

# Analysis of capture fisheries prime commodities in Pariaman City, West Sumatera, Indonesia

*by* Yusrizal, Eddy S. H, Jerry Hutajulu, Maman H M Handri, Rahmat Muallim, Suharto, Yaser K

---

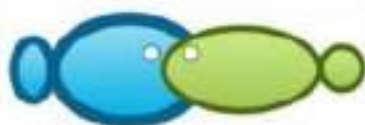
**Submission date:** 11-Jun-2022 09:14AM (UTC+0700)

**Submission ID:** 1854617848

**File name:** esember\_2021\_Analysis\_of\_capture\_fisheries\_prime\_commodities.pdf (490.14K)

**Word count:** 6239

**Character count:** 33721



## Analysis of capture fisheries prime commodities in Pariaman City, West Sumatera, Indonesia

<sup>1</sup>Yusrizal, <sup>1</sup>Eddy S. Husen, <sup>1</sup>Jerry Hutajulu, <sup>1</sup>Maman Hermawan, <sup>1</sup>Muhammad Handri, <sup>1</sup>Rahmat Muallim, <sup>1</sup>Suharto, <sup>2</sup>Yaser Krisnafi

22

<sup>1</sup> Faculty of Fishing Technology, Jakarta Technical University of Fisheries, South Jakarta, Indonesia; <sup>2</sup> Faculty of Fishing Technology, Pangandaran Fisheries Institute, West Java, Indonesia. Corresponding author: Yusrizal, yusrizalrc@gmail.com

**Abstract.** Capture fisheries of Pariaman City consist of sea capture fisheries and general water capture fisheries, which have the potential to be developed. Pariaman City is located on the coast of the Indian Ocean, being a coastal area with various potential fish resources, with marine fish resources of 7892 tons. Potential marine fish resources consist of pelagic, demersal, coral fish, as well as crustaceans and molluscs. Of the potential marine fish resources, 2841.12 tons year<sup>-1</sup> are represented by large pelagic fish, 3156 tons year<sup>-1</sup> are small pelagic fish, and 236.76 tons year<sup>-1</sup> are demersal fish. In 2018, Pariaman City targeted a capture fisheries production of 6588 tonnes. With such large capture fisheries resources, Pariaman City has a prime commodity in the regional economic development sector. The purpose of this study is to analyze the superior commodity in the capture fisheries sector in Pariaman City. The research was conducted in August 2020. The method used in this research is a descriptive method using primary and second data. Data collection was conducted by direct observations, interviews, and literature study. The data analysis methods used are Location Quotient (LQ) analysis, Shift Share (SS) analysis, and Specialization analysis (SI). Main catch fishery commodities in Pariaman City include *Eleutheronema tetradactylum*, *Auxis rochei*, *Auxis thazard* and *Katsuwonus pelamis*.

**Key Words:** *Auxis rochei*, *Auxis thazard*, capture fisheries, *Eleutheronema tetradactylum*, *Katsuwonus pelamis*.

**Introduction.** According to Pariaman City marine and fisheries statistics (MFS) (2018), Pariaman City is located on the Western Coast of Sumatera Island, which is geographically south of the equator, latitude 00°33'00"-00°40'43"S and longitude 100°10'33"-100°10'55"E. Thus, Pariaman City has a tropical climate with sufficient rainfall. The land area is located at an altitude between 2 - 35 m above sea level (asl), with an average height between 0 - 15 m asl. Thus, Pariaman City is a lowland stretch with few hills.

The marine and fisheries potential of Pariaman City is diverse according to the location of the Unitary State of the Republic of Indonesia, which is located at the equator and between two continents and two oceans. The fishery potential consists of fishing and cultivation. The dominant fishing is sea fishing. Pariaman City is located on the coast of the Indian Ocean, being a coastal area with various potential fish resources with marine fish resources of 7892 tons (MFS 2018). Potential marine fish resources consist of pelagic, demersal, coral fish and crustaceans and molluscs. According to Pariaman City marine and fisheries statistics data (2018), of the potential marine fish resources, 2841.12 tons per year are large pelagic fish, 3156 tons per year are small pelagic fish, and 236.76 tons per year are demersal fish. In 2018, Pariaman City targeting a capture fisheries production of 6588 tonnes (MFS 2018).

Kohar & Paramartha (2012) stated that determining prime fish commodities in an area is the first step towards the development and management of capture fisheries based on the concept of efficiency to gain comparative and competitive advantages in the face of globalization of trade. A superior commodity is a commodity that is in high demand, has a high selling value and is expected to be able to provide a large income compared to other types (Sembiring 2009). According to Kohar & Paramartha (2012), the

marketing activities can be divided into local and export superior commodities. The existence of prime exports is expected to increase foreign exchange for the country from the non-oil and gas sector and can also increase regional income (Kohar & Paramartha 2012). According to Sembiring (2009), the existence of a superior commodity means that a country is able to produce products with distinctive attributes, which are due to domestic resource factors. Provision of quality products must be carried out followed by increased productivity and efficiency, so that these commodities have high competitiveness.

Prime commodities are expected to provide a greater income compared to other commodities. According to Resosudarmo et al (2002), if utilized optimally and sustainably, the potential of Indonesia's marine resources can become the main capital for national development in the future. According to Kohar & Paramartha (2012), determination of superior fish commodities in an area is the first step towards the development and management of capture fisheries based on the concept of efficiency to achieve comparative and competitive advantages in the face of globalization of trade. Steps towards efficiency can be taken by determining fish commodities that have comparative advantages, both in terms of supply and demand, as well as high competitive advantages (Alit et al 2017). Kohar & Paramartha (2012) stated that the criteria for superior fisheries commodities are the following: high production and selling prices; high public taste; high market demand; economically important fish/non-fish species; the flesh is tender/soft, chewy, not prickly, and highly nutritious.

The purpose of this research is to analyze the superior capture fisheries commodities in Pariaman City, including: (1) determining the amount of capture fisheries production; (2) determining the growth of capture fisheries production; and (3) determining the contribution of capture fisheries.

