

Stokholms Universitet  
Biblioteket  
Arkiv  
729

This paper not to be cited without prior reference to the authors

International Council for the  
Exploration of the Sea

C. M. 1970/F:13  
Demersal Fish (Northern) Committee

Observations on Silver Smelts (Argentina sp.) from  
the Norwegian Deeps

by

J. Lahn-Johannessen<sup>x)</sup> and N. Radhakrishnan<sup>xx)</sup>

---

x) Institute of Marine Research,  
Bergen, Norway.

xx) Central Marine Fisheries Research Institute,  
Marine Fisheries P. O. (Mandapam Camp),  
India.

## INTRODUCTION

The biology of the greater silver smelt Argentina silus has been thoroughly described by Borodulina (1964 and 1968), Keysler (1968) and Wood and Raitt (1963 and 1968). Yet very little is known about the actual commercial exploitation of the species and the potential resources in the sea. The present paper deals with the contribution of silver smelts to the Norwegian industrial trawl fisheries, with particular reference to the Norwegian Deeps. In this area fishing is carried out with small-meshed bottom trawls throughout the year. The cod end mesh size varies between 22 and 35 mm (Lahn-Johannessen et al. 1964).

## MATERIAL AND METHODS

Records on commercial landings of silver smelts Argentina sp. are available in the official fishery statistics from 1956 to 1966. Table 1 presents the annual landings of the species with the corresponding figures for industrial trawl landings of Article 6 species.

The Institute of Marine Research initiated sampling of commercial catches in July 1957 and May 1958 on board a factory trawler fishing for reduction purposes in the Norwegian Deeps. During the period 1961-1965 and in 1969 regular sampling of industrial trawl landings has been carried out. The samples (each of 80-100 kg) were divided according to species and the relative amount in weight of species estimated directly or from length distributions and length/weight relations. Table 2 summarises the estimated annual weight percentages of silver smelts, Norway pout and blue whiting in industrial trawl samples from the Norwegian Deeps.

Fig. 1 gives monthly length distributions of greater silver smelt (A. silus) from industrial trawl samples (April 1969 - February 1970) and shrimp trawl samples (April-May 1969).

## STATISTICAL DATA OF SILVER SMELTS

Industrial trawl landings are specified in the fishery statistics as: Herring, Norway pout, sandeel and silver smelts. Lahn-Johannessen et al. (1964) have pointed out that the statistics give fairly accurate estimates of the

landings of herring and sandeel, but the quantities specified as Norway pout also include various other species, mainly gadoids. These by-catches are not usually accounted for in the statistics, which in the case of silver smelts have resulted in underestimates of the true landing figures.

Table 1 shows that during 1956 - 1966 silver smelts constituted on an average 1 per cent of the total industrial trawl landings from the North Sea and Skagerak. Approx. 70 per cent of the silver smelt landings originated from Skagerak and the remaining 30 per cent from the North Sea. The highest annual landings were recorded in 1959 - 1961 when a regular summer fishery for the lesser silver smelt (A. sphyraena) mainly, took place at the Norwegian Skagerak coast. No separate records of silver smelts are given from the North Sea and Skagerak since 1966, most probably because the species by then had ceased to be predominant in industrial trawl landings at all.

#### INVESTIGATIONS OF SILVER SMELTS FROM THE NORWEGIAN DEEPS

Samples from commercial landings have indicated that silver smelts frequently occur as by-catches in the industrial trawl fishery for Norway pout in the Norwegian Deeps and in the shrimp fisheries. Preliminary investigations conducted in the summer 1957 and 1958 on the Jaeren Riff (area IVa, 14 J-K) and the Egersund Bank (area IVa, 15 J-K) respectively, revealed that while the greater silver smelt (A. silus) occurred in all the 36 hauls made, the lesser silver smelt (A. sphyraena) was absent from the samples. Trawling was carried out between 120 and 160 fms. (average 141 fms.), and the estimated weight percentage of greater silver smelt ranged from approx. 2 to 62, on an average 15 per cent.

Table 2 indicates that during the period 1961-1965 silver smelts mainly were recorded in samples from the Egersund Bank and the Jaeren Riff. A few samples were also collected from other grounds, but the data are found to be inadequate for comparisons. In 1969 nearly all samples came from the Viking Bank, Sirahola and the Patch Bank. From 1961 to 1965 the estimated annual by-catch of silver smelts in landings specified as Norway pout, has been on an average 2 per cent, where as Norway pout constituted 48.2 and blue whiting 36.9 per cent. In 1969 the corresponding figures were 5.6, 47.3 and 38.2 per cent. The monthly length distributions of greater silver

smelt (A. silus) given in figure 1, clearly indicate that by-catches of this species occurring in industrial trawl landings of Norway pout, consist of juveniles (Borodulina 1968, Keysler 1968, Wood and Raitt 1968), whereas in the shrimp fishery both juveniles and adults occur together. From the figure it is noticed that a new year class enters the industrial trawl fishery during late autumn.

