

# **Small pelagic fish from the Croatian fishing grounds**

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## **Abstract**

A brief description of the small pelagic fish (*Sardina pilchardus*, *Engraulis encrasicolus*, *Scomber scombrus*, and *Sprattus sprattus*) biological and population dynamics parameters is given. Data were taken from the Croatian fishing grounds of the Adriatic Sea.

## **1. Introduction**

Small pelagic fish populations: sardine, *Sardina pilchardus* (Walb.), anchovy, *Engraulis encrasicolus* (L.), Atlantic mackerel, *Scomber scombrus* (L.), chub mackerel, *Scomber japonicus* (Houtt.) and sprat, *Sprattus sprattus* (L.) are rather widely distributed in the Adriatic Sea and play an important role in the commercial fisheries of all countries located along the coast of the Adriatic Sea.

In this paper, a review of the most important and, for the most part, published results of investigation into the main pelagic species' biology and population dynamics, is presented.

## **2. Results**

The main small pelagic fish populations: sardine (*S. pilchardus*), anchovy (*E. encrasicolus*), Atlantic mackerel (*S. scombrus*), chub mackerel (*S. japonicus*) and sprat (*S. sprattus*) are migratory species, common and shared between all countries located along the Adriatic Sea (Figures 1, 2, 3, 4 and 5).

Sardine is the most important small pelagic fish - almost all Croatian fish processing companies are canning this small pelagic species. At the same time, it is the most abundant fish species in the Croatian fishing grounds (Figure 6). Other species are poorly represented in Croatian catches.

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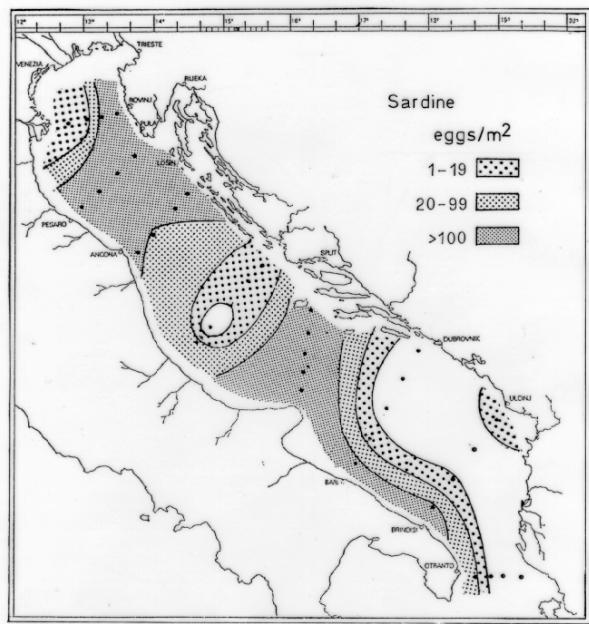


Figure 1. Distribution of sardine eggs in the open Adriatic Sea (according to Gamulin and Hure, 1983).

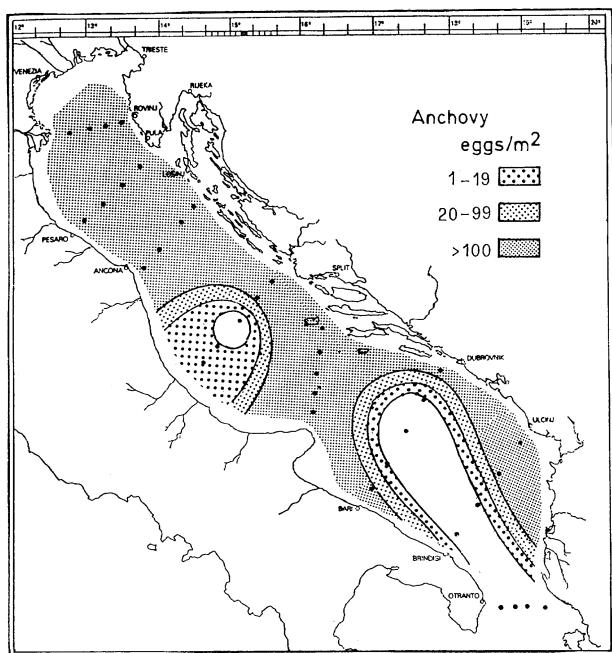


Figure 2. Distribution of anchovy eggs in the open Adriatic Sea (according to Gamulin and Hure, 1983).

