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THE WEXFORD COMMERCIAL SEA BASS *DICENTRARCHUS LABRAX* (L.) FISHERY.

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The Wexford commercial sea bass *Dicentrarchus labrax* (L.) fishery

by

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ABSTRACT

The Wexford sea bass fishery is operated during most months of the year with a high season from May to October. The fishery commenced in the 1950s but has shown a decline from the first years in which statistics became available. A proportion of the commercial catch comes from stake and ring nets with a mesh size of 18.4 cm in the round. Both take fish of similar fork length. Bass of 30-43 cm were the majority of those retained and they were mainly immatures. The smallest mature female examined in 1978 was a 6+ of 36.5 cm fork length. The greater part of the commercial catch is taken by line. Some details of the biology of bass in south east Ireland in 1978 are given: the fish fed mainly on shore crabs, sand shrimps and bait fishes. Sex ratios were approximately two females to each male. Growth in the mid 1970s differed little from other decades and it is concluded that bass in Irish waters conform to a single growth curve which is temporarily altered by good or bad growing years.

INTRODUCTION

Work on Irish and British sea bass *Dicentrarchus labrax* (L.) so far reported in the literature describes adult and older juvenile material collected largely by anglers (Kennedy and Fitzmaurice, 1972; Holden and Williams, 1974) although egg and larval surveys have also been carried out (Kennedy and Fitzmaurice, 1968). Fitzmaurice (1978) mentions the existence of a commercial fishery for the species but no information has to date been published on its operation. This paper gives an account of the bass fishery on the south east coast of Ireland together with details of bass samples collected in 1978; these are compared with material collected between 1947 and 1971.

THE WEXFORD FISHERY

Sea bass are captured by a variety of means in Wexford Harbour (the estuary of the River Slaney) and the adjacent open sea. Salmon draft and drift nets contribute a small proportion of the total catch and sea anglers also take some. The largest part of the commercial catch is taken by line (i.e. hand line and rod and line) and a smaller proportion originates in monofilament nets operated primarily for the capture of mullet *Chelon labrosus* Risso, the fishery for which has been described (Fahy, 1979).

As in the case of mullet trade in bass commenced in the 1950s and rapidly expanded as an export business in the early years of the following decade. Both species have been handled chiefly by the same dealer in Wexford (referred to below as the Company) until catches declined in the late 1970s to the point at which a volume of exports could not be maintained. Thereafter the small bass catch was dispersed among several dealers in Wexford, Kilmore Quay and Waterford. Tracing their trade in the species became impracticable.

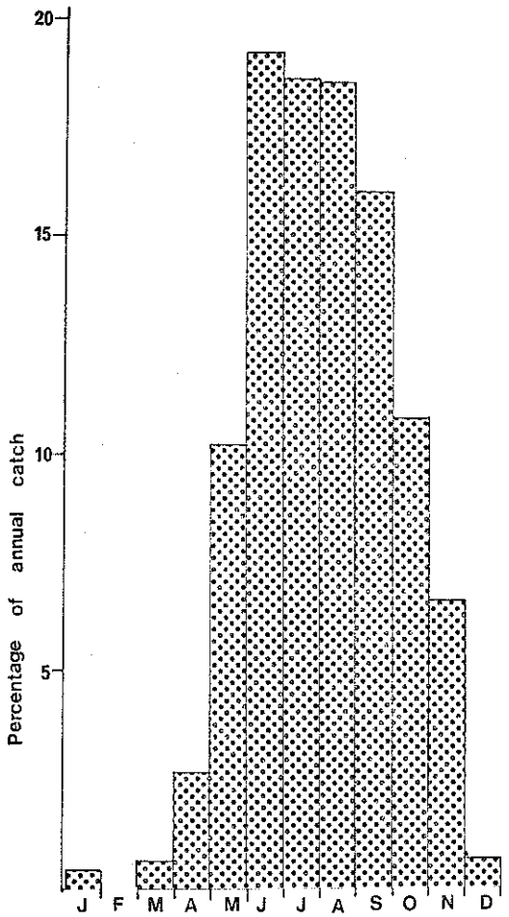

Fig. 1. Weight of bass landed per month as a percentage of total annual catch (from the Company's export figures for the period 1963 to 1976).

Similar buying-in and export statistics for bass as for mullet are available from the Company but, unlike mullet which are captured commercially by fixed engine, it was not possible to attribute with confidence consignments of bass to a specific fishing method because certain named fishermen used lines in addition to nets. For bass therefore it has not been feasible to provide catch/effort statistics.

