EXPLORATORY FISHING BY OCEANIC DRIFT GILLNETTING AND PURSE SEINING IN THE LAKSHADWEEP

E. G. Silas and P. P. Pillai
Central Marine Fisheries Research Institute, Cochin, 682 031

With a view to develop the oceanic pelagic fisheries, it was planned as early as 1965 to conduct exploratory fishing in the offshore and oceanic areas by drift gillnetting and purse seining. During the cruises of R. V. Varuna it was possible to plan out the operation of drift gillnet fishing which was started in January 1965 and continued as and when possible up to the end of January 1968. Purse seining for tunas was also conducted by R. V. Varuna and M. V. Tuna of the erstwhile Indo-Norwegian Project. Although during the cruises scouting for tuna was conducted by sonar (ASDIC) (horizontal range 1500 m) and echosounders, it was found that visual scouting was more effective. The characteristic sonic spires in the Deep scattering layer between 300 and 450 metre were observed and it is presumed that these could be due to the presence of larger tunas such as bigeye and possibly billfishes at that depth. A brief summary of the results of the operations has been presented earlier (Silas 1969).

EXPLORATORY DRIFT GILLNETTING

A number of units of drift gillnets made of nylon was used at each operation, each unit being 25.85 m long and 6.10 m broad. In a single unit the mesh size was the same and units with mesh size 2.5, 5.5, 10.0, 12.5 and 17.0 cm were used. The smaller mesh sizes were selected specially for collecting juvenile of pelagic fishes.

The area of operation is presented in Fig. 1. The nets were operated in the Lakshadweep Sea as well as in the continental shelf off the south-west coast. A summary of the total operational details is as follows:

| No. of fishing operation | = 86 |
| Total soaking time        | = 794.50 hrs. |
| Total catch              | = 2,522.0 kg. |
| Av. catch/fishing operation | = 29.33 kg. |
| Total catch of tunas      | = 853 kg. |

The number of units of nets varied from 14 to 45. The maximum soaking time of the net for a single operation was 15.00 hrs. and the minimum 4 hrs. and 10 minutes. Mostly handling was done manually, but on a few occasions a line hauler fixed on the port side was used. The effective fishing depth was from surface to between 4 and 5 m.

The number of specimens, size range, percentage composition, and average weight of tunas (squids and other pelagics such as horse mackerel and Coryphaena sp are not considered here) were as follows:

<table>
<thead>
<tr>
<th>No. of specimen</th>
<th>Fork length (cm)</th>
<th>% composition (by weight)</th>
<th>Total (weight kg)</th>
<th>Average weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. rochei</td>
<td>141</td>
<td>191-290</td>
<td>2.8</td>
<td>24</td>
</tr>
<tr>
<td>A. thazard</td>
<td>155</td>
<td>201-510</td>
<td>13.5</td>
<td>115</td>
</tr>
<tr>
<td>E. affinis</td>
<td>238</td>
<td>281-620</td>
<td>62.1</td>
<td>531</td>
</tr>
<tr>
<td>S. orientalis</td>
<td>21</td>
<td>281-520</td>
<td>3.2</td>
<td>27</td>
</tr>
<tr>
<td>K. pelamis</td>
<td>38</td>
<td>421-650</td>
<td>14.9</td>
<td>127</td>
</tr>
<tr>
<td>T. tonggol</td>
<td>4</td>
<td>447</td>
<td>0.5</td>
<td>4</td>
</tr>
<tr>
<td>T. alboeaces</td>
<td>7</td>
<td>500-650</td>
<td>3.0</td>
<td>25</td>
</tr>
</tbody>
</table>
EXPLORATORY FISHING BY