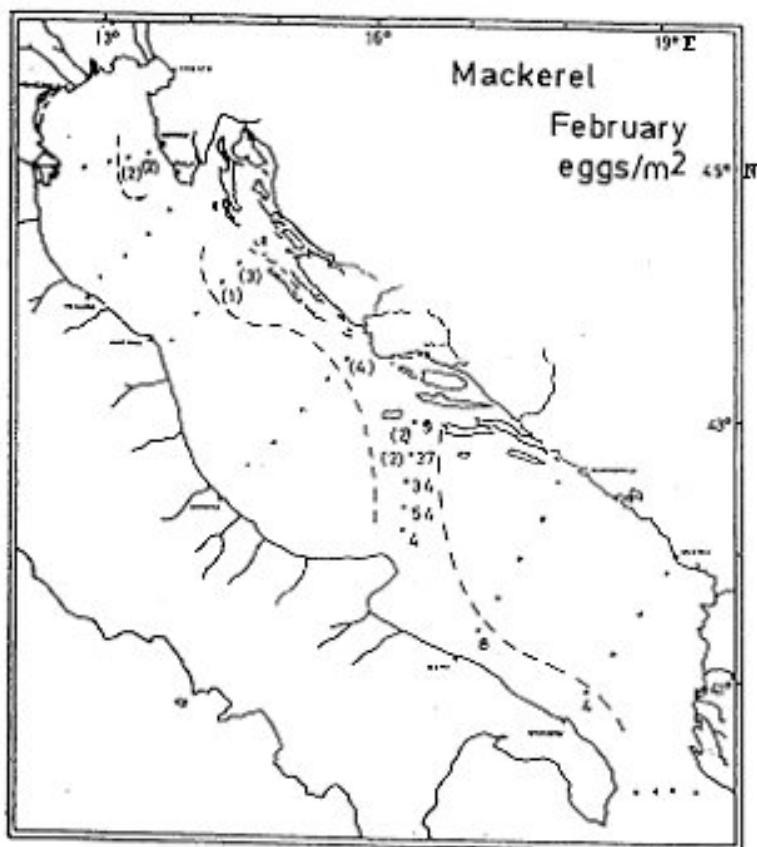


Figure 3. Distribution of Atlantic mackerel eggs in the open Adriatic Sea (after Gamulin and Hure, 1983).

