from healthy stocks. The members represent over 80% of all crab exported from Indonesia.

Data from the same year noted that at least there are about 65 U.S. crab importers that import crab from Indonesia. Some biggest US crab importers from Indonesia are Phillips Foods, John Keeler & Co, Twin Tails Seafood, Lawrence Street Seafood, Crab Association, Triways Shipping Lines, Metompkin Bay Oyster, Quirch Foods, Tamco and Boston Bay Brokers. All together contributed to almost 75% of crab import from Indonesia in 2008.

Stock Assessment of Indonesian Blue Swimming Crab

A comprehensive population stock assessment is not available for Blue Swimming Crab (BSC) at all geographic scale level (national or sub-national level). Most of biological research have focused on the individual life-cycle of the species, as well as

aspects of environmental condition and breeding, all geared toward the improving the potential for BSC culture. A limited number of stock density estimates have been conducted as the base for evaluating the utilization/harvesting level of Blue Swimming Crab. However, there is a growing interest from the Association (APRI) to undertake a Marine Stewardship Council (MSC) pre-assessment for a pilot location, and initial efforts are being undertaken to fill data gaps on population status. The association has recently supported an initial study focusing in Jakarta Bay to define the stock status in the area and develop a conservation strategy for this stock.

Current Status and Trends

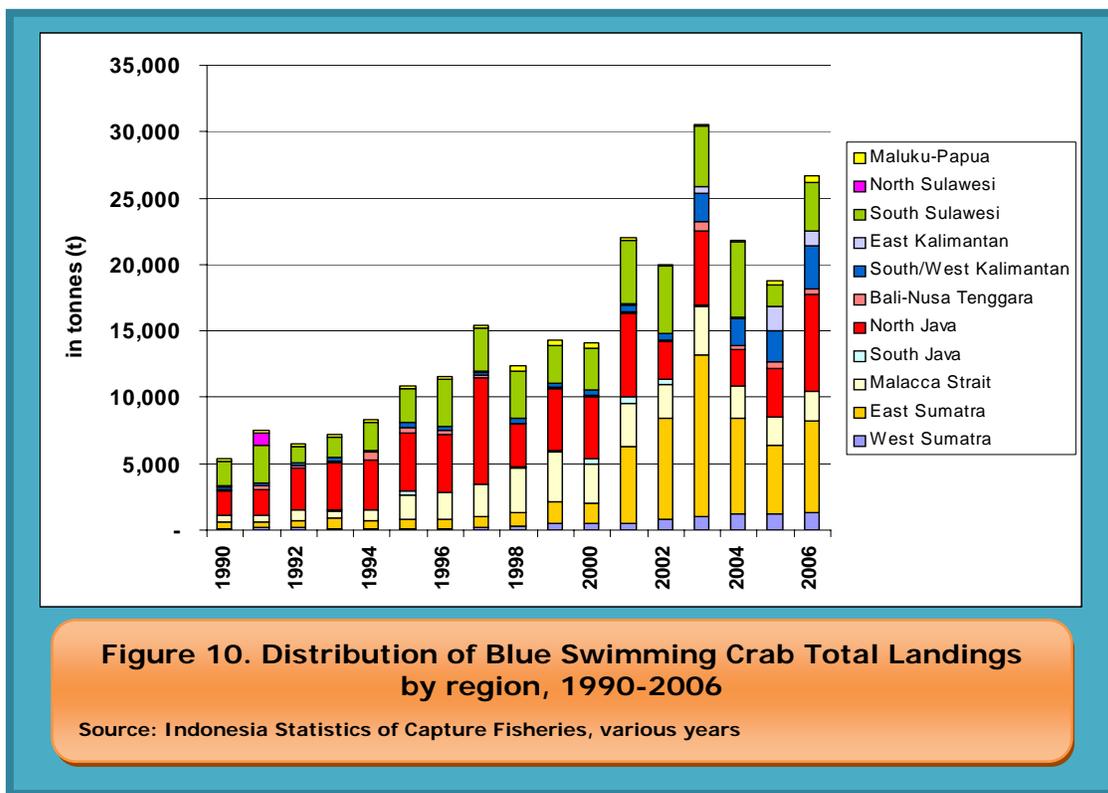
The current situation shows that as for most of Indonesia, the utilization level of Blue Swimming Crab has met the Maximum Sustainable Yields (MSYs). However, given the lack of biomass and yield data at the national level it is unclear how these estimates have been calculated.