#### ESTIMATES OF SILVER SMELTS IN BY-CATCHES

Based on the annual landing figure of Norway pout and table 2 an attempt has been made to estimate the quantities of silver smelts landed as by-catches from this fishery. In the period 1961-1965 Norway pout landings from the Egersund Bank and the Jaeren Riff exceeded 91 000 tons altogether, or approx. 32.5 per cent of the total Norway pout landings. The corresponding figures of silver smelts estimated year by year, are found to be approx. 1 900 - 2 000 tons. A similar estimate for 1969 indicates that approx. 1 000 tons of silver smelts were landed from the Viking Bank, Sirahola and the Patch Bank.

On the assumption that the figures of silver smelts given in table 2 are fairly representative for the other fishing grounds in the Norwegian Deeps, the estimated landings of the species would come to approx. 4 600 tons for 1961 - 1965, and more than 3 200 tons in 1969.

Though the estimates presented above confirm that the official fishery statistics underestimate the actual landings of silver smelts, the contribution of the species to the total industrial trawl landings from the North Sea and Skagerak (including by-catches from the shrimp fishery), is still of minor importance.

#### FUTURE PROSPECTS FOR EXPLOITATION OF SILVER SMELTS

Keysler (1968) states that the greater silver smelt (A. silus) prefers depths ranging from 300 to 600 meters. The Norwegian industrial trawlers usually carry out fishing between 175 and 275 meters depth in the Norwegian Deeps, which means that these vessels hardly exploit more than approx. 1 per cent

of the actual resources of the species (Keysler 1968). As Norway pout and blue whiting are the main species sought for (Table 2), and they still occur in abundance within the traditional depths, the prospects for more intensive exploitation of silver smelts at present seem to be rather small.

The shrimp fishery carried out in the deeper regions of the Norwegian Deeps generally accounts for higher weight percentages of silver smelts in the by-catches, but as the industrial landings from this fishery form only a minor part of the total industrial trawl landings, this fact is not likely to alter the above mentioned rate of exploitation of the species very much.

In recent years an industrial trawl fishery has developed in coastal regions off south western Norway (from Moere and northwards). This is also based on Norway pout and blue whiting resources, but as no regular sampling has been carried out, reliable information of the species composition of the landings are not available. In 1969 the landings constituted approx. 21.5 per cent of the total quantity landed in Norway (18 261 against 85 122 tons). This may probably to some extent increase the actual total landings of silver smelts.

Table 1. Commercial landings of silver smelts and Article 6 species (in tons) from the North Sea and Skagerak, 1956 to 1966.

YEAR	SILVER SMELTS			ARTICLE 6	TOTAL
	NORTH SEA	SKAGERAK	SUM	SPECIES	
1956		830		6 743	7 573
1957	202	-	202	10 871	11 073
1958	-	-	-	13 004	13 004
1959	398	644	1 042	43 683	44 725
1960	202	1 649	1 851	51 120	52 971
1961	310	617	927	34 295	35 222
1962	5	-	5	59 064	59 069
1963	-	89	89	139 314	139 403
1964	416	201	617	125 092	125 709
1965	-	171	171	74 159	74 330
1966	-	154	154	24 183	24 337
SUM	1 533 <sup>x)</sup>	3 525 <sup>x)</sup>	5 888	581 528	587 416
PERCENTAGE PERCENTAGE	30.3 <sup>x)</sup>	69.7 <sup>x)</sup>	1.0 100.0 <sup>x)</sup>	99.0	100.0

x) 1956 data excluded.

Table 2. Estimated annual weight percentages of silver smelts, Norway pout and blue whiting in industrial trawl samples from the Egersund Bank and the Jaeren Riff 1961-1965 and from the Viking Bank, Sirahola and the Patch Bank 1969.

YEAR	TOTAL NO. OF SAMPLES	POSITIVE SAMPLES	WEIGHT - PERCENTAGES		
			SILVER SMELTS	NORWAY POUT	BLUE WHITING
1961	17	16	3.15	39.13	30.38
1962	28	14	1.29	60.77	26.73
1963	27	22	4.15	68.31	24.31
1964	22	3	0.10	41.34	48.12
1965	13	7	1.33	31.48	55.00
1969	21	21	5.61	38.26	47.31

REFERENCES

- Borodulina, O.D., 1964. Some data on the biology of the Argentine Argentina silus (Ascanius) Vop. Ikhtiol., 4: (1), 68-81. (In Russian).
- " " " 1968. Argentina silus in the Atlantic Ocean. Rapp. P.-v. Reun. Cons. perm. int. Explor. Mer, 158: 54-57.
- Keysler, H.D., 1968. Investigations on the stocks of Argentina silus in the waters off Norway, Iceland and Newfoundland. Rapp. P. -v. Reun. Cons. perm. int. Explor. Mer, 158: 58-64.
- Lahn-Johannessen, J. et al. 1964. The Norwegian fisheries for Norway pout. Coun. Meet. int. Coun. Explor. Sea 1964 (120): 1-5 (Mimeo).
- Wood, R.J. and Raitt, D.F.S., 1963. Preliminary investigations on the biology of the Greater Silver Smelt Argentina silus (Ascanius) Coun. Meet. int. Coun. Explor. Sea 1963 (128): 1-11 (Mimeo).
- " " " " " " " 1968. Some observations on the biology of the Greater Silver Smelt, particularly in the North-eastern Atlantic Ocean. Rapp. P. -v. Reun. Cons. perm. int. Explor. Mer, 1968 (158): 64-73.



