

Catch Rate and Catch Composition of Mini Purse Seine in Bualemo, Banggai District (Anggawangsa, R.F., et al)

CATCH RATE AND CATCH COMPOSITION OF MINI PURSE SEINE IN BUALEMO, BANGGAI DISTRICT

Regi Fiji Anggawangsa¹, Suwarso² and Wudianto¹

¹Research Center for Fisheries Management and Conservation

²Research Institute for Marine Fisheries

Received January 04-2013; Received in revised form June 03-2014; Accepted June 05-2014

Email: regi.anggawangsa@gmail.com

ABSTRACT

Small pelagic fishery is the largest potential commodity in the waters of Tomini Bay which reached 64% of the total fish resources. Mini purse seine (soma pajeko) is the major fishing gear that used to utilize small pelagic resources in Tomini Bay. One of the main fishing grounds of mini purse seine vessels in Tomini Bay is in Bualemo and the surrounding waters. The aim of this research was to describe mini purse seine fishery in Bualemo especially about the aspects of the catch rate and catch composition. From the analysis of the daily catch data, there was a fluctuation of the average of catch rate each month. The catch of mini purse seine in Bualemo was dominated by two main species that is malalugis/mackerel scad (*Decapterus macarellus*) and bigeye scad (*Selar crumenophthalmus*). The large amount of the young fish (juvenile) caught by mini purse seine caused by the vessels operated around FADs and the mesh size that was less selective.

KEYWORDS: Catch rate, composition, mini purse seine, Bualemo

INTRODUCTION

Tomini Bay is one of the largest bays in Indonesia, it has area of about 59,500 km², and included into the Regional Fisheries Management (WPP) 713: Tomini Bay - Molucca Sea - Ceram Sea (BRPL, 2005). Administratively, Tomini bay surrounded by three provinces (North Sulawesi, Gorontalo and Central Sulawesi) of 11 districts / cities. Tomini Bay waters covers coastal areas with very large oceanic influence, or in other words intermediate waters with an average depth of > 1500 m, shaped as a funnel that opens to the east, and directly related to the Molucca Sea, the Gulf of Tolo, and the Celebes Sea. Geographical conditions thereby consequent circulation of water masses between the waters in the bay with the surrounding waters (Prasetyati, 2004; Suwarso *et al.*, 2005).

Fish production in the Tomini Bay was dominated by small pelagic. Based on the Ministerial Decree No. Kep 45/MEN/11, the estimated of potential fishery resources in the Tomini Bay reached 595.6 thousand tons / year and dominated by small pelagic which approximately about 379.4 thousand tons / year or about 64% of the total catch, large pelagic resources, 106.5 thousand tons/year (18%) and demersal 88.8 thousand tons/year (15%). The exploitation of small pelagic fish resources in Tomini Bay are mostly by traditional fishing gear and most widely used mini purse seine (*soma pajeko*). There were about 419 units of mini purse seine vessels that exploit small

pelagic fish in Tomini Bay and spread in Bitung (121 units), Bolaang-Mongondow (67 units), Gorontalo (98 units), Parigi-Moutong (39 units), Poso (25 units), Ampana (25 units) and Banggai (44 units) (Nurhakim *et al.*, 2007).

The waters north of Bualemo is one of the main fishing ground of mini purse seine to catch small pelagic fish in the Tomini Bay. There is a tendency that the fishing ground of small pelagic fish shifted toward the waters around the mouth of the bay. Changes in catch rate/CPUE and catch composition data provide information about relative abundance of an exploited fish stock (Jul-Larsen *et al.*, 2003), so it is important to get information about catch rate/CPUE and catch composition of mini purse seine vessels in Bualemo.

Until now there is only few published information about the activity of mini purse seine in Bualemo waters and surrounding areas. This research aims to describe the mini purse seine fishery in Bualemo, Banggai District particularly on the catch rate and catch composition.

MATERIALS AND METHODS

The study was conducted in November 2011 in some major fishing ports and fish landing sites in Bualemo, Banggai District. The data collected was daily landing data of mini purse seine recorded by fish collectors from September 2010 to November

Corresponding author:

Researcher in Research Center for Fisheries Management and Conservation
Jl. Pasir Putih II, East Ancol-Jakarta 14430

2011. Data were analyzed to obtain the catch rate and catch composition of mini purse seine vessels catch that landed in Bualemo.