Seasonal analysis of the buying-in statistics (Fig. 1) for the duration of the fishery shows that, like mullet catches, bass landings peak in a "high season", defined as months in which 10% or more of the annual catch is landed. The high season, extending from May to October inclusive, is thus slightly longer than for mullet.

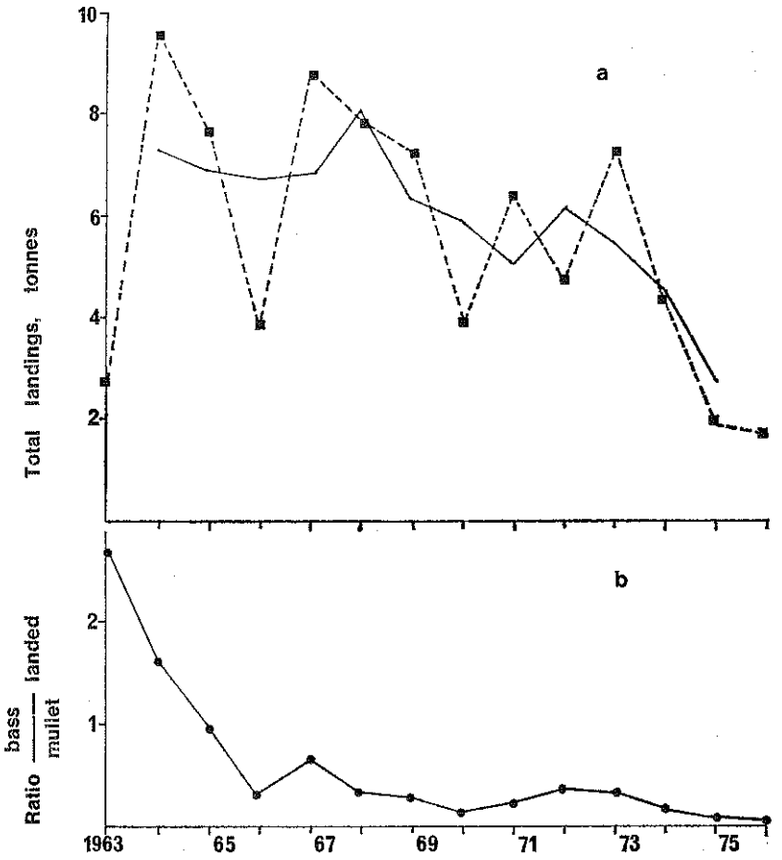

Fig. 2. Trends in landings (from export figures) between 1963 and 1976: a, broken line, actual landings; continuous line, a three year moving average; b, bass as a proportion of mullet landings.

Annual export statistics were interpreted as equivalent to total landings, as for mullet, and the figures from 1963 to 1976 are shown in Fig. 2. Bass catches have declined since the expansion of an export fishery in the early 1960s and as a proportion of mullet bass have also diminished.

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BIOLOGICAL OBSERVATIONS ON BASS

Materials and methods

During the 1977 high season the capture of bass by stake and ring net was watched in Wexford Harbour. In addition some 250 bass from the Harbour and adjacent sea, taken by various means of capture (120 in June and 130 in September) were examined. The fork lengths and the girths about the eyes and at the anterior end of the first dorsal fin of all these fish were measured. In 1978 length, girths and weight of monthly samples of bass totalling 184, caught by line in July, August and September were measured. Scales and stomachs of these fish were collected and sex and state of maturity recorded. Each sample consisted of an entire day's landing.

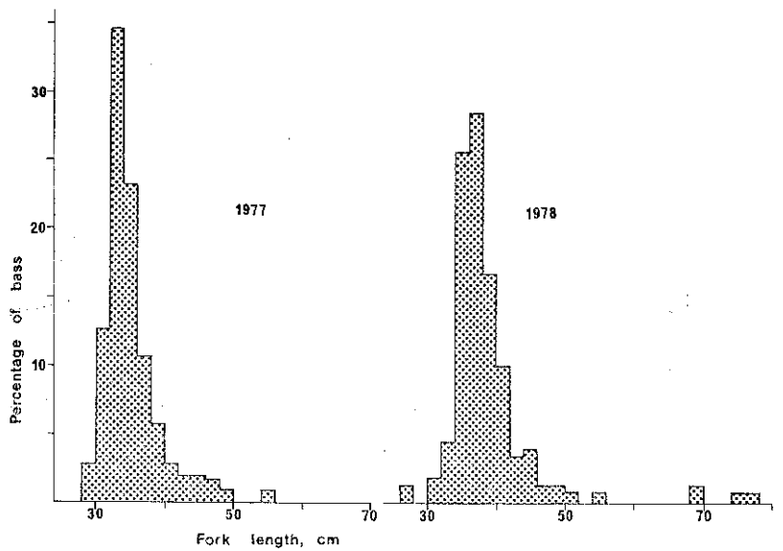

Fig. 3. Length frequency distribution of all bass sampled at Wexford in 1977 and 1978.

