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(Department of Agriculture and Fisheries)

FISHERY LEAFLET No. 47.

REPORT ON INSHORE SURVEYS
AROUND THE IRISH COAST.

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DUBLIN
1973.

INTRODUCTION

The purpose of this leaflet is to discuss the quantity and quality of some species of commercially valuable shellfish found in certain estuaries around the Irish coast.

In recent years the shellfish industry has attracted considerable interest in Ireland, partly because of the demand in England and on the Continent of Europe for Irish shellfish and shellfish products and partly because of the interest which the general public has in fish farming.

The development of estuaries, suitable for shellfish exploitation, requires a study of the various species present. For example, an estuary may be producing large quantities of mussels (Mytilus edulis), cockles (Cardium edule) and periwinkles (Littorina littorea) currently, but for rational exploitation, the abundance quality and commercial value of all three species must be determined. Certain organisms such as the clams (Tellina tenuis and Scrobicularia plana) if present in normal quantities will indicate that the biosphere is in a healthy state. A number of areas along the south east and south coasts were surveyed since 1967, particular attention being given to the natural population of mussels in these areas. The results of this work, together with observations on the natural stocks of cockles and whelks, form the material for this Leaflet.

Mussels commence life as free swimming larvae which spend three to four weeks feeding actively in the water near the surface. They then change into spat or minute mussels complete with shell, and settle on suitable substrates, usually algae. After a short period of growth, these juvenile mussels migrate from the algae to the surrounding sea bed, where they fix themselves securely to rock, small stones, shell or even hard mud. If such mussels remain unfished, they will accumulate and form compact overcrowded masses, and often in these conditions individual mussels do not reach marketable size.

Many of the mussel beds examined in this study appeared to have reached their maximum extent under natural conditions. The absence of juvenile mussels at the perimeter of these beds indicates that there has been no new spat fall around the edges, thereby halting the extension of the beds. In Youghal for instance no juvenile mussels were found on the large intertidal mussel bed, while very large

quantities of recently settled spat (mussels less than 4 weeks old) were found at East Point a short distance away from the bed, at extreme low water, attached to the branched red algae Cryptoplura lamosum.

METHODS

The sublittoral areas were surveyed by standard 5 minute dredge hauls using a 4 ft dredge. The number of dredge hauls made in each estuary were as follows:-

| | |
|-------------------|-----------------------|
| Wexford Harbour | - 120 dredge hauls |
| Waterford Harbour | - 92 " " |
| Dungarvan Harbour | - 23 " " |
| Youghal Harbour | - 31 " " |
| Cork Harbour | - 130 " " |

The grid system of dredging was used in all cases, thus ensuring that an acceptable area of each estuary was examined. The intertidal areas were surveyed by transects at 200 yard intervals. The animals and plants were identified and counted in quadrats of 25 cm². Information in this Leaflet is confined to mussels, cockles and whelks and to a general appraisal of each estuary.

RESULTS

WEXFORD HARBOUR

The area in Wexford Harbour (into which the River Slaney flows), inside a straight line drawn from Rosslare Point to Raven Point and as far as New Bridge covers approximately 8,870 acres (3548 hectares) (Fig. 1). It may be sub-divided into -

- i. Intertidal zone 3206 acres (1283 hectares)
- ii. Sublittoral zone 5664 acres (1265 hectares)

Intertidal zone - A large bed of mussels was located at Thomson's Bank (Admiralty chart No. 1772) covering approximately 11 acres or 4.4 hectares (Fig. 1). It was estimated to contain about 2700 tons of mussels, or about 245 tons per acre (Table 1). The length distribution of these mussels shows that year classes including juveniles and all older age groups were present (Table 2). The high density of mussels in this bed results in overcrowding, thus causing poor growth rates and inferior quality. However, since all age groups were represented in this mussel stock, it is an excellent source of mussels for transplantation to the sublittoral beds in the Harbour, formerly the main mussel fishing ground.

