



Design features of Seer fish gill nets operated by OBM along the selected landing centres of Junagadh District, Gujarat

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ABSTRACT

The present study was carried out from February 2012 – April 2013 to assess the design features of gillnetters along the selected centers of Junagadh, district Gujarat. In Junagadh district, gill nets for seer fish were operated as drifting gear at the surface or in the column water. PA multifilament twines having specifications of 210d×2×3 to 210d×12×3 were used according to the mesh size. The mesh size ranged between 60 to 160 mm. PA monofilament of diameter 0.24 to 0.26 mm was used as webbing material for both drift type of mackerel gill net respectively. The mesh size for the mackerel drift gill nets ranged between 52 to 60 mm.

Key words: Mesh size, Diameter, Multifilament, Gillnetting, and OBM.

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INTRODUCTION

Selectivity of fishing gear is an important tool for effective management of fisheries (1). The importance of selecting the optimum mesh size from the standard point of conservation of resources has been stressed by several investigators. The selectivity of fishing gear has a direct influence on the exploited stock (2). The catching efficiency of gill nets depends on the use of right materials having least thickness reduction in strength, lesser visibility, softness with desired elasticity and knot strength. The colour of material, mesh size and hanging ratios also influence the efficiency of gill nets (1). Polyamide (PA) monofilament gill nets have been found to be more efficient than PA multifilament nets (3). Polyamide (PA) became the first synthetic material to replace cotton/hemp in India for fishing gear construction and its indigenous production started in 1962. PA is available as multifilament twisted and monofilament single twines for netting purpose. In gill net sector, the use of PA as multifilament is the commonest material used for gill net fabrication (4). Initially, PA multifilament and later PA monofilament became popular for gill nets (5). Among all these years nylon twine (polyamide) of different specifications has been exclusively used for gill net fabrication. The increased cost of polyamide makes the operation of the gill nets fleet more expensive. This necessitated the need of introducing a cheaper material like High density polyethylene (HDPE) in place of nylon for gill net fabrication in recent years (6).

Seer fish gill nets were operated as drifting gear at the surface or in the column waters from different landing centres of Junagadh district namely, Veraval fishing harbour, Dhamlej, Mangrol, Chorwad, Muldwarka, and Madhwad. These nets were operated in column or surface depending on the swimming layer of the fish during different seasons. Gill nets were operated as surface drift gill net during September to December and column drift gill net during October to May. During the column drift netting the float line was rigged in such a way that it remains below the surface by adjusting the buoy lines, which were attached to the float lines at regular intervals. It was observed that, Seer fish gill nets were used as combined gill nets in which webbings of different mesh sizes were used in combination so that different size groups of same species could be captured which were moving in shoals together.

MATERIALS AND METHODS

Junagadh district (21° 30' 21" N latitude and 70° 26' 57" E longitude) comprising of six important fish landing centers was selected for the present study. Veraval fishing harbour is a major fish landing and distribution centre while Dhamlej, Mangrol, Chorwad, Muldwarka, and Madhwad. are the small fishing and landing centres.

Different types of marine gill nets operated by the various types of gill netters from the selected fish landing stations of Junagadh were undertaken as the sampling units for the present study. The detail information regarding design and construction of gill nets was undertaken by physical sampling of the units and by collecting information from gill net owners in the study area. The information regarding the number of gill netters operated from different sampling stations under study was collected from the Department of Fisheries, Government of Gujarat.

Interview schedule was prepared in proper way to collect required information to satisfy the objectives of the present study. Structured data collection schedule formulated for the present study comprised of two major sections. The first section dealt with the particulars of gill net owner and the fishing vessel used for gill net operation. The second section dealt with the technical specifications, design aspects, and the mode of operation of the different types of marine gill nets used by the fisherman of Junagadh district. The information included in the first section was recorded according to Sreekrishna and Shenoy (2001) whereas; the information in the second section was physically collected and recorded according to (5). The net designs of the different gill nets were presented according to (7). Once data collection schedule was ready, the trial run was employed in the study area to check the validity of the formulated schedule. Collected data was analyzed. Final draft of data collection schedule was prepared after restructuring the interview schedule and eliminating the lacunae observed during trial run.