## Material and Method

**Description of the study sites.** The method used in this study uses descriptive methods, namely direct observation of the field through surveys and interviews with fishery port parties and fishermen to obtain primary data. The primary data is processed and strengthened by secondary data, with some reinforcement in the form of references and literature studies, aiming to determine the superior commodity of capture fisheries in Pariaman City. This research was conducted for 1 month, in August 2020. According to Arifin (2008), the descriptive method is a research method where the researcher or writer comes directly to the data source and analyzes the data as it is. Data collection in this study is primary data collection and secondary data. Primary data collection was carried out by means of observation, interviews, and literature study.

**Primary data.** The primary data required includes data on the price of fish which is a prime commodity, continuity of production, and government policies regarding follow-up on superior commodities in Pariaman City. Primary data was obtained by direct observation and interviews (30 respondents) with related parties, including the Pariaman City Marine and Fisheries Service to local fishermen.

**Secondary data.** Secondary data collected is from the Department of Marine Affairs and Fisheries and the Central Statistics Agency for the City of Pariaman and West Sumatera Province in the 2014-2018 period. The data obtained include the following: production data and production value per type of fish each year in Pariaman City, and production data and production value per type of fish in West Sumatera Province.

**Analysis of the capture amount of fisheries production.** Location quotiens analysis (LQ) was used to determine the amount of capture fisheries production. According to Budiharsono (2001), the formula for calculating LQ is:



$$LQ = \frac{v_i/v_t}{V_i/V_t}$$

Where:  $v_i$  - total production of type  $i$  fish at Pariaman City level;  $v_t$  - total capture fishery production at Pariaman City level;  $V_i$  - total production of species  $i$  fish at national level;  $V_t$  - total capture fisheries production at national level. If  $LQ \geq 1$ , type  $i$  fish is a prime commodity in Pariaman City; if  $LQ \leq 1$ , type  $i$  fish is not a prime commodity in Pariaman City.

**Capture fisheries production growth analysis.** Shift Share analysis was used to determine the growth of capture fisheries production. According to Susanto (2008), the formulas used for the Shift Share analysis are as follows:

$$G_j = Y_{jt} - Y_{j0}$$

$$N_j = Y_{j0} (Y_t/Y_0) - Y_{j0}$$

$$(G-N)_j = Y_{jt} - (Y_t/Y_0) \cdot Y_{j0}$$

$$D_{jt} = Y_{ijt} - (Y_{it}/Y_{i0}) \cdot Y_{ij0}$$

Where:  $G_j$  - total fishery production growth in Pariaman City;  $N_j$  - regional share component in Pariaman City;  $(G-N)_j$  - net shift component in Pariaman City;  $D_{jt}$  - differential shift component in Pariaman City;  $Y_{ijt}$  - total production of type  $i$  fish at Pariaman City level;  $Y_j$  - total capture fishery production at Pariaman City level;  $Y_i$  - total production of type  $i$  fish in West Sumatera Province;  $Y$  - total capture fisheries production in West Sumatera Province;  $0$  - initial period (2014);  $t$  - end period (2018).

If  $G_j - N_j < 0$ , the fishery growth in area  $j$  (Pariaman City) is slower than in West Sumatera Province. If  $G_j - N_j > 0$ , the fishery growth in area  $j$  (Pariaman City) is faster than in West Sumatera Province. If  $D_{jt} > 0$ , the type of fish  $i$  in area  $j$  (Pariaman City) grows faster than the same fish species in West Sumatera Province. If  $D_{jt} < 0$ , the fish species  $i$  in area  $j$  (Pariaman City) has a slower growth compared to the growth of the same fish species in West Sumatera Province.  $D_{jt}$  shows the differential shift component used to measure the amount of net shift caused by certain species of fish that grow faster or slower in the concerned area.

**Analysis of the contribution of capture fisheries production.** Shift Share analysis is used to determine the growth of capture fisheries production. According to Susanto (2008), the formula used for the Shift Share analysis is as follows:

$$SI = \left[ \frac{v_i}{v_t} - \frac{V_i}{V_t} \right] \times 100 \%$$

Where:  $v_i$  - total production of type  $i$  fish at Pariaman City level;  $v_t$  - total capture fisheries production at Pariaman City level;  $V_i$  - total production of fish species  $i$  in West Sumatera Province;  $V_t$  - total capture fisheries production at the level of West Sumatera Province.

**Results and Discussion.** Capture fisheries resources have an important role in the economic turnover of coastal communities in Pariaman City. Among the most important species are *Thunnus* spp., *Euthynnus affinis*, *Katsuwonus palamis*, *Sardinella* spp., *Rastrelliger* spp., *Atule* mate, *Engraulidae* spp. and some reef fish, with of high economic value. Capture fisheries represent the main livelihood for some coastal communities in coastal villages in Pariaman City. The number of fishermen in Pariaman City in 2017 reached 1183 people.

**Analysis of the amount of capture fisheries production.** Inawati et al (2011) stated that the LQ method makes a comparison of the relative share of sector i revenue at the regional level to total regional income in the relative share of sector i revenue at the provincial level to provincial revenue. In this study, the determination of LQ with income criteria is replaced by production criteria and fish production value. LQ analysis is used to determine a capture fishery commodity in Pariaman City, whether the fish species is a basic or non-basic commodity by comparing it to a wider area, namely the province. If the value of  $LQ > 1$ , type i fish is the leading commodity in Pariaman City, whereas if the value of  $LQ < 1$ , type i fish is not the leading commodity in Pariaman City.

Based on Table 1, the fish that have an  $LQ > 1$  include *Trichiurus lepturus*, *Makaira* sp., *E. tetradactylum*, *Auxis rochei*, *Auxis thazard* and *Katsuwonus pelamis*. These types of fish are commodities representing the base sector for capture fisheries in Pariaman City. The highest LQ value was found in *Makaira* sp., namely 2.81, followed by *E. tetradactylum* (2.76) and *K. pelamis* (2.59). This is because the production of *Makaira* sp. in Pariaman City is the largest in West Sumatera Province. The fish with an  $LQ < 1$  are not included in the catch fishery base commodity in Pariaman City, because the fishery production is still low when compared to other areas in West Sumatera Province. These commodities include *Atule mate*, *Trachinotus* spp., *Decapterus* spp., *Engraulidae*, *Lutjanus campechanus*, *Litopenaeus vannamei*, *Epinephelus* spp., *Rastrelliger* spp. and *Loligo* spp.