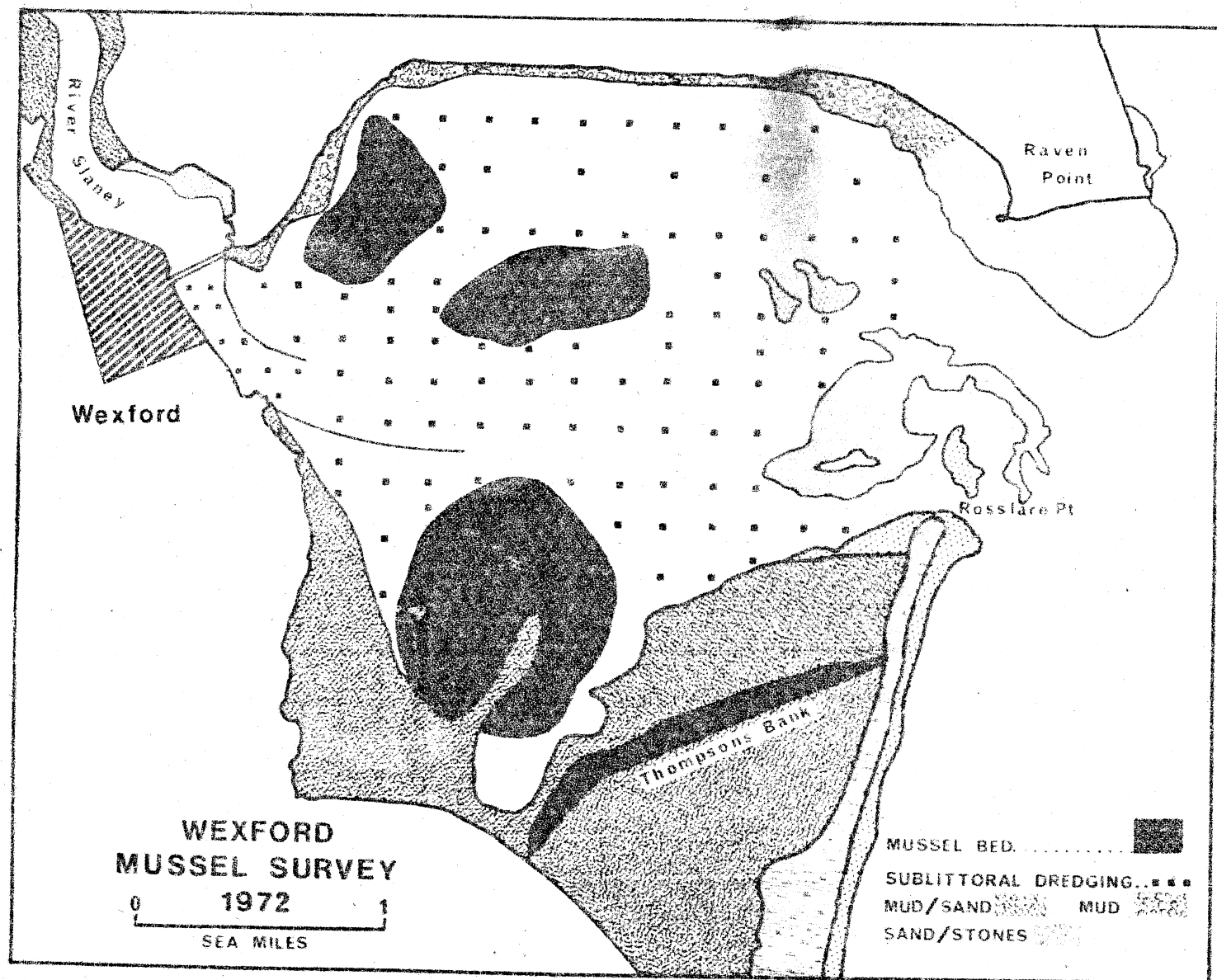


FIG. 1.

There were 24 cockles per m^2 in the intertidal zone at the Raven Point (Fig. 1). There were approximately 43 cockles per kg. and the meat yield was 14.4% (Table 3). The length distribution of these cockles showed that of the year classes were present - 7% were under 20 mm and 46% were over 35 mm (Tables 4 and 5).

Sublittoral zone In 1967 and 1969 sublittoral surveys were carried out in the estuary. These surveys revealed that about 1,200 acres or 480 hectares contained mussels in commercial quantities. Three main beds were located but it was difficult to estimate the quantity available. Sufficient quantities were present in these beds to maintain high production levels (Edwards and Crowley, 1968).

In 1966 mussel fishing commenced at Wexford when 100 tons of mussels were landed. The landings increased to 1,235 tons in 1971 (Fig. 6). Since the commencement of this mussel fishery 3,994 tons of mussels have been landed from the sublittoral area. A high proportion of the mussel stocks in the sublittoral area have been removed and consequently it is now denuded of mussels. By 1972 fishermen were experiencing difficulty in maintaining their weekly catches at rates comparable to those of the three previous years. Therefore, transplantations of the bed at Thomson's Bank would be highly beneficial to the general fishery.

WATERFORD HARBOUR

The area of Waterford Harbour (into which the Rivers Barrow, Nore and Suir flow) inside a straight line from Creaden Head to Broomhill Point as far as Waterford city is approximately 13,500 acres or 5,400 hectares in extent (Fig.2). It may be subdivided into -

- i Intertidal zone. 1,680 acres (674 hectares)
- ii Sublittoral zone 11,820 acres (4,726 hectares).

Intertidal zone The intertidal zone contains a mussel bed at Passage East, which covers an area of about 3-5 acres or 1.4 hectares and contains approximately 150 tons of mussels, at a density of about 44 tons per acre (Table 1). There were no spat on the bed, all the mussels being over 35 mm in length. Seventy one per cent of the mussels had reached the acceptable marketable size (Table 2).