Catch rate/CPUE is obtained by dividing the number of catch with fishing effort over a time interval. Fishing effort that used are number of trip because almost all vessels operated daily, then calculated the average of CPUE per month to analyze monthly trends of CPUE and composition. The catch rate or Catch per Unit of Effort (CPUE) defined as:

$$CPUE(Catchrate) = \frac{Cw}{t}$$

Remarks:

- CPUE = Catch rate (kg/trip)
- Cw = Catch weight (kg)
- T = fishing period (trip)

RESULTS AND DISCUSSION

RESULTS

Bualemo is one of the districts in northern Banggai, Central Sulawesi (Figure 1). Fishing vessels that conducted fishing activity in Bualemo waters mostly coming from outside Bualemo, among others of Gorontalo and Parigi Moutong which is two major fishing bases for mini purse seine in Tomini Bay. Mini purse seine owners from Parigi and Gorontalo who operate their vessels in the Bualemo waters assigned employees to take care of administrative and logistical purposes.

The data analyzed to get description about trends and fluctuations of monthly catch rate and catch composition of mini purse seine landed in. Figure 2 shows that there are fluctuations of catch rate from



Figure 1. Some major landing site for mini purse seine vessels in Tomini Bay.

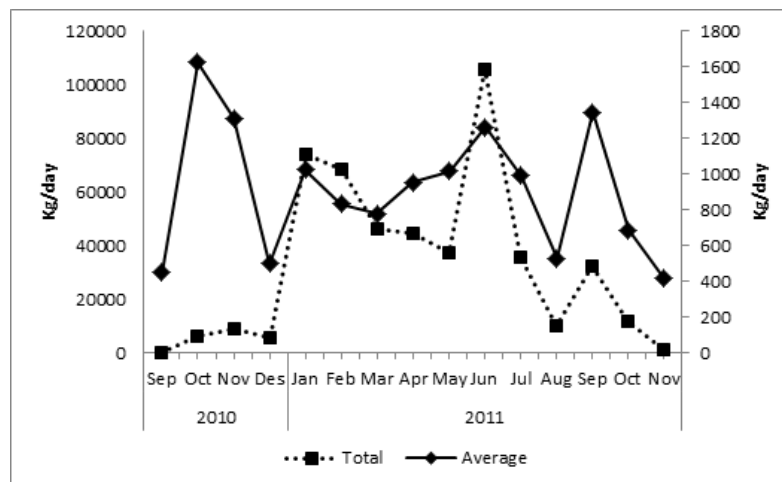


Figure 2. Total daily catch and average daily catch rate (kg/trip) of mini purse seine vessels in Bualemo.

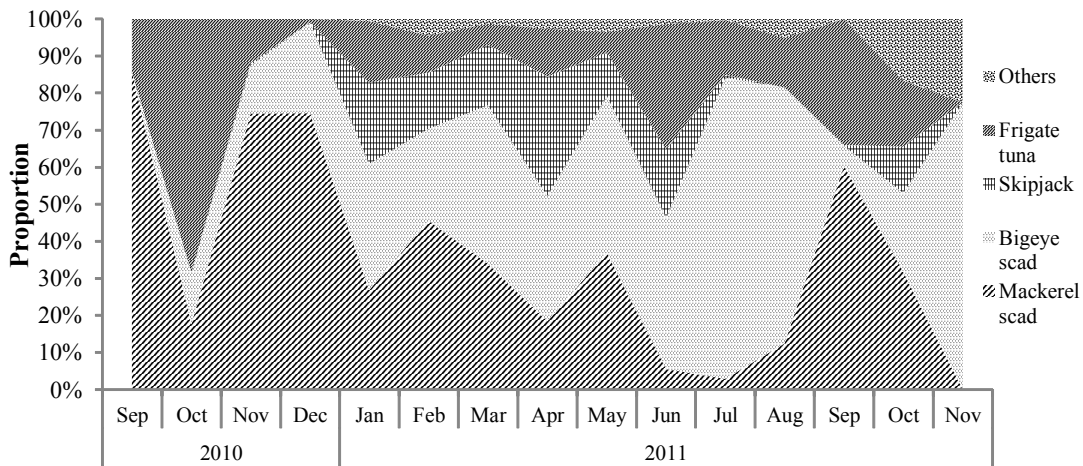


Figure 3. Catch proportion of mini purse seine in Bualemo.

