



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(4): 1196-1199

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Received: 10-05-2019

Accepted: 12-06-2019

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## Status of penaeid prawn fishery by mechanized trawlers off Visakhapatnam, east coast of India

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### Abstract

Status of penaeid prawn fishery by mechanized trawlers off Visakhapatnam was monitored during 2011-2015. Data was collected on penaeid prawn catch, fishing effort, CPH and species composition. Multi stage random sampling method of ICAR- CMFRI was followed to collect data. Schaefer production model (CEDA) was used to estimate expected penaeid prawn catch (t) based on the total fishing effort and penaeid prawn landings by mechanized trawlers. Study was conducted to assess the mechanized trawl fishery of penaeid prawns.

**Keywords:** Penaeid prawns, mechanized trawlers, east coast

### Introduction

Crustaceans constituted 12.6% of marine fish landings in India during 2017-18. Penaeid prawns contributed 43.3% of crustacean landings. Penaeid prawns constituted 71.6% of crustacean catch in Andhra Pradesh <sup>[1]</sup>. Penaeid prawns are the mainstay of the trawl fishery and catches showed more than 5-fold increase between 1960 and 2005 <sup>[2]</sup>. Excess capacity in trawling is causing widespread damage to marine resources and urgent need for regulation in fishing is required <sup>[3]</sup>. Present study was conducted to assess the penaeid prawn fishery off Visakhapatnam, east coast of India. Study would help in management of penaeid prawn fishery off Visakhapatnam coast.

### Material and methods

Once in a week sampling was conducted at Visakhapatnam fishing harbor, east coast of India during 2011-15. Data was collected on fish landings, fishing effort and species composition. Multi stage random sampling method of ICAR- CMFRI was followed to collect data from trawlers <sup>[4]</sup>. Annual catch was estimated based on the catch data of observation days and same raised to monthly catch based on the number of fishing days in a month. Catch and effort data of penaeid prawns from mechanized trawlers for the ten year period, 2006-15 was analyzed using the Schaefer production model, Catch Effort Data Analysis (CEDA) <sup>[5]</sup> to estimate expected catch and status of exploitation of the penaeid prawns.

### Results and discussion

Penaeid prawns have good demand for export and consumption in domestic market. Commercial species of penaeid prawns are targeted by mechanized trawlers for good returns. Annually, about 9,741 t of penaeid prawns were caught off Visakhapatnam coast during 2011-15 (Table 1). Prawn landings by trawlers increased from 132 t (1967) to 6,191 t (1977) and declined to 2,026 t in 1978 <sup>[6]</sup>. Maheswarudu *et al.* reported 4,601 t of penaeid prawn catch <sup>[7]</sup>.

**Table 1:** Penaeid prawn catch and fishing effort of mechanized trawlers off Visakhapatnam, east coast of India, 2011-15.

Year	Effort (units)	Effort (lakh h)	Effort/trip (h)	Penaeid prawn catch (t)	Total fish catch (t)	CPH of penaeid prawns (kg)	CPH of total fish catch (kg)	Penaeid prawn catch (%)
2011	19606	25.00	127.5	10945	70203	4.38	28.08	15.59
2012	21537	27.57	128.0	10109	70438	3.67	25.55	14.35
2013	16433	29.50	179.5	8831	64796	2.99	21.96	13.63
2014	14025	19.84	141.5	10725	77392	5.41	39.00	13.86
2015	14514	21.20	146.1	8315	49718	3.92	23.45	16.72
Mean	17223	24.62	144.5	9741	66509	4.07	27.61	14.89
SD	3259	4.10	21.20	1162	10397	0.90	6.77	1.30
SE	1457	1.83	9.48	520	4650	0.40	3.03	0.58

**Note:** Annual average values are given in the table for the period 2011 to 2015

Mean catch per hour (CPH) of penaeid prawns were recorded at 4.07 kg. during the study period, 2011-15. Rao reported that the annual CPH indicated the abundance of prawns during the period 1967-78 [8]. Sastry and Chandrasekhar reported annual CPH for prawns as 3.0 kg and 2.7 kg for the period 1982-83 and 1983-84 respectively [9]. Maheswarudu *et al.*, reported CPH of penaeid prawns at 3.55 kg and 4.53 kg [7, 10].

Penaeid prawns constituted 14.9% of the marine fish catch during 2011-15. Sastry and Chandrasekhar reported 13.8% prawn contribution to the marine fish catch [9]. Rajkumar *et al.* also reported 11.9% prawns to total marine fish catch [11]. Prawns constituted 16.7% and 30.2% of total trawl catch in 1968 and 1972 respectively [6]. Maheswarudu *et al.* reported prawns contribution as 9.8%, 15.9 % and 13.7 % along east

coast [7, 10, 12].

