



Research Note

Catch Composition of Trawl landings along Mumbai coast, Maharashtra

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Globally, marine fishery resources are under enormous pressure with the estimated fishing effort exceeding the optimum by a factor of three to four (Pauly et al., 2002). The economic losses due to excess fishing effort have been estimated to be 50 billion USD annually (World Bank, 2009). FAO estimated 52% of global fish stocks as fully exploited, 28% overexploited or depleted, 20% moderately exploited, and only 1% showing signs of recovery as a result of the consequences of fishing, since 1970 (FAO, 2009). Maharashtra with a coastline of 720 km is one of the leading states in India in marine fish production. Major fish landing centres are New Ferry Wharf, Sassoon Dock and Versova, situated in Greater Mumbai (GRM) and they account for nearly 60% of the state fish landings (Annam & Augustine, 2005; Mane & Sundaram, 2011). Trawlers and purse seiners land large quantity of bycatch (60-65%) comprising juveniles, undersized fishes and inedible biota which is discarded at sea and mostly goes unreported. The marine fishery in Maharashtra has been facing crisis since late nineties owing to overfishing, urbanization, domestic and industrial pollution and habitat degradation (Deshmukh, 2013).

In India, trawlers have contributed major part of the total marine fish production (Srinath, 2003). Trawlers landed 67% of demersal resources in Maharashtra followed by gillnetters (14.3%) and bagnetters (11.7%) (CMFRI, 2015). The GRM district contributed 50.4% to the total estimated marine fish

landings of Maharashtra (CMFRI, 2016). Multi-day trawlers are operated from all the three landing centres, while single-day units operate only from Versova (CMFRI, 2016). Major share of revenue from the marine capture fisheries of Maharashtra is contributed by trawlers (38.8%). The decline in catch over the years may be attributed to the increased operational cost (especially fuel) and poor economic returns that forced fishermen not to venture into sea (CMFRI, 2015).

Catch composition of single-day and multi-day trawlers of Kerala was studied by Hassan & Sathiadhas (2009). Marine fish landings (1998-2004) of Greater Mumbai were studied by Annam & Augustine (2005). Mane & Sundaram (2011) discussed about fishing area and season, fishing gears and craft operated from Versova, Sassoon Dock and New Ferry Wharf, Maharashtra. Though catch estimation was made by many researchers, detailed information on the trawl catch composition along Mumbai coast is lacking, hence the present study assessed the catch composition of trawlers operated along Mumbai coast.

Studies were carried out on the catch and catch composition of trawlers operating off Mumbai coast, Maharashtra, India, during August 2016 to May 2017. Three major fish landing centres *viz.*, Versova (19°08'32.7"N; 72°48'10.9"E), Sassoon Dock (SSD) (18°54'43.3"N; 72°49'32.6"E) and New Ferry Wharf (NFW) (18°57'30.5"N ;72°51'03.1"E) situated in this district were selected for the study (Fig. 1). Landings of trawlers were recorded every fortnight as per Alagaraja (1984). Major species were identified up to species level and those landed in small quantity were identified up to genus level (Fischer & Bianchi, 1984; Sparre et al., 1989). Catch composition studies

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were carried out for both single-day and multi-day trawlers that operated from these landing centres. Fishing vessels which carried out fishing for more than a day were classified as multi-day units and those that fished for a day or half day as single-day units.

Trawlers at Versova undertook both single-day and multi-day fishing. Single-day vessels spent between 5 and 9 h to conduct trawling for 3-7 h in a day while multi-day trawlers undertook fishing trips of 2-23 days. Mechanised shrimp trawlers of Maharashtra in the past (1995-2000) remained out at sea for 4 to 5 days (Pillai, 2000) which was much shorter compared to the present study. This indicated increase in fishing intensity associated with the increase in capacity of trawlers in terms of size, engine horsepower, fish hold of trawlers and other design parameters of trawlers and trawl nets (Devi et al., 2018). Trawlers from Sassoon Dock and New Ferry Wharf conduct only multiday fishing.