Table 1. Blue Swimming Crab utilization level by Fishery Management Area (FMA), 1998

Fishery Management Area (FMA)	Province	% utilized	Fishery Management Area (FMA)	Province	% utilized
Malacca Strait	Aceh	100	Banda Sea	(nd)	(nd)
	North Sumatra	100	Seram Sea	Central Sulawesi	100
	Riau	80		Maluku	10
South China Sea	Riau	20	Sulawesi Sea and Pacific Ocean	North Sulawesi	100
	Jambi	100		Papua	20
	West Kalimantan	100	Arafura Sea	Papua	80
	Central Kalimantan	40		Maluku	90
Java Sea	South Sumatra	100	Indian Ocean	Aceh	100
	Lampung	100		North Sumatra	100
	Central Kalimantan	60		West Sumatra	100
	DKI	100		Bengkulu	100
	West Java	100		Lampung	100
	Central Java	100		West Java	100
	East Java	100		Central Java	100
	South Kalimantan	60		East Java	100
Makassar Strait and Flores Sea	South Kalimantan	40		Yogyakarta	100
	East Kalimantan	100		Bali	100
	South Sulawesi	100		West Nusa Tenggara	100
	Southeast Sulawesi	100		East Nusa Tenggara	100

Source: Widodo *et al.*, 1998

The trend in volume landed by region (Figure 10) show clearly the upward trend up to the mid 90s, and fluctuates from the one. Starting the year 2000 the fluctuation was more pronounced, and for the regions the trend is clearly declining (e.g. Malacca Strait). The patterns of landings have shifted over the years. During the early 1990s, landings from North Java and South Sulawesi dominate, with also significant landings in the Malacca Strait area. During the mid 1990s up to 2000, Malacca Strait and East Sumatra landings gained in volume, while North Java landings are remain stable. Since 2000, East Sumatra contributes the largest volume of landings, while Malacca Strait landings declined in relative proportion. West Sumatra, Maluku-Papua, South/West and East Kalimantan are starting to contribute larger proportions. The Maluku and Papua region are particularly remote, therefore any harvesting and processing of BSC will be more costly and difficult compared to other parts of Indonesia. Expansion of harvesting in that region, however, is expected in the future as BSC stocks elsewhere in Indonesia starts to decline.

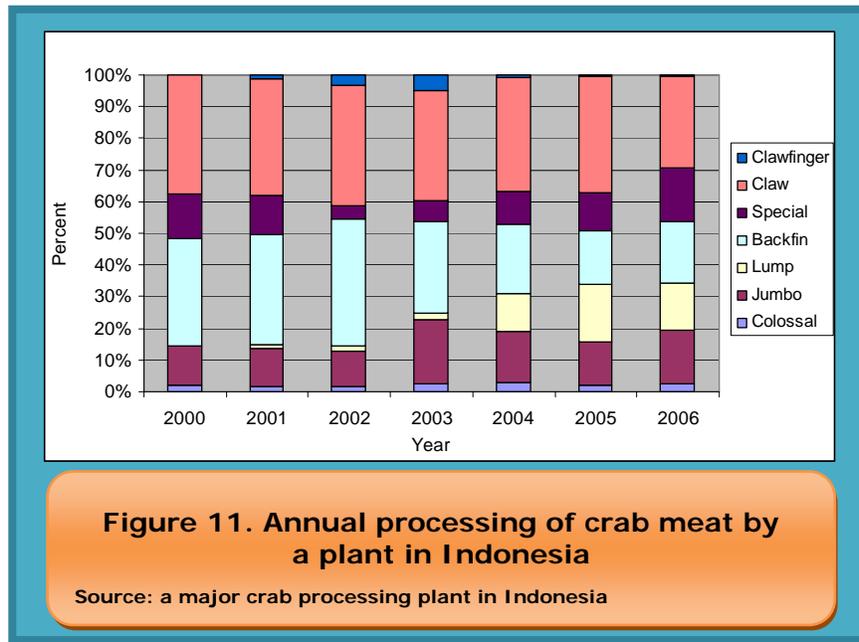


It is impossible to indicate the size of the fleet and total effort being expended each year, however anecdotal observations indicate that new fishermen continue to enter the Blue Swimming Crab fisheries, including in the northern coast of Cirebon in West Java (Antara, 2006). The closest fishing ground for these fishermen is Java Sea fishing ground off the coast of West Java, currently already fully utilized. It is expected that at the national level the number of households dependant on fishing will continue to increase. Between 2002 and 2004, the numbers of such households have increased by 25% (CBS, 2006).

