

Original article

## The use of bridle line on the bottom gill net as the criteria of environmentally friendly fishing gear

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### Introduction

Indonesia possesses 2,517,858 Ha of coral reefs [1]. The primary productivity of cal reef area can reach 10 kg C/m<sup>2</sup>/yr, while that of the offshore area reaches about 50–100 g C/m<sup>2</sup>/yr [2]. Therefore, coral reef area has become main target of fishing activities of most coastal communities whose life relies on the coastal resources [3]. High primary productivity of the coral reefs makes the area become spawning ground, nursery ground, and feeding ground for marine organisms [4].

One of the fishing activities in this area is the use of bottom gill net. This fishing gear is a passive fishing apparatus with simple construction, relatively inexpensive, easy in operation, and very selective in target fish size [5,6]. Bottom gill nets are generally manipulated from surface gill nets by adding more weight at the lower part of the gear to catch demersal fish. The weight addition is intended to sink the entire fishing net or accelerate the sinking speed of the net and maintain the shape of the gear in vertically rectangular position on the sea bottom.

The fishing operation is usually done in coral reef areas, but this activity has impacted to destructions of corals and other associated animals since the lower part of the net is dragged on the coral substrates [7]. The net is also often stuck on the sea bottom and can cover the coral reefs and be non-selective fishing gear [8]. This study attempts to develop bottom gill net needs to minimize the negative impact on the coral reefs and maintain the high fish catch through bridle line utilization.

### Materials and methods

This study was carried out in Manado Bay waters using 4 units of PA Cf 210 × 21 net with different length, width, and bridle line.

The installation of bridle line is done with weight on one edge of the line at the lower part of the net to prevent it touch the sea bottom in fishing operations

and to meet the category of environmentally friendly and sustainable fishing gear [9]. Parameters observed were the effect of 0.75 m and 1.00 m bridle line. Fishing experiments used 10 trips for each net unit with 3 replications. Control gill net without bridle line was also applied. Fishing operations were performed at 18:00 pm – 06:00 am at about 35 – 40 m depth around coral reef area. Corals stuck in the net were collected, measured, and presented as coral cover (m<sup>2</sup>).

**Table 1.** Four units of PA Cf 210 × 21 net

Webbing	Length (m)	Width (m)	Mesh size (inch)	Bridle line (m)
PA cf 210D × 21	18.2	4.56	4	0.75
PA cf 210D × 21	18.2	4.56	4	-
PA cf 210D × 21	24.67	4.7	5.5	1
PA cf 210D × 21	24.67	4.7	5.5	-

### Results and discussion

This study showed differences in corals taken and number of fish catch between the gill nets using the bridle line of 0.75 m, 1 m, and without bridle line. Corals entangled in the bottom gill net during the fishing experiments using 0.75 m-bridle line ranged from 0.07 to 0.26 m<sup>2</sup> with mean coral cover of 0.12 m<sup>2</sup>/unit/trip, while the gill net without bridle line (C1) took 0.25 – 0.33 m<sup>2</sup> of corals with mean cover of 0.3 m<sup>2</sup>/unit/trip. Mean corals stuck on the gill net using 1.00 m-bridle line were 0.01 – 0.14 m<sup>2</sup> with mean cover of 0.07 m<sup>2</sup>/unit/trip, while the same-sized gill net without bridle line (C2) took 0.35 – 0.50 m<sup>2</sup> of corals with mean cover of 0.41 m<sup>2</sup>/unit/trip. It reflects that the use of bridle line could reduce coral habitat destruction.

Moreover, this study found that total number of fish caught in the bottom gill net using 0.75 m-bridle line was 70 individuals with mean catch of 2.3 ind./unit/trip, while the control net (C1) caught a total of 85 individuals with mean catch of 2.83 ind./unit/trip. The bottom gill of 1 m-bridle line caught a total of 64 individuals with mean catch of 2.13 ind./unit/trip, while

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the control net (C2) caught a total of 125 individuals with mean catch of 4.16 ind./unit/trip. It reveals that the use of environmentally friendly bottom gill net does not necessarily give higher catch.

The fish species caught consisted of *Lutjanus gibbus*, *Caranx* sp., *Chaetodonargus*, and *Gymnosarda unicolor*. Previous study found that the use of bottom gill net of 185.40 m long, 4.70 m wide, and 13.75 cm mesh caught *Gymnosarda unicolor*, *Caranx* sp., *Plectorhincus* sp., *Botusocellatus*, *Upeneustragula*, and *Caranx* sp. [10].

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