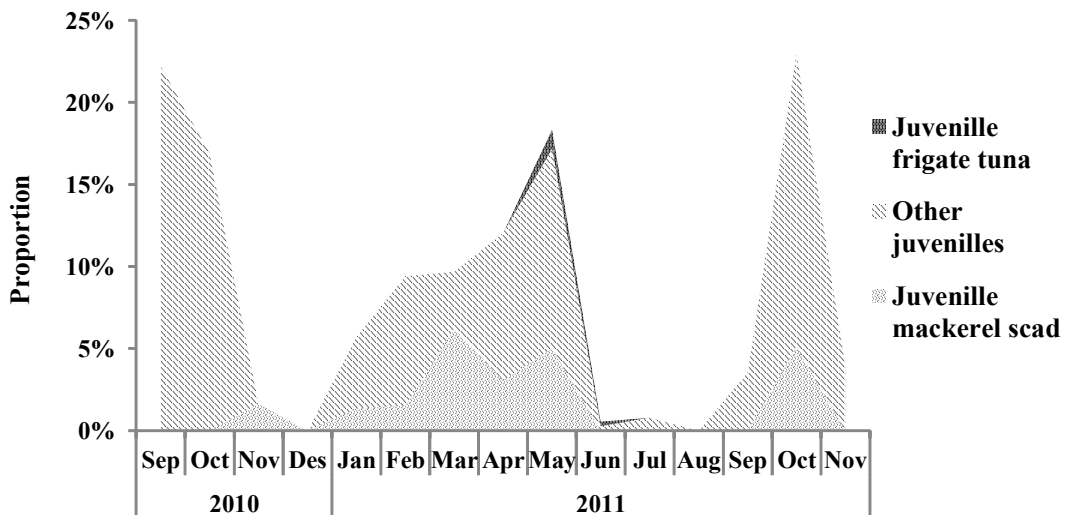


Figure 4. Proportion of juveniles caught by mini purse seine in Bualemo.

September 2010 to November 2011. The highest average catch rate occurred in October 2010 which reached 1625 kg/trip and September 2011 which reached 1345 kg/trip, while the lowest occurred in November 2011 amounted to 416.7 kg/trip. The average catch rate from September 2010 to November 2011 was about 916 kg/trip. Figure 2 showed a similar pattern occurred each year. Average high catches occurred in September-October and then declined at the end of the year and the early next year, then increased in the middle of the year around the month of April to July.

From the data obtained, there were two dominant species of fish caught by mini purse seine vessels, malalugis / mackerel scad (*Decapterus macarellus*) and katombo/bigeye scad (*Selar crumenophthalmus*).

The average mackerel scad caught approximately 295.7 kg/vessel/day while bigeye scad approximately 293.7 kg/vessel/day. Besides mackerel scad and bigeye scad, there were several species of fish caught include deho/frigate tuna (*Auxis spp.*), skipjack (*Katsuwonus pelamis*) and mixed of juveniles such as yellowfin tuna, mackerel scad and other species.

The proportion of fish caught by mini purse seine in Bualemo in September 2010 to October 2011 can be seen in Figure 3. The data shows that mackerel scad (*Decapterus macarellus*) and bigeye scad (*Selar crumenophthalmus*) dominated the catch most of the year. Frigate tuna (*Auxis spp.*) also caught most of the year with the largest proportion in October, while skipjack (*Katsuwonus Pelamis*) appeared in January

- June and then disappeared and reappeared in October 2011.

The proportion of juvenile fish caught was large, reached more than 20% of the total catch in average (Figure 4). There were several species of juvenile fish caught include juvenile frigate tuna, mackerel scads and other juveniles. Juveniles in the Bualemo waters were caught starting in February until May and then declined and many juveniles were caught again in September and October. From several species of juveniles caught, mackerel scads were the most widely caught, with large proportion in March-May and September-October.

