

An Assessment of the Effect of Accepted Fisheries
Byelaws for Kaledupa Fisheries,
Wakatobi Marine National Park
Indonesia
Based on the Results of the Kaledupa Fisheries
Forum on August 1st and 2nd

August 2009
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On August 1st and 2nd 2009 the Kaledupa fisheries forum stakeholder discussion was held in Ambeua, Kaledupa. Proposed byelaws were discussed and a preliminary draft of the adopted byelaws was composed. This document reports the estimates of the effects of adopted byelaws on the fishery based on the following techniques, Fish Fences, Gillnets, and Bubu traps.

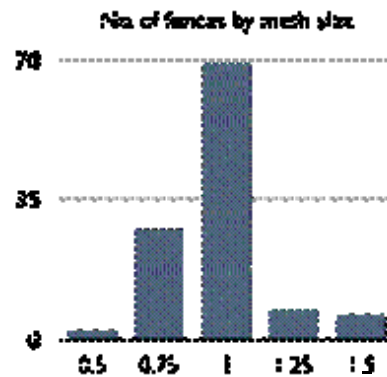
Byelaws Regarding Fish Fences

Effect of Fish Fence Byelaw #1

Byelaw number one regarding fish fences is oriented at standardizing mesh size. This byelaw contains three separate recommendations on the practice and constructions of fish fences. Byelaw number 1a relates to the size of the mesh used in the futu (cod end) section of the fish fence, and standardizes it to a minimum of 1 inch. Currently in the fish fences varies between 0.5 inches and 1.5 inches, with 1 inch meshes being the most common (Table 1 and Figure 1).

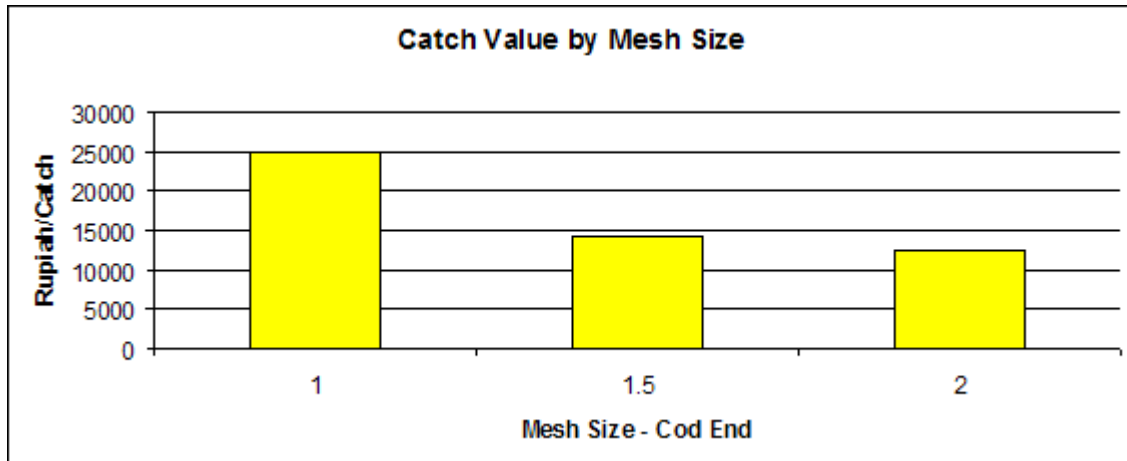
Table 1 and Figure 1. Numbers of fish fences by futu mesh size.

| Net Size | Number of Nets |
|-------------|----------------|
| 0.5 inches | 2 |
| 0.75 inches | 27 |
| 1 inch | 69 |
| 1.25 inches | 7 |
| 1.5 inches | 6 |



Currently there are 29 fish fences with mesh sizes that are less than one inch, the effect of changing these nets to 1 inch nets would presumably be to reduce the number of juveniles caught. Although there is currently no data on the percentage of juveniles caught in 0.5 and 0.75 inch nets, extrapolation based on data from 1, 1.25, 1.5 and 2 inch nets is possible. The smaller mesh nets (size 0.5 and 0.75) catch more total fish and more juveniles that would otherwise escape the larger nets. This will cause a slight decrease in the CPUE by 0-5% and a corresponding decrease in the numbers of juveniles in the catch is likely.

