

RECORDS OF PILCHARD SPAWNING IN THE ENGLISH CHANNEL

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(Text-fig. 1)

The pilchard, *Clupea pilchardus* Walbaum, is known to spawn in summer in the southern North Sea in the neighbourhood of the Sandettié Bank (Buchanan-Wollaston, 1911; Furnestin, 1939*a*, 1945) and in the eastern English Channel off Beachy Head (Furnestin, 1939*a*, 1945). Furnestin (1939*b*, 1945) concludes from these records that spawning is in all probability continuous throughout the Channel from the southern North Sea to the Celtic Sea. There appear, however, to be no previous references to pilchard spawning in the central part of the English Channel. The following records from the area are of interest therefore, and provide confirmation of Furnestin's conclusion.

The station positions and numbers per haul are shown in Fig. 1 and Table I. The plankton samples were collected in 1947 and 1948 by $\frac{1}{2}$ hr. oblique hauls of the 1 m. stramin ring-net during cruises of the motor yacht *Manihine*, which was placed at the disposal of the British Museum (Natural History) through the generosity of Major H. W. Hall, M.C. In 1948, a number of surface hauls with a medium silk tonet were also taken by Mr M. H. W. Gall from his yacht *Colleen*. The writer is much indebted to the Trustees and Director of the British Museum for the opportunity of examining the *Manihine* collections, and to Mr Gall for the *Colleen* material.

A number of the *Colleen* stations (C1-12) were worked in the southern North Sea (see Gall, 1949, fig. 13, p. 772). Pilchard eggs were taken at four of these stations; at the northern entrance to the Straits of Dover (C9, Sandettié Bank; C10, south-east of Goodwin Lightship) and to the north-east off the Belgian coast (C7, north-east of Bligh Bank; C8, East Hinder Bank). None occurred at stations off the Norfolk coast (C1, C3 and C4) or close in to the Belgian coast (C5, C6 and C12). The presence of pilchard eggs in the area of the East Hinder and Bligh Banks slightly extends to the north-east the known spawning area of the species in the southern North Sea.

The *Manihine* stations, all of which were worked in the English Channel, fall into two groups; one to the west, the other to the east of the Isle of Wight. The monthly means of the numbers of pilchard eggs from all stations (positive and negative) of the two groups are given on p. 94.

TABLE I. NUMBERS OF PILCHARD EGGS, ETC. PER $\frac{1}{2}$ HR. OBLIQUE HAUL OF THE I M. STRAMIN NET

* denotes figure obtained by subsampling.