DISCUSSION

Fish resources in Tomini Bay were dominated by small pelagic and large pelagic fish. Small pelagic fishes in the Tomini Bay were mostly captured using some fishing gear such as paying / danish seine and mini purse seine (soma pajeko). Northern Bualemo and surrounding waters was one of main fishing ground of mini purse seine in the Tomini Bay. According to Suwarso *et al.* (2011), fishing activity of mini purse seine were more concentrated at the mouth of the bay to the south (Bualemo, Banggai and east Togean) with the intensity and catch rate (CPUE kg/trip) was highest in Bualemo.

Catch rate/CPUE is one of indicators of the status of fish resources which is a measure of the relative abundance (Suman *et al.*, 2011). As an index of stock abundance, catch rate also can be used to monitor the health of fish stock, even though catch rate/CPUE data generally cannot provide information needed to assess and manage communities or ecosystems (King, 2007; Maunder *et al.*, 2006). The average catch rate of mini purse seine in landed Bualemo from September 2010 to November 2011 was about 916 kg/trip, it was the highest among several fishing based in Tomini Bay. Based on data from 2002 to 2004, the average catch rate of mini purse seine vessels in Gorontalo was about (952 kg/trip), Ampana (735 kg/trip), Parigi (731 kg/trip) and Poso (629 kg/trip). Catch rate of Gorontalo's mini purse seine was higher than other fishing base because the vessels operate 3-7 days while in other fishing base generally 1 day/trip (BRPL, 2005).

The concentration of chlorophyll-a is an indication of fertility waters that might increase the fish resources in the waters. From the image of chlorophyll-a from

Moderate Resolution Imaging Spectroradiometer on some specific locations in the southern mouth of the bay, the waters in south to the southeast Bitung, about Togian Island and the west coast of Gorontalo, there were an increase in the concentration of chlorophyll-a with the highest range of 0.8 to 1.25 mg m⁻³ which indicate the presence of upwelling (Amri *et al.*, 2005). According to BRPL (2005), chlorophyll content was found in the bay around the mouth than the waters in the bay and outside the bay east.

There are several species of fish caught by mini purse seine vessels; malalugis/mackerel scad (*Decapterus macarellus*), katombo/bigeye scad (*Selar crumenophthalmus*), deho/frigate tuna (*Auxis spp.*), and skipjack (*Katsuwonus pelamis*). There are also mixed of juveniles such as juvenile yellowfin tuna and mackerel scad. According to Natsir *et al.* (2011), malalugis dominated about 58% of fish resources in Tomini Bay, other dominant fish were frigate tuna (*Auxis spp.*), skipjack (*Katsuwonus pelamis*) and juvenile yellowfin tuna. Mackerel scad and bigeye scad were the most fish caught by mini purse seine, both are caught more than 50% of total catch. The catch of malalugis/mackerel scad more dominant in October to March and May to August. There was an indication that bigeye scad catch increased when malalugis were less caught (Suwarso *et al.*, 2011).

There were plenty of juveniles caught most of the year, this is due to the operation of the mini purse seine caught around FADs so that all sizes of fish can be caught (Figure 3). The small mesh size used by mini purse seine also caused captured of juveniles, the smaller mesh size found was only 1 inch. Large proportion of juveniles were caught (up to 20% of the total catch) provide indication that mini purse seine fishing were less selective. Juvenile of mackerel scads was the dominant species than other juveniles while juvenile frigate tuna were caught in small number (Figure 3). High number of juvenile mackerel scad (*Decapterus macarellus*) caught by mini purse seine is because this species is a plankton eaters so could be abundant around FADs. According to Suwarso *et al.*, (2005), malalugis/mackerel scad and solisi/Indian mackerel (*R. Canagurta*) are plankton eaters, while katombo (*Selar spp.*) is carnivores. Large pelagic fish (tuna, skipjack and frigate tuna) were generally carnivorous, prey on a variety of small pelagic fish species which were thought to be important prey for these species. Primarily bigeye and yellowfin tuna associated with FADs are younger and smaller than those found in free schools (Menard *et al.*, 2000).

CONCLUSION

Bualemo and surrounding waters are one of the major fishing grounds of mini purse seine in Tomini Bay. There were fluctuations in the catch rate of mini purse seine vessels operated in Bualemo and surrounding waters with the peak occurred in September and October, while the lowest occurred in November. Mini purse seine catches in Bualemo dominated by mackerel scad (*Decapterus macarellus*) and bigeye scad (*Selar crumenophthalmus*), other species of fish that caught were frigate tuna (*Auxis sp.*), skipjack (*Katsuwonus Pelamis*) and juveniles. High number of capture of juvenile due to the operation of mini purse seine around FADs and mesh size are less selective.