Fish landings were recorded as 66,509 t at Visakhapatnam fishing harbor during 2011-15. Maheswarudu *et al.* reported 28,874 t of fish catch [7]. Mean CPH of mechanized trawl catch was recorded at 27.61 kg. During 1981-84 and 1985-89 CPH of total fish catch was reported as 25.5 kg and 23.1 kg, respectively [13]. Maheswarudu *et al.* reported 25.93 kg and 28.44 kg CPH of total fish catch [7, 10].

Fishing effort in terms of units (no's) and hours (h) were observed as 17,223 and 24.62 lakh h respectively, during the study period. Rao reported gradual increase in fishing effort (h) during 1967-77 and decrease during 1978 along Kakinada coast [6]. Average effort per unit (h) increased from 27.3 to 103.7 h during the period 2001 to 2010 [10].

**Table 2:** Month-wise fish catch, fishing effort and species composition of penaeid prawns landed by mechanized trawlers off Visakhapatnam coast during 2011-15

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Effort (units)	1543	1666	1519	731	0	1204	1764	1958	2142	1293	1556	1849	17223
Effort (lakh h)	2.62	2.32	2.07	0.87	0	1.37	2.56	2.86	3.19	1.94	2.31	2.52	24.62
Total fish catch (t)	6505	6882	4596	2093	0	3085	6139	8302	10083	4880	6087	7857	66509
Penaeid prawn catch (t)	967	823	645	258	0	690	985	1321	1405	731	810	1105	9741
Penaeid prawn catch (%)	14.87	11.96	14.04	12.34	0	22.38	16.05	15.91	13.93	14.98	13.31	14.06	13.65
CPH of penaeid prawns	3.69	3.54	3.12	2.96	0	5.04	3.85	4.63	4.40	3.77	3.51	4.38	3.58
Species catch (t)													
<i>Penaeus monodon</i>	40.59	25.54	21.97	7.42	0	22.52	43.99	119.24	52.35	34.14	65.47	39.46	472.68
<i>Femeroopenaeus indicus</i>	43.04	32.10	25.55	7.17	0	31.17	71.92	167.36	84.08	47.77	81.69	57.66	649.53
<i>Penaeus merguensis</i>	0.00	0.08	0.00	0.00	0	0.70	0.00	0.06	0.00	0.00	0.00	0.00	0.84
<i>Penaeus japonicus</i>	23.63	2.09	0.69	2.43	0	6.92	13.08	29.52	21.78	31.16	45.83	24.49	201.61
<i>Penaeus semisulcatus</i>	27.48	6.00	30.33	3.78	0	8.56	19.81	35.33	31.28	30.95	71.67	27.82	293.01
<i>Metapenaeus monocerus</i>	358.43	215.18	177.99	80.73	0	211.78	218.48	183.68	181.72	130.64	25.75	205.72	1990.10
<i>Metapenaeus affinis</i>	66.83	4.70	5.90	1.43	0	134.36	41.39	51.78	4.99	19.62	47.46	10.73	389.19
<i>Metapenaeus dobsoni</i>	51.73	2.78	57.04	23.98	0	32.26	115.22	123.12	83.77	107.34	71.00	97.65	765.89
<i>Solenocera crassicornis</i>	156.58	180.60	131.90	27.40	0	19.43	73.02	169.82	120.73	86.76	150.60	230.45	1347.30
<i>Solenocera melantho</i>	49.19	128.88	55.85	59.57	0	47.94	34.24	37.83	22.08	13.74	22.74	25.90	497.95
<i>Trachypenaeus curvirostris</i>	60.45	85.90	36.26	13.72	0	23.40	49.81	40.73	27.84	39.97	62.33	117.81	558.23
<i>Trachypenaeus granulatus</i>	1.57	32.90	10.95	4.18	0	1.26	22.09	31.79	66.85	15.33	14.17	10.53	211.61
<i>Trachypenaeus sedili</i>	0.30	4.63	8.41	0.23	0	0.23	1.21	7.06	0.53	3.82	1.16	9.68	37.27
<i>Metapenaeopsis barbata</i>	60.94	74.13	39.97	18.10	0	44.55	52.96	114.92	88.10	101.19	103.09	122.51	820.46
<i>Metapenaeopsis stridulens</i>	2.83	10.44	4.72	0.09	0	23.67	26.24	32.45	448.21	9.53	31.54	22.32	612.02
<i>Metapenaeopsis mogiensis</i>	0.00	0.07	0.23	0.00	0	1.41	1.38	1.78	22.95	0.09	0.00	0.00	27.90
<i>Parapenaeus longipes</i>	4.77	17.32	3.22	7.93	0	0.23	0.85	0.86	36.12	1.02	1.28	4.96	78.55
<i>Parapenaeopsis stylifera</i>	12.20	0.00	33.20	0.00	0	9.09	70.58	131.73	28.96	9.54	2.97	0.00	298.26
<i>Parapenaeopsis coromondelica</i>	0.00	0.00	0.00	0.00	0	0.27	5.11	1.75	20.88	16.26	0.00	0.00	44.27
<i>Parapenaeopsis hardwickii</i>	0.00	0.00	0.00	0.00	0	0.00	2.96	12.43	28.57	7.34	1.94	4.42	57.66
<i>Parapenaeopsis uncta</i>	6.24	0.00	0.00	0.00	0	37.70	46.69	25.88	27.35	22.78	5.62	25.48	197.74
<i>Parapenaeopsis maxillipedo</i>	0.35	0.00	1.13	0.00	0	32.94	74.29	1.76	5.73	1.88	3.74	67.32	189.13
Total	967.17	823.34	645.30	258.14	0	690.39	985.32	1320.90	1404.85	730.87	810.06	1104.91	9741.23