Table 1  
Capture fisheries commodities in Pariaman City based on the Location Quotient (LQ) analysis in 2018

Types of fish	LQ	Information
<i>Atule mate</i>	0.68	Non prime
<i>Trachinotus</i> spp.	0.94	Non prime
<i>Decapterus</i> spp.	0.27	Non prime
<i>Trichiurus lepturus</i>	1.85	Prime
<i>Engraulidae</i>	0.37	Non prime
<i>Makaira</i> sp.	2.81	Prime
<i>Lutjanus campechanus</i>	0.60	Non prime
<i>Eleutheronema tetradactylum</i>	2.76	Prime
<i>Auxis rochei</i>	2.21	Prime
<i>Auxis thazard</i>	1.48	Prime
<i>Katsuwonus pelamis</i>	2.59	Prime
<i>Rastrelliger</i> spp.	0.45	Non prime
<i>Epinephelus</i> spp.	0.27	Non prime
<i>Litopenaeus vannamei</i>	0.22	Non prime
<i>Loligo</i> spp.	0.39	Non prime

**Capture fisheries production growth analysis.** Shift Share analysis is a very useful technique in analyzing the growth of capture fisheries production in Pariaman City compared to the fishery production in West Sumatera Province, or commonly known as the Net Shift component. The Net Shift Component of capture fisheries commodities in Pariaman City in the 2014–2018 period amounted to 205661.14 kg. So it can be concluded that the Net Shift component  $(Gj-Nj) > 0$ , and in 2014–2018 the growth of fishery production in Pariaman City was faster than in West Sumatera Province. According to Mangilelang et al (2015), Shift Share analysis is a very useful technique in analyzing changes in the regional economic structure compared to the provincial economy.

The purpose of this analysis (Table 2) is to determine the performance or work productivity of the regional economy by comparing it with a larger region (regional/province). To determine the types of fish that have the potential to be

developed into superior capture fisheries commodities, it is necessary to calculate the Djt for each fish.

31 Table 2  
The catch fishery commodity in Pariaman City based on the Shift Share (SS) analysis in 2018

Types of fish	SS	Information
<i>Atule mate</i>	-25.4	Slow
<i>Trachinotus</i> spp.	-10.8	Slow
<i>Decapterus</i> spp.	40.4	Fast
<i>Trichiurus lepturus</i>	-10	Fast
Engraulidae	40	Fast
<i>Makaira</i> sp.	-16.6	Fast
<i>Lutjanus campechanus</i>	-4.6	Fast
<i>Eleutheronema tetradactylum</i>	59.4	Fast
<i>Auxis rochei</i>	85.4	Fast
<i>Auxis thazard</i>	229.2	Fast
<i>Katsuwonus pelamis</i>	186.2	Fast
<i>Rastrelliger</i> spp.	-46.2	Slow
<i>Epinephelus</i> spp.	-22.2	Slow
<i>Litopenaeus vannamei</i>	-16	Slow
<i>Loligo</i> spp.	-9	Slow

Based on Table 2, several capture fisheries commodities in Pariaman City experienced faster growth when compared to the same commodity at the provincial level, which means that the value of  $Djt > 0$ . These fishery commodities include *Decapterus* spp., *Engraulidae*, *E. tetradactylum*, *A. rochei*, *A. thazard* and *K. pelamis*. The highest value of Djt occurred for *K. pelamis*, namely 229.2; this occurred because the production of *K. pelamis* was the largest compared to other fish species in Pariaman City, and when compared to other areas in West Sumatera province.

If capture fisheries commodities have a Djt value less than 0, then the fisheries commodity growth is slower than that of the same fish species at the provincial level. This fishery commodity has lower competitiveness when compared to the same fish species in other districts in West Sumatera Province. These fishery commodities include *A. mate*, *Trachinotus* spp., *T. lepturus*, *Makaira* sp., *L. campechanus*, *Rastrelliger* spp., *Epinephelus* spp., *L. vannamei* and *Loligo* spp.

**Analysis of the contribution of capture fisheries production.** The specialization analysis (Table 3) is used to determine the existence of specialization in capture fisheries production in certain fish species in Pariaman City. If  $SI > 1$ , then there is a specialization of fishery production in Pariaman City relatively comparable to the province, while if  $SI < 1$ , there is no specialization in fishery production in Pariaman City relative to that of West Sumatera Province.

Based on Table 3, there fish that experience specialization in production, which means that they contribute to economic growth in Pariaman City, including *Decapterus* spp., *E. tetradactylum*, *A. rochei*, *A. thazard* and *K. pelamis*, the latter having the highest specialization value (SI) (9.42%).

The fish with specialization value (SI) less than 1 do not experience specialization in fishery production in Pariaman City when compared to the production of West Sumatera Province. This fishery commodity has low competitiveness when compared to other areas in West Sumatera Province, so that there is no specialization of capture fisheries activities for these fish commodities in Pariaman City (*A. mate*, *Trachinotus* spp., *Trichiurus lepturus*, *Engraulidae*, *Makaira* sp., *L. campechanus*, *Rastrelliger* spp., *Epinephelus* spp., *L. vannamei* and *Loligo* spp.).