Cockles were found at Woodstown Strand, Passage East, and parts of the Back Strand at Tramore. The densities, numbers per kg and meat yields were as follows:-

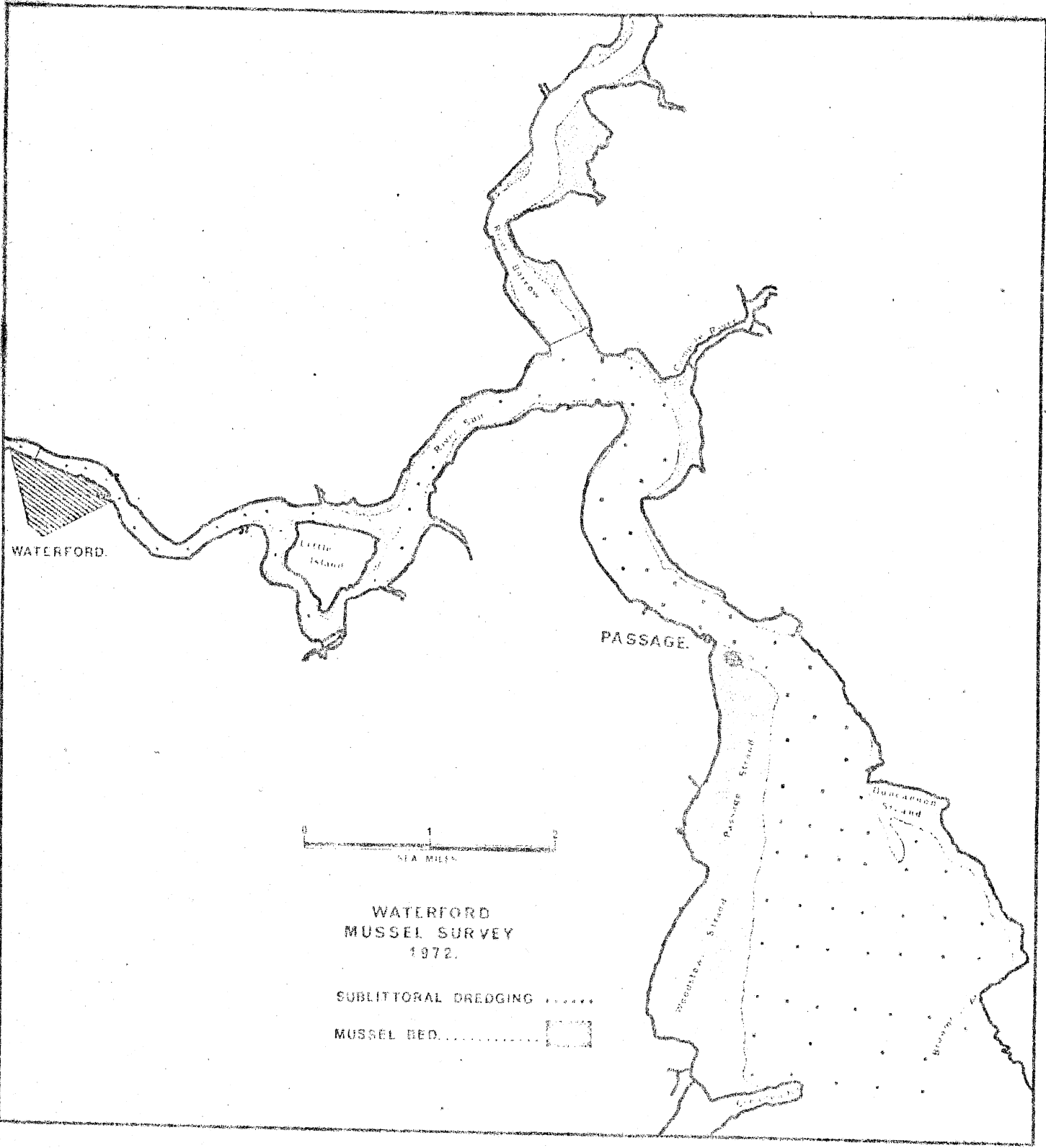


FIG. 2.

| | <u>Density</u> <u>m²</u> | <u>No. per kg</u> | <u>Meat yield (%)</u> |
|------------------|--|-------------------|-----------------------|
| Woodstown Strand | 45 | 70 | 18.5 |
| Passage East | 48 | 53 | 17.0 |
| Tramore | 42 | 47 | 14.5 |

The length distribution of these cockles showed that the youngest cockles were at Woodstown, 22% being less than 20 mm in diameter while only 2% were less than 20 mm in Passage East and Tramore. On the other hand only 1% were over 40 mm in Woodstown while 6% were over 40 mm in Passage East and 28% at Tramore (Table 4). The intertidal area of this estuary is large and appears to have potential as a cockle producing area.

Sublittoral zone No commercial quantities of mussels or any other shellfish were found in this area. The ground appeared too sandy and little seaweed was dredged up.

DUNGARVAN HARBOUR:

The area in Dungarvan Harbour (into which the Rivers Colligan and Tay flow) inside a straight line drawn from Ballinagaul to Wyse Point is about 4,600 acres or 1,840 hectares Fig.3. It may be subdivided into -

- i Intertidal zone 2,748 acres (1,099 hectares)
- ii Sublittoral zone 1,852 acres (741 hectares).

Intertidal zone. Two mussel beds were located in Dungarvan, one at Abbeyside and the other west of the Cunnigar Bank. The bed at Abbeyside held about 100 tons of mussels while the "Cunnigar" bed held about 360 tons. The total ground covered with mussels was approximately 9 acres and the density was about 40 tons per acre (Table 1). The length frequency distribution (Table 2) indicates that the year classes from 0 upwards were present. Eighty two per cent of the mussels were under the normal acceptable size and 30% were spat of this year.