**Note:** Month-wise average values for the five years during 2011 to 2015 were given in the table.

Maximum penaeid prawn catch (10,945 t) was observed in the year 2011 off Visakhapatnam coast during 2011-15. Peak in fishing effort was observed in 2012 (units) and 2013 (h). Mean penaeid prawn catch varied from 258 t (April) to 1405 t (Sep.). Maximum penaeid prawn contribution (22.4%) and CPH (5.04 kg) was observed in the month of June. Highest fish catch (10,083 t), penaeid prawn catch (1,405 t) and catch

per hour (CPH) was observed in September month (Table 2). Totally seven groups/generas of penaeids were recorded in the trawl catch off Visakhapatnam coast. In all, *Metapenaeus* Wood-Mason in Wood-Mason & Alcock, 1891 (32.3%) was dominant followed by *Solenocera* Lucas, 1849 (18.9%) (Fig. 1).

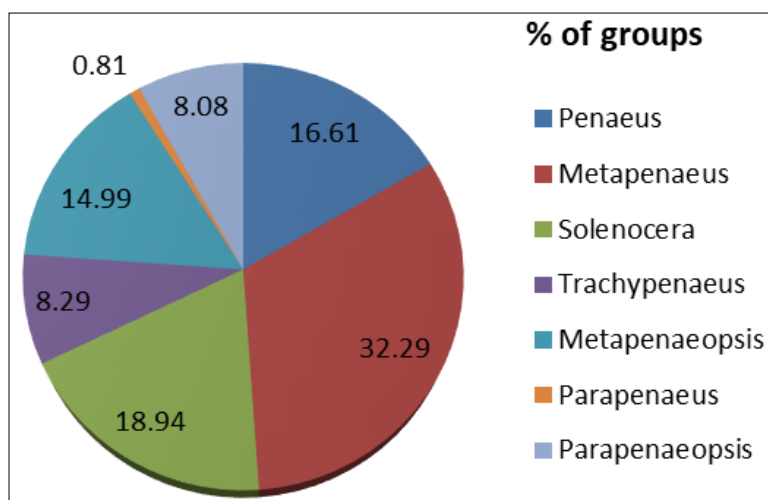


Fig 1: Group wise contribution (%) of penaeid prawns by mechanized trawlers off Visakhapatnam during 2011-15

Totally 22 species of penaeid prawns contributed to trawl catch (Table 2 & Fig. 2). Penaeid prawn catch was dominated by *Metapenaeus monoceros* (Fabricius, 1798) with 1,990 t (20.4%) followed by *Solenocera crassicornis* (H. Milne Edwards, 1837 [in Milne Edwards, 1834-1840]) with 1,347 t (13.8%) and *Metapenaeopsis barbata* (De Haan, 1844 [in De

Haan, 1833-1850]) with 821 t (8.4%) catch (Fig.2). Muthu reported 37 species of penaeid prawns from Visakhapatnam and Kakinada [14]. Maheswarudu *et al.* reported 19 species from Andhra coast and 24 species from Visakhapatnam coast [7, 10, 12].