Length

The length frequency distribution of bass samples in the two years of sampling is shown in Fig. 3. The mean girths at the eyes and the anterior end of the first dorsal fin for each cm fork length interval of bass, rounded down, are presented in Fig. 4. The fixed engines and ring nets which contribute to the Wexford fishery use nets of the same mesh size, 18.4 cm in the round. Mean lengths of bass caught in each type did not differ significantly ($P < 0.05$).

Engine	Date	Fork Length (cm) Mean	Range	S.D.	N.
Stake	June 1977	34.75	28.7—42.0	4.36	21
Ring	Sept. 1977	34.51	29.2—54.2	2.97	84

In 1978 the July sample of 111 specimens contained 5% with fork length greater than 50 cm while in September all 53 specimens were less than this.

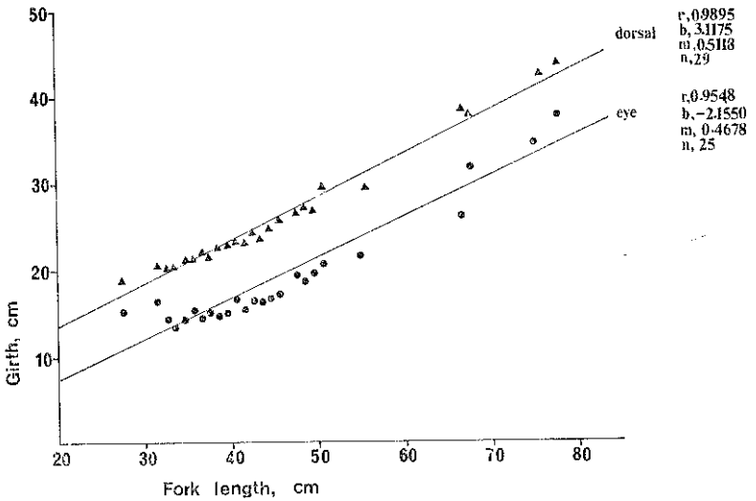

Fig. 4. Predictive regressions of girth of bass at the anterior end of the first dorsal fin and at the eyes on the fork length. Each point indicates mean girth per fork length in cm rounded downwards.

Condition

The length : weight relationship of bass is described by geometric mean functional regression (Ricker, 1973) of log weight on log fork length for material collected in July and September, 1978. Values in the equation $y = ax^b$ for both months were:

	r	log a	b	N
July	0.9381	—1.2782	2.6331	114
September	0.8628	—0.4846	2.1496	51

The slope of the regression line was higher in July suggesting that a fall in Condition occurred during the summer months.

Sex ratio

Females outnumbered males in all sampling months in 1978 but the sex ratio remained fairly constant. Expressed as the number of females to males the figures were 1.7 in July and 1.8 in September, the months in which the largest samples were examined.

Age, growth and maturation

The age composition of the bass examined in 1978 is given in Table 1. Some of the annuli of the single 1960 spawned fish were indistinct so it was omitted from the calculations of length at age. Pooling the remainder gave mean lengths in 15 years (Fig. 5). The majority of the specimens were from the 1973 brood year.

