

A Brief Review Indo-Pacific King Mackerel (Scomberomorus guttatus) in Indonesia**K. Zarochman*****Senior specialist on Marine Fisheries Resources and fishery capture technologist
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Indo-Pacific King Mackerel (Scomberomorus guttatus) in simultaneously food industrial trade is classified as an export commodity fisheries product. A continual research concerning about resource, exploitation rate, handling technologies became commercial food product, are an comprehensives step as constitute on preliminary fisheries effort studies to gain developing and making efficient use of high quality products commodity. Introducing fish stock in a synopsis beginning with life cycle, habitat, fish behaviors, migratory status and stock abundance, constitute for optimal resources utilization strategy and continuously. An indo-Pacific King Mackerel are known as local migratory types, i.e. anadromus and catadromus. Studies on feeding habits and their food preferences mostly on preferable prey fish is stolephorus and from behaviors movement towards prey classified as greedy and active predators until adults, due to this it could be one of effective and efficient. Intensifications utilization through increasing fishing gear affectivity and unit of fishing vessel group endeavoring will become a victuals for technology relocations to gain fishing extensive by empowering local community.

Keywords: *Indo-Pacific King Mackerel, resources review, gear efficiency, an advance prospect*

1. PREFACE

A large family of scombridae (tunas-skipjack-little tuna and frigate mackerel-spanish mackerelles – small others of mackerelles) still became the main purpose of catching cosmopolitan fishery by various countries in the world. The Distance Water of Fishing Nations / DWFN) continue to actively fish crossing ocean; while in various coastal states of with his local fleet continue to make more fishing activities of scombrids. For increasing efficiency fishery long-distance for the purpose of catching fish scombrids especially in the waters of the pacific ocean had been working on by using the method remote monitoring of schooling fish (sophisticated spotting methods) such as : through the monitoring via satellite, scouting fish from the aero plane, and methods of the current a more efficient use of maps to scatter the sea surface temperatures of hydrography and other various information that has proved the existence of a correlation between the parameters of the environment the waters with comportment scombrids fish.

In the period of 1978 - 1983 is an early period of a decline in production of fish of the scombridae. Fishery scombridae increasingly compounded by an increase in operational cost a fleet, meanwhile, international law of the sea tends to limit the motion of DWFN' fishing fleets so that the opportunities of local fishery from various coastal states grow rapidly especially in the asia pacific region including around indonesian waters. The development of local fishing fleets for pelagic fishery ranging from simple technology (traditionally small-scale) until advanced technology of industrial scale.

Indo-Pacific King Mackerel (*Scomberomorus guttatus*) is one of the species pelagic fish important in indonesia whose existence was spread throughout the territorial waters of indonesia. Potential resources *Scomberomorus guttatus* and their fishing activities still provides opportunities to develop the production of a trading venture of commodities superior fish both for domestic and exports. Today, export demand for commodities *Scomberomorus guttatus* reported to have increased. The business of fishery *Scomberomorus guttatus* until now is the result of production through the activity of fishing. The activity of fishing of *Scomberomorus guttatus* done by groups of small and medium scale. *Scomberomorus guttatus* not be a main as fishing target, and still associated one group fishing together with other species target fishing, such as: *Rastrelliger spp.*, *Scomberomorus commersoni* or barred spanish mackerel, and *Katsuwonus pelamis* or skipjack. In statistics on the production of fisheries of indonesia, the production of annual *Scomberomorus guttatus* of various indonesian waters shown significantly and its existence is constantly present in every coastal fishing waters. But the existence of this has not been reck seriously as one of commodities superior fish strategic enough for food trade in the future. It is therefore needed as support information specifically to express the background of biology, to explain the features of taxonomi, their distribution and movement based on the dynamics of behaviour towards the environment is needed in making strategy tips effort to exploiting it. Besides that should be put forward against a choice fishing gears as a means of the exploitation of proper worthy of the activity of fishing equally, responsible and sustainable. Addition to business prospects passing support information of trend production is an offer for devotees entrepreneurs moved do utilization of commodities of *Scomberomorus guttatus*. This review is to know the background of biology fishes related to *Scomberomorus guttatus* on which information about the history of life and behaviour of *Scomberomorus guttatus*. AS for the objective is the preparation of materials for business review of *Scomberomorus guttatus* for the development of utilization of the commodities. The information furnished production data and choice fishing gear technology which is proper for the optimizing and resources utilization of *Scomberomorus guttatus* as commodities that economy value domestic essential for trade and exports.

