

**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**

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ABSTRACT

The bullet tuna (*Auxis rochei* Risso, 1810) is a commercially important Scombrid widely distributed in tropical and subtropical waters around the world, including Indian Ocean. As country which significantly contribute on landing, yet its biological aspect were still far limited available on publication. This paper expected to reveals some of the biological aspect of bullet tuna (*Auxis rochei*) based on trial scientific observer data conducted in May and September 2012. The result showed that the composition of the catch both from small scale or industrial purse seine vessel was dominated by Indian scad and yet only bullet tuna (*Auxis rochei*) which able to be identified. Size distribution of bullet tuna caught by small scale purse seiner was bigger than industrial and all bullet tuna samples both scale of purse seiner were found at immature stage.

Keyword : Size structure, Purse seine, Small and Industrial scale, Indian Ocean, South of Java

INTRODUCTION

In indian ocean, landing of neritic tunas were mainly caught by drifting gillnets and purse seines fleets operated in coastal waters, although some species are also caught by industrial purse

seines, hand lines, troll lines or other gears both in coastal waters and on the high seas. neritic tunas are targetted by several type of fisheries including as a by-catch of fisheries targeting small pelagic species, large tunas or other non-tuna species (Herrera, *et al.*, 2009).

Purse seine is one of the most advance types of fishing gears for surrounding schools of fish, e.g. anchovies, sardines, scads, mackerel, bonito and tuna. In 1980s a new purse-seine fishery started in the western Indian Ocean, and an important portion of the fishing effort in the eastern Atlantic, particularly French purse seiners, moved to the Indian Ocean (FAO). While in Indonesian Purse seine was firstly introduced on the north coast of central Java by Research Institute for Marine Fisheries in 1970, and then applied in Muncar - East Java Province and rapidly expanding until now (Susanti, 1992). In the past fisherman used small purse seines and traditional fishing gears for the small pelagic fish species in coastal areas. At present fishing gears and techniques are developed by using light luring techniques, FADs and advance technology fish finder equipment. Notwithstanding the technology innovations and massive investments in modern vessels in tuna and like species, the great contributor to purse seine fisheries of the world is the vast number of small vessels landing small quantities of many kinds of fish species. These small vessels have multi-purpose uses and thus, it is difficult to come up with the exact estimate of the number of vessels involved in purse seine fisheries (Yingyuad *et al.*, 2010). This paper presents the the biological aspects of bullet tuna caught under industrial and small-scale purse seine fishery based on onboard observations conducted in 2012.

MATERIALS AND METHODS

Two types of data (primer and secondary) data were analyzed in this paper.

1. The primer data obtained from onboard observation that was conducted on May and September 2012. The data covers fisheries (technical aspect of gear, tools and fishing ground) and biological aspect (species composition and size distribution).
2. The secondary data come from National Fisheries Statistics year 2007-2011 published by DGCF and Pacitan Fishing Port Statistic year 2009-2012.

RESULT AND DISCUSSION

Fishing gears and fishing ground

In general, purse seiners have two main operational modes i.e. setting nets on schools associated with floating objects such as drifting logs, and anchored or drifting fish aggregation devices (FADs); and setting on free-swimming (or unassociated) schools of fishes. Generally, Indonesian industrial scale purse seiners fleets recognised between 60 - 100 GT, only a few with size of more than 100 GT. Fishing fleets usually consist of four main components i.e. catcher, lights boat, haul boat and carrier vessel. The vessel runs by 23 crews and stay up for a whole year. The catch periodically picked up by carrier vessel (usually every 2 – 4 weeks) for efficiency reason. Details of vessel, gears and FAD are presented in [Figure 1](#). Small scale purse seiner were not so different except in size, and the duration of the trip. Small scale purse seiners usually sized less than 30 GT (16 – 18 GT in particular) and less day at sea (7 – 10 days). The operating fishing ground geographically located between 110 – 122⁰ E and 8 – 13⁰ S ([Figure 2](#)). Small scale fleets fishing grounds were less far compared to industrial. Detail comparison of industrial and small scale purse seine vessel are presented in [Table 1](#).