RESULTS AND DISCUSSION

It was observed that, Polyamide (PA) multifilament twines were used in all the centres of study for Seer fish. To nullify the visibility underwater, PA multifilament yarns were coloured to camouflage with the environment. Brown and green were the colours commonly used. The specification of the multifilament yarn generally depends on the mesh size. Variations were seen with respect to the specifications of yarn according to the mesh size. Multifilament yarn having specifications of 210d×2×3 to 210d×12×3 were most commonly used according to the mesh size. It was recorded that, polyethylene (PE) of 1 to 2 mm diameter was the most common material used for the selvedge meshes for the Seer fish gill net. Specification and design of the typical Seer fish gill net is shown in the Table 1 and Fig. 1 respectively.

Thomas *et al.* (2005) reported the Seer fish gill nets with material specification of 210d×6×3 in Karnataka, 210d×6×3 to 210d×12×3 in Kerala, 210d×2×3 in Andaman islands, HDPE twisted monofilament of 2 to 2.5 mm in Gujarat, PA monofilament of 0.16 to 0.23 and PA multifilament of 210d×1×3 to 210d×12×3 in Andhra Pradesh. (5) reported that, PA multifilament of specification of 210d×6×3 was most commonly used as webbing material for Seer fish in Kerala. Results of the present study indicated that the main webbing material used for Seer fish gill net was quite similar as that of the gear material used along the Indian coast.

Mesh size

The mesh size of Seer fish gill net generally ranged between 60 to 160 mm for main webbing as well as for the selvedge meshes. Total fishing fleet carry different number of units with different mesh sizes to capture the target species of different size groups. Generally, 4 to 7 different mesh sizes were used in a fleet of Seer fish gill net.

During present study, it was recorded that, for catching Seer fish, mesh size of the gill nets ranged between 60 to 150 mm. Fishing trials were made by (8) in lower Sundarbans to study the effectiveness of three different mesh sizes (88, 101 and 114 mm) of gill nets in the capture of fishes of commercial importance and observed that *S. guttatus* and *H. ilisha* were mainly gilled by the 88 mm meshes. (9). Mesh size recorded for the Seer fish gill nets during the present study were in the similar size range as compared to the mesh size reported by other studies conducted along the Indian coast.

Hanging coefficient

It was observed that, the hanging coefficient of the Seer fish gill net varied in between 0.53 to 0.60. Foot rope was totally absent in this type of gear.

In Junagadh district the hanging coefficient of the Seer fish gill net varied in between 0.53 to 0.60. Hanging coefficient in the same range as recorded during the present study of 0.50 to 0.65 for Seer fish gill nets were observed by (10) from Andhra Pradesh and of 0.44 to 0.71 in Kerala by (5).

Colour of webbing

It was recorded that, green or brown coloured gill nets were most commonly used for Seer fish.

Dark green or brown coloured gill nets were used for catching of Seer fish from Junagadh. Attempt have been made by (11) to study the effect of white, green, blue and yellow colored drift gill nets on their catch with respect to Seer, Pomfrets, tuna and Sharks along the Andhra coast. White nets were more effective for *S. guttatus* while the colored ones caught more of *P. niger*. Blue had no significant effect for Sharks. In the case of *S. lineolatus*, *S. commerson* and *E. affinis* no preference to color was noted. Though dark green or brown colour was preferred by Junagadh district fishermen for Seer fish gill nets, similar colour preference was not observed elsewhere along the Indian coast.

Table 1 Specifications of Seer fish combination drift gill net operated from Junagadh district.