Byelaw number 1b is oriented at reducing the total number of juvenile fish landed by employing a system of different sized ladles to scoop the fish out of the futu section. This byelaw would ensure that each fish fence owner has to empty the catch first by using a 2inch scoop net as a ladle (so only large fish are retained) and then by using a 1 inch ladle to remove only those remaining fish species that are mature (juveniles caught in this ladle are to be released back into the sea). If preformed correctly this measure will result in the reduction of juvenile fish in the catch by approximately 25 %. The effect of this byelaw on the CPUE and value of the catch should be approximately 10 % over the next 1-2 years. The success of this byelaw will require continued and directed effort on the part of the fishermen to reduce the number of juveniles landed.



Byelaw #1c for fish fences requires that each fish fence has to have a vertical slit in the cod end with a 1 inch gap to allow the smallest fish to escape. A 1 inch gap that runs the length of the fish fence may allow fish which are laterally compressed to escape, however this subject needs further study.

Effect of Fish Fence Byelaw Number 2-5

Fish Fence byelaws number 2-5 will regulate the use of mangroves in the construction of fish fences (Byelaw #2), the instillation of fish fences (Byelaw #3), the governments help in providing alternative income for fish fence owners (Byelaw #4) and the compensation for damages to a fish fence (Byelaw number 5). Although these byelaws may be necessary to the successful management of the fish fence fishery, the direct effects on the current fish fences and the associated catches will be minimal. Byelaw number 3 potentially limits the growth of new fish fences, however this is dependent on the judgment of the local village headmen.

Adopted Byelaws: Fish Fences

1. Mesh size standardization.

1a. The minimum cod end mesh size for fish fences is 1 inch (measured knot to knot stretched mesh).

1b. Each fish fence owner has to empty the catch first by using a 2inch scoop net as a ladle (so only large fish are retained) and then by using a 1 inch ladle to remove only those remaining fish species that are mature (juveniles caught in this ladle are to be released back into the sea). Note the scoops should be done using the large mesh net first otherwise mixing large and small fish in the catch will cause extensive scale loss on the small fish and they will die even if released.

1c. Each fish fence has to have a vertical slit in the cod end with a 1inch gap to allow the smallest fish to escape.

2. Fish fences cannot be constructed using mangrove wood.

3. The headman of each village must give permission for the installation of

any fish fences on their reefs.

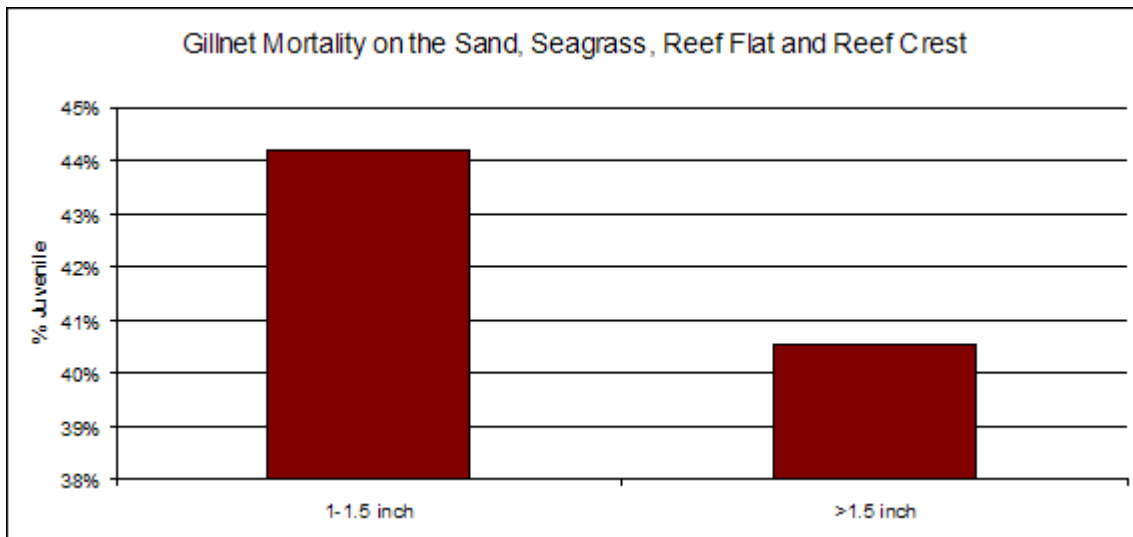
4. The government will help with providing alternative income for those fish fence owners who cannot be accommodated under the new regulations.