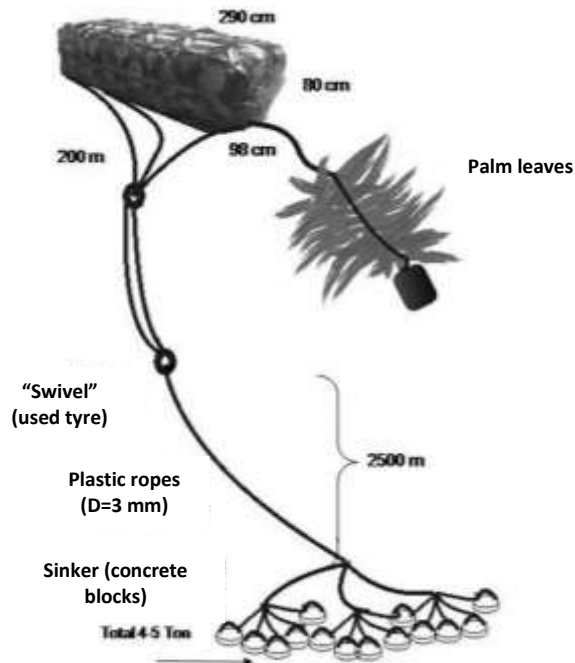
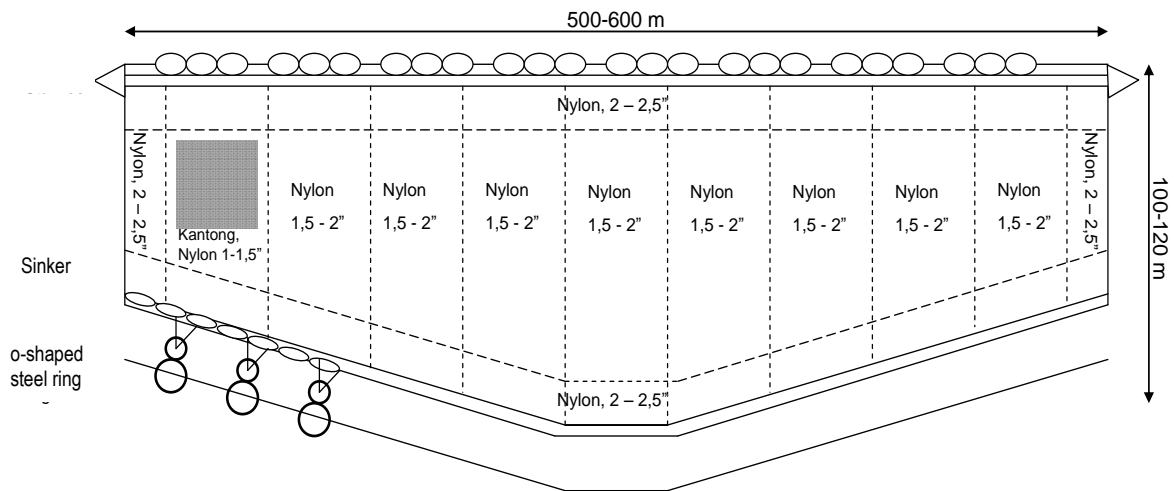


Figure 1. Small scale and industrial purseiners (top), detail construction of purse seine net (middle), and FAD used (bottom).