Station number (date in parentheses)	Station position	Pilchard eggs (Mackerel eggs)	<i>Sagitta setosa</i> (<i>Sagitta elegans</i>)	<i>Muggiaea atlantica</i> (<i>Muggiaea kochi</i>)
M.Y. Mamihine				
23-25 July 1947				
1 (23)	50° 29' N., 1° 41' W.	200*	28 (22)	..
2	50° 20' N., 1° 43' W.	1	1 (2)	..
3 (24)	50° 39' N., 0° 10' W.	..	14 (3)	..
5	50° 19' N., 0° 00' W.	123	..	..
6	50° 09' N., 0° 05' E.	147	..	..
7	49° 57' N., 0° 07' E.	4	..	..
8 (25)	49° 55' N., 1° 54' W.	..	..	..
9	50° 03' N., 1° 51' W.	68 (28)	..	..
10	50° 11' N., 1° 47' W.	38 (28)	..	..
27-28 August 1947				
11 (27)	50° 26' N., 0° 25' E.	97	8	..
12	50° 27' N., 0° 29' E.	3	5	..
13	50° 20' N., 0° 37' E.	..	..	..
14	50° 13' N., 0° 46' E.	..	..	..
16 (28)	50° 47' N., 1° 10' E.	..	1	..
17	50° 35' N., 1° 20' E.	1	3	..
18	50° 03' N., 1° 37' E.	..	1	..
6-7 May 1948				
19 (6)	50° 39' N., 0° 39' E.	4980*	..	..
20	50° 53' N., 0° 53' E.	2468*	..	..
21	50° 47' N., 1° 10' E.	1980*	..	..
22	50° 38' N., 1° 24' E.	9	..	..
24	50° 13' N., 0° 46' E.	3	1	..
25 (7)	50° 36' N., 0° 26' E.	8680*	1	..
26	50° 27' N., 0° 29' E.	480*	..	..
27	50° 20' N., 0° 39' E.	440*	..	..
15 June 1948				
33	50° 40' N., 0° 11' W.	800*	2	..
34	50° 27' N., 0° 18' W.	600*	..	..
35	50° 18' N., 0° 02' W.	260*	13	..
36	50° 09' N., 0° 05' W.	820*	2	..
37	50° 00' N., 0° 00' W.	660*	..	..
3-4 July 1948				
40 (3)	50° 29' N., 1° 42' W.	800*	..	..
41	50° 20' N., 1° 39' W.	62	..	..
42	50° 11' N., 1° 45' W.	479 (21)	..	..
43 (4)	49° 54' N., 2° 10' W.	29 (54)	4	..
44	49° 51' N., 2° 18' W.	.. (10)	8	..
45	49° 54' N., 1° 55' W.	44 (12)	..	..
31 August 1948				
47	49° 55' N., 2° 08' W.	..	128	.. (2)
48	49° 52' N., 2° 10' W.	..	168	.. (2)
49	49° 50' N., 2° 08' W.	..	72	..
50	49° 49' N., 2° 28' W.	..	23	1 (8)
51	49° 50' N., 2° 21' W.	..	2	3 (7)
15, 26 September 1948				
52 (15)	50° 06' N., 3° 27' W.	..	207 (1)	96 (21)
53	50° 00' N., 3° 16' W.	..	1000*	61 (11)
54	49° 51' N., 3° 07' W.	..	500*	93 (37)
57 (26)	50° 31' N., 1° 25' E.	2	10	..
58	50° 38' N., 1° 26' E.	20	13	..
59	50° 47' N., 1° 07' E.	8	1	..
Yacht <i>Colleen</i> ‡				
C1 (15. vii. 48)	52° 28' N., 1° 47' E.	..	..	..
C3 (16)	52° 43' N., 2° 18' E.	..	..	..
C4 (19)	52° 26' N., 2° 24' E.	..	..	..
C5 (23)	51° 51' N., 3° 38' E.	..	..	..
C6	51° 55' N., 3° 29' E.	..	..	..
C7 (24)	51° 48' N., 2° 58' E.	76	..	..
C8	51° 36' N., 2° 41' E.	33	..	..
C9 (25)	51° 12' N., 1° 54' E.	8	..	..
C10 (29)	51° 11' N., 1° 39' E.	11	..	..
C12 (30)	51° 11' N., 2° 41' E.	..	..	..
C13 (5. viii. 48)	50° 46' N., 1° 34' E.	..	..	..
C16 (14)	50° 36' N., 0° 03' W.	4	..	..
C17 (15)	50° 21' N., 0° 34' W.	..	..	..
C19 (16)	49° 45' N., 1° 00' W.	..	..	..
C20 (20)	2 mls. N. of Alderney Lt. House	1	..	..
C21 (21)	50° 23' N., 1° 51' W.	..	..	..
C22 (24)	50° 16' N., 1° 33' W.	..	..	..
C23	50° 07' N., 2° 21' W.	..	..	..
C24 (6. ix. 48)	50° 04' N., 4° 22' W.	..	..	..
C25	49° 56' N., 3° 47' W.	..	..	1 numerous eudoxids
C26 (9)	49° 47' N., 2° 01' W.	..	..	..
C27 (10)	49° 56' N., 1° 47' W.	..	..	..
C28 (11)	50° 11' N., 1° 33' W.	..	..	.. (1) numerous eudoxids

† The writer is indebted to Mr A. C. Simpson, Fisheries Laboratory, Lowestoft, for the counts of pilchard eggs from these two stations.

‡ Catches not examined for mackerel eggs and *Sagitta* spp.

