PREDICTION OF BIOMASS OF SPOTTED SARDINE (*Amblygaster sirm*) IN THE JAVA SEA

Suherman Banon Atmaja[*)] and Bambang Sadhotomo[*)]

ABSTRACT

Biomass of spotted sardine (*Amblygaster sirm*) has been predicted using biomass dynamic model and cohort analysis. These methods can predict behaviour biomass to impact of exploitation. A biomass dynamic can be used to explain how biomass responds to fishing pressure, for example, reduction of catch by quota, while relationship biomass of cohort analysis with effort can be used to explain how biomass responds to reduction of effort. Time series data used in modelling (1976 to 2004), the results of biomass dynamic model showed that biomass tend to recovery after 1994, when the catch has declined. On the contrary, length cohort analysis showed a declining trend since 1994. If effort is reduced around 10% to 20% of effort in 2004, it could result to the increasing biomass of about 1,5 to 2,5 times higher than biomass 2004, respectively. The size of biomass from Gompertz (B_{MSY}=24,200 tons) was higher than the results of cohort analysis (B_{MSY}=21,600 tons).

KEYWORDS:

INTRODUCTION

The siro, spotted sardine (*Amblygaster sirm*) is one of main pelagic fish in the Java Sea. This species is grouped into the group of fish, which like oceanic habitat (salinity habitat >33 per mil) (Sadhotomo & Durand, 1997) and comprises around 10% of average annual catches of purse seiner during the period of 1977 to 2004. The landing increased significantly since the fishing grounds have been extended eastward. The monthly landings peaked obviously from December to February (Atmaja & Sadhatomo, 2000).

The catch of spotted sardine was dominated by size 13 to 19 cm (FL) and more than 90% of the individuals caught by purse seiners were immature fish. The fish that have reached ripe stage leave the fishery and are not vulnerable to the seine net. The broodstocks were incidental caught in the purse seine fishery. The monthly development of GSI indicated that only single peak occurred in February and June, and to spawn along the continental slope of eastern part of the Java Sea (Atmaja & Sadhatomo, 1997; Sadhotomo, 1998). Length at first maturity was 18.6 cm (FL) and the size of 17.5 to 20.5 cm (FL) have the batch fecundity with ranges of 15 to 24 thousands eggs (Atmaja *et al.*, 1995). Average size of fish remained relatively unchanged during one decade (1983 to 1992) (Dwiponggo *et al.*, 1986; Atmaja & Nugroho, 1995; Sadhotomo, 1998). Conand (1991) concluded that this species was a short lifespan, the fish usually die before the second year, but some individuals can reach a second spawning season.

Together with the increase in the number of large vessels, there was a simultaneous increase in the engine capacity of the vessels and change main fishing tactic (spotlight replaced by fish aggregating device). The increasing fishing capacity has led to the changes in efficiency of fishing gear. The catchability coefficient (q) has risen about 6 times (Atmaja & Nugroho, 2006a) and the diminution of small pelagic fish biomass reached 66% (Atmaja & Nugroho, 2006b). In recent (2002 to 2004) years, the catch of purse seiners had drastically declined and changes in species composition on the eastern part of Java Sea, especially the increase in landing of leather jacket (*Aluterus monoceros*) when the peak season of scads, pronidea signal of the unhealthy status of pelagic fishery (Atmaja & Nugroho, 2005). A theoretical perspective suggests that the fishery has to be managed through reduction in effort or harvest levels of individual fishermen (Clark & Munro, 1979 *in* Wiratno *et al.*, 1993).

Fish stocks are commonly estimated by performing one or more methods of the following three categories of approaches. The first one is direct method that usually applies acoustics data estimate. The second approach is the global or surplus production model. All of the family of this model at least needs catch and effort data with steady state equilibrium assumption underlying the model. Some extension of this approach, called as Climprod developed by Fréon (1986) includes

*) Research Institute for Marine Fisheries, Muara Baru-Jakarta