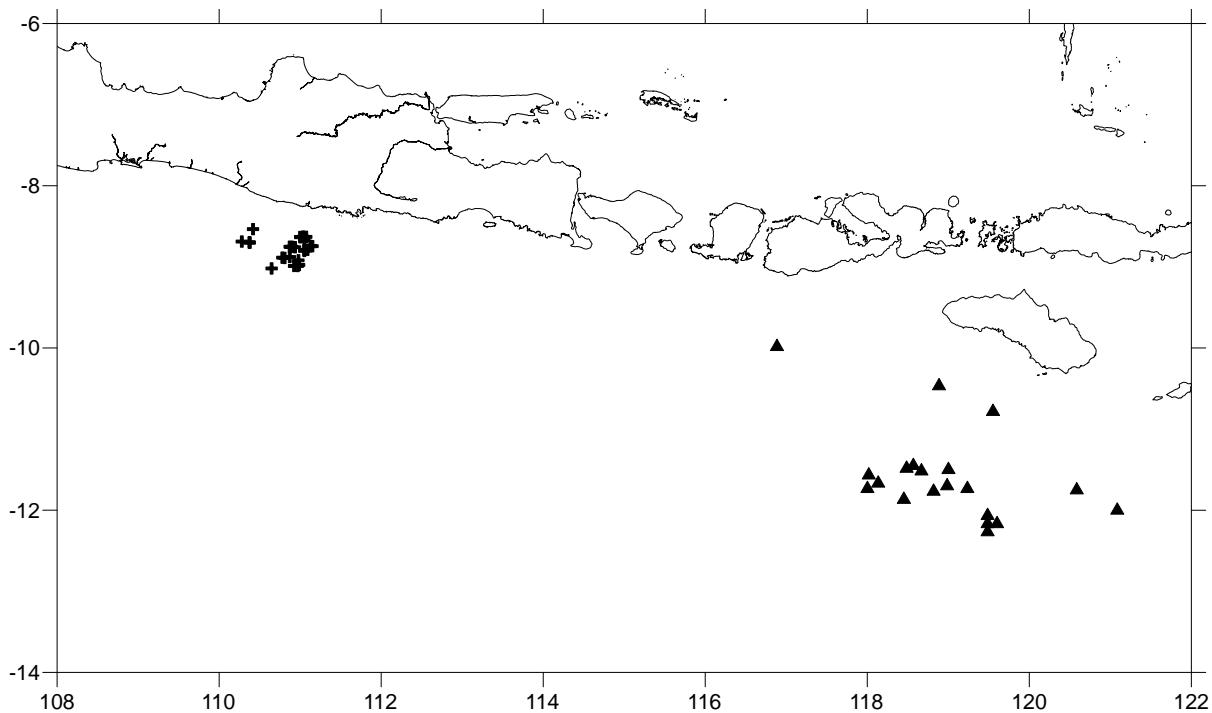


Figure 2. Sampling area and fishing ground of small scale (Δ) and industrial (+) purse seiner based on observer data in 2012.

Table 1. Detail comparison of industrial and small scale purse seine vessel

| Spesification Details | Industrial | Small Scale |
|------------------------------|--------------------|--------------------|
| Gross Tonnage (GT) | 98 | 18 |
| Length | 24,58 | 17,25 |
| Width | 7,40 | 5,80 |
| Depth | 2,62 | 1,70 |
| Fish hold | 10 | 3 |
| Crew | 23 | 26 |
| Fishing technique | integrated catcher | single vessel |
| Duration of the trip | 10-12 month | 7-15 days |
| FADs | Yes | Yes/No |
| Materials | Steel | Wood |

Catches Dynamics

Five serial years production of 6 known species of neritic tuna in Indonesian Fisheries Management Area (IFMA) 573 by type of gear (purse seine) tend to decline or steady except for frigate tuna (Figure 3). Kawakawa is likely the dominant species caught by purse seine followed by frigate and longtail tuna, while others species are steady.

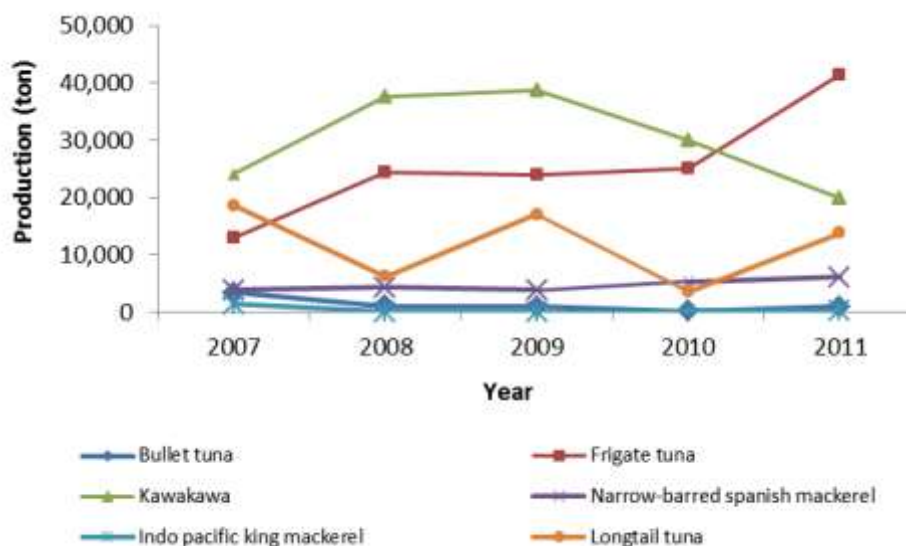


Figure 3. Development of neritic tuna production from 2007 – 2011 (Source: Anonymous, 2011; 2012)

Catch Composition

Both observed vessels showed that the composition of the catch were much less the same. On small scale tuna the composition of the catch dominated by Indian scad (95.88%) followed by bullet tuna (2.96%), yellowfin tuna (0.26%) and squid (0.88%). While on industrial scale it composed of Indian scad (50.67%), bullet tuna (22.20%), skipjack (15.75%), juvenile tuna (9.65%) and yellowfin tuna (1.71%) (Figure 4). Catch composition was less varied on small

scale tuna compared to the industrial. Limited availability of observer data generated some difficulties to determine whether neritic tuna of both from small scale or industrial were just a side catch, while their main target was originally Indian scad. In addition, small scale purse seiners define their target based on fishing season. From known 6 species only bullet tuna caught by small scale and industrial purse seiners that associated with FADs.