2. Naming and classification

Based on the report Bruce B.Collette and Cornelia E.Nauen to FAO (1983) as follows :

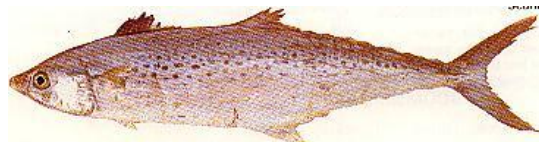
1) Naming :

- Scientific name : *Scomberomorus guttatus* (Bloch & Scheineder, 1801)
- Nama Sinoname : *Scomber leopardus* Shaw, 1803; *Cybium guttatum* – Cuvier, 1829; *Cybium interruptum* Cuvier in Cuvier & Valenciennes, 1831; *Cybium kuhlii* Cuvier in Cuvier & Valenciennes, 1831; *Cybium crockewitii* Bleeker, 1851; *Scomberomorus guttatus* – Fowler, 1905; *Scomberomorus guttatum* – Malpas, 1926; *Scomberomorus kuhlii* – Chevey, 1934; *Scomberomorus crockewiti* – Beaufort, 1951; *Indocybium guttatum* – Munro, 1955; *Scomberomorus guttatus guttatus* – Silas, 1964.

- FAO name : Indo-Pacific King Mackerel (Inggris), Thazard ponctué (Indo-Pacifique) (perancis), Carite del Indo Pacifico (Spanyol).
- Local name : based on each country served in table 1.

Table 1. The local name Spotted spanish mackerel in several countries

NEGARA	NAMA LOKAL
Australia	Spotted Spanish mackerel
Bangladesh	Bijram
Burma	Nga-bu-zin
India	Aya-kora (Malayalam), Jhavar, Seela, Spotted Seer, Vanjiram (Tamil), Varimeen (Malayalam).
Indonesia	Tenggiri Papan, Ayong-ayong, Tandang
Iran	Ghobad, Sheer
Japan	Taiwansawara
Madagascar	Razandamatra,
Sri Langka	Spotted Spanish mackerel
Thailand	Insi
United Kingdom	Indo-Pacific Spanish mackerel
USSR	Indijskaya makrel, Pyatnistaya, Ispanskaya makrel, Pyatnistaya pelamida
Vietnam	Cá thu cham.

Figure 1. *Scomberomorus guttatus*
(Bloch & Scheineder, 1801)

2) Classification :

- Family : Scombridae
- Sub Family : Scombrinae
- Tribe : Scomberomorini
- Genus : Scomberomorus
- Species : *Scomberomorus guttatus* (Bloch & Scheineder, 1801)

- Having similarities between two spotted spanish mackerel from Indonesian (*Scomberomorus guttatus*) and Korean (*Scomberomorus koreanus*), unless some features that can be distinguished on a table 2 (it would also look at an image 1).

Table 2. The difference <i>Scomberomorus guttatus</i> dan <i>Scomberomorus koreanus</i>		
Perbedaan	<i>Scomberomorus guttatus</i>	<i>Scomberomorus koreanus</i>
- Dorsal fin	Hard spiny 15 - 18, ordinarily 16 or more	Hard spiny 14 – 17, ordinarily 14 or 15
- Intestine	2 folds and 3 limbs	4 folds and 5 limbs
- Vertebrae	47 - 52, ordinarily 50 atau 51	46 - 47, ordinarily 46
- Head	longer: 20,2-21,5% FL	shorter: 19,7 - 20,4% FL
- Body width	lower : 22,8 – 25,2% FL	bigger: 24,4-26,7% FL