Table 3

The catch fishery commodity in Pariaman City based on the Specialization (SI) analysis in 2018

Fish	SI	Information
<i>Atule mate</i>	-4.44	No Specialization
<i>Trachinotus</i> spp.	-2.32	No Specialization
<i>Decapterus</i> spp.	1.07	Specialization
<i>Trichiurus lepturus</i>	-1.96	No Specialization
<i>Engraulidae</i>	-2.95	No Specialization
<i>Makaira</i> sp.	0.9	No Specialization
<i>Lutjanus campechanus</i>	0.49	No Specialization
<i>Eleutheronema tetradactylum</i>	4.25	Specialization
<i>Auxis rochei</i>	5.25	Specialization
<i>Auxis thazard</i>	5.53	Specialization
<i>Katsuwonus pelamis</i>	9.42	Specialization
<i>Rastrelliger</i> spp.	-3.66	No Specialization
<i>Epinephelus</i> spp.	0.45	No Specialization
<i>Litopenaeus vannamei</i>	-2.04	No Specialization
<i>Loligo</i> spp.	0.5	No Specialization

**Prime capture fisheries commodity in Pariaman City.** The prime catch fisheries commodity (23) in Pariaman City are obtained from the results of the analysis of LQ, SS, and SI, found in Table 4.

Table 4

Results of the analysis of location quotient (LQ), shift share (SS), and specialization (SI) of capture fisheries commodities in Pariaman City in 2018

Types of fish	LQ	Djt	SI (%)	Information
<i>Atule mate</i>	0.68	-25.4	-4.44	Not prime
<i>Trachinotus</i> spp.	0.94	-10.8	-2.32	Not prime
<i>Decapterus</i> spp.	0.27	40.4	1.07	Not prime
<i>Trichiurus lepturus</i>	1.85	-10	-1.96	Not prime
<i>Engraulidae</i>	0.37	40	-2.95	Not prime
<i>Makaira</i> sp.	2.81	-15.6	0.9	Not prime
<i>Lutjanus campechanus</i>	0.6	-4.6	0.49	Not prime
<i>Eleutheronema tetradactylum</i>	2.76	59.4	4.25	Prime
<i>Auxis rochei</i>	2.21	85.4	5.25	Prime
<i>Auxis thazard</i>	1.48	229.2	5.53	Prime
<i>Katsuwonus pelamis</i>	2.59	186.2	9.42	Prime
<i>Rastrelliger</i> spp.	0.45	-45.2	-3.66	Not prime
<i>Epinephelus</i> spp.	0.27	-22.2	0.45	Not prime
<i>Litopenaeus vannamei</i>	0.22	-16	-2.04	Not prime
<i>Loligo</i> spp.	0.39	-9	0.5	Not prime

Note: Djt - differential shift component in Pariaman City.

Table 4 shows that the superior capture fisheries commodities in Pariaman City include *E. tetradactylum*, *A. rochei*, *A. thazard* and *K. pelamis*. This commodity is a large pelagic fish, except for *E. tetradactylum*, which are demersal fish. The fish that are not included in the superior capture fisheries commodity in Pariaman City are *A. mate*, *Trachinotus* spp., *Decapterus* spp., *T. lepturus*, *Engraulidae*, *Makaira* sp., *L. campechanus*, *Rastrelliger* spp., *Epinephelus* spp., *L. vannamei* and *Loligo* spp. Determination of the superior capture fisheries commodity is based on the amount of production.

***Eleutheronema tetradactylum*.** *E. tetradactylum* (Figure 1) is one of the capture fisheries prime commodities in Pariaman City. The results of the analysis show that the LQ value of *E. tetradactylum* is 2.7%, which means that the fish is the base for capture fisheries in Pariaman City. The Djt value of *E. tetradactylum*, 59.4, indicates that the fish production growth is faster than that of the same fish species from West Sumatera Province, so that it has a competitive edge when compared to other regions. The SI of *Eleutheronema tetradactylum* in Pariaman City reaches 4.25%, which means that the fish is relatively specialized in production in Pariaman City. This fish is an important consumption fish in Kuwait, India, Thailand, Vietnam, Malaysia, Singapore and Indonesia (Motomura 2004).

*E. tetradactylum* belongs to the Polynemidae family, which consists of 41 species in 8 genera, which are epibenic fish and can be found in all tropical and subtropical marine waters. *E. tetradactylum* is a protandrous hermaphrodite fish (Motomura 2004). The number of fishing activities causes this fish stock to rapidly decline, marked by a drastic decrease in catch (Wijopriyono et al 2012). Wijopriyono et al (2012) state that In 2012, the production of *E. tetradactylum* was only 9273 kg with a very significant decrease in production, namely 49822 kg when compared to the production in 2008. The optimum sustainable production value (Catch Maximum Sustainable Yield) of *E. tetradactylum* was 4067 kg per year within an optimum fishing effort of 497 trips per year. Fishing effort in 2012 was 849 trips (170.8% of the optimum fishing effort), so there has been an overfishing of *E. tetradactylum* (Indra et al 2013).

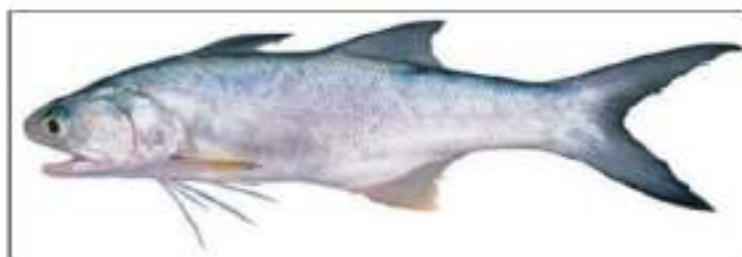


Figure 1. *Eleutheronema tetradactylum* (source: FishBase).

***Auxis rochei*.** *A. rochei* (Figure 2) production in 572 Fisheries Management Area has been recorded in capture fisheries statistics starting from 2005. In the previous year, the production of all tuna species was recorded in statistical data for "tuna" only, without distinguishing the species. According to Pariaman City marine and fisheries statistics data (2018), *A. rochei* production from 2005-2012 showed a fluctuating trend, the lowest was in 2005-2007 and increased rapidly in 2008-2012. *A. rochei* only contributes 2% of all neritic tuna production originating from the waters of West Sumatera (Directorate General of Capture Fisheries 2013). This value is very small compared to the percentage of other types of mackerel, such as *A. thazard* by 26%. There is a possibility that the data recording officer in the field misidentifies it because morphologically, *A. rochei* and *A. thazard* are very similar. Apart from being marketed in the local market, neritic tuna has been caught by fishermen which also enter the industry and are exported. The level of cultivation of *A. rochei* that is continuous without the existence of control can cause its sustainability to be threatened, therefore accurate and precise scientific information is needed.

