

## MSY LEVELS FOR SOME COMMERCIALY IMPORTANT EXPLOITABLE FISH RESOURCES OF NORTH COAST OF KARNATAKA, INDIA\*

M. H. DHULKHED AND G. G. ANNIGERI

*Central Marine Fisheries Research Institute, Cochin 682 014*

### ABSTRACT

In the northern Karnataka Coast, oilsardine and mackerel form the most important pelagic fish resources thus guiding the economic sustenance of fishermen of this region. The introduction of purse seines in the mid-seventies, resulted in the boosting of catches of oilsardine and mackerel, but also the existence of new resources like anchovies, carangids, catfishes, etc. come in the operational ambit of this gear which remained untapped hitherto by the traditional gears. Of late, it is feared that some of these resources are being subjected to fishing pressure which requires an urgent need for their assessment to make judicious approach as to their further exploitation. Studies have indicated that there is an imperative need for restricting further increase in the fishing effort, since they indicated negative relation in terms of effort. On the other hand, anchovies, carangids and catfishes manifested direct relation between the abundance and effort expended showing better prospects for their further exploitation. The critical levels of input of effort in unit days of fishing for oilsardine, lesser sardines, mackerel, anchovies and carangids are 5306, 3332, 3885, 6589 and 2812 respectively and the corresponding MSY level being 3632 t, 1117 t, 1362 t, 54 t and 84 t.

### INTRODUCTION

DURING the last two decades, the developing countries of the third world are gradually adapting new fishing methods and other techniques for augmenting food resources for the requirements of their ever increasing population. In India, amongst the maritime States, Karnataka stands first for employing the purse seiners in mid-seventies on commercial basis which resulted in the boosting of its fish catches to almost cent per cent (1.5 lakh t). Thanks to oilsardine and mackerel catches forming the mainstay of the fisheries of Karnataka. Besides, these two resources, with increase in strength year after year, purse seine

fleet started exploiting the new resources like seerfishes, tuna, pomfret, corangids, catfishes, anchovies, etc. Since the purse seines sustained their returns on almost virgin stocks of these and as to be expected the catches of these fishes were of a higher magnitude in the first few years. In recent years the fish catches showed a downward trend. This indicated that the above resources are subjected to more fishing pressure than required and hence the urgent need to assess their yields in relation to fishing effort, so that suitable action could be initiated for restoring the catches to their equilibrium level. Towards this end, an attempt has been made here to estimate Maximum Sustainable Yields (MSY) of commercially important fishes of the northcoast of Karnataka, taking Karwar as the representative fish landing centre using the data for 1979 through 1986.

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The earlier work on the stock assessment of oilsardine and mackerel was based on the indigenous gears (Banerji, 1973; Sekharan, 1974). However, the recent work on the estimated yields of varieties of fishes of Karnataka is made on the purse seine fishing (Kurup *et al.*, 1987).

#### MATERIAL AND METHODS

In this study, catch and effort in respect of purse seine operating off Karwar only has been considered for the period 1979 to 1986. The effort is expressed in terms of number of trips made by purse seiners each day and estimated for a given month. The MSY was computed following the method of Schaefer's model (1954).

#### RESULTS

**Oilsardine** : By far, the most important fishery resource of northwest coast of Karnataka is oilsardine. The fishery is active usually between September and March. It could be seen that the catches indicated an increasing trend from 8 t in 1977 to 4,730 t in 1984 except for a slight drop in 1980 and 1983 (Fig. 1). The average catch worked out for the ten year period was 2,540 t. The Fig. 1 also indicates increasing effort in relation to catch

from 1977 to 1982. In 1983, the effort put in was 3,786 units which was less than the previous year by 77.7% and so also the catches dwindled by 1,975 t over the previous year (58%). The trend of CPUE was closely related to the catch and the effort for the entire period of investigation. Further, the regression co-efficient 'b' for catch and effort was negative. The MSY level is 3,632 t and the effort for this estimated works out to be 5,306 unit days. This suggests that any increase in effort beyond this level would not be remunerative, but on the contrary the increase may exert pressure on the resource.

**Lesser sardines** : This group comprised *Sardinella dayi*, *S. fimbriata*, *S. gibbosa* and *S. albella* in the order of abundance in the purse seine catches. Prior to the introduction of purse seines, the contribution of this group to the total marine fish landings of Karwar was almost negligible. This group contributed a total catch as high as 1306 t in 1979 and fell to 126 t in 1986. The MSY for first three species were 336, 277 and 458 t respectively and the corresponding values of effort worked out to be 3279, 3264 and 3263 of unit days of fishing. The MSY for *S. albella* was not worked out as their catch was of no significance.