ACKNOWLEDGEMENT

This paper was a result from the research "Study at the Management Policy of Fish Resources of Tomini Bay and Surrounding Areas" at Research Center for Fisheries Management and Conservation in 2011.

REFERENCES

- Amri, K., Suwarso & Herlisman. 2005. Alleged Upwelling by Comparative Analysis of Imagery Distribution of Sea Surface Temperature and Chlorophyll-A in Tomini Bay. *J.Lit. Perikanan Indonesia*. 11 (6): 57-71. (In Indonesian).
- BRPL. 2005. *Tomini Bay: Ecology, Potential Resources, Fisheries Profile and Biological Aspect of Some Economically Important Fish*. Research Institute for Marine Fisheries, Jakarta. 114 pp. (In Indonesian).
- Jul-Larsen, E., Kolding, J., Overå, R., Raakjær Nielsen, J & Zwieten, P.A.M. van. 2003. Management, co-management or no management? Major dilemmas in southern African freshwater fisheries. 1. Synthesis report. FAO Fisheries Technical Paper. No. 426/1. Rome, FAO. 2003. 127p.
- King, M. 2007. *Fisheries Management, in Fisheries Biology, Assessment and Management*. Second Edition. Blackwell Publishing Ltd. Oxford, UK. 400p
- Maunder, M.N., J.R.Sibert, A. Fonteneau, J. Hampton, P. Kleiber & S.J. Harley. 2006. Interpreting catch per unit effort data to assess the status of individual stocks and communities. *ICES Journal of Marine Science*. 63: 1373-1385. Downloaded from <http://icesjms.oxfordjournals.org/> on June 13, 2013.
- Ménard, F., Stéquert, B., Rubin, A., Herrera, M., and E Marchal. 2000. Food consumption of tuna in the equatorial Atlantic Ocean: FAD associated versus unassociated schools. *Aquatic and Living Resources*. 13:233-240.
- Natsir, M., Suwarso, K. Amri & A. Priatna. 2011. Relationship between weather variability and oceanographic environment and abundance of small pelagic fish resources in Tomini Bay. In A. Suman, Wudianto & B. Sumiono (Eds). *Utilization Status of Fish Resources in Indonesia, case in Tomini Bay*. Research Institute for Marine Fisheries, Jakarta. P.149-161. (In Indonesian).
- Nurhakim, S., V.P.H. Nikijuluw, D. Nugroho & B.I. Prisantoso. 2007. *Fisheries Management Area. Fisheries Status by Fisheries Management Area, Basic Information for Sustainable Utilization*. Research Center for Capture Fisheries, Jakarta. 47 pp. (In Indonesian).
- Prasetyati, D.E. 2004. *Relationship Between Temperature, Salinity and Water Currents with Distribution-Abundance of Zooplankton and Ichthyoplankton Filtered by Bonggo Net in Tomini Bay Waters in 2003 East Monsoon*. Thesis. Marine Science Program, Bogor Institute of Agriculture. (In Indonesian).
- Suman, A. D.S. Effendi & Badrudin. 2011. Trend of Small Pelagic Stock Abundance Index in Tomini Bay Waters. In A. Suman, Wudianto & B. Sumiono (Eds). *Utilization Status of Fish Resources in Indonesia, case in Tomini Bay*. Research Institute

- for Marine Fisheries, Jakarta. p.121-130. (In Indonesian).
- Suwarso, Herlisman & Wudianto. 2005. Physical Characteristics of Water Mass in Tomini Bay Waters. *J.Lit. Perikanan Indonesia*. 11 (6): 17-31. (In Indonesian).
- Suwarso, A. Zamroni & M. Fauzi. 2011. Status of Small Pelagic Fish Resources and Its Sustainable Management in Tomini Bay Waters. In A. Suman, Wudianto & B. Sumiono (Eds). *Utilization Status of Fish Resources in Indonesia, case in Tomini Bay*. Research Institute for Marine Fisheries, Jakarta. p.131-148. (In Indonesian).