Received: 01 June 2013

FISHERY, BIOLOGY AND POPULATION CHARACTERISTICS OF THE NARROW BARRED SPANISH MACKEREL *SCOMBEROMORUS COMMERSON* EXPLOITED IN INDIA

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Abstract

The king seer also known as the narrow barred spanish mackerel, *Scomberomoruscommerson* is an important and most sought after scombroid included under seerfishes. Exploitation is mainly by hooks and lines and to a lesser extent by gillnets and seines. The annual catch of *S.commerson* ranged between 26,625 t and 40,309 t forming 0.8% to 1.9% of the total fish catch and 57.8 to 66.3 % of the total seerfish catch of the country during 2007-2011. The fishery of *S.commerson* was sustained by fishes with a fork length ranging from 32 to 126 cm and mean at 74 cm. L_r was at 12 cm and L_{max} at 155 cm. The length at first maturity was estimated at 70 cm. Fishes with empty stomachs were prevalent and the prey mostly consisted of smaller fishes like sardines, mackerel and scads. The asymptotic length L_∞ was estimated at 162 cm, annual K at 0.78. Natural mortality M was estimated at 1.61 and total mortality Z at 6.43.

Introduction

The seerfishes form an important and valuable component of exploited marine fishery resource of India. The king seer also known as the narrow barred spanish mackerel, *Scomberomorus commerson* is an important and most sought after scombroid included under seerfishes.The group mainly include the king seer- *Scomberomorus commerson*, the spotted seer *S.guttatus*, the streaked seer *S.lineolatus* and wahoo *Acanthocybium solandri*. Seerfish fishery from different regions of the Indian coast has been reported as early as 1987 and later on the biology and stock has been reported by several earlier workers in the field. An update of the seerfish fishery in India with a brief account of its biology and stock during 2007-2011 is given in this report.

Fishery

The seerfish catch in India has generally increased over the years. The total seerfish catch increased from a mere 4,505 t in 1953 to 60,801 t in 2007; but has registered a declining trend during 2007-11, The catch ranged between 26,625 t and 40,309 t forming 0.8% to 1.4% of the total fish catch and 57.8 to 66.3 % of the total seerfish catch of the country (Fig.1).

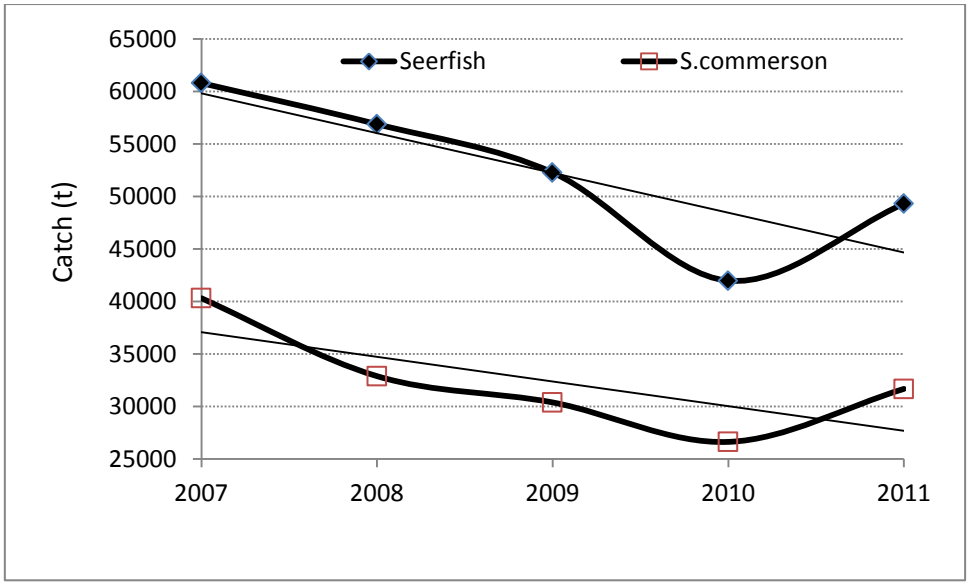

Fig.1. Total seerfish and king seer production in India during 2007-2011

S.commerson formed a part of the total marine fish catch in all the maritime states of the country forming 0.1% in West Bengal to 2.3 % at Pondicherry. Kerala was the most productive state with a contribution of 20.9% followed by Tamil Nadu (16.5%), Andhra Pradesh (16.0%) and Karnataka (15.5%) of the total king seer landing of the country (Fig.2).The west coast comprising of Gujarat, Maharastra, Goa, Karnataka and Goa