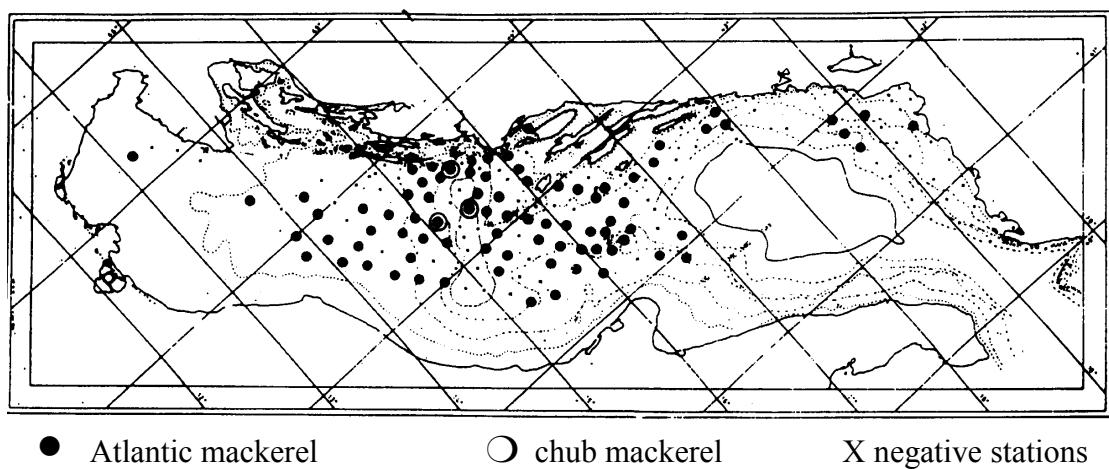


Figure 4. The Atlantic mackerel and chub mackerel catches of the "Hvar" Expedition, 1948-1949 (black and white circles respectively) (according to the unpublished data of Karlovac).

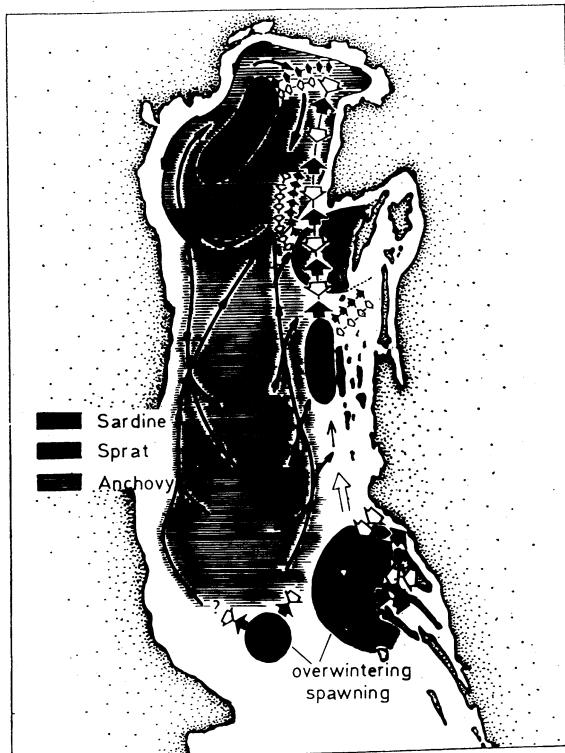


Figure 5. Schematic presentation of sardine, anchovy and sprat migrations in the Adriatic Sea (obtained combining data from: Štirn, 1969; Piccinetti, 1971; Štirn and Kubik, 1974).

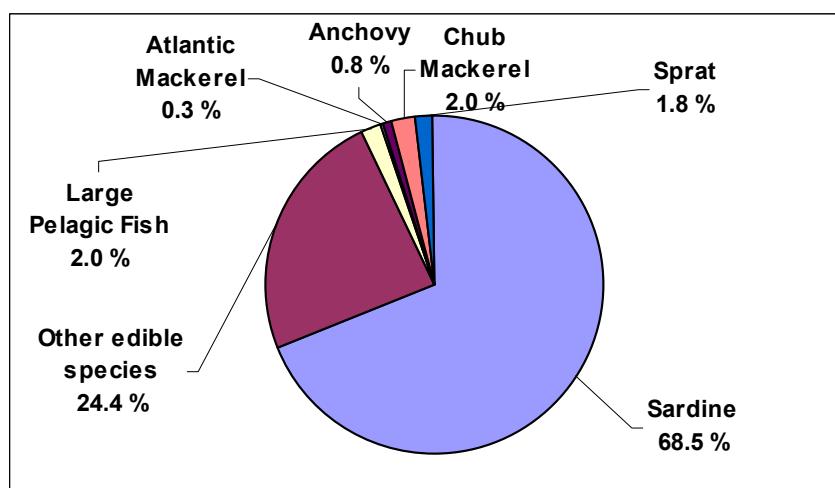


Figure 6. Contribution of separate small pelagic species to total catch of the Republic of Croatia during the 1950-1993 period.

The summary of the biological and population dynamics parameters of the small pelagics from the Croatian fishing grounds of the Adriatic Sea are presented in Table 1.