3. The materials and methods

Materials of a piece of writing is a book of pustaka and tools processors and writing in the form of a set of computer program excel and by making use of words as software. A method

of writing is a study of reference. A source of data analysis in descriptive and some of the data are still in the form of a list of numbers or the value of quantitative a count by using suitable theory. Scope of discussion is cover the biology of *Scomberomorus guttatus*, in regard to size habitats, life cycle and the spread of geography. Approach a unit of catching *Scomberomorus guttatus* with the introduction of a choice variety of fishing gear and methods which more worthy to be applied in business activity of fishing around Indonesian waters.

4. Review of biology resources of Spotted spanish mackerel

1) The size of *Scomberomorus guttatus*

The size of the width of a body of *Scomberomorus guttatus* : 22,8 - 25,2 % times standard (forked length length of the body). The size of the width of the body or the height lower than species *Scomberomorus koreanus*. Form a head species *Scomberomorus guttatus* more longwise than species *Scomberomorus koreanus*. Dwi ponggo (1979), the measure of *Scomberomorus guttatus* caught in the Java sea reached a length of 60 cm and this measure has not yet reached a maximum of 100 cm in length. *Scomberomorus guttatus* that are caught in the waters of malaysia reported by Chee Phai Kean (1982) undersized long mode of 45 - 55 cm and size of maximum length reach 82 cm. Based on the report Bruce B. Collette and Cornelia E. Nauen to FAO, (1983) that *Scomberomorus guttatus* caught in the Arabia Sea waters and in Western Indo-Pacific until the Sea of Japan having a maximum length (FL) of 76 centimeters. A measure of length (TL) on the first maturity between 48 - 52 cm in India and 40 cm in Thailand. Based on data from a measure of total length of *Scomberomorus guttatus* reported by Indonesian Fisheries Research Centre (1978), can be shown a mode of a measure of length fish *Scomberomorus guttatus* caught in the Java Sea waters in October - November 1977 was 31 - 37 centimeters and maximum length of 49 cm (figure 2). *Scomberomorus guttatus* that are caught in the Airbangis waters, West of Sumatra in December 1985, based on the report of survey by Suherman Purnomo (1986) shown mode of a measure of length fish of *Scomberomorus guttatus* in length of 44 - 46 cm with a measure of length maximum 55 cm (figure 3).

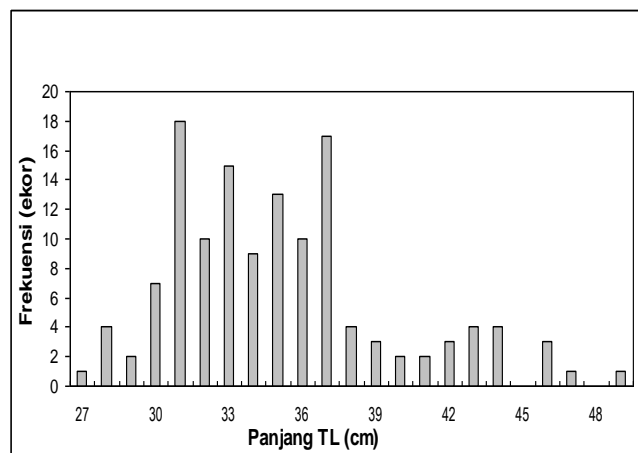


Fig. 2 Length Frequency of *Scomberomorus guttatus* in Java Sea Waters, October – November 1977 (Source : The result of Data processing)

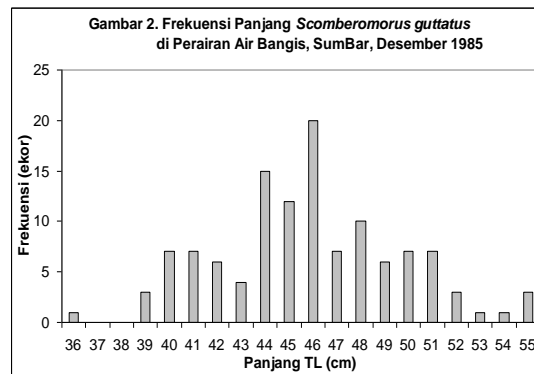


Fig. 3 Length Frequency of *Scomberomorus guttatus* in Air Bangis Waters-West Sumatra, Desember 1977 (Source : The result of Data processing)