Station	Junagadh							
Local name	Mahual Jal / Mahual na Jal							
Main webbing mesh size (mm)	60	80	90	100	115	120	130	160
Twine type	PA multi	PA multi	PA multi	PA multi	PA multi	PA multi	PA multi	PA multi
Twine specification/ diameter (mm)	210×3×3/	210×3×3/	210×4×3	210×6×3/	210×8×3	210×8×3/	210×10×3/	210×12×3
	210×4×3	210×4×3	210×4×3	210×8×3		210×10×3	210×12×3	
Mean horizontal hanging coefficient (E)	0.6	0.60 ± 0.07	0.55 ± 0.60	0.53 ± 0.01	0.55 ± 0.04	0.57 ± 0.02	0.53 ± 0.02	0.50 ± 0.02
Vertical hanging coefficient (1-E2)	0.78-0.78	0.79-0.93	0.78-0.89	0.78-0.94	0.80-0.90	0.76-0.80	0.78-0.91	0.85-0.93
Mean vertical hanging coefficient (1 E2)	0.8	0.86 ± 0.03	0.9	0.81	0.85 ± 0.01	0.84	0.86	0.89
No. of meshes per unit	1090-1290	620-1060	650-1280	544-1180	610-1040	600-1126	600-1290	490-1089
Mean no. of meshes per unit	1186 ± 60.18	819 ± 77.96	985.6 ± 46.28	900.35 ± 45.60	840.85 ± 67.56	980 ± 48.24	918.1 ± 41.03	858.75 ± 82.99
Hung length (m)	44.19-55.10	21.24-43.90	34.04-68.09	22.91-70.21	30.10-66.82	45.65-81.66	32.77-82.86	30.25-78.04
Mean hung length (m)	49.94 ± 3.10	33.14 ± 4.86	51.29 ± 2.60	49.40 ± 3.43	49.24 ± 5.36	65.28 ± 3.82	61.94 ± 3.64	62.11 ± 6.20
Hung depth (m)	6.63-11.20	8.88-10.12	7.45-11.74	7.6-10.90	8.40-9.22	8.2-10.46	7.9-12.48	9.60-10.28
Colour of webbing	Green	Green	Green/Brown	Green	Green	Green	Green	Green
Selvedge twine type	PE	PE	PE	PE	PE	PE	PE	PE
Selvedge specification/ diameter (mm)	1	1-1.5	1-1.5	1-1.5	1-1.5	1-1.5	1-1.5	1.5-2
Selvedge mesh size (mm)	70	75	90	100	115	120	130	150
No. of selvedge meshes in depth	1	1	1	1	1	1	1	1
Selvedge hung depth (m)	0.05	0.05-0.06	0.06-0.07	0.08	0.09-0.10	0.1	0.10-0.11	0.13
Total hung depth (m)	6.68-11.25	8.94-10.18	7.51-11.81	7.58-10.88	8.47-9.31	8.20-10.54	7.90-11.42	9.69-10.36
Mean total hung depth (m)	9.68 ± 1.50	9.50 ± 0.25	9.47 ± 0.30	8.89 ± 0.25	8.94 ± 0.13	9.20 ± 0.19	9.17 ± 0.35	9.92 ± 0.08
Head rope material	PP							
Head rope diameter (mm)	8							
Hoat material	PVC							
Hoat dimensions (mm)	130×15/125×20/140×15							
No. of floats per unit	4-10							
Mean no. of floats per unit	6.33 ± 0.34							
Foot rope material	Nil							
Sinker material	Concrete							
Sinker dimension	60×20/80×33/100×20/140×15							
Sinker weight (g)	400-500							
No. of sinkers per unit	2-6							
Mean no. of sinkers per unit	3.55 ± 0.38							
Total fleet length (m)	10-11							
Mean total fleet length (m)	10.50 ± 3.10							
Depth of operation (m)	28-73							
Fishing craft	FRP							
Horse power of the engine (HP)	8							