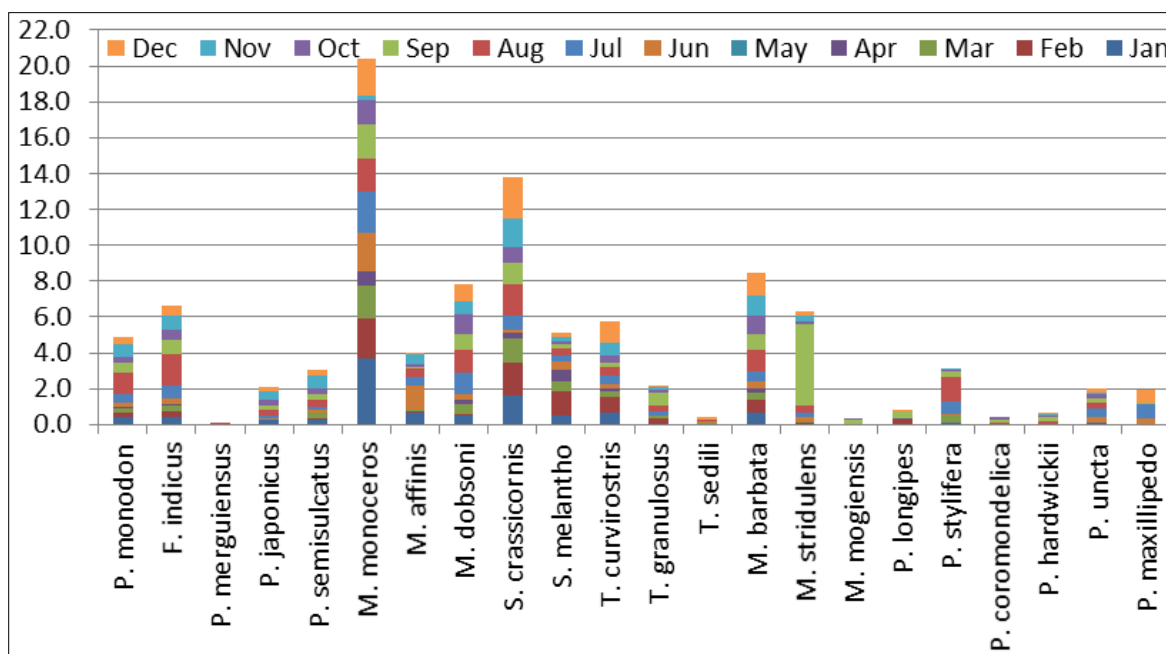
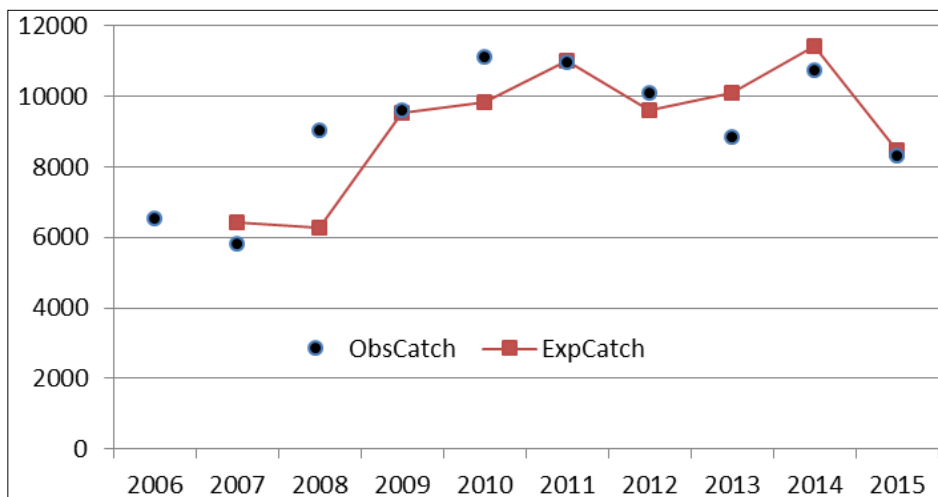


Fig 2: Species composition (%) of penaeid prawns landed by mechanized trawlers at Visakhapatnam during 2011-15

Observed penaeid prawn catch, and total fishing effort for the period 2006-2015 was used to estimate expected penaeid prawn catch (t) (Fig. 3) by Schaefer production model (CEDA). Graph shows that penaeid prawns were over

exploited in 2008 & 2010, and under exploited in 2007 & 2013-14. Study revealed that fishing effort of mechanised trawlers off Visakhapatnam coast should be restricted at present level for sustainable harvest of resources.



**Fig 3:** Expected and observed penaeid prawn catch (t) by mechanised trawlers off Visakhapatnam, east coast of India during 2006-2015.

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