Refer the size of the *Scomberomorus guttatus* at maturity of first in India and Thailand, a measure of length fish are caught to a mode of 31-37 cm across the Java sea waters categorized medium-size young fish or at least not yet subjected to maturity at the first on that month, while *Scomberomorus guttatus* that are caught in the Airbangis waters has grown mature enough or at least already maturity at first. May be presumed that the average size of *Scomberomorus guttatus* in the Java Sea waters was smaller than in Airbangis waters. But to reinforce this hypothetical need to do the analysis growth of both.

Based on data of length-weight measurement of species *Scomberomorus guttatus* in Airbangis waters West of Sumatra in December 1985 that can be shown a curve relations length-weight approaching an exponential curve $y = 16.483e^{0.0785x}$ on a level close relationship (r^2) = 84 % (figure 4). This curve described glance the acceleration of addition to weight per length-unit or in other words that growth acceleration occurs when the lengths of fish reached 12,74 cm or weighing about 44,8 grams. To the different regions and with different times the tendency of a curve (trendline) described could not the same, depending on the fertility rate environment waters as the habitat period during its growth (growth period).

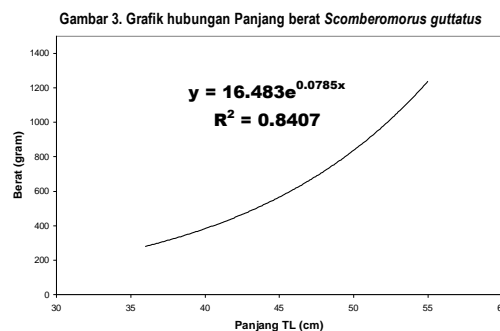


Figure 4. The graph of length-weight relationship of *Scomberomorus guttatus*

2) Habitat

Spotted spanish mackerel, *Scomberomorus guttatus*, is epipelagic fish, tending to migrate local or their habitat relatif settled (sedentary) around the beach. Dwi ponggo (1976), a lot of *Scomberomorus guttatus* in coastal northern Java Sea waters even in a state of lacking a clear waters. In Kumai-Kalimantan Tengah, alot of spotted spanish mackerel move into a river, it is so many those fishes caught in the river.

A habitat of fish undersized larvæ (TL < 13 cm) live near a coast around estuaries that generally lower salinity. On the size post larval or juvenil to medium-sized (TL > 13 cm to < 40 cm) or before maturity at first still be around coastal waters and gradually follow growth to adult (TL > 40 cm) began to steer away from shore. Spotted spanish mackerel or

Scomberomorus guttatus migrate in spacial limited, not like others fish mackerels such as *Scomberomorus comersoni*, it more active to migration. In coastal northern Java Sea waters *Scomberomorus guttatus* had already diminished because the water is already very roily and destitute of nutrients, as it did in Kalimantan are still quite clearly and there are a lot of nutrients.

The migration of *Scomberomorus guttatus* along the coast can be observed based on shifting the peak season fishing is concerned. An observation that in doing in Thailand shown fish movement in December from the eastern coast moving toward the north in the waters of the Gulf of Thailand on the end of December until January, and then they continue moving to coastal Western Thailand waters in from February to March. In Indonesia in general there has been no special research especially on the movement of *Scomberomorus guttatus*. A research trawler of Mutiara IV catch *Scomberomorus guttatus* undersized adult at the depth of 30 - 60 m (BPPI Semarang 1986).