The total fish landings of trawlers operated from Versova, Sassoon Dock and New Ferry Wharf for the period 16th Aug 2016 to 31 May 2017 is presented

in Fig. 2. There was no landing between 1st June to 15th August, 2017 due to the trawl ban imposed by the Maharashtra government. Highest landing by single-day trawlers of Versova in terms of quantity was in September 2016 and this was associated with more numbers of vessels involved in fishing during this month. Lowest landing by multi-day trawlers at Versova was in May 2017 coinciding with less catch per vessel during this month. The peak fish landings by multi-day trawlers were during September/October while the lean period was August, December and May for Versova, SSD and NFW respectively.

The major species landed by single-day trawlers at Versova consisted of *Parapenaeopsis styliifera*, *Coilia dussumieri*, *Harpadon nehereus*, *Johnius macrorhynchus*, *Johnieops vogleri*, *Solenocera crassicornis*, *Otolithes cuvieri*, *Metapenaeus affinis*, *Acetes indicus* and *Trichiurus lepturus* (Fig. 3). *C. dussumieri*, *Apogon quadrifasciatus*, *J. vogleri*, *H. nehereus*, *L. savala*, *P. styliifera*, *M. affinis*, *J. glaucus* and *Harpiosquilla harpex* during September 2013 to February 2014 (Bhendeekar et al., 2016). *P. styliifera* contributed maximum (20%)