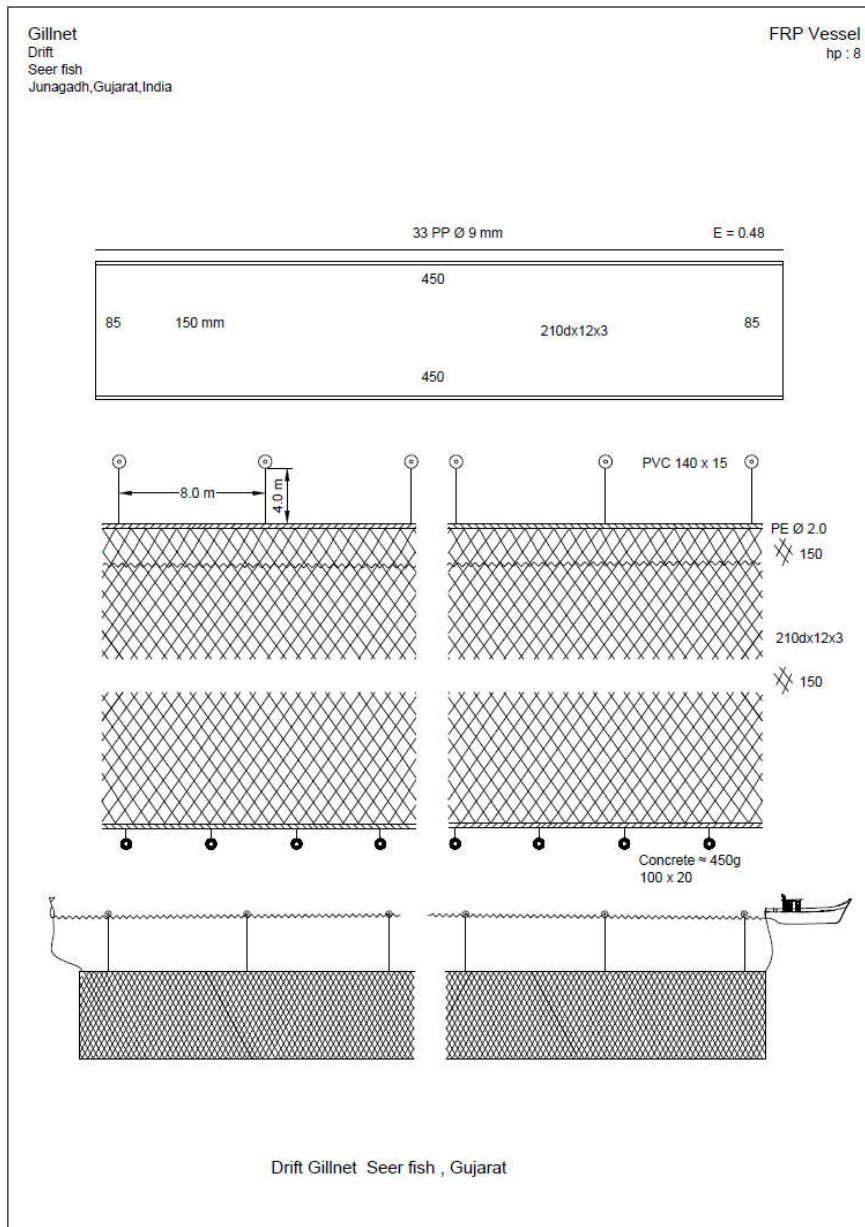
Hung length

Variation was seen in hung length of each unit in total fishing fleet. Generally hung length of each unit varied from 21.24 to 82.86 m of the Seer fish gill net operated from selected landing centres of Junagadh district.

During the present investigation, it was observed that, for Seer fish gill nets hung length of each unit varied from 21.24 to 82.86 m. The larger hung lengths for gill net units were reported by (10) which varied from 25 to 720 m in Andhra Pradesh. (5) reported the Seer fish gill net units of Kerala with average hung length of 53 m, which was recorded in the range observed during the present study.