3) Growth and Life Cycle

Based on a length-weight curve tending to exponential where $y = 16.483e^{0.0785x}$ when the length of fish by TL > 13 cm, the fish has started accelerating growth and when the lengths of fish by TL > 40 cm *Scomberomorus guttatus* really experienced a significant acceleration of growth in an exponential manner. At that moment *Scomberomorus guttatus* been subjected to ripeness of the gonads, even getting longer or more mature the acceleration of growth was the more significant. This has proven based on the research Geof Mc Pherson in widodo, dkk., (1999); that the end of rapid growth coinciding with the maturity of gonads or hence start spawning.

The early life history of *Scomberomorus guttatus* specifically has not been revealed, especially around Indonesian waters. The approach which has been done is based on the movement of the life cycle of a group of spanish mackerel of the genera *scomberomorus*. The larvae of fish mackerel during the juvenil undersized 2 - 10 cm live in the waters near the coast of including in estuaries. The larvae of bigger fish undersized 13 - 40 cm begin moving somewhat to the middle between the depth of 6-12 m. Having the fish experience ripeness of eggs or coming-of-age guarantee to live independently (not clustered) until it reaches the depth of 60-70 meters. Spawning happened around coastal waters somewhat to the middle and usually reach the spawning somewhat shielded as in coral waters. Eggs or pre larvæ drifted to the shore or around near the mouth of the river. Thus the entire life cycle of *Scomberomorus guttatus* was in coastal waters.

In the waters surrounding Rameswaram island between India and Srilangka spawning has occured on *Scomberomorus guttatus* in April - July. In May in the waters of Thailand be found a lot of female fish that it is fully matured the eggs in a measure of length standard (forked length): 32.5 - 46,5 cm.

4) Geographycal Distribution

Species *Scomberomorus guttatus* is spread along a chain of coastal waters of various coastal states especially that dealing with the territorial waters of fishing area that have statistics fishing area code of the world:

- number of 51 (the westeastern Indian ocean)
- numbers 57 (the northeastern Indian ocean)
- number 61 (the southwestern Pacific ocean)
- number 67 (the northwestern Pacific ocean)

The area distributuion of *Scomberomorus guttatus* coinciding with a chain of coast on Continental of Western Indo Pacific ranging from Wakasa Bay, the Sea of Japan and South of Hongkong until the Gulf of Thailand and toward the West along the Gulf between Arabian Peninsula and Iran. The spread of *Scomberomorus guttatus* potentially almost in the coastal

ranges Indonesian archipelago from Sabang until Merauke. Space to scatter it is the widest in the world because by chance on the basis of the life history of fish is based on habitat and its life cycle wholly in coastal waters.

5) Feeding habit

The fishing ground for local migratory fish usually associated with behaviour, the habit or feeding habit. The feeding behaviour can be seen based on stomach content for a moment after meals. Thus has can be known about the kind of food, fondness from which and where the food, then when fondness eat it. The relation between feeding behaviour of fish predatory and fish prey is the study to understand the habit of eating of fish predators, covering the strategy to where, when and how.

As the mackerel fish groups in General, spotted king spanish mackerel or *Scomberomorus guttatus* usually has habit to eat small fish or fingerling especially teleosts group. *Scomberomorus guttatus* is voracious with gladness eat small fish and move quickly when chasing prey or lures. Adult of *Scomberomorus guttatus* also eat shrimp and squid besides eat small fish. The most favourites of various types of foods are mainly post larvae and young fish or juvenil of anchovies or sardines. As for the various types of fish are so habitual food or prey such as anchovy, sardines and other small fishes. As the most favourites food fish of the *Scomberomorus guttatus* are anchovies (*Stolephorus*).

Based on custom or fondness fish-eating against various species of fish undersized small (small fish) or juvenile fishes, so that *Scomberomorus guttatus* move inclined to follow and clustered together or approaching be around the existence of fish prey (prey fishes extinction). By knowing to scatter fish prey and his feeding behavior then strategy for fish predatory has prepared fishing gear suit to route movement or in accordance with the methods to attract fish gathered on a certain position in the waters of so as to be caught. When used a surrounding nets or a hook line fishing gear, so first fish prey collected and used as bait to withdraw. If fishing gear in the form of a gill net then it can be blocked against the migration route of fish.