The length of the first ripe gonads (Lm) of *A. rochei* is 24.6 cm (Marine Fisheries Institute 2013). Based on the Lm value, the length distribution of *A. rochei* caught in the waters of West Sumatera shows that adult fish are 53% and immature fish are 47%. Setyadji et al (2013) obtained a more different range, namely 23-32 cm for mini purse seines and 20-28 cm for large purse seines (industrial scale) in the South Indian Ocean. One of the differences in the length of the fish caught is caused by the difference in the size of the mesh used. *A. rochei* population will be sustainable if the size caught is above the length of the first time the gonads mature. Continuous exploitation of juvenile *A.*



*rochei* by means of non-selective purse seine fishing gear will cause the sustainability of *A. rochei* to be threatened.



Figure 2. *Auxis rochei* (FishBase).

***Auxis thazard*** <sup>11</sup>. *A. thazard* (Figure 3) is a pelagic fish from the Scombridae family. This fish can be found in almost all tropical and subtropical waters (Collette & Aadland 1996; Liu 2008). *A. thazard* is included in neritic tuna with sea surface habitats up to a depth of 50 meters (Collette & Nauen 1983; Maguire et al 2006; Herrera & Pierre 2009). The migration pattern is local with the optimal temperature between 27-27.9°C. The catch of *A. thazard* is increasing every year with a variety of fishing gears (gill nets, purse <sup>15</sup>nes and pole and line). IOTC (2014) reports that more than 90% of *A. thazard* catch is concentrated in four countries, namely Indonesia (59%), India (14%), Sri Lanka (11%) and Iran (7%). Thus, *A. thazard* is an economically important fish in Indonesia and one of its distribution areas in Western Sumatera <sup>18</sup>specially in the waters around Sibolga.

<sup>18</sup> According to Ghosh et al (2012), the size of the fish first reached gonad maturity at a fork length of 29.7 cm. According to Tampubolon et al (2016), *A. thazard* in the waters of western Sumatra have a standard length of 34.89 cm. Based on the research of Ghosh et al (2012), the frequency of mature tuna landed at the Kusamba fish auction is only 12% of the total sample. This can be caused by the size of the mesh used by the fishermen, which is too small, causing immature fish to be unable to escape from the net.



Figure 3. *Auxis thazard* (FishBase).

***Katsuwonus pelamis***. *K. pelamis* (Figure 4) is a highly migratory species <sup>30</sup>and occupies tropical and sub-tropical waters (Arai et al 2005). Their distribution, movement and vulnerability are influenced by their preferred habitat. The presence of prey, suitable temperature and sufficient oxygen significantly affect the survival of *K. pelamis*. As a consequence, the spatial distribution of *K. pelamis* is seasonal and has an annual pattern (Mugo et al 2010).

The distribution of *K. pelamis* in Indonesia includes the Indonesian Ocean, the west coast of Sumatera, South Java, Bali, Nusa Tenggara, East Indonesian waters including the Banda Sea, Flores Sea, Maluku Sea, Makassar Sea (Uktolseja 1987). The fishing location for *K. pelamis* is determined by different seasons in each water. Catching *K. pelamis* can be conducted all year round. The results obtained differ from season to season and also vary according to the fishing location. According to Supriana et al (2014), the distribution areas for tuna and *K. pelamis* in Indonesia include the Banda Sea, Maluku Sea, Flores Sea, Sulawesi Sea, Indian Sea, Halmahera Sea, northern Aceh waters, west Sumatera, southern Java, northern Sulawesi, Temini Bay, Cendrawasih Bay, and the Arafura Sea.

Rochman et al (2015) stated that the continuous use of *K. pelamis* in the Indian Ocean, especially in Indonesia's territorial areas, results in the utilization rate of *K. pelamis* in optimum conditions so that it needs caution and accuracy in its management. According to IOTC (2016), the status of *K. pelamis* stocks in 2014 in the Indian Ocean was in good condition. One aspect to support efforts to manage fish resources is basic knowledge regarding aspects of reproductive biology (Jatmiko et al 2015) and the spawning season (Suwarso et al 2015).

Research results of Rochman et al (2015), Zedta et al (2017) and Nurdin & Panggabean (2017) show that the capture length of *K. pelamis* in the South Indian Ocean, Java was 38.73, 39.4, and 40 cm, respectively, while the results of Hidayat et al (2017) in the Pacific Ocean showed a capture length of 40.1 cm. The difference in the length value of first catch in each region is strongly influenced by the fishing gear used. The average length in this study was 42.5 cm. The results of Nikijuluw (2009) and Jatmiko et al (2015) showed that the Lm of *K. pelamis* at maturity was between 41-43 cm in the Indian Ocean. Indian Ocean Tuna Commission (2014) reported that the Lm of *K. pelamis* is 44 cm. The Lm in the Western Indian Ocean is 37.8 cm (Grande et al 2010) and 44.7 cm in the Southern Indian Ocean, Bali (Hartaty & Amenda 2019). These differences can occur because of the suitability of environmental conditions (Udupa 1986; Lambert et al 2003). In this study, *K. pelamis* caught in the Southern Indian Ocean, Java and Nusa Tenggara, had not yet reached gonad maturity. A large number of young fish caught will put the fish stock at risk.