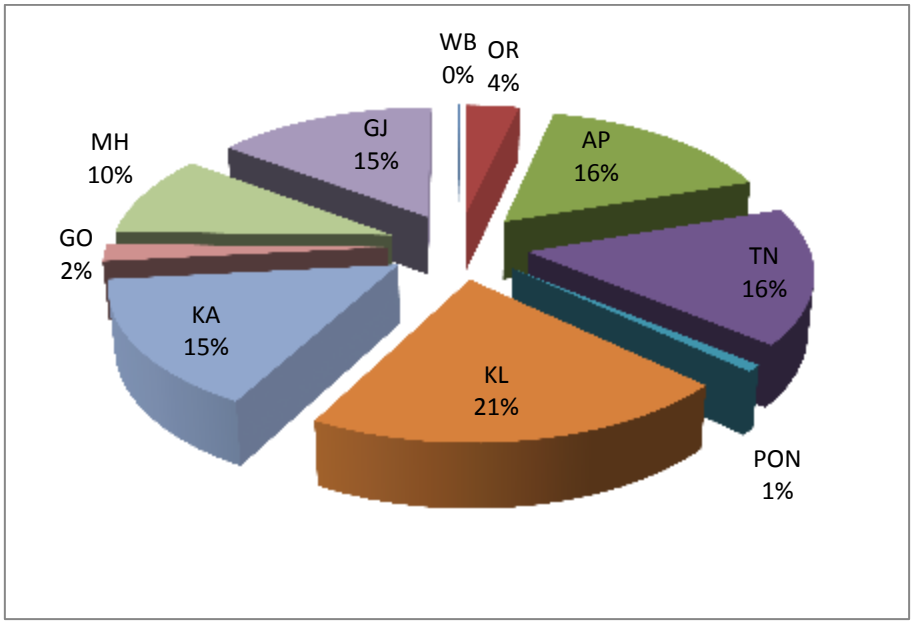

Fig.2. Contribution of different maritime states to the total king seer production in India
(KL-Kerala, Ka-Karnataka, Go- Goa, MH- Maharastra, GJ- Gujarat, WB- West Bengal, Or-Orissa, AP-Andhra Pradesh, TN-Tamil Nadu, PON-Pondicherry)

Exploitation of king seer was made by a different types of craft and gear combinations. Over all the large meshed gillnets (65-170 mm) landed more than 65% of the catch followed by trawls (20%) and hooks and lines (5%). Seines, trolls and other indigenous gears contributed to the rest of the catch (Fig.3).

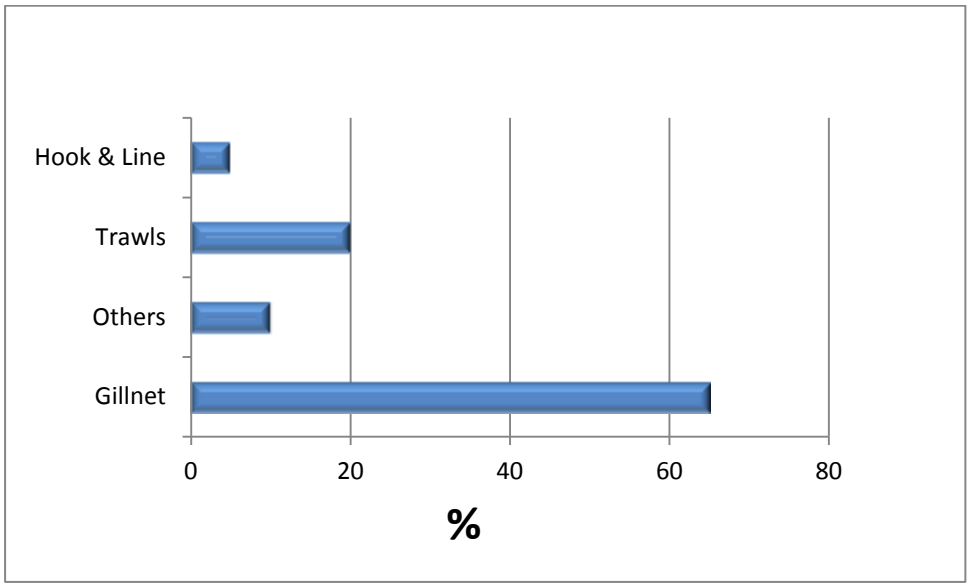

Fig.3. Contribution of different gears to the king seer catch

S.commerson is observed in the fishery throughout the year. However, peak period of abundance varies in different states. In general January-April was the most productive period along the east coast and September-January along west coast.

S.commerson having a fork length ranging from 12-126 cm was observed in the fishery and a mean at 74 cm. Gillnets and the hooks and line exploited only large sized fishes. The fork length of *S.commerson* exploited by gillnets ranged from38-149 cm with the mean at 70 cm. Fishes of 50-98 cm length range mainly contributed to the fishery and formed 82% of the catch. The Hooks and line too landed large sized fishes with their fork length ranging from 68-126 cm and a mean length at 78 cm. The king seer catch made by trawls consisted mainly of smaller sized fishes with the fork length ranging from 12-86 cm and the mean at 36 cm. In the purse seine, the fork length ranged from 28-74 cm with mean at 51 cm. The length frequency distribution of *S.commerson* by different gears is given in Fig.4.