TABLE 1. Estimates of equilibrium catch 'Ce' (tonnes) and effort 'f' (units)

Resource	Calculated equilibrium catch Ce (tonnes) for different years								
	f :	1979	1980	1981	1982	1983	1984	1985	1986
		1506	2543	4707	6623	3726	5697	6264	4210
Oilsardine		1483	2260	3241	3386	2903	3401	3411	3092
<i>S. dayi</i>		632	783	352	873	673	182	583	540
<i>S. fimbriata</i>		189	250	196	56	251	90	6	230
<i>S. gibbosa</i>		1089	1392	856	940	1295	83	509	1119
Mackerel		662	636	687	3287	125	1863	2698	231
Anchovies		148	153	93	599	62	321	484	6
Carangids		106	132	62	138	115	25	91	220
Catfishes		208	284	266	52	304	179	106	292
Other fishes		481	432	667	2766	2	1620	2292	296

The extant condition based on the fishing equilibrium computations hold no future for their further exploitation as the values between effort and CPUE also show a negative correlation.

**Mackerel :** *The Indian mackerel Rastrelliger kanagurta* ranks second to oilsardine for its abundance and commercial importance. The catches showed wide fluctuations. From 1970 to 1983, the catches indicated gradual decline, except in 1981. During 1984, the catch recorded was 533 t and in the subsequent year there was more than a seven-fold increase in their haulings. The CPUE was 0.62 t. The MSY level is about 1362 t and the corresponding effort being 3885 unit days of fishing. This highlighted that beyond this level of effort input, there is little likelihood of increased catches of mackerel in this area. In other words, the equilibrium relation between effort and CPUE indicated a negative relationship.

**Anchovies :** *This group comprising Thriposocles spp., Stolephorus commerson, S. Bataviensis and S. devisi* though form a minor fishery has now assumed greater importance because of decline in catches of other commercially important big fishes. In 1979, these fishes totalled a mere 1.5 t which attained 318 t by 1983. Thereafter, there was a successive decline in the next three years. It is felt that there exists vast scope in view of this potential resource yet to be exploited from our coastal waters. However, the value of MSY level arrived at is 54.5 t, the corresponding value of effort being 6589 units.

**Carangids :** This group is represented mostly by *Caranx kalla, C. cruminophthalmis, Megalaspis cordyla, Decapterus russelli, C. signobilis* and other minor species which are present in the catches, in most of the months.

In 1979, the estimated catch of these amounted to 37 t and by 1984 it was 981 t. In the subsequent years the catches declined by 32%. However, during 1986 the catches were made good off and they totalled as high as 2083 t, the return per unit being 0.5 t. Their maximum yield is about 85 t for the total effort of 2812 units. It is surmised that catches during all the years considered here were within the permissible limits.

**Catfishes :** This group has assumed greater significance due to its good catches. *Tachysurus tenuispinis* and *T. serratus* are the two most common species caught in good numbers between September and December. In 1979, their catch was 91 t forming 2% of the total catch, whereas in 1982 they totalled 806 t and formed 10.4% of the total. The catch of 76 t recorded in 1986 is rather closer to the MSY level of 84 t for these fishes. Further, the equilibrium computations indicated a positive relationship between the effort and the catch and any further increase in effort may not be conducive for increased haulings of catfishes.

**Other fishes :** In this group are included tuna, sciaenids, leiognathids, perches, ribbonfishes, etc. which are occasionally caught more and rest of the times absent in the catches. Their average catch was 1071 t and the highest CPUE of 1.2 t followed by 0.4 t in 1980 and 1983. The MSY determined for these categories of fish amounts to 1667 t for an output of 3465 unit effort. This shows the optimal level for tapping the above categories of fishes.

#### GENERAL OBSERVATIONS

It could be observed that the fishery at this place is of multispecies. Hence, it apparently poses a problem to evaluate their respective yield estimates. Even then, with certain limitations MSY levels have been worked out for important groups of fishes on which the

sustenance of the fishermen depends. The average annual catch of oilsardine is about 2500 t, which could be increased by another 50% to reach the maximum level of its exploitation. On the contrary there appears to be no further scope to increase the exploitation of lesser sardines. In case of anchovies, it may be mentioned that unless the boats venture out for fishing activities beyond 50 m depth where they are reportedly abundant, the prospects of their increased catches are doubtful since practically the purse seiners have concentrated their activities over the years in the 10-30 m depth zone.

With regard to mackerel, it is to be noted that at present their annual hauling is about 1100 t, whereas its MSY is only 1362 t showing a marginal difference. This holds good for catfish resource also.

It is estimated that the maximum yield for Karnataka is 2.2 lakhs t and in Uttar Kannada by purse seiners is of 18,000 t (Kurup *et al.*, 1987). In the district of Uttar Kannada, the four important purse seine landing centres are Karwar, Tadri, Kasargode (Nonnavar) and Bhatkal. The fish catches of all these centres, almost come nearer to the above expected yield in respect of purse seiners only.

Further, it is to be highlighted that the equilibrium levels for different categories of fishes indicated that their catches do not show corresponding increase. In other words, any further increase in effort by strengthening the purse seine fleet, will not yield increased catches. In this context it is felt that there is a greater need now to regulate the number of purse seiners (Silas *et al.*, 1980). The present studies have revealed that with less fishing effort the equilibrium catches for various categories of fishes could be attained.

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