5. Marine Fishing Activity

1) Avarieties of Fishing Method

Scomberomorus guttatus fishing can do various expected fishing methods fully caught it. A way of catching fish can be done directly on the target of *Scomberomorus guttatus* or appertain kinds of fish mackerel groups (direct a fishing methode to the target fishes), or lure fishing methods by means of collecting / attract fish in advance with an auxiliary apparatus a gatherer of fish (fish agregating device) in order to facilitate fish can be captured by means of certain fishing around the fishing gear. The fishing activity it can be done at day and / or night depending on the type of fishing gear and time operate. A fishing gear type which is expected to catch fish *Scomberomorus guttatus* at night by means of a lamp (are lamps) includes: a surrounding nets(purse seine, seine net with a lamp), lift nets: (bagan fishery: boat bagan , raft bagan, fix bagan). Fishing gears like drift gillnet and trawl net operating at night also get *Scomberomorus guttatus* as the catch. Catching *Scomberomorus guttatus* in the afternoon, especially by using drift gill net, troll line fishing, hand line fishing line, tidal traps (jermal). Trawl fising also often got the catch *Scomberomorus guttatus*.

2) Preffered Fishing gear and methode

Although *Scomberomorus guttatus*, can be interpreted, by various types of fising gears yet there is no single kind of fishing gear that specifically target for catching *Scomberomorus guttatus*. It is so called “spoted spanish mackerel fishing gear and method”. Until now *Scomberomorus guttatus* that caught still impressed by-chance (non targeted species). These

reasons associated with behaviour of *Scomberomorus guttatus* do not always clustered in the form of a big herd (schooling fish) especially *Scomberomorus guttatus* that 's fine and undersized larger tending to spread each other. In other word, the abundance of *Scomberomorus guttatus* is low not as abundance of great shoals of *Rastrelliger spp*, *Euthynnus affinis*, *Katsuwonis pelamis* when in the movement route and search of food. The life of *Scomberomorus guttatus* of adult that tends to less like clustered or spread themselves, prefer and the latencies quickly as pursuing prey so difficult anticipated by fishing method like encircling net and seine net . These fishing method considered less assure the success of fishing in large quantities (bulky a fishing) or at least not considered to be balanced with costs and labor for once the fishing operation. If *Scomberomorus guttatus* are caught with surrounding nets still speculative or with the frequency of occurrence low. *Scomberomorus guttatus* always be with a group of other fish (together with other shoaling fishes) or follow prey (anchovies, fish and all kinds of other small fish). The ultimate principle of fishing gear to catch fish like *Scomberomorus guttatus* is capable of being anticipates a time and where fish are located or are doing the movement of route and pursuing prey. The fishing gear and method prepared catch *Scomberomorus guttatus* of adult already after spawning with maximum size and the existence of fish are caught are in a fresh. In neighboring countries, as the Philippines, generally *Scomberomorus guttatus* caught with drift gill net, and tidal traps; in Thailand with a hand line fishing ; in India and Malaysia with a troll line fishing. *Scomberomorus guttatus* around indonesian waters in general caught by a drift gillnet. But all regions do not yet have the main fishing gear which specifically addressed catch *Scomberomorus guttatus*. A few prototypes drift gillnet in some areas has been devoted to catch *Scomberomorus*, as has been using gill net mackerel or netted mackerel. Special drift gillnet with dominant catch of *Scomberomorus guttatus* especially the areas of coastal waters of Kalimantan and the vicinity; Malacca Strait, nothern coastal Java waters, parts of coastal West of Sumatra, Bangka Belitung, South sumatra and South Sulawesi. Commonly of fish catches in a gill net 's dead and not freshly or qualified relatip low. In higher intertidal regions, *Scomberomorus guttatus* caught by a group of a trap that is set on the beach (tidal bamboo fixed trap net), such as : Jermal traps, Togo, Tidal nets, anchored seine net (long bag seine net). Fish are caught are in a fresh and generally still alive.