5. Anyone damaging a fish fence must compensate the owner for the damage caused.

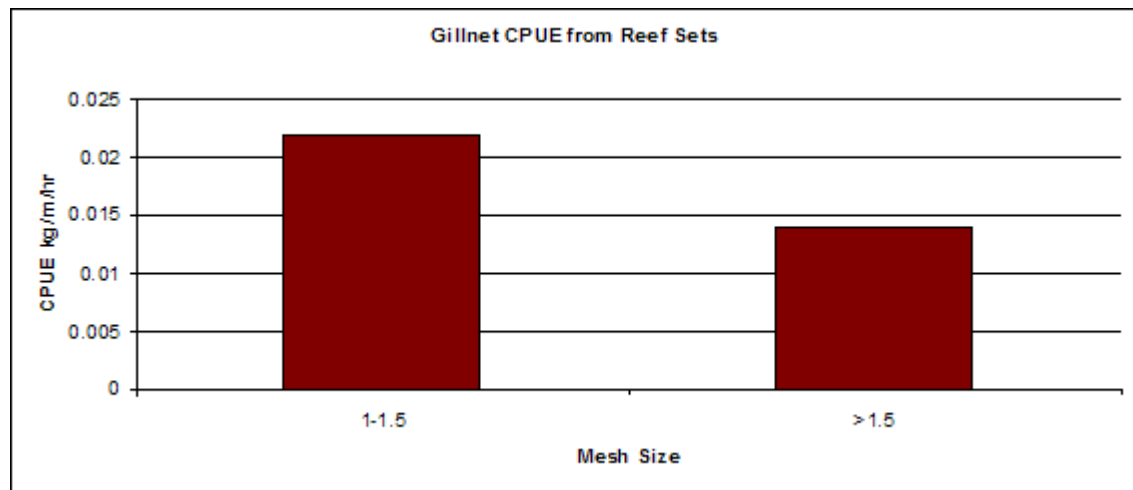
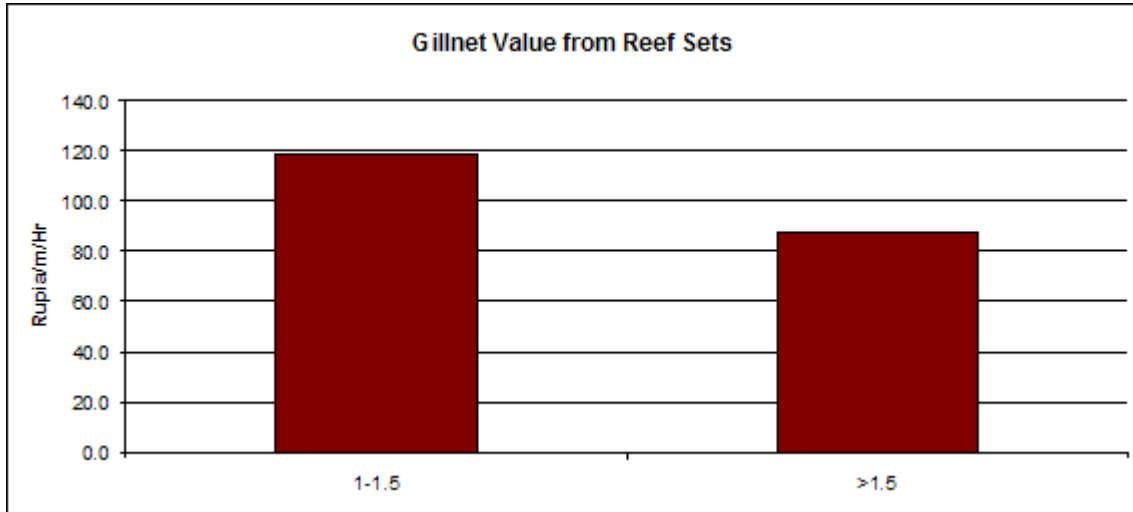
Byelaws Regarding Gill Nets

Effect of Gillnet Byelaw #1

Byelaw number one regarding gillnets is oriented at limiting the use of gillnets with mesh size 1 and 1.5 inches to the pelagic areas, presumably 30 meters away from the crest. The effect of gillnet bylaw #1 will affect the inshore areas of the reef, namely the sand, Seagrass, Reef Flat and Reef Crest. Currently 5.1 % of the juvenile mortality on the sand, sea grass, reef flat and reef crest comes from gillnets with mesh sized 1, 1.25 and 1.5 inches. Presumably if some of this effort is the difference in the rate of juvenile capture from 1-1.5 inch nets and >1.5 is 3%. This is the estimated total amount that juvenile capture rates are expected to decrease under Gillnet byelaw #1.