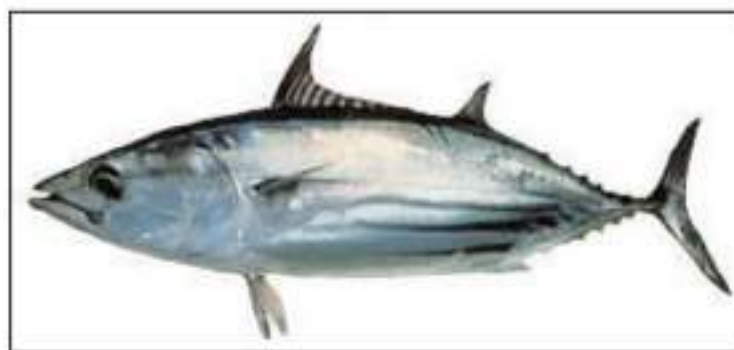


Figure 2. *Katsuwonus pelamis* (FishBase).

**Government efforts to increase fishery potential.** According to Suharno & Widayati (2015), there are several problems in fisheries on the coast of Pariaman City, namely the lack of welfare of fishermen, indications of over fishing, fluctuating fishery production, use of various kinds of fishing gear, fishing fleets which are still dominated. Small-scale/community fisheries and generally fishermen in small-scale fisheries have not been able to use the appropriate input as they should (unable to combine inputs optimally).

Government efforts to increase the potential for superior capture fisheries commodities in Pariaman City include diversification of prime fishery products, increasing public awareness in participating in fisheries and marine management, increasing

supervision in the utilization of fishery resources and building and developing industrial estates for prime capture fisheries commodities.

**Conclusions.** Main catch fisheries commodities in Pariaman City include *Eleutheronema tetradactylum* with a location quotient value of 2.76, differential shift of 59.4 and specialization of 4.25%. *Auxis rochei* present a location quotient value of 2.21, differential shift of 85.4 and specialization of 5.25%. *Auxis thazard* presents a location quotient of 1.48, differential shift of 229.2 and specialization of 5.53%. *Katsuwonus pelamis* had a location quotient value of 2.59, differential shift of 186.2 and specialization of 9.42%.

12

**Conflict of Interest.** The authors declare that there is no conflict of interest.

## References

- Alit D. B. N., Wijayanto D., Sardiyatmo, 2017 [Analysis of prime capture fisheries commodities in Central Java Province]. Journal of Fisheries Resources Utilization Management and Technology 6:37-46. [In Indonesian].
- Arai T., Kotake A., Kayama S., Ogura M., Watanabe Y., 2005 Movements and life history patterns of the skipjack tuna (*Katsuwonus pelamis*) in the western Pacific, as revealed by otolith Sr:Ca ratios. Journal of the Marine Biological Association of the United Kingdom 85(5):1211-1216.
- Arifin Z., 2008 [Basics of writing scientific papers]. PT Grasindo, Jakarta, 38 p. [In Indonesian].
- Budiharsono S., 2001 [Coastal and ocean development analysis techniques]. PT Pradnya Paramitha, Jakarta, 48 p. [In Indonesian].
- Collette B. B., Aadland C. R., 1996 Revision of the frigate tunas (Scombridae, Auxis) with descriptions of two new subspecies from the eastern Pacific. Fishery Bulletin 94(3):423-441.
- Collette B. B., Nauen C. E., 1983 FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fisheries Synopsis 125(2), 137 p.
- Ghosh S., Sivasdas M., Abdussamad E. M., Rohit P., Koya K. P. S., Joshi K. K., Chellappan A., Rathinam M. M., Prakasan D., Sebastine M., 2012 Fishery, population dynamics and stock structure of frigate tuna *Auxis thazard* (Lacepede, 1800) exploited from Indian waters. Indian Journal of Fisheries 59(2):95-100.
- Grande M., Murua H., Zudaire I., Korta M., 2010 Spawning activity and batch fecundity of skipjack, *Katsuwonus pelamis*, in the Western Indian Ocean. IOTC-2010-WPTT-47, 28 p.
- Hartaty H., Annenda G. L., 2019 [Determination of size for the first time mature gonad (Lm) of skipjack tuna (*Katsuwonus pelamis* Linnaeus, 1758) in the South Indian Ocean of Bali]. Indonesian Fisheries Research Journal 25(2):135-145. [In Indonesian].
- Herera M., Pierre L., 2009 Status of IOTC databases for neritic tunas. IOTC-2009-WPDCS-06, 46 p.
- Hidayat T., Noegroho T., Wagiyo K., 2017 [Size structure and several population parameters of skipjack tuna (*Katsuwonus Pelamis*, Linnaeus, 1758) in the Northern Pacific Ocean of Papua]. BAWAL 9(2):113-121. [In Indonesian].
- Indra, Tang U. M., Nasution S., 2013 [Relationship of aquatic environmental conditions to *Eleutheronema tetradactylum* production in Pambang Bay, Bengkalis Regency]. Riau University Environmental Research Center, Riau, Indonesia, 11 p. [In Indonesian].
- Irnawati, Ririn, Simbolon D., Wiryawan B., Mirdiyanto B., Nurani T. W., 2011 [Analysis of prime capture fisheries commodities in Karimunjawa National Park]. Journal of Fisheries Science 7(1):1-9. [In Indonesian].