There were 8 cockles per m², 92 per kg and the meat yield was 16.5% (Table 3). All year classes were present (Table 4)

Sublittoral zone. No commercial quantities of mussels or of any other shellfish were found in this area. The ground appeared too sandy and little seaweed was dredged up.

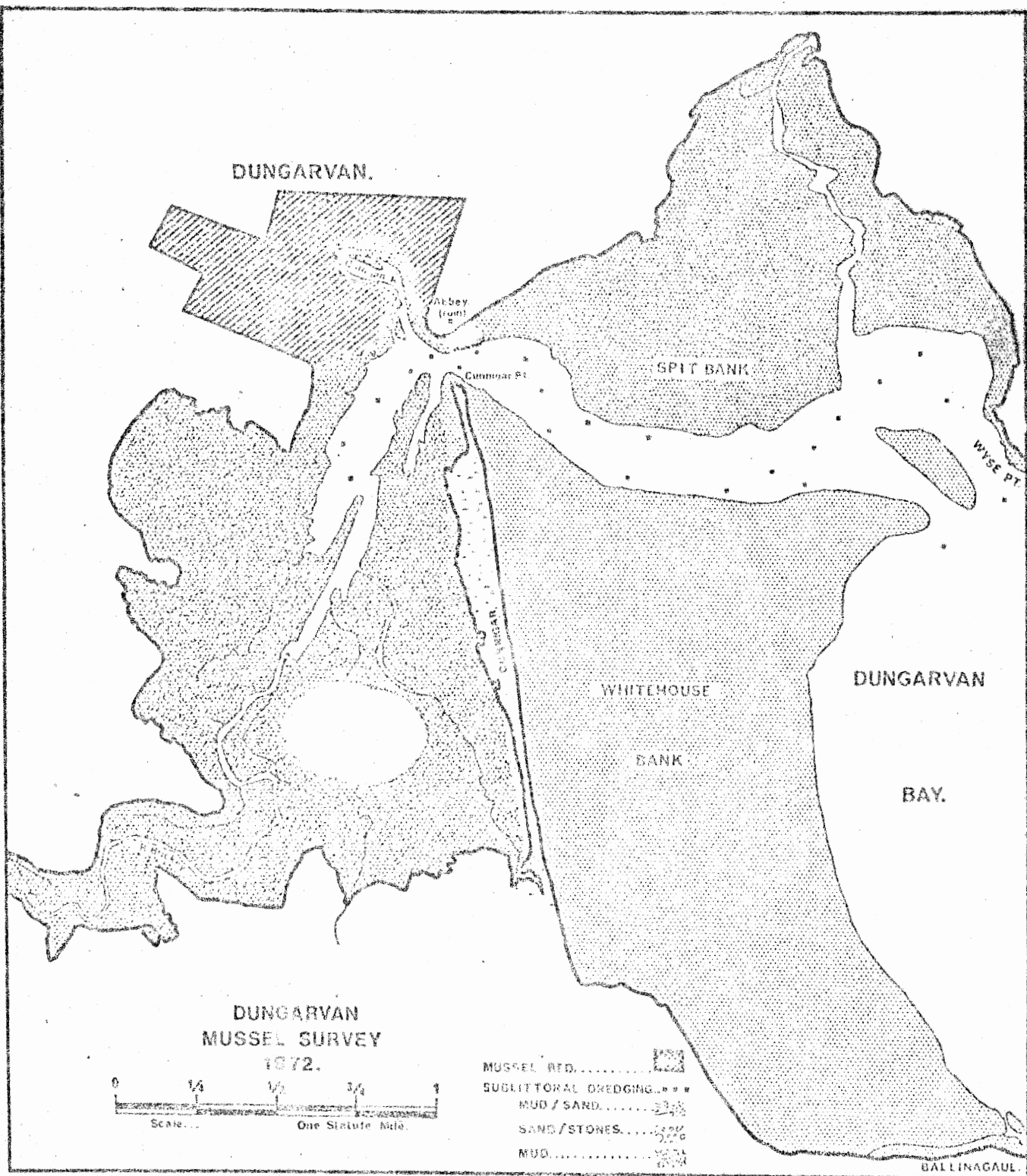


FIG. 3.

YOUGHAL HARBOUR.

The area of Youghal Harbour (into which the Rivers Blackwater and Tourig flow) between a straight line from the East Point to Moll Goggins Corner and the old bridge above Youghal is about 1,350 acres or 540 hectares in extent (Fig. 4).