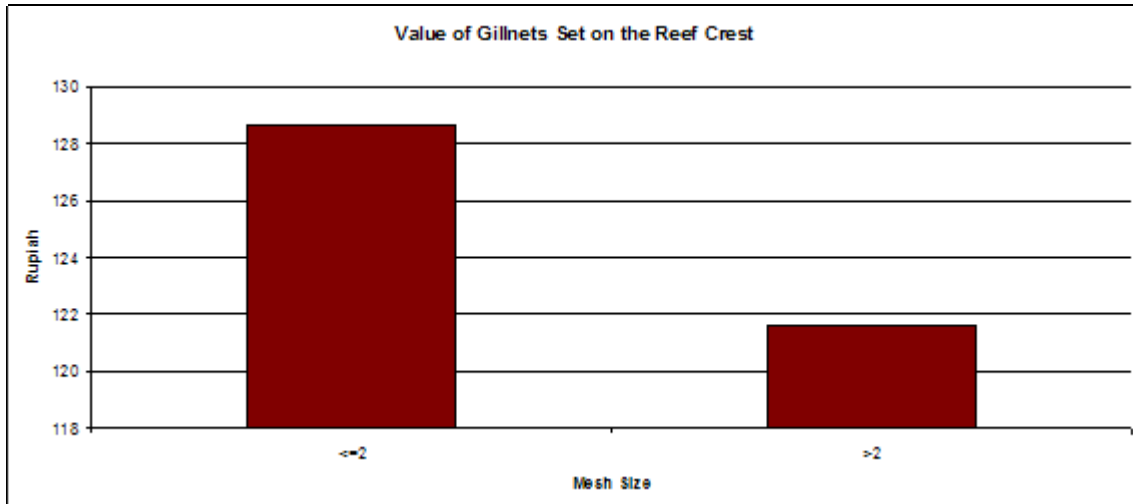
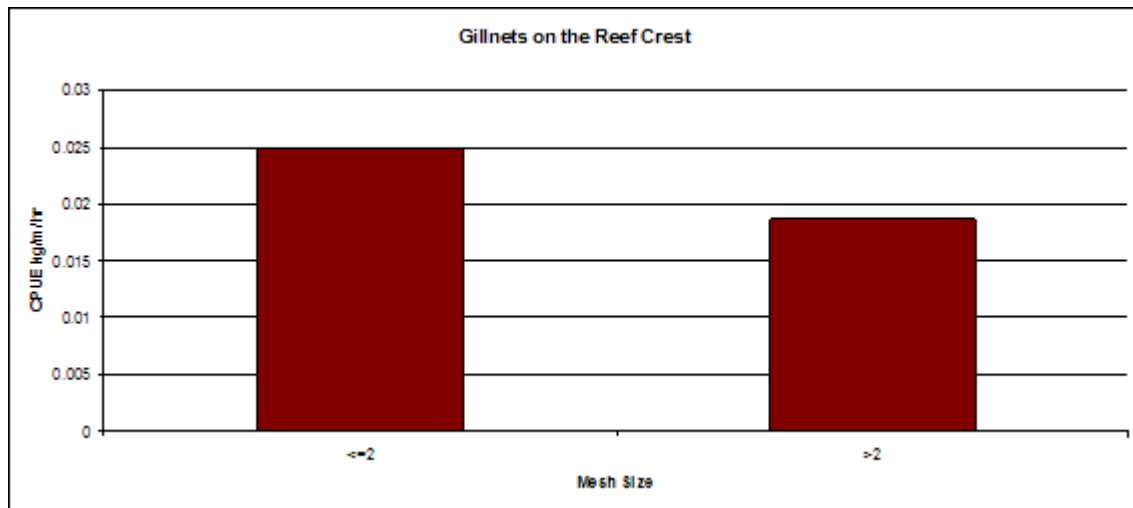


There will also be a corresponding decrease in CPUE and value per catch based on this byelaw, as illustrated in the following figures. This decrease in catch amount and value is temporary, and will rebound after the current juveniles that escape capture due to the larger mesh sizes reach maturity.