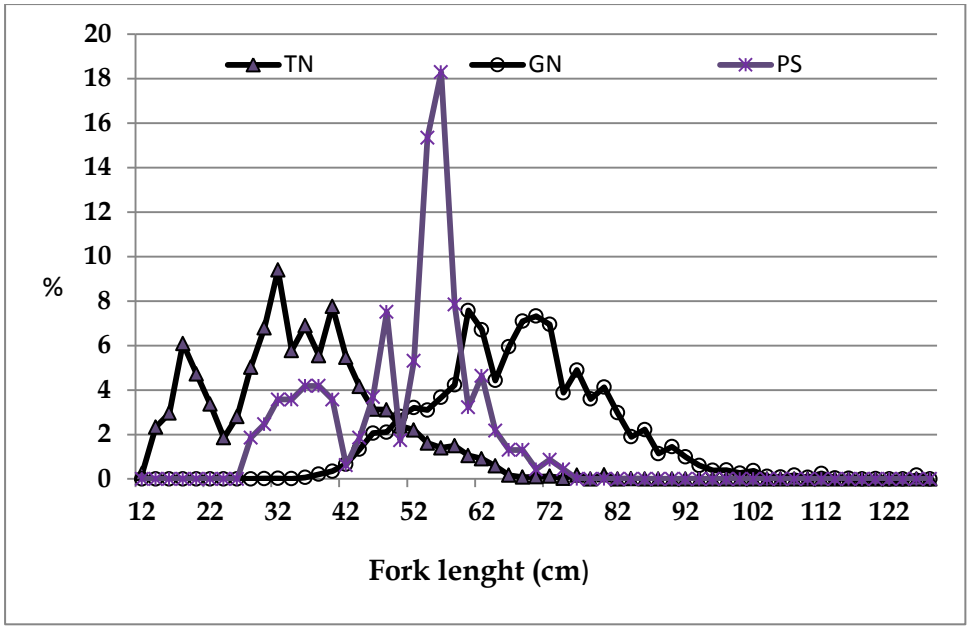

Fig.4. Fork length frequency of king seer in different gears used to exploit the resource.

S.commerson is one of the apex predators in the marine system feeding on a variety of fishes. Fishes with empty stomachs was prevalent in the commercial catches and it comprised 56 % flowed by onefourth full, half full and full stomach condition. The food contents and prey items comprising the diet of *S.commerson* was studied in detail. Fishes comprised the entire diet with scads (*Decapterus* spp.) forming the dominant group. The other fishes that formed the food of *S.commerson* included *Rastrelliger kanagurta, Sardinella longicpes, Epinephelus* spp., *Saurida* spp., *Chorinemes* sp., *Megalaspis cordyla* and anchovies. Partially digested fishes, fish bone and other undigested hard parts of fish also were observed in the stomach.

The length-weight relationship was estimated using 558 length-weight measurements. Separate estimates were made for males and females. However, comparison of slopes and of the elevations of males and females gave F-values that were not significant at 1% and 5% levels. Hence the length-weight data were pooled and the pooled length-weight estimated relationship $W=aL^b$estimated was $W= 0.016*L^{2.802}$. Growth was allometric where the weight increase was slower than 3; relative to the increase in length.The sex ratio, male:female in the commercial catch was estimated at 1:0.94 and size at first maturity at 70 cm (FL).

The growth parameters in the von Bertalanffy equation were estimated. The L_{∞}, and K obtained through ELEFAN I were 162 cm and 0.78 per year respectively and t_0 estimated at -0.0742.

The length at recruitment into the fishery (L_r) was 12 cm. The fish attained a fork length of 91 cm and 129 cm at the end of 1 and 2 year respectively. Longevity estimated was nine to ten years. The fishery was dominated by fishes of 1 year class. The asymptotic weight (W_∞) estimated from the length-weight relationship was 24.841 kg.

The mortality rates M, F and Z computed were 1.61, 4.82 and 6.43, respectively. The exploitation rate was 0.74 and exploitation ratio was 0.75 indicating that the seerfish fishery in the present ground is under pressure

The annual average catch of seerfishes from the Indian seas during 2007-2011 was 5,2254 t, which constituted 1.6% of the total marine fish catch in India. Though there was an increasing trend in the seerfish production in the decade's upto the 1990's the rate of increase through the successive decades decreased, suggesting the attainment of near optimum level of production (Devraj 1999). *S.commerson* has always been the overall dominant seerfish species along the Indian coast with it being more abundant in Tamilnadu in the east coast to Goa in the central west coast Muthiah *et al*., 1999).

Devaraj (1998) also reported finfishes to be the most abundant prey item in the stomach of king seer. Other items consisted of loligo and isopods. However in the present study, fish species formed the only prey item. High incidence of empty stomachs maybe due to the scarcity of forage fishes in the surrounding environment (Devraj, 1998).

Earlier studies on the age ad growth of king seer in India and other areas have been reviewed by Devaraj and Kasim (1998). The difference noticed in the $L\infty$ values from region to region may be the due to the collection of smaller specimen from a region from a particular gear. Muthiah et al., 1999 obtained a smaller $L\infty$ value of 142 cm form specimens collected along the west coast of India. The lower K values observed by various authors in India could be attributed to the recruitment of several broods (into the fishery), common in tropical seas. The present study has indicated that the fishery of seerfish is under high fishing pressure and there is a need to reduce the effort so as to exploit the available resource optimally.

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