Table 1. Summary of the biological and population dynamics parameters of the sardine, anchovy, Atlantic mackerel and sprat from the Croatian fishing grounds of the Adriatic Sea. Sinović (1978, 1983-84, 1984, 1986, 1990, 1998\*, 1992; in press, 2000<sub>a</sub>, 2000<sub>b</sub>), Tičina (2000<sup>+</sup>).

<b>Management unit</b>	37.2.1.a and 37.2.1.b	37.2.1.a and 37.2.1.b	37.2.1.a and 37.2.1.b	37.2.1.a
<b>Scientific name</b>	<i>Sardina pilchardus</i> (Sardine)	<i>Engraulis encrasiculus</i> (Anchovy)	<i>Scomber scombrus</i> (Atlantic mackerel)	<i>Sprattus sprattus</i> (Sprat)
<b>Gear</b>	purse seine, mid-water trawl	purse seine, mid-water trawl	purse seine, mid-water trawl	purse seine, mid-water trawl
<b>Reproduction area</b>	all of the Adriatic (except Jabuka Pit and South Adriatic basin deeper than 200 m)	all of the Adriatic (except deepest water of the Adriatic)	Palagruža – Monte Gargano, off shore of Dugi otok, Istra	Western Istra, Kvarner
<b>Reproduction season</b>	X - V	IV - X	X - V	XI - V*
<b>Nursery areas</b>	coastal waters, estuaries	coastal waters, estuaries	coastal waters	coastal water*
<b>Minimum legal total length</b>	12 cm	11 cm	20 cm	8 cm
<b>Age of first maturity</b>	end of the first year of life	end of the first year of life	1 +	end of the first year of life
<b>Age of first capture</b>	end of the first year of life	end of the first year of life	1 +	end of the first year of life
<b>Asymptotic length (L<sub>∞</sub>)</b>	20.5 cm	19.4 cm	42.0 cm	15.8 <sup>+</sup> cm
<b>Asymptotic weight (W<sub>∞</sub>)</b>	86.15 g	34.8 g		
<b>Curvature parameter (K)</b>	0.46 yr <sup>-1</sup>	0.57 yr <sup>-1</sup>	0.37 yr <sup>-1</sup>	0.75 <sup>+</sup> yr <sup>-1</sup>
<b>time at length zero (t<sub>0</sub>)</b>	-0.5 yr	-0.5 yr	-0.5 yr	-0.73 <sup>+</sup> yr
<b>Length-weight relationship (W=a*L<sup>b</sup>)</b>	W = 0.00561 L <sup>3.0327</sup>	W = 0.0122 L <sup>2.9137</sup>	W = 0.0014 L <sup>3.7680</sup>	W = 0.0602 L <sup>3.051</sup>
	a=0.00561   b=3.0327	a=0.0122   b=0.29137	a=0.0014   b=3.7680	a=0.0602 <sup>+</sup>   b=3.051 <sup>+</sup>
<b>Maximum length (L<sub>max</sub>)</b>	20 cm	19.2 cm	41.5 cm	
<b>Survival rate (S)</b>	0.479 yr <sup>-1</sup>	0.387 yr <sup>-1</sup>		
<b>Natural mortality coefficient (M)</b>	0.5 yr <sup>-1</sup>	0.65 yr <sup>-1</sup>		1.3 <sup>+</sup> yr <sup>-1</sup>
<b>Fishing mortality coefficient (F)</b>	0.236 yr <sup>-1</sup>	0.533 yr <sup>-1</sup>		0.6 <sup>+</sup> yr <sup>-1</sup>
<b>Total mortality coefficient (Z)</b>	0.736 yr <sup>-1</sup>	1.183 yr <sup>-1</sup>		1.9 <sup>+</sup> yr <sup>-1</sup>
<b>Exploitation rate (E = F/Z)</b>	0.321	0.45		0.3 <sup>+</sup>

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