- Jatmiko I., Hartaty H., Bahtiar A., 2015 [Reproductive biology of skipjack tuna (*Katsuwonus pelamis*) in the East Indian Ocean]. BAWAL 7(2):87-94. [In Indonesian].
- Kohar A. M., Paramartha D., 2012 [Analysis of capture fisheries prime commodities in Rembang Regency]. Harpodon Borneo Journal 5:161-171. [In Indonesian].
- Lambert Y., Yaragina N. A., Kraus G., Martensdottir G., Wright P. J., 2003 Using environmental and biological indices as proxies for egg and larval production of marine fish. Journal of Northwest Atlantic Fishery Science 33:115-159.
- Mengileleng, Jekne E., Rotinsulu D., Rompes W., 2015 [Analysis of prime sectors of South Minahasa Regency]. Efficiency Scientific Periodical Journal 15(4):193-205. [In Indonesian].
- Motomura H., 2004 Threadfins of the world (Family Polynemidae). An annotated and illustrated catalogue of polynemid species known to date. FAO, Rome, 10 p.
- Mugo R., Saitoh S. I., Nihira A., Kuroyama T., 2010 Habitat characteristics of skipjack tuna (*Katsuwonus pelamis*) in the western North Pacific: a remote sensing perspective. Fisheries Oceanography 19(5):382-396.
- Nikijuluw V. P. H., 2009 [Status of Indian Ocean tuna resources: Implications for Indonesia]. Indonesian Fisheries Policy Journal 1(1):32-44. [In Indonesian].
- Nurdin E., Panggabean A. S., 2017 [Catching season and size structure of skipjack tuna (*Katsuwonus pelamis* Linnaeus, 1758) around FADs in the waters of Palabuhan Ratu]. Indonesian Fisheries Research Journal 23(4):299-308. [In Indonesian].
- Resosudarmo, Budy P., Hartono D., Ahmad T., Subiman N. I. L., Olivia, Noegroho A., 2002 [Analysis of determination of priority sectors in maritime affairs and fisheries in Indonesia]. Coastal and Ocean Journal 4(2):17-28. [In Indonesian].
- Rochman F., Nugraha B., Wujdi A., 2015 [Estimation of population parameters of skipjack tuna (*Katsuwonus pelamis*, Linnaeus, 1758) in the Indian Ocean, South Java]. BAWAL 2(2):77-85. [In Indonesian].
- Sembiring E., 2009 [Study of business opportunities for ten prime commodities in Northern Sumatera]. Research Team for the Economy and Development of the North Sumatera Province, Balitbang, 58p. [In Indonesian].
- Setyadji B., Novianto D., Bahtiar A., 2013 Size structure of bullet tuna (*Auxis rochei*, Risso, 1810) caught by small scale and industrial purse seine fisheries in Indian Ocean - south of Java based on trial scientific observer data. IOTC third working party on neritic tuna, IOTC-2013-WPNT03-30, 10 p.
- Suharno, Widayati T., 2015 [Small-scale fisherman capture fisheries business management policy in Pantura, Central Java]. Proceedings of the Multi-Disciplined National Seminar on Science and & Call For Paper, University Stikubank, Semarang, Indonesia. [In Indonesian].
- Supriana A. B., Hascaryo S. H., Wisudo M., Baskoro, Nikijuluw V. P. H., 2014 [Value chain model for tuna, cob and skipjack fisheries development in Indonesia]. Journal of Indonesian Fish Product Processing 17(2):144-155. [In Indonesian].
- Susanto A., 2008 [Potential sector analysis and regional development to encourage development in Rembang Regency]. Journal of Media Economics and Management 18(2):153-164. [In Indonesian].
- Suwarso, Ernawati T., Hariati T., 2015 [Reproductive biology and suspected *Rastrelliger brachysoma* spawning on the North Coast of Java]. BAWAL 7(1):9-16. [In Indonesian].
- Tampubolon P. A. R. P., Novianto D., Hartaty H., Kurniawan R., Setyadji B., Nugraha B., 2016 Size distribution and reproductive aspects of *Auxis* spp. from West Coast Sumatera, Eastern Indian Ocean. IOTC-2016-WPNT06-19, 9 p.
- Udupa K. S., 1986 Statistical method of estimating the size at first maturity in fishes. Fishbyte 4(2):8-10.
- Uktolseja J. C. B., 1987 [Estimated growth parameters and migration of skipjack tuna - *Katsuwonus pelamis* in the eastern Indonesian water through tagging experiments]. Research Institute for Marine Fisheries, Jakarta, pp. 15-44. [In Indonesian].

- Wijopriyono, Nugroho D., Sadhotomo B., 2012 [Trends in the utilization of *Polinemidae* in Bengkalis waters, Malacca Strait]. Indonesian Fisheries Research Journal 18(4):205-212. [In Indonesian].
- Zadta R. R., Tampubolon P. A. R. P., Novianto D., 2017 [Estimated population parameters of skipjack tuna (*Katsuwonus Pelamis*, Linnaeus, 1758) in Indian Ocean waters]. BAWAL 9(3):163-173. [In Indonesian].
- \*\*\* Directorate General of Capture Fisheries, 2013 [Indonesian capture fisheries statistics 2013]. Marine and Fisheries Ministry, Jakarta. [In Indonesian].
- \*\*\* Directorate General of Capture Fisheries, 2014 [Strategic plan]. Marine and Fisheries Ministry of Indonesia, pp. 35-36. [In Indonesian].
- \*\*\* <https://www.fishbase.de/>
- \*\*\* Indian Ocean Tuna Commission (IOTC), 2014 Report of the fourth session of the IOTC working party on neritic tunas. IOTC-2014-WPNT04-R[E], Phuket, Thailand, 90 p.
- \*\*\* Marine Fisheries Research Institute, 2013 [Research on biological aspects, utilization rates, and optimization of utilization of large pelagic fish resources in WPP 572, WPP 573, and WPP 717 to support fisheries industrialization]. Final Report. [In Indonesian].
- \*\*\* Pariaman City, 2018 [Pariaman City marine and fishery potential]. Pariaman, Indonesia, pp. 12-31. [In Indonesian].

Received: 12 March 2021. Accepted: 21 April 2021. Published online: 27 December 2021.

#### Authors:

Yusrizal, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, South Jakarta, Indonesia, e-mail: yusrizaltrc@gmail.com

Eddy Sugriwa Husen, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: sugriwasip@gmail.com

Jerry Hutajulu, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: jerryhutajulu15@gmail.com

Maman Hermawan, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: mhermawan60@gmail.com

Muhammad Handri, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: handrimuhammad@gmail.com

Rahmat Muallim, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: rahmatmuallim@gmail.com

Suharto, Faculty of Fishing Technology, Jakarta Technical University of Fisheries, AUP Street Pasar Minggu, 12520 South Jakarta, Indonesia, e-mail: suhartoxvi@gmail.com

Yaser Krisnafi, Pangandaran Fisheries Institute, Faculty of Fishing Technology, West Java, Indonesia, e-mail: yaser\_bunda@yahoo.com

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

#### How to cite this article:

Yusrizal, Husen E. S., Hutajulu J., Hermawan M., Handri M., Muallim R., Suharto, Krisnafi Y., 2021 Analysis of capture fisheries prime commodities in Pariaman City, West Sumatera, Indonesia. AACL Bioflux 14(6):3674-3685.