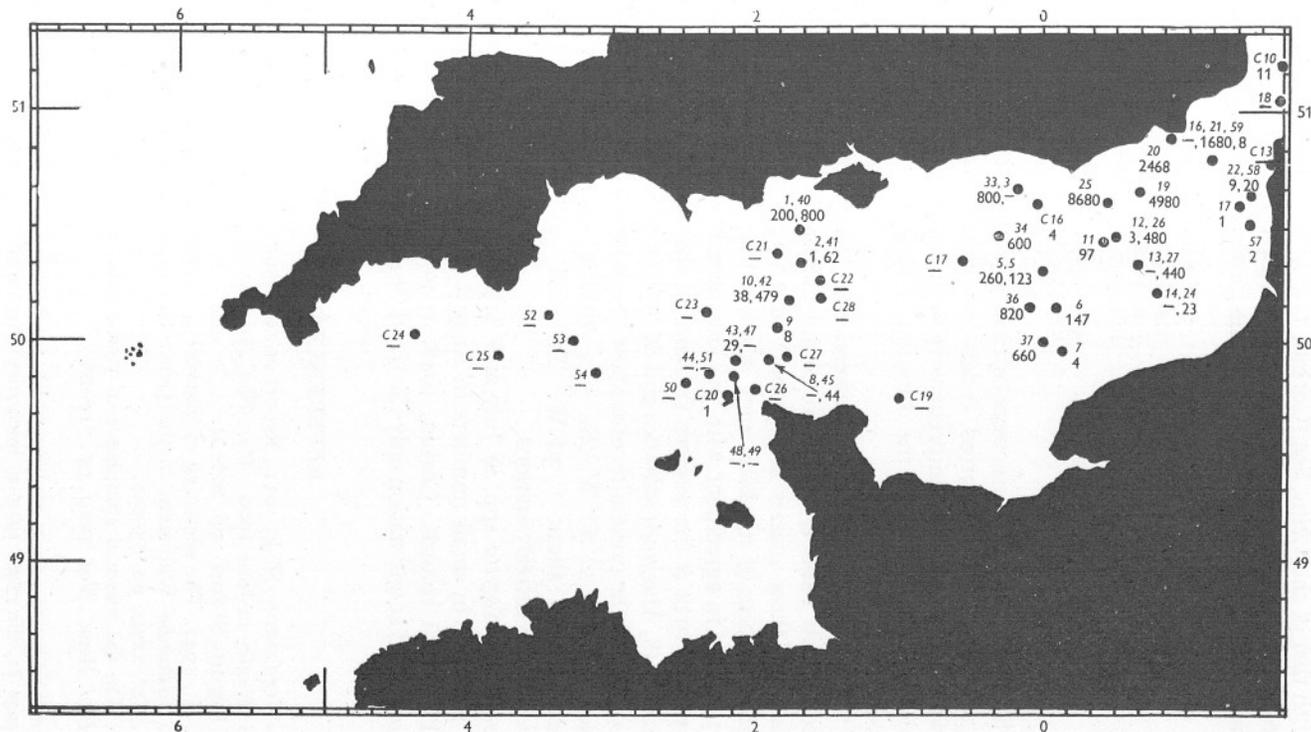


Fig. 1. Records of pilchard spawning in the English Channel in 1947 and 1948. Station numbers are shown in italics. The lower figures are the numbers of pilchard eggs per haul. Stations worked by the *Colleen* have the prefix C; those worked by the *Manihine* have no prefix. Several of the stations which were close together have for convenience been indicated by a single point on this chart.

In order roughly to compare the intensity of spawning in the central English Channel with that of the Celtic Sea (Corbin, 1947),¹ the means of the present records have been multiplied by four (figures in parentheses) to approximate the 1 m. net catches to those of the 2 m. ring-trawl. It should be noted that

Western stations			Eastern stations		
			May 1948	2379	(9516)
			June 1948	628	(2512)
			July 1947	68	(272)
July 1947	61	(244)			
July 1948	236	(944)			
Aug. 1948	Nil		Aug. 1947	14	(56)
Sept. 1948	Nil		Sept. 1948	10	(40)

the Celtic Sea spawning intensities were calculated from positive stations where more than 100 eggs per haul occurred. A detailed quantitative comparison of the two areas would require more comprehensive sampling in the English Channel. It should be further noted that the duration of some of the *Manihine* hauls varied considerably.

Data of the numbers per haul of mackerel eggs, *Sagitta* spp. and *Muggiaea* spp. are included in Table I, as they are complementary to the observations on the abundance of these species in Plymouth off-shore waters.

The small numbers of mackerel eggs taken in the central Channel in July 1947 and 1948 are in agreement with the low intensity of spawning observed in July 1937 and 1938 at the western entrance of the Channel (Corbin, 1947).

In autumn 1948, *Muggiaea atlantica* and *M. kochi* were plentiful off Plymouth (Corbin, 1949), and the present records show that both species were distributed up Channel to about 2° 30' W. (St. 51), with *M. kochi* extending slightly farther eastwards to about 1° 30' W. (St. C28) and also out-numbering *M. atlantica* at the easterly stations.

The absence of *Sagitta* spp. in July and August, 1947, in May–July 1948, and their presence in small numbers in August and September 1948, agrees with the Plymouth records (Corbin, 1948, 1949). In the eastern Channel, *S. elegans* occurred at one station only (St. 3, off Beachy Head, three specimens).

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¹ The writer wishes to correct an error which occurred in this paper. In the last line of Table III, page 81, the mean 1937–39 intensities of pilchard spawning should be amended to read: April 6680, May–June 14,843, July 4701.

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