Effect of Gillnet Byelaw #2

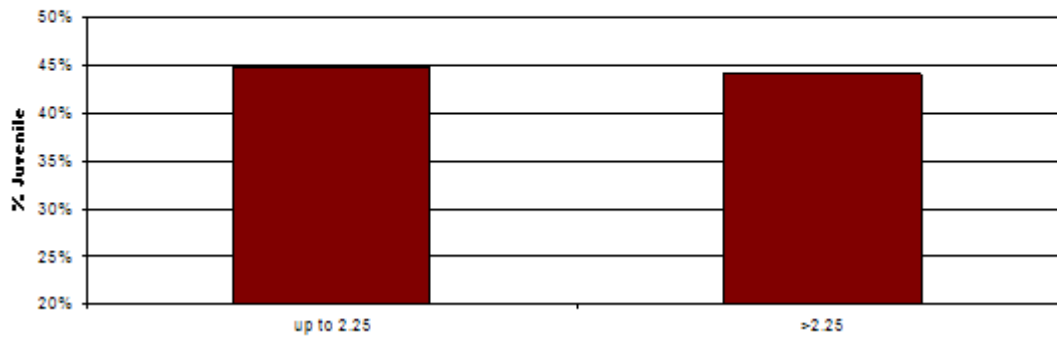
The effect of gillnet bylaw number 2 will limit floating gill nets with a mesh size >1.75 inches and < 2 inches can only be used on the reef crest. Currently 5% of the recorded catch on the Reef Crest and Reef Wall is from nets with mesh size smaller than or equal to 2 inches. Of this catch, 28 % of the catch is from gillnets less than or equal to 2 inches is juvenile. Gillnet Byelaw #2 is estimated to decrease the overall juvenile mortality rate by 3-5%.



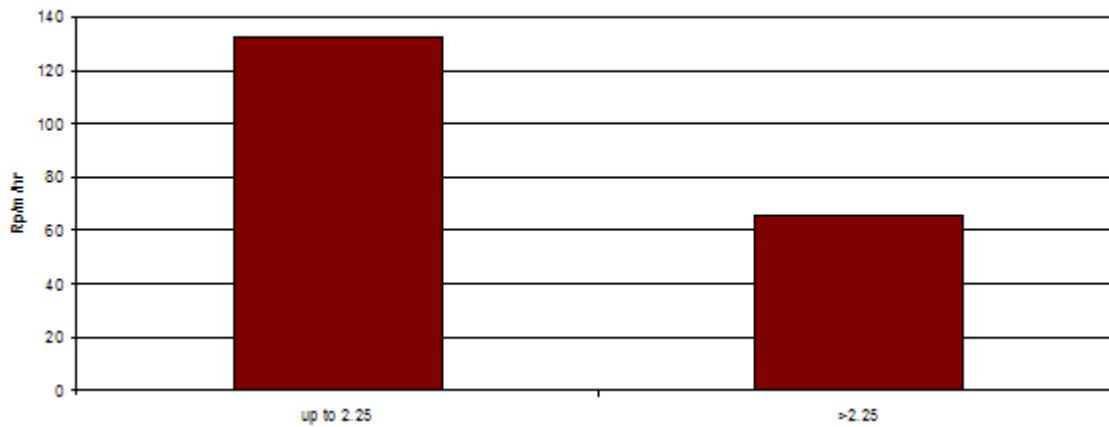
Effect of Gillnet Byelaw #3

The effect of Gillnet Byelaw #3 Gill nets (whether floated or bottom fished) with a mesh size >2.25 inches can be used at any site. This is the key achievement with the gill nets since it will now not be allowed to use mesh smaller than this on the reef flat. Gillnets on the reef flat, sand and seagrass represent 25% of the juveniles caught in the gillnet fishery. The effects of Gillnet Byelaw # 3 will be to reduce juvenile catch by in this area, however it should be noted that as a percentage of the fish caught by mesh size group, the larger mesh sizes catch only 1% less juveniles than the gillnets with mesh size less than 2.25 inches. Value and CPUE are expected to drop as a result of using larger mesh sizes on the reef flat, though this is expected to be a transitory effect.