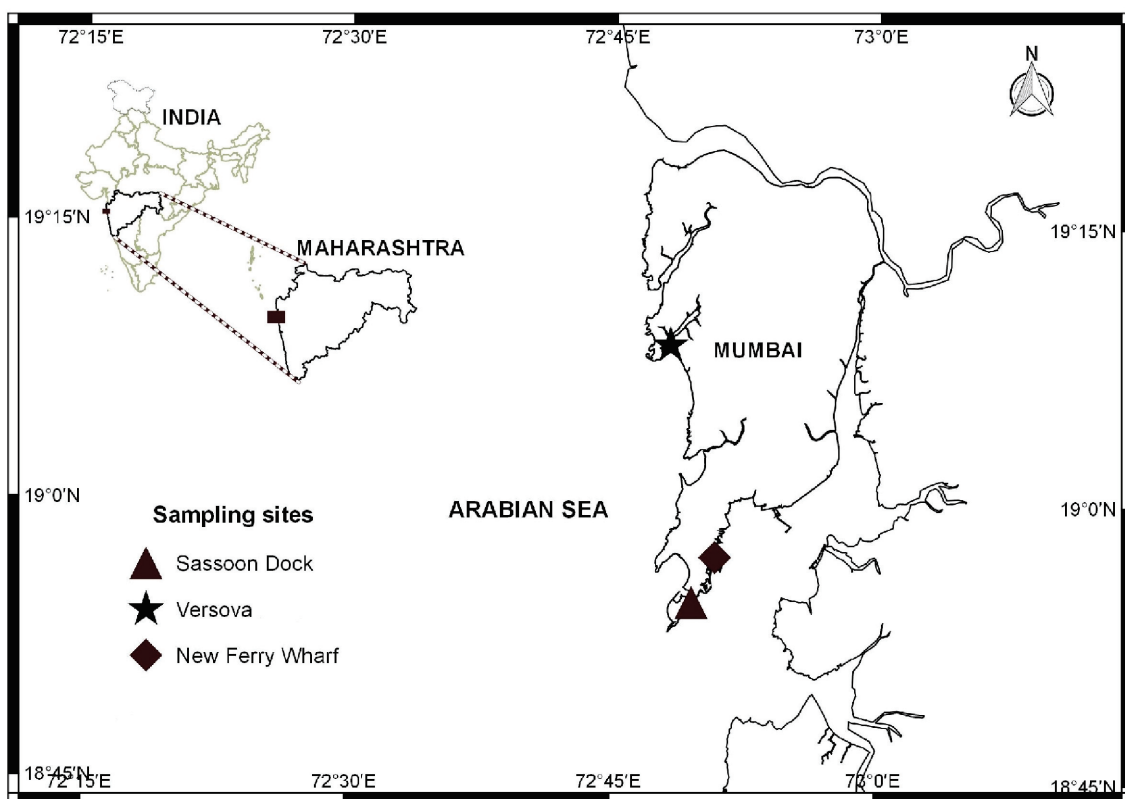


Fig. 1. Map showing study sites (major fish landing centres of Mumbai, Maharashtra)

to the total landings by single day trawlers at Versova.

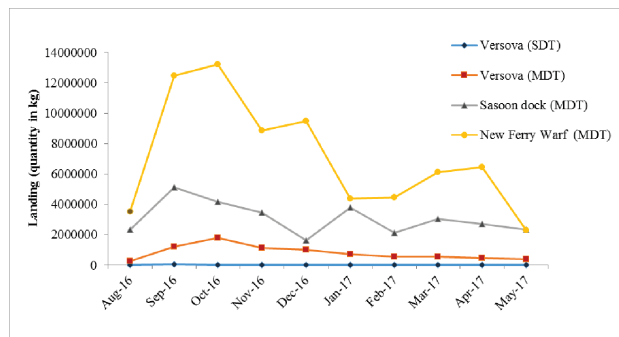


Fig. 2. Month-wise landings of trawlers operating from major fish landing centres of Mumbai, Maharashtra (*SDT= Single-day trawling; MDT=Multi-day trawling)

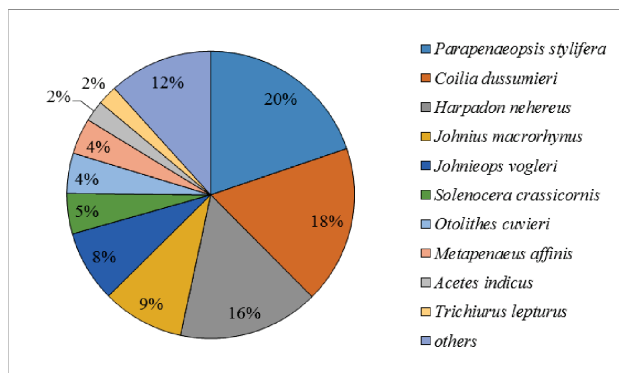


Fig. 3. Percentage catch composition of single-day trawlers at Versova during 2016-17

The percentage catch composition of the major species landed by multi-day trawlers of Versova, SSD and NFW are given in Fig. 4. The major species landed by multi-day trawlers of Versova consisted of *P. stylifera*, *L. duvauceli*, *T. lepturus*, *J. vogleri*, *M. affinis*, *J. macrorhynchus*, *N. randalli*, *E. diacanthus*, *P. prolixus*, and *S. crassicornis*. The major species landed by multi-day trawlers of SSD were *L. duvauceli*, *P. prolixus*, *J. vogleri*, *P. stylifera*, *N. randalli*, *J. macrorhynchus*, *T. lepturus*, *M. monoceros*, *Sepia aculeata* and *M. affinis*. The dominant species landed by multi-day trawlers of NFW consisted of *J. vogleri*, *P. stylifera*, *M. affinis*, *J. macrorhynchus*, *L. duvauceli*, *M. monoceros*, *T. lepturus*, *H. nehereus*, *N. randalli* and *S. crassicornis*. Major catches in the exploratory trawling operation off Goa included small sciaenids, cat fishes, elasmobranchs, *Lactarius*, *Nemipterus*, pomfrets, prawns, *Sphyrna*, cephalopods, soles, and ghol (Rao & Dorairaj, 1968). Annam & Augustine (2005) also had

reported major catches of Greater Mumbai Region (Versova, SSD and NFW) that comprised of sharks, catfishes, *Coilia* sp., Bombay duck, *Nemipterus* sp., croakers, ribbon fishes, penaeid prawns and cephalopods. In all the three landing centres, *T. lepturus* was the major ribbon fish species landed, which is similar to the study by Rizvi et al., 2010. *L. duvauceli* is one of the major catch recorded in the present study. Substantial increase in squid catches worldwide was reported (Anusha & Fleming, 2014).