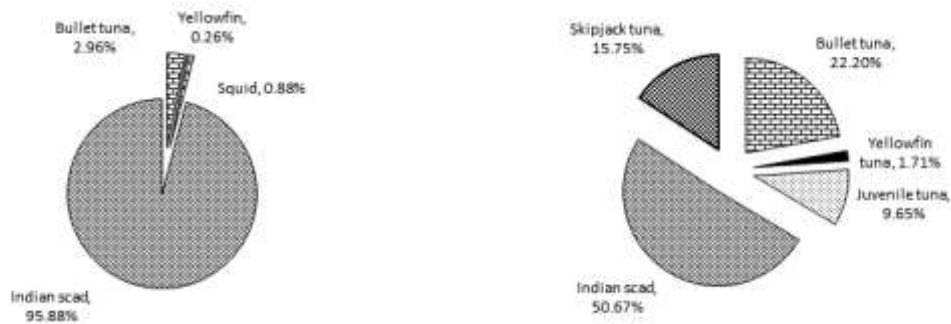


Figure 4. Catch composition of small scale (left) and industrial (right) purse seiner based on onboard observation in 2012

Size Structure

A total number of 81 bullet tuna samples, comprised of 34 samples from small scale and 41 samples from industrial purse seiner showed that size distribution of bullet tuna caught by small scale purse seiner were bigger than industrial (**Figure 5**). Bullet tuna caught from small scale purse seiner ranged from 23 – 32 cmFL and dominated at size 30 cmFL, while on industrial ranged from 20 – 28 cmFL and dominated at size 20 – 22 cmFL. It is probably due to naturally the adults group are mainly caught in coastal waters and around islands (**Collette, 1995**), while eggs larvae and Juvenile are swimming more in the oceanic pelagic waters (**Collette, 1986**). All

bullet tuna samples both collected from small scale or industrial purse seiner were in immature¹ stages although information on its reproductive biology in Indonesia stil not available yet.

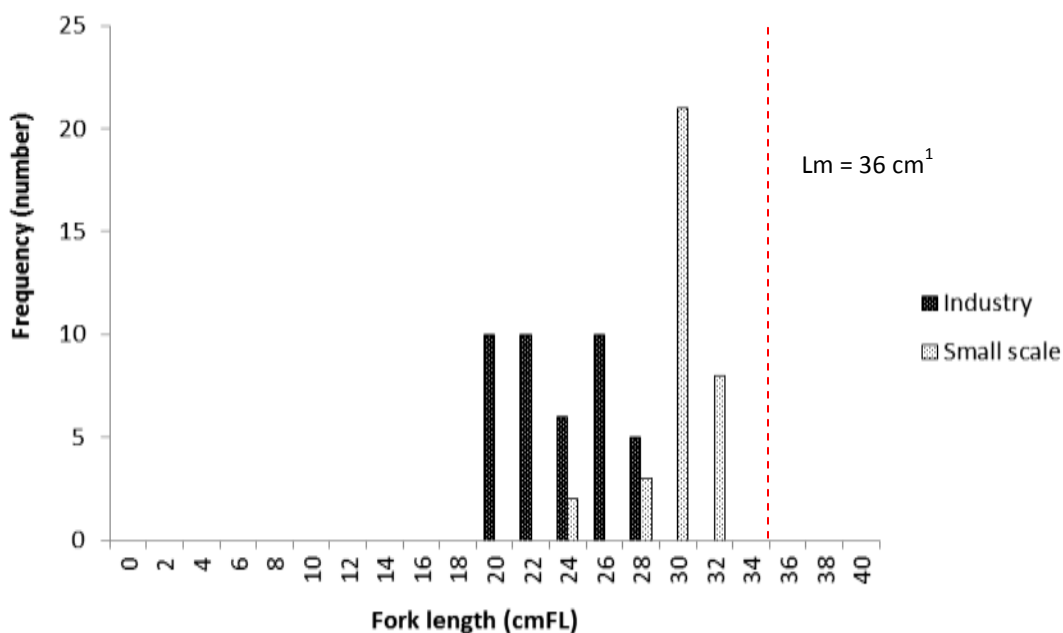


Figure 5. Size distribution of bullet tuna (*Auxis rochei*) caught by small scale & industrial purse seine base on onboard observation in 2012

CONCLUSION

1. The catch composition of both small scale or industrial purse seine vessel was dominated by Indian scad and only bullet tuna (*Auxis rochei*) which able to be identified.
2. Size distribution of bullet tuna caught by small scale purse seiner was bigger than industrial.
3. All bullet tuna samples both collected from small scale or industrial purse seiner were immature.

¹Based on Macias *et al.* (2005) on Mediterranean Sea.

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