It may be subdivided into -

- i Intertidal zone. 510 acres (204 hectares)
- ii Sublittoral zone. 840 acres (336 hectares)

Intertidal zone The intertidal zone contains two mussel beds, one situated north of Ferry Point at Red Bank (Fig. 4) and the other situated at Pilmore opposite Goat Island. The bed at Red Bank is by far the larger of the two with a total quantity of about 450 tons; the area covered by mussels on this bed being 2.5 acres (1 hectare) and the density about 180 tons per acre (Table 1). The length frequency distribution of these mussels (Table 2) indicates that there were no juveniles present at the time of sampling. The larger bed, at Red Bank, was heavily covered with the green seaweed Enteromorpha linza. Although no juvenile mussels were found on this bed large quantities of recently settled spat were observed at East Point attached to the branched red algae Cryptoplura lamosus at extreme low water level. These mussels were all under 3 mm in length and therefore less than 6 weeks old.

The intertidal area contains cockles particularly north of Ferry Point. The average number per m² was 43. There were approximately 53 per kg and the meat yield was 14.5% (Table 3). All the year classes were present although juvenile cockles were scarce (Table 4).

Sublittoral zone Large quantities of mussels were dredged from an area south of Ferry Point opposite Monatray House at a rate of 50 kgs per 5 minute haul. Whilst the quantity of mussels was not determined precisely it was obvious that it is a large bed holding at least 100 tons. The quality of the mussels is also good. Mussels were found in many other parts of the harbour but not in commercial quantities. Whelks (Buccinum undatum) were also dredged in large numbers and were thought to be present in commercial quantities. However, this was not confirmed by pot fishing.

CORK HARBOUR.

The area in Cork Harbour inside a straight line drawn from Ram's Head to Dognose

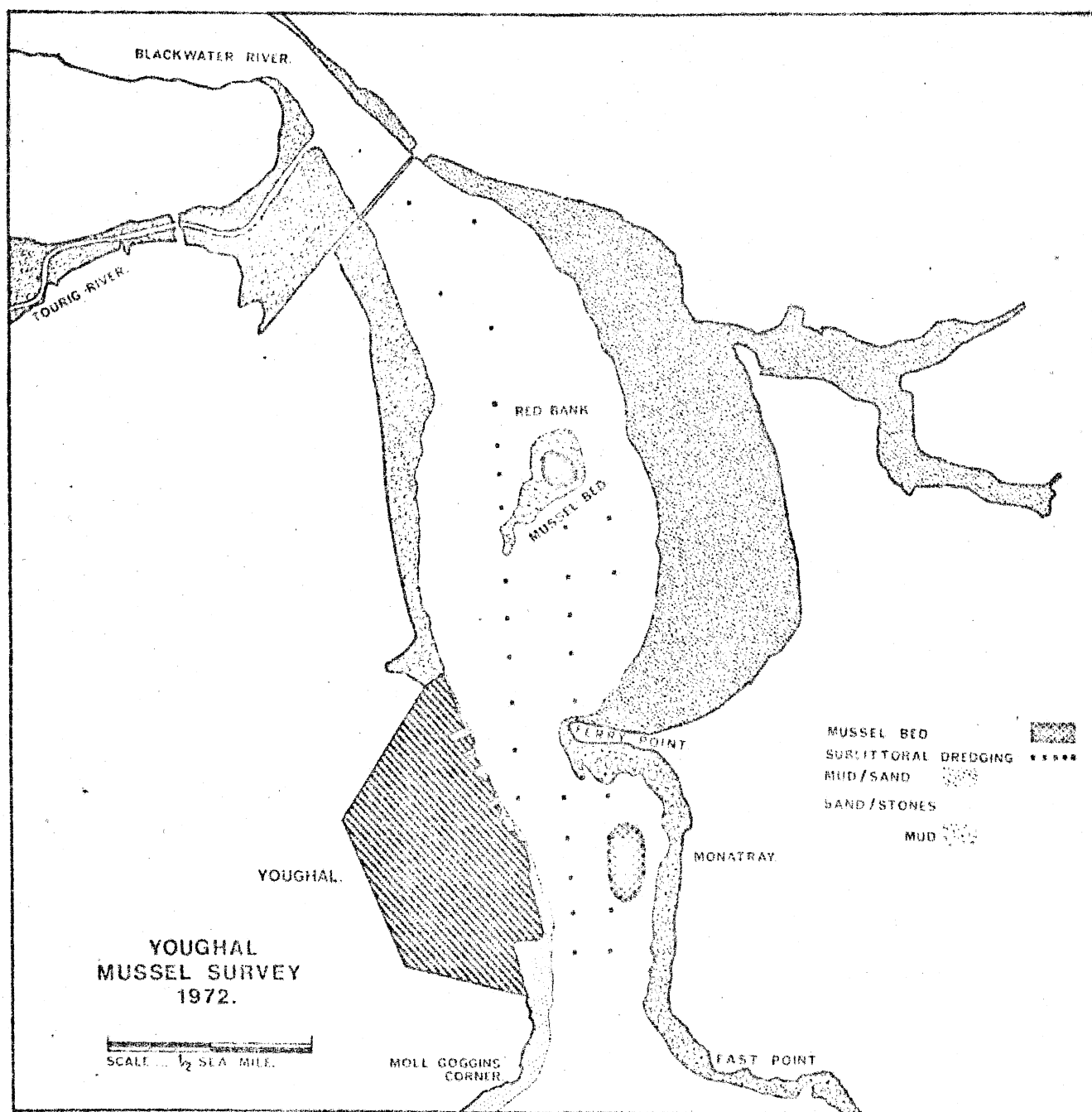


FIG. 4.