Total hung depth

Total hung depth of the Seer fish gill nets ranged from 6.63 to 11.74 m. Total fishing fleet contained different number of units with different mesh sizes so that the total hung depth of total fishing fleet was maintained by adjusting the number of meshes in depth. It was calculated that, for different mesh sizes of Seer fish gill net mounted height ranged from 79.5 to 82% of the stretched height.



The hung depth of Seer fish gill nets ranged between 5 to 5.8 m in 1958 and during 1991 hung depth of the nets ranged from 7 to 15.1 m (12). During late 1950s the operation of gill net was from non-motorized crafts and the area of operation was limited and hence the lesser hung depth of the nets. (10) recorded hung depth of 5.5 to 12 m in Andhra Pradesh and average hung depth of 9.28 m was reported by (5) in Kerala for Seer fish gill nets. Similar results were observed, during present study for catching Seer fish in Junagadh district with a hung depth of the nets ranging from 6.63 to 11.74 m.

Fleet length

The total fleet length of the Seer fish gill net ranged between 1100-2480 m with mean of 19.56 ± 65.12 m. The total fleet length of gill nets recorded during the present study, ranged between 1100 m to 2480 m. Northridge (1991) reported that gill nets above 2500 meters or those operated outside Exclusive Economic Zone (EEZ) fall under 'large scale drift net fisheries'. Most of the gill nets operated from Junagadh district fall under the category of 'small scale. In Kerala, (5) observed the Seer fish gill nets with the total fleet length in the range from 800 to 2400 m which was in accordance with the observations of the present study.

Depth of operation

Gill net for Seer fish was mostly operated from motorized fishing vessel. Depth of operation of gill net fishing ranged from 20 to 80 m.

During the present study, it was recorded that, depth of operation of motorized gill netters ranged between 20 to 80 m. (12) recorded that depth of operation changed from 12 to 40 m during 1958 to 7 to 120 m during 1991 in Seer fish fishery along Kerala coast. Bigger vessels, with high engine power and use of ice facilitated the fisherman to go for operations in deeper waters. (5) reported that the depth of operation for Seer fish ranged from 19 to 300 m in Kerala and 35 to 80 m in Karnataka. The depth of operation of Seer fish gill nets were mostly in accordance with the observations of the present study except Kerala where the Seer fish gill nets were even operated up to the depth of 120 and 300 m as reported by (12) and (5) respectively.

Other accessories and rigging of the net

During the present study it was observed that, Seer fish gill nets were used as surface or column drift gill nets. In this type of gill nets foot rope and mounting ropes were totally absent. Only head rope of 9 mm diameter Polypropylene (PP) was used and expanded Polyvinyl chloride (PVC) of 4 to 12 in number per unit with mean of 6.33 ± 0.34 were used as floats. Floats were attached to the head rope by norselling, in which hanging line of float was attached to the head rope by means of short pieces of twine. Master floats of thermocole 1 to 3 number per net of rectangular size were used. Circular concrete sinkers of 2 to 8 number per unit were attached at a distance of 0.6 to 1.7 feet from the main webbing, as foot rope was absent. It was recorded that, 22 to 50 of units were joined end to end by making knots at head rope and by seaming in which two parts of webbing were joined by fastening a twine at intervals through out the depth with a hitch to prevent slipping. During the present investigation it was observed that, PP head rope of 9 mm diameter was used and expanded PVC of 4 to 12 in number per net were used as floats on head rope. Foot rope and mounting ropes were totally absent. Circular concrete sinkers (*Patri*) of 2 to 8 number per unit were attached to the main webbing as foot rope was absent. Similar observations were recorded by (5) in Kerala for Seer fish gill nets. (10) recorded that 2 to 35 number of units were operated from each fishing craft during the operation of Seer fish gill net, which was within the range of the number of units operated from each vessel in the Junagadh district.

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