R.V. VARUNA

Drift net station positions
Aug 1965 - Jan 1966

○ R.V Varuna
△ Kalava

Fig. 1. R. V. VARUNA station positions of experimental oceanic drift gillnetting conducted during Aug. 1965-Jan., '66.
Fig. 2. Length frequency distribution (percentage) and the length-weight relationship of *K. pelamis* taken during the oceanic drift gillnetting.
Fig. 3. Length frequency distribution (percentage) and the length weight relationship of *E. affinis* taken during the oceanic drift gillnetting.
Fig. 4. Length frequency distribution (percentage) and the length-weight relationship of *Auxis thazard* taken during the oceanic drift gillnetting.
Fig. 5. Length frequency distribution (percentage) and the length-weight relationship of *A. rochei* taken during the oceanic drift gillnetting.
Fig. 6. Fecundity in relation to the total length of *A. thazard* and *E. affinis* taken during the oceanic drift gillnetting.
Fig. 7. R. V. VARUNA and M. V. TUNA station positions of experimental purse seining conducted during Feb., 1966-April, 1968.
Fig. 8. Length frequency distribution (percentage) and the length-weight relationship of *E. affinis* taken during purse seining.
Fig. 9. Length frequency distribution (percentage) and the length-weight relationship of *Auxis thazard* taken during purse seining.

\[ y = 0.0008916x - 1.914985 \]
Length frequency of tunas collected during the drift gillnet and their length-weight relationship is presented in Fig. 2-5. The length-weight relationship of different species were as follows:

- **E. affinis** \( y = 0.000057360 \times x^{2.079} \)
- **A. thazard** \( y = 0.00002462 \times x^{2.846} \)
- **A. rochei** \( y = 0.00000082 \times x^{1.873} \)
- **S. orientalis** \( y = 0.00039446 \times x^{2.199} \)
- **K. pelamis** \( y = 0.00000384 \times x^{2.156} \)

Other aspects of biology especially the fecundity (Fig. 116) worked out for different species is presented below:

<table>
<thead>
<tr>
<th>Species</th>
<th>No. of ovaries examined</th>
<th>Estimated number of ova (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. rochei</td>
<td>4</td>
<td>31236 - 102902 (52000)</td>
</tr>
<tr>
<td>A. thazard</td>
<td>9</td>
<td>197223 - 1056468 (601400)</td>
</tr>
<tr>
<td>E. affinis</td>
<td>7</td>
<td>493617 - 1393882 (866900)</td>
</tr>
<tr>
<td>S. orientalis</td>
<td>4</td>
<td>268930 - 403603 (354100)</td>
</tr>
<tr>
<td>K. pelamis</td>
<td>1</td>
<td>26873</td>
</tr>
</tbody>
</table>

**EXPLORATORY PURSE SEINING**

Purse seine fishing for tunas in the Lakshadweep sea was first carried out by R. V. Varuna in February, 1966, but was not successful. Later, in March 1967, R. V. Varuna and M. V. Tuna conducted purse seine operations with a net of 540 m long, 67 m depth and 10 mm mesh size. Although skipjack shoals were encircled, they sounded faster and not a single fish was caught. It was observed that, for successful operations, in the oceanic areas nets of larger dimensions should be employed which could operate in relation to the thermocline. The same purse seine net was successfully operated on the shelf areas where good catches were obtained, the maximum exceeding 10 tonnes in a single operation (Fig. 7).

Out of a total of 38 purse seine operations carried out by R. V. Varuna and M. V. Tuna, the number of positive stations with tuna were only 10 for which the effort expended in hours was 39.50. The total catch amounted to 19,436 kg. The average duration of the positive operations being 3.95 hours the average catch in kg per positive operations was 1943.8 kg and catch/hour for positive hauls worked out to about 494 kg. However, these investigations have proven beyond doubt that in the coastal waters, the nets of the type used could be successfully operated and much higher catch rates could be expected.

The catch was mainly composed of **E. affinis** and **A. thazard**. **E. affinis** occurred in the size range 32-58 cm and **A. thazard** 32-46 cm. Their length frequency distribution and the length-weight relationship is presented in Figs. 8 & 9. The length-weight relationship of the two species calculated were as follows:

- **E. affinis** \( y = 0.00002962 \times x^{2.082} \)
- **A. thazard** \( y = 0.00089160 \times x^{1.192} \)
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