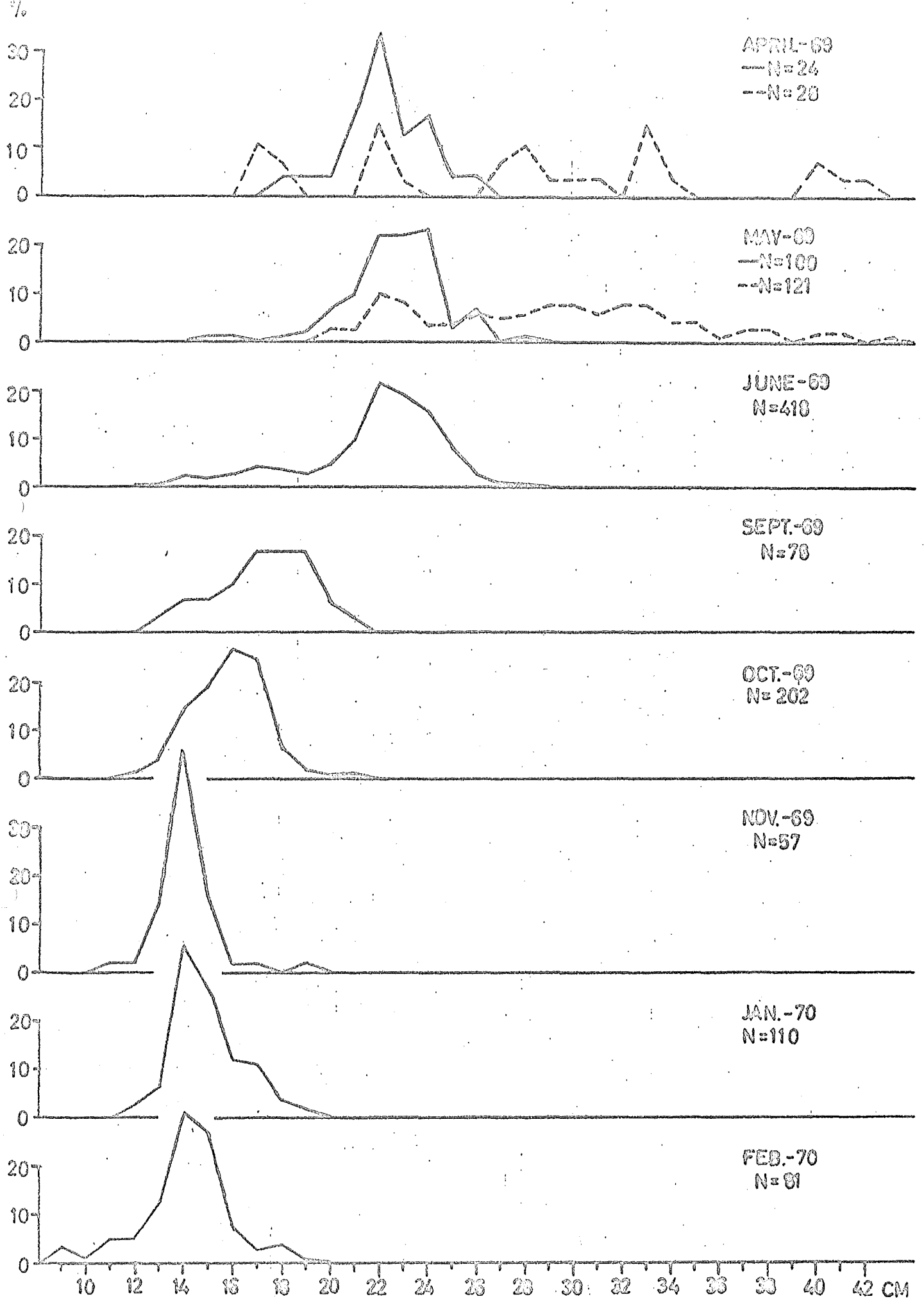


Fig. 1. Monthly length-frequency distribution of greater silver smelt (*A. silus*) from industrial trawl samples from the Norwegian Deeps, April 1969 - February 1970, and from shrimp trawl samples from the Norwegian Deeps, April - May 1969 (broken line).