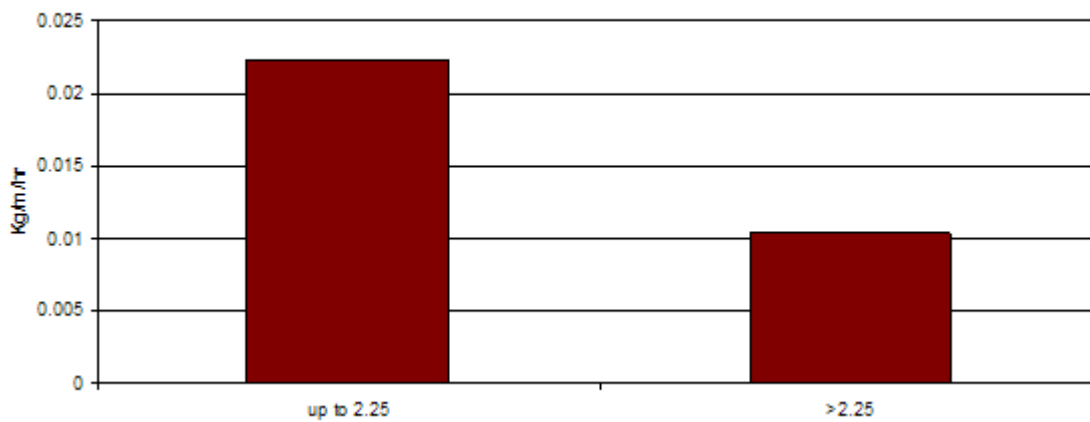
Percent of Gillnet Catch that is Juvenile, by Mesh Size Group on the Reef Flat, Sand and Sea Grass



Value of Gillnet Catch by Mesh Size group on the reef flat, sand and sea grass



CPUE Of Gillnet Catch by Mesh Size group on the reef flat, sand and sea grass



Effect of Gillnet Byelaw #4 & #5

Gillnet byelaw number 4 restricts gillnets with mesh 3 - 3.5 inches to use for catching a few species - Kakatua, b. Baronang , c. Ikan Kakap Merah. The effect of this byelaw on the overall biomass is unclear.

Gillnet byelaw number 5 restricts gillnets with mesh 4 - 5 inches can be used for a few species named a. Babara, b. Saso dsb. (the Long nosed emperor) The effect of this byelaw on the overall biomass is unclear.

Effect of Gillnet Byelaw #5 -#8

Gillnet byelaw number 6 concerns the use of lamba nets. No decision made on how to restrict the use of lamba nets. This report suggests that the use of lamba nets be the subject to the same restrictions as static gillnets, that is to ban their use on the reefs or within 30m of the crest unless they had a mesh size >2.25 inches.

Gillnet byelaw number 7 is oriented at the continuation of monitoring of the gillnet catches.

Gillnet byelaw number 8 is oriented reaching a island wide decision on the maximum size of nets or and the numbers allowed for each village. Discussions will continue at village level on this one.

Byelaws Regarding Bubu Traps

Effect of Bubu Traps Byelaws

The bubu trap byelaws will have minimal direct effect on the fish biomass because the byelaws enforce the status quo. Indirect effects of the byelaws will be though byelaws 2 and 3 which regulate the use of coral to weigh down the traps and whether the traps can be placed on live coral. These byelaws are aimed at reducing the detrimental effect of bubu trap fishing on coral reefs, thus ensuring the long term availability of reef function available to the fish biomass.

Limits on the maximum number of bubu traps per fishermen and the maximum number per town will set upper limits on the maximum effort of 100 bubu traps per village on the surrounding reef. Currently the number of traps per village is less than 100 in all villages except Sombano (Table 2). Further more the current size of the hand made bubu traps is 2.5 inches.

Table 2 Number of Bubu Traps by Village from 2007 Census

| Village Name | Total |
|---------------------|--------------|
| Balasuna | 28 |
| Daraura | 89 |
| Langge | 37 |
| Lentisa | 37 |
| Lawulo | 35 |
| Mantigola | 0 |
| Perupa | 42 |
| Sama Bahari | 30 |
| Sombano | 170 |
| Grand Total | 468 |

Bubu Trap Byelaws

1. Minimum mesh size should be 2.5 inches
2. It is prohibited to use live coral to weight down the traps.
3. Bubu traps cannot be placed on coral - this is an amazing achievement to get this one through.
4. The maximum number of bubu traps that can be owned and operated by one person is 10.
5. Only 10 people in each village are allowed to own and operate bubu traps.
6. Anyone caught damaging a bubu trap will have to pay the owner 10X the costs of the repair.
7. Bubu traps can only be operated on a village's reefs with permission of the headman of that village.
8. The use of large bubu traps should be considered.