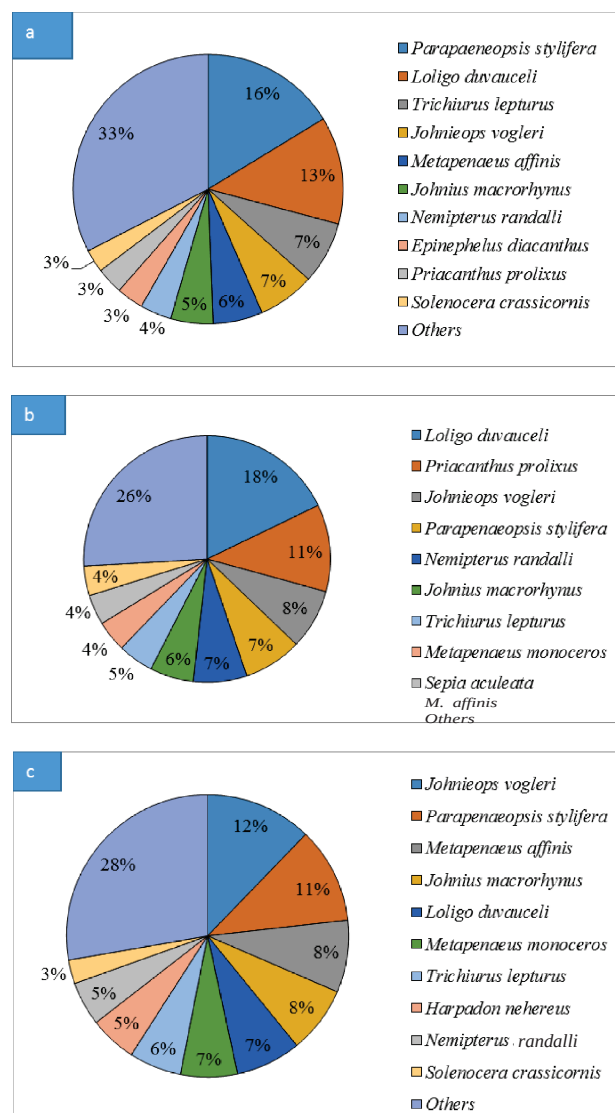


Fig. 4. Percentage catch composition of multi-day trawlers at (a) Versova, (b) SSD and (c) NFW during 2016-17

Landings of *P. stylifera* by the single-day trawlers of Versova and multi-day trawlers of NFW were highest in October while it was found to be highest

in September for the multi-day trawlers of Versova and SSD. Bhendekar et al. (2016) had also reported October as peak landing month for *P. stylifera* by both the single-day and multi-day trawlers of Mumbai coast during September 2013 to February 2014. The major species landed at Versova and NFW in the present study viz., *S. crassicornis*. *P. stylifera* and *S. crassicornis* also formed a significant catch off the Veraval coast during 1996-1999 (Dineshbabu, 2003).

The difference in catches of the single-day trawlers and multi-day trawlers is mostly due to the difference in depth of operation, distance from the shore, speed of trawling and fishing ground. Analysis of catch composition revealed significant landing of *L. duvauceli* by multiday trawlers of Mumbai coast, a trend observed in the recent past. The study highlighted the changing trends of trawl fisheries along Mumbai coast of Maharashtra in terms of catch, catch composition, intensity of fishing, voyage duration and fishing capacity. The increase in number of fishing days in a trip is a clear indication of high intensity and high fishing pressure. Exhaustive studies to include the directions of fishing, depth of operation, fishing ground etc. are needed to elucidate the reason for change in composition of resources.

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