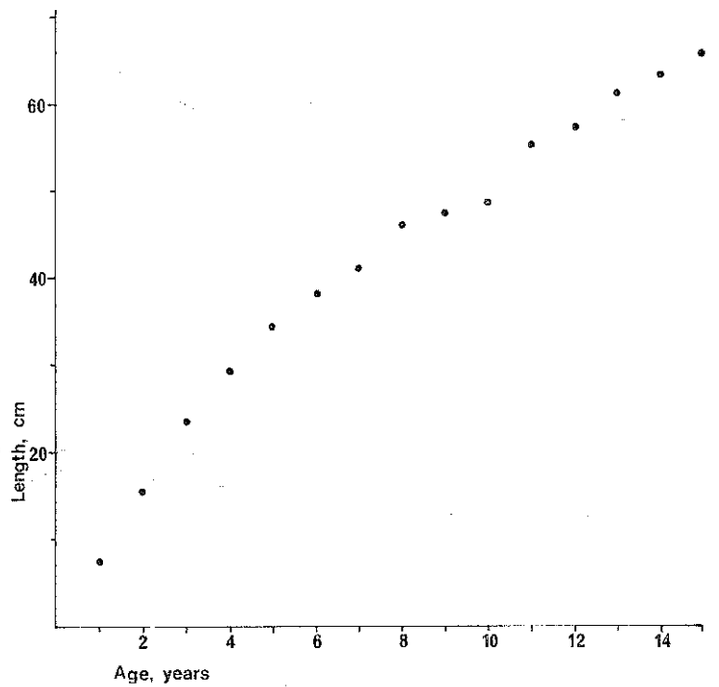

Fig. 5. Mean length at age from all bass sampled at Wexford in 1978.

Because bass are fractional spawners and the majority are spent in late June interpretation of maturation was difficult. The smallest female which had certainly reached maturity was a recovering spent aged 6+ years and 36.5 cm fork length, taken in the July 1978 sample.

Food

Of the 184 stomachs examined in Wexford, 35 contained no food remains. Food items were distributed among the remainder as shown in Table 2. Sand shrimps *Crangon vulgaris* (Fab.) were numerically most important although some of the shore crabs *Carcinus maenus* (L.) were large (maximum carapace width 7 cm) and their total volume approached that of sand shrimps. Fish remains (Clupeidae, Ammodytidae) were in the majority of cases too fragmented to enable an evaluation of their volumetric contribution to the total. While the larger shore crabs were apparently consumed by the largest bass there was no clear evidence of a correlation between predator length and food items.

DISCUSSION

Although bass are widespread along the western seaboard of Europe (Wheeler, 1969) they are recognised to be a species of warmer waters, typically a southern European, Northern African fish. The Wexford fishery is situated in the zone of greatest abundance of bass on the east Irish coast and thus is as close as possible to the supposed centre for the species in the Celtic Sea (Holden and Williams, 1974). The decline in bass stocks has been referred to in all accounts of the biology of the species published during the past decade. Holden and Williams concluded (1974):

> *"recruitment failure due to unfavourable climatic conditions is the cause of the decline in the abundance of bass and it would seem that if present climatic trends continue . . . . . bass could become a rare species even in southern British waters".*

Every paper evaluating the status of bass, the latest of them by Fitzmaurice (1978) suggests that sea temperatures are in some way implicated as a cause of the decline of the species. Southwood, Butler and Pennycuick (1975), examined the secular decrease in temperatures in the surface waters of the English Channel. A consequence of the climatic trend was the decline of various warm water fish and invertebrate species and their displacement by species which are more characteristic of colder conditions. Of these two grouping bass would belong to the former.

What statistics on bass capture are available show that after a rapid expansion in the 1960s annual catches fell. Data on catch per unit effort are not reliable but indications from the circumstances of the fishery suggest that interest in the species was maintained. Prices for bass were consistently greater than for mullet and in the 1970s bass prices were often four and five times higher than for the other species. In spite of this bass landings declined; in some early years of the fishery they had doubled the weight of mullet, significantly however there was no dramatic increase in bass landings following the introduction of monofilament netting in 1968, as was the case for mullet. When in 1976 the Company in Wexford ceased to handle bass the landings amounted to a mere 8% of the mullet catch.

Kennedy and Fitzmaurice (1972) found it possible to identify exceptionally good and poor years for bass growth by back-calculation from the scales and good growth years were also recognised as successful brood years by the heavy representation of those year classes in the samples. On the presence and absence of good growth years Kennedy and Fitzmaurice (1972) grouped Irish bass into a number of categories and an attempt was made to discover with which of these the Wexford fish collected in 1978 best agreed. They described several easily recognizable growth patterns in bass; their data are summarised in Table 3 and the most distinctive of their curves (those of the group D—"specimen" and group C—slow growing bass) are compared.

Regression of D length on C length for corresponding ages:

$$D = 1.1208C + 0.034.$$

If the curves are similar the slope of the above regression should be equal to 1. Testing for significance gives a t value of 0.45 (df = 15; P = n.s.). It is concluded that bass in Irish waters conform to a single growth curve which is temporarily altered by good or bad growing years.