Declining size composition can be observed in many landing areas. Even small crabs (150 crabs per kg) are being caught and harvested. Anecdotal evidence indicate that

during the late 1990s fishermen in the northern coast of West Java can capture 100-200 kg each day, whereas in 2006 they obtain much less, only 5 to 10 crabs even though they have placed an equivalent of 5 km of netting (Antara, 2006). Similar condition is faced by fishermen in Takalar, South Sulawesi. In 2000 they were able to obtain larger sizes (4-5 crabs per kg), in 2004 the common practice is 7-10 crabs per kg (Kompas, 10 May 2006).

Declining composition can also be seen at the exporter or wholesale buyer level (Figure 11). The special and, most notably, lump meats have increased in proportion of total meats being processed. This is a rough indication that meats are coming from smaller sized crabs, which, in turn, show that harvests consist of roughly smaller sized crabs than in previous years.



Impacts on Environment and Biodiversity

There are some differences in gear effectiveness in the Blue Swimming Crab fisheries. A study in Cirebon (West Java) shows that crab fishing practices by using collapsible trap (*bubu lipat*) result in trapping about 19 species consisting of Blue Swimming Crabs, other crustaceans (shrimp and other crab species), mollusks, fishes, echinoderms and sea snakes. In terms of ratio to total, Blue Swimming Crabs contribute 30% of total catch, while bycatch make up the remaining 70% (Table 2). Almost all the other and bycatch species that are not used by the fishers are thrown back to the sea, especially *Nerita sp.* These discarded species, therefore, have relatively high survival rates (Agatri, 2005).

Table 2. Bycatch of BSC fishery by using collapsible (*bubu lipat*)

Group	# Species	# Individual	Percentage (%)
Blue Swimming Crab	1	580	30
Crustaceans (shrimp and other crabs)	5	342	17
Mollusks	6	978	50
Echinoderms	2	6	0

Other fishes	4	56	3
Sea snakes	1	2	0
Total	19	1964	100

Source: Agatri, 2005

Meanwhile, a separate study in Banten Bay (West Java) shows that crab fishing practices using bottom gillnets caught more species than by using crab pot; a total of 45 species are caught, including Blue Swimming Crabs, other crustaceans (shrimp and other crab), coelenterate, mollusks, fishes, seaweed and echinoderms (Suadela, 2004). In terms of ratio to total, the composition is similar between using gillnets or crab pots/baskets (Table 3). There is a difference, however, in the treatment of by-catch, whereby gillnet fishers discard their bycatch on shore upon landing. Crabs that are of lower quality are sold locally, and only about 5% of by-catch is retained. The rest (95%) of bycatch is discarded; at this point, discards have a low chance of surviving.

Table 3. Bycatch of BSC fishery by using bottom gillnet

Group	# Species	# Individual	Percentage (%)
Blue Swimming Crab	1	646	27
Crustaceans (shrimp and other crabs)	7	264	11
Coelenterates	3	513	21
Mollusks	12	717	30
Other fishes	18	113	5
Seaweed	2	23	1
Echinoderms	2	142	6
Total	45	2418	100

Source: Suadela, 2004

Although Presidential Decree No. 85 Year 1982 has banned trawlers since 1983 in Indonesia except east of longitude 130° E (essentially east of Tanimbar Islands, and only for single vessel trawls as pair trawls are still banned), draggers such as baby trawlers or shallow bottom trawlers are still being used in the Blue Swimming Crab fishery. Although relatively small in size, this type of gear is more indiscriminate than others because the net scoops up everything in the trawl's path. The main negative environmental externality from the use of trawls is the large amount of by-catch it generates; an additional negative impact is the dredging of the ocean floor (Nédélec & Prado, 1999). In the northern coast of West Java, one study roughly estimated fishery losses due to trawls to be Rp. 972 billion (about USD 102 million) (Antara, 2006).

Note: Data Discrepancy

Data from the field shows that crabmeat yield = 20% of whole crab (raw material) – excluding failed products. It means that to produce about 6,300 t of crabmeat (taking total U.S. import of crabmeat swimming from Indonesia in 2006 as example), at least 31,500 t of crab (raw material) is needed. Meanwhile, data from the government suggests that landings of blue swimming crab from main coastal area in Indonesia reached 26,686 t. So the discrepancy between total blue swimming crab landings and total crabmeat swimming export to U.S. market in 2006 was about 4,800 t. The discrepancy of data might be bigger since according to data from Indonesian Fishery Research News suggests that U.S. contributes about 60% of total blue swimming crab from Indonesia, the remaining 40% is exported to Singapore, Japan and Netherlands. So the data from industry side indicates that the estimates of Indonesian blue swimming crab landings are grossly underestimated.

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