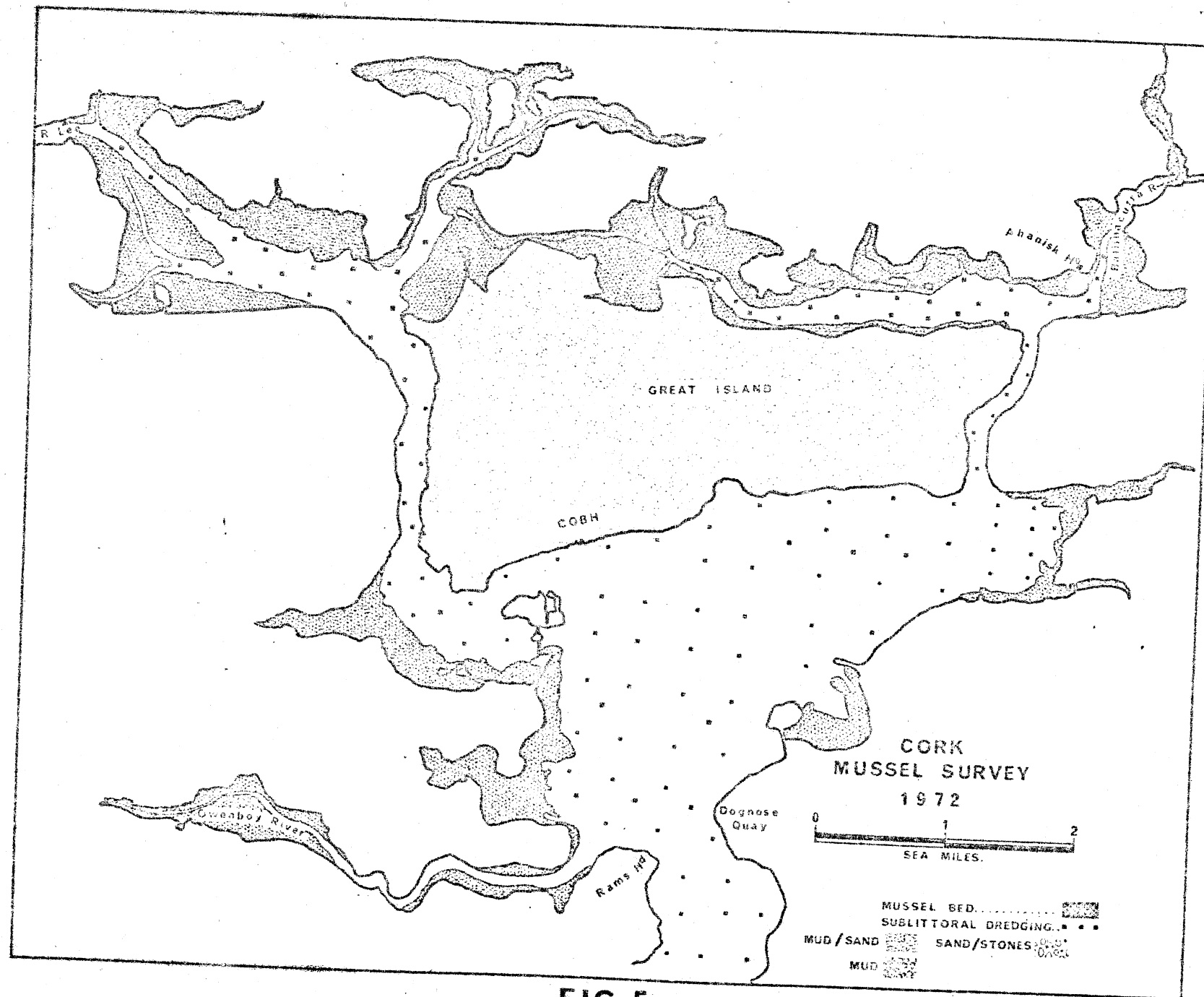


FIG. 5.

Quay is about 6,300 acres (2,520 hectares) (Fig.5). The total area may be subdivided as follows:-

- (i) Intertidal zone - 1,660 acres (644 hectares)
- (ii) Sublittoral zone - 4,640 acres (1,856 hectares)

The three main rivers flowing into this are the Lee at Cork City, the Owenboy at Carrigaline and the Ballinacurra at Middleton.

Intertidal zone. The intertidal zone supports one mussel bed situated in the North Channel between Great Island and the mainland opposite Ahanes House (Fig.5), covering an area of 2 acres (less than 1 hectare) and containing about 500 tons of mussels at a density of approximately 250 tons per acre (Table 1). The length distribution of these mussels indicated that all year classes were present and that 50% of the mussels were less than the normal acceptable marketable size, namely 50 mm (Table 2). This extremely high density could be reduced by transplantation with consequent increase in productivity.

On average 20 cockles were found per m^2 in the intertidal zone. There were approximately 60 cockles per kg and the meat yield was 25% (Table 3).