# Analysis of capture fisheries prime commodities in Pariaman City, West Sumatera, Indonesia

## ORIGINALITY REPORT

13%

SIMILARITY INDEX

7%

INTERNET SOURCES

9%

PUBLICATIONS

5%

STUDENT PAPERS

## PRIMARY SOURCES

- |   |   |    |
|---|---|----|
| 1 | Submitted to Universitas Jenderal Soedirman<br>Student Paper  | 2% |
| 2 | 123dok.com<br>Internet Source   | 1% |
| 3 | Mahyuddin, M Arsyad, R Darma, M Fahmid, L Fudjaja, R M Rukka, Miftahulmawaddah.<br>"Analysis of agriculture based sector in regional development of Gowa Regency", IOP Conference Series: Earth and Environmental Science, 2021<br>Publication  | 1% |
| 4 | Yoke Hany Restiangsih, Anthony Sisco Panggabean, Erfind Nurdin. "DUGAAN MUSIM PEMIJAHAN IKAN CAKALANG (Katsuwonus pelamis) DI PERAIRAN SAMUDRA HINDIA SELATAN JAWA DAN NUSA TENGGARA", BAWAL Widya Riset Perikanan Tangkap, 2020<br>Publication | 1% |
| 5 | M Arsyad, S R Yunus, N Lanuhu, M H Jamil, Mahyuddin, N Alim. "An analysis of  | 1% |



progressive sectors: agriculture position", IOP  
Conference Series: Earth and Environmental  
Science, 2021

Publication

6

Azis Nur Bambang, Imam Triarso, Abdul  
Kohar Muzakir. "Excellent Commodity of  
Capture Fisheries and Preservation of Fish  
Resources in Pekalongan City", E3S Web of  
Conferences, 2020

Publication

1 %

7

Mas Odi, Riyanarto Sarno, R.V. Hari Ginardi.  
"Analysis of Potencies and Investment  
Opportunities in East Java Based on  
Geographic Information System", 2018  
International Seminar on Application for  
Technology of Information and  
Communication, 2018

Publication

1 %

8

[garuda.kemdikbud.go.id](http://garuda.kemdikbud.go.id)

Internet Source

<1 %

9

[www.mchenryswcd.org](http://www.mchenryswcd.org)

Internet Source

<1 %

10

Submitted to Universitas Diponegoro

Student Paper

<1 %

11

Ririk Kartika Sulistyaningsih, Irwan Jatmiko,  
Maya Agustina. "CPUE STANDARDIZATION OF  
FRIGATE TUNA (*Auxis thazard*) CAUGHT BY

<1 %

PURSE SEINE OFF THE COAST OF WESTERN  
SUMATERA (FMA 572)", Indonesian Fisheries  
Research Journal, 2020

Publication

---

12	Submitted to Universitas Negeri Medan	<1 %
	Student Paper	

---

13	doku.pub	<1 %
	Internet Source	

---

14	journal.ubaya.ac.id	<1 %
	Internet Source	

---

15	www.boblme.org	<1 %
	Internet Source	

---

16	www.coloradopairpace.com	<1 %
	Internet Source	

---

17	"World review of capture fisheries and aquaculture insurance 2022", Food and Agriculture Organization of the United Nations (FAO), 2022	<1 %
	Publication	

---

18	Baihaqi, Mahiswara, T W Budiarti. "Characteristics of purse seine fisheries in the Sulawesi Sea (case study in Tumumpa fishing port)", IOP Conference Series: Earth and Environmental Science, 2021	<1 %
	Publication	

---

19	<p>Mohammad Othman Jamil Rashdan, Faisal Faisal, Turgut Tursoy, Ruqiya Pervaiz.</p> <p>"Investigating the N-shape EKC using capture fisheries as a biodiversity indicator: empirical evidence from selected 14 emerging countries", Environmental Science and Pollution Research, 2021</p> <p>Publication</p>	<1 %
20	<p>Submitted to Universitas Dian Nuswantoro</p> <p>Student Paper</p>	<1 %
21	<p>Submitted to World Maritime University</p> <p>Student Paper</p>	<1 %
22	<p>bioflux.com.ro</p> <p>Internet Source</p>	<1 %
23	<p>Submitted to Universitas Hasanuddin</p> <p>Student Paper</p>	<1 %
24	<p>art1lib.org</p> <p>Internet Source</p>	<1 %
25	<p>showtimegolf.com</p> <p>Internet Source</p>	<1 %
26	<p>www.ijphrd.com</p> <p>Internet Source</p>	<1 %
27	<p>www.repositorio.ieo.es</p> <p>Internet Source</p>	<1 %
28	<p>ejournal-balitbang.kkp.go.id</p>	



<1 %

29

[eprints.undip.ac.id](https://eprints.undip.ac.id)

Internet Source

<1 %

30

ARS Putri, M Zainuddin. "Application of remotely sensed satellite data to identify Skipjack Tuna distributions and abundance in the coastal waters of Bone Gulf", IOP Conference Series: Earth and Environmental Science, 2019

Publication

<1 %

31

Sutanti Sutanti, Dwi Oktariani. "ANALYSIS OF LEADING SECTORS IN SOUTH TANGERANG FOR DETERMINING REGIONAL DEVELOPMENT PRIORITIES", Muhammadiyah International Journal of Economics and Business, 2019

Publication

<1 %

32

[otolith.ori.u-tokyo.ac.jp](https://otolith.ori.u-tokyo.ac.jp)

Internet Source

<1 %

33

takaomi arai, aya kotake, sadaaki kayama, miki ogura, yoshiro watanabe. " movements and life history patterns of the skipjack tuna in the western pacific, as revealed by otolith sr:ca ratios ", Journal of the Marine Biological Association of the United Kingdom, 2005

Publication

<1 %

---

Exclude quotes      On

Exclude matches      Off

Exclude bibliography      On