The growth curves were further compared by transforming the 1978 and Kennedy and Fitzmaurice's (1972) four growth categories to Walford Plot (Table 4). The 1978 Wexford sample is presented firstly as all year classes pooled and secondly as year classes from 1970 onwards, omitting older fish. The former show some resemblance to Kennedy and Fitzmaurice's Group A bass, fish which made growth in the 1940s and 1950s and the latter to Group C, slow growing bass caught in 1967 and 1968.

The majority of bass whose net capture was observed were wedged in a single mesh as described by Baranov (1948); a small minority of larger fish tangled. As the mesh of the mullet gear used for the capture of bass usually gripped behind the eyes and before the anterior end of the first dorsal fin these girths were identified as critical to the meshing mechanism, as for mullet (Fahy, 1979). On the principles stated to influence the capture of mullet by a mesh of 18.4 cm in the round the Wexford nets should hold bass of mainly between 30 and 43 cm fork length (Fig. 4).

The data for the earliest age at which maturation was observed supports earlier findings and the observations on length frequency of net-caught fish suggests that the majority of bass taken by this method have not matured. Kennedy and Fitzmaurice (1972) reported that bass deepen in shape as the summer progresses. The fall in the value of the Condition index could be explained by this observation. As is the case for mullet therefore (Fahy, 1979) the nets could be expected to take younger bass at the end of the summer than at the beginning.

The length frequency distribution of the 1977 and 1978 Wexford bass samples resembled those of inshore bass populations along the English coast (Holden and Williams, 1974) and the prey of these fish consisted of food items plentifully recorded in bass from the Wexford region (Kennedy and Fitzmaurice, 1972). Sex ratios showed little change between the two largest monthly samples. Kennedy and Fitzmaurice (1972) sexed some of their material only but calculations of female to male ratios for their combined A, B, and C groups of bass had an overall value of 1.97 which shows some basic agreement with the ratio at Wexford.

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Table 1. Year class composition of three samples of line caught Bass, Wexford, 1978.

	Year Classes																
Date	1960	'61	'62	'63	'64	'65	'66	'67	'68	'69	'70	'71	'72	'73	'74	'75	Totals
July	1		3					1		4	4	18	23	54	3		111
August												1	1	15	3		20
Sept.												1	1	43	7	1	53
	1		3					1		4	4	20	25	112	13	1	184

Table 2. Main food items of bass in the Wexford fishery in 1978.

Food item	Numbers recorded	In numbers of bass	Fork length of bass (cm)	
			mean	S.D.
Crangon vulgaris	3,200	94	41.8	8.97
Carcinus maenus	271	64	44.7	10.95
Fish remains	*c* 328	63	43.0	8.43

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Table 3. Length at age (cm) for Wexford (1978) bass and four groups A to D as distinguished by Kennedy and Fitzmaurice (1972).

Age	Wexford (1978)	Group A	Group B	Group C	Group D
1	7.5	7.6	8.6	6.6	9.3
2	15.6	16.3	16.7	14.6	17.2
3	23.4	22.7	22.8	21.4	24.5
4	29.3	28.6	26.9	27.4	29.7
5	34.3	34.1	31.0	32.8	35.2
6	38.0	38.7	35.1	37.0	39.5
7	41.2	43.7	38.7	40.9	44.4
8	40.0	47.2	41.9	44.2	48.2
9	47.7	49.8	43.9	46.7	51.2
10	47.7	52.1		49.0	54.2
11	48.8	54.5		50.2	57.2
12	55.4	56.8		51.6	59.5
13	57.7	59.1		53.3	61.7
14	61.1	62.1		55.4	63.7
15	63.1	62.6		58.0	65.1
16	65.7	63.3		60.1	66.8
17	65.7	61.0		60.4	68.5
18		59.5			69.8
19					71.1
20					72.4
21					73.5
22					74.5
23					77.0

Table 4. Length at age data (from Table 3) transformed by Walford Plot (L (n + 1) on Ln).

		N	r	Slope (K)	Intercept	L∞
Wexford (1978)	All	15	0.9963	0.8989 (.11)	8.2860	70.0
	1970s	7	0.9974	0.8593 (.15)	9.3007	65.0
Group	A	18	0.9922	0.8701 (.14)	9.2191	71.0
	B	8	0.9983	0.8426 (.17)	8.7648	55.0
	C	16	0.9992	0.8683 (.14)	8.7026	67.0
	D	23	0.9996	0.9016 (.10)	8.2799	77.0

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