Sublittoral zone: Mussels, cockles, and whelks were found but not in commercial quantities. The area generally supports very dense settlements of the boot lace brown sea weed (Chorda filum spp.). This provides evidence that the substrate is stable but because it is not worked for any other purpose, the weed cover prevents mussels and cockles from settling in quantity.

DISCUSSION

The five estuaries under review cover a total area of 34,620 acres (13,848 hectares). Each of the estuaries examined contains sizeable beds of intertidal mussels in sufficient quantity to justify development. Wexford is the only estuary with an existing mussel fishery and this is of recent origin. Mussel fishing at Youghal commenced in 1970 but to date the catch has neither been large nor continuous.

Some 4,300 tons of mussels are present in the intertidal zones of the estuaries surveyed. This natural resource could be developed, but in order to derive maximum benefit the mussels should initially be transplanted to the sublittoral zones thus making productive large sublittoral areas as well as making the now

densely populated beds available for a future spat settlement. Because of the high density of the mussels on the beds it would not require much effort to transplant them into deeper waters within the estuaries. Sufficient mussels are present for transplantation in each estuary so that the best productive areas could be isolated and utilized to the maximum.

Not all the sublittoral areas in each estuary are suitable for mussel farming but in almost all the estuaries suitable areas can be found. These locations must be found by trial and error but assuming that only 10% of the total area is suitable 3,000 acres would be available for mussel farming.

The cockle industry in this country is very poorly developed. The stocks in Waterford Harbour at Woodstown and Passage East indicate that very large quantities are available and that the meat yield of these cockles is quite satisfactory. The methods of harvesting cockles which have proved highly satisfactory in England and Wales would warrant examination to see whether they could be introduced into this country.

SUMMARY:

1. Each estuary surveyed contains extensive intertidal mussel stocks which with proper management could result in greatly improved production.
2. Only Wexford Harbour supports a mussel fishery at present.
3. An additional area of at least 3,000 acres of mussel producing ground could be made available by the farming of mussels in these estuaries.
4. The cockle population in this area is not very extensive. However in Waterford Harbour large intertidal areas have a reasonably high density of cockles and a fishery for them could be developed using some method of harvesting other than hand picking.
5. Whelks may be found in commercial quantities in Wexford and Youghal Harbours.

REFERENCES

Edwards E and Crowley M. 1968 - A survey of Wexford Harbour to BIM Fish Dev. Div.
Dublin.