An area that has a potential to the operation of tidal traps fishing such as: in Malacca Strait waters (North Sumatera, Riau, South Sumatra), coastal waters of Kalimantan in general (East Kalimantan, South Kalimantan, Middle Kalimantan and West Kalimantan). Fishers in various areas that still operates trawl often catch *Scomberomorus guttatus*, even in the operation of in more shallow waters or nearer the coats line allegedly often captured *Scomberomorus guttatus* of young generation or small in size.

This would endanger the survival of *Scomberomorus guttatus* in the areas concerned. A trawl fish (fish trawl net) that is often obscured by an appellation "fishnet" is basically bottom trawl resembles balloon capable of catching shrimps and various groups of fish on the coasts both demersal and surface as well including *Scomberomorus guttatus*. In East Kalimantan and South Kalimantan still done the operation of trawl nets. Boat Bagan Fishery also reported potentially to catch fish *Scomberomorus guttatus* especially on East Sumatra waters (Sibolga, Padang, Bengkulu). The quality of the catch good enough because it commonly fish are caught still in fresh, and some even still alive. The main fishing gear potentially to catch *Scomberomorus guttatus* is line fishing such as hand iine, and troll line. These two types of fishing gears tend to develop in the western coast of Sumatra. These fishing gears is more efficient to be operated around rumpon (fish agregrating device). Troll line fishing as the main fishing gear operated local fishers in Padang, West Sumatera. The catch of troll line fishing is still fresh. The commodities fishes of *Scomberomorus guttatus* caught from line fishing it can be promoted as a commodity the main product.

6. CONCLUSION

- *Scomberomorus guttatus* Resource scattered across the expanse of the along Indonesian coastal waters almost all the Islands starting from Sabang to Merauke, especially on the coastal cluster of Islands, such as Sumatra, Java, Kalimantan, Sulawesi and Papua.
- A distinctive species in *Scomberomorus guttatus*: caudal peduncle keel, there are two short and 1 long keel between the two, the body's future as well-armored as corselet, linea front lateral branching dorsal finlet and soft anal finlet amounted to 8 - 9, vertebrae 50 -51, hard thorn of dorsal fin consisting of 16 or more, intestine consisting of 2 folds and 3 limb, head is longer and width of the body is lower than species *Scomberomorus koreanus*.
- The fish route migration of spotted spanish mackerel, *Scomberomorus guttatus* is localized, sedentary stock, so as to support the coastal ecosystem surrounding has very important role towards the fish stock spotted spanish mackerel. For this, coastal spatial should be arranged for sustainability of community of coastal ecosystems, as an coral ecosystem as spawning habitat (spawning ground) and the mangrove ecosystems as a nursery ground to be protected and retained as reservart.
- accelerating growth to *Scomberomorus guttatus* for the size of adult (during mature until after spawn) signalled *Scomberomorus guttatus* most excellent on the size after lay eggs besides size reached a maximum of (tl = 82 - 100 cm or more) and prices high also to sustain abundantly stock species.
- Spotted spanis mackerel or *Scomberomorus guttatus* appertain voracious fish and active pursuit of prey that dependence fish mackerel floorboard against prey very real and this information is important while studying fish prey behaviour which favored, as: anchovy (stolephorus), a variety of small fish other being information strategy of catching fish mackerel coinciding of the season and the size of maximum to be desired.
- Study and socialization of behaviour, and the life cycle of *Scomberomorus guttatus* raised so that communities aware to maintain species that vulnerable to disruption to habitat destruction of the environment and sought escape from irresponsible fishing (capturing young fishes or intercepting migratory fishes recruitmen for enlargement at sea, fishing operation in nursery ground and fishing not selective and destructive habitats).
- Capturing to *Scomberomorus guttatus* before spawning very risky against to sustainability of *Scomberomorus guttatus* and for the fishing activity is not reach maximum yet so as to the next fisheries management for *Scomberomorus guttatus* was already arranged together with other fisheries management about restrictions to fishing time and the number of units of fishing efforts.

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