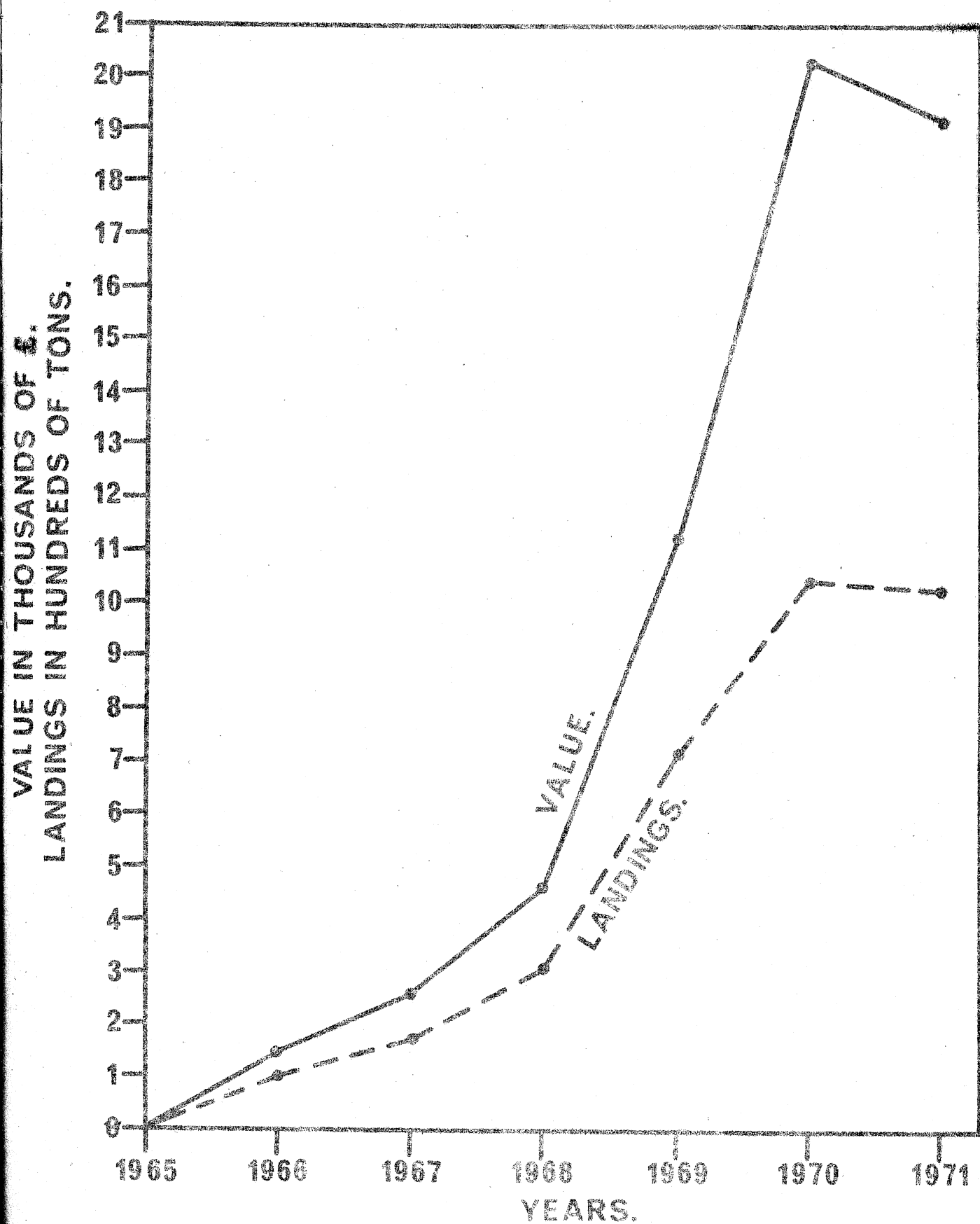


Fig. 6. Annual landings of mussels in Wexford in tons, together with their value in pounds sterling (£).

Table 1. Quantities of intertidal mussels expressed in tons per acre

| Area | Total Acreage | Total Tonnage | Density in tons per acre |
|-----------------------------------|---------------|---------------|-----------------------------|
| Wexford Harbour | 11.0 | 2,728.0 | 248.0 |
| Passage East Waterford Harbour | 3.5 | 152.5 | 44.0 |
| Dungarvan | 9.0 | 466.0 | 52.0 |
| Youghal | 2.5 | 461.0 | 184.0 |
| Cork | 2.0 | 508.0 | 254.0 |
| Total | 28.0 | 4,316.0 | 154.0 |

Table 2. Percentage length distribution of mussels in 5 mm. blocks

| Area | 0-4* | 5-9* | 10-14* | 15-19* | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 |
|-----------------|------|------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Wexford Harbour | | 2 | 12 | 9 | 3 | 3 | 7 | 9 | 15 | 18 | 15 | 6 | 1 | | | |
| Passage East | | | | | | | | 4 | 14 | 11 | 9 | 16 | 27 | 13 | 5 | 1 |
| Dungarvan | | 2 | 21 | 7 | 5 | 5 | 5 | 3 | 7 | 27 | 11 | 3 | 4 | | | |
| Youghal | | | | | | | 1 | 1 | 1 | 3 | 1 | 8 | 29 | 41 | 11 | 4 |
| Cork | | | 1 | 1 | 2 | 1 | 2 | 8 | 18 | 19 | 25 | 23 | | | | |

* Mussels up to 19 mm. settled from 1972 spatfall.

Table 3. Average number of cockles (a) per m² (b) per kg together with average percentage Meat yield

| Location | Average No m ² | Average No per Kg. | Average meat yield (%) |
|--------------|---------------------------|--------------------|------------------------|
| Wexford | 24 | 43 | 14.4 |
| Woodstown | 45 | 70 | 18.5 |
| Passage East | 48 | 53 | 17.0 |
| Tramore | 42 | 47 | 14.5 |
| Dungarvan | 8 | 92 | 16.5 |
| Youghal | 42 | 53 | 14.5 |
| Cork* | 20 | 60 | 25.0 |

* The quantities of cockles per m² were not estimated because the substrata could not be travelled on foot.

Table 4. Length distribution of cockles in 5 mm blocks expressed in percentages

| Location | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Wexford | 4 | 3 | 11 | 1 | 35 | 36 | 10 | - |
| Woodstown | 13 | 9 | 3 | 24 | 32 | 18 | 1 | - |
| Passage East | - | 2 | 2 | 54 | 28 | 8 | 6 | - |
| Tramore | - | 2 | 1 | 2 | 13 | 54 | 21 | 7 |
| Dungarvan | 4 | 4 | 21 | 21 | 20 | 22 | 7 | 1 |
| Youghal | - | 1 | 1 | 4 | 32 | 39 | 23 | - |
| Cork | 1 | 2 | - | 6 | 28 | 46 | 17 | - |

Table 5. Age distribution of cockles expressed in percentages.

| Location | 0+ | 1+ | 2+ | 3+ | 4+ | 5+ | 6+ | 7+ | 8+ | 9+ |
|--------------|----|----|----|----|----|----|----|----|----|----|
| Wexford | 4 | 12 | 4 | 12 | 12 | 16 | 10 | 16 | 8 | 6 |
| Woodstown | 15 | 8 | 50 | 22 | 3 | 1 | 1 | - | - | - |
| Passage East | 2 | - | 72 | 9 | 17 | - | - | - | - | - |
| Tramore | 2 | - | 3 | 3 | 16 | 32 | 20 | 13 | 8 | 3 |
| Dungarvan | 6 | 4 | 30 | 40 | 20 | - | - | - | - | - |
| Youghal | 2 | 2 | 3 | 29 | 29 | 14 | 7 | 7 | 7 | - |
| Cork | 2 | 3 | 4 | 6 | 33 | 46 | 6 | - | - | - |