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PRELIMINARY RESULTS OF A STUDY OF THE STOCKS OF CLAMS (MERCENARIA MERCENARIA) IN SOUTHAMPTON WATER, ENGLAND

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ABSTRACT

In 1979 a grab survey was made in Southampton Water to determine the level of commercial stocks of Mercenaria mercenaria, the American hard shelled clam or quahog, in the area. The results indicated that the present estimated level of exploitation could be doubled and the higher yields sustained for about 5 years provided small clams were not taken from the fishery. It has been recommended that a minimum size limit for the removal of clams should be applied to this fishery. Recruitment has been intermittent in recent years with spatfall failures in 1978 and 1976, but an accurate size-age relationship for the total stock has yet to be fully determined.

INTRODUCTION

The American hard shelled clam (Mercenaria mercenaria) was introduced into Southampton Water early in this century, probably either by being thrown overboard from transatlantic cruise liners at the end of a crossing from the United States or in ballast carried from the United States in ships docking in Southampton.

The stock established itself about 20 years ago and it is the only natural stock of this species in UK waters. Commercial exploitation started with clams being dug by hand along the intertidal zone. In the past five years dredging techniques have been developed and clams are now fished exclusively by dredging from small fishing boats. This change in fishing technique has led to stocks being exploited from the areas of deeper water as well as from the intertidal zones. In recent years the markets for these clams have been expanded in Europe and new markets are being actively sought in the United Kingdom following several years of good recruitment.

At present the management of the stock is based on the Sea Fisheries Committee regulations which cover only the issue of licences to fishing boats which have a market outlet approved by the Southampton Port Health Authority. No regulations governing size limits or catch limitations are in force. Little information has been available to enable estimates to be made regarding the size of the stock and the length of time an increased fishing rate might be sustained. In order to obtain some, an assessment of the densities and sizes of clams on the major fishing grounds

was made in 1979. This paper sets out the survey results and contains some observations regarding the likely sustainable yield for the next five years.

METHODS

The main areas of ground were surveyed by taking, at each station, 4 x 0.5m^2 samples of the sea bed, using a Baird grab worked from a fishing boat. This grab removes an undisturbed sample of the sea bed to a depth of 75-100mm in the soft substrate found in Southampton Water. It is therefore considered to be a most accurate method of sampling clam stocks. All clams sampled were counted and measured (to the nearest 5mm) across the greatest length of the shell parallel to the hinge. Calculated numbers of clams for each size group from each area are presented in Table 1. During the survey, samples of clams of each 5mm size group were retained in order to determine the size/weight relationship. These samples were taken ashore for accurate weighing (to the nearest 0.1g).

The largest area of stock was found to be on the Netley and Weston shore of Southampton Water, (Figure 1). Forty-nine sampling stations on this ground were located on Decca Navigator lanes running obliquely to the shore line, and were spaced at approximately 350m intervals. The positions of each of the 49 stations sampled were plotted on an Admiralty Chart and from these plots the areas on which the populations of clams occurred were calculated.

On the western shore between Hythe Pier and Marchwood Power Station (the Gymp shore), a narrower band of ground contained clams. A further 24 stations were sampled with the grab, mainly along the length of the edge of the channel, as it was not possible to work a grid of stations along Decca Navigator lanes.

In the River Itchen, areas containing commercial densities of stocks were found irregularly. The shores in this region were examined at low tide and, where the highest densities of clams occurred, samples from areas of 2m x 2m were obtained by hand digging. For the beds on the Gymp shore and R.Itchen, visual estimates of the extent of ground carrying clam stocks were made at low tide and these were later used to make estimates of the sizes of areas from the charts.

RESULTS

1. Areas of clam ground

The largest area containing clam stocks occurred on the eastern shore of Southampton Water (Netley/Weston shore) on an area extending over some 350 hectares*. This area reaches some 5km along the shore and has a mean width of about 700m. Clams are to be found in virtually all parts, from near the edge of the dredged channel (in about 9m of water at low tide) to the intertidal region at about mid-tide level.

On the western shore (Gymp), stocks of clams in commercial densities are found in a narrower band of ground than on the eastern shore and concentrations of clams

* 1 hectare = 10 000m^2

here are more variable. Commercial densities are to be found intermittently along the public part of the fishery for about 3.5km between Hythe Pier and Cracknore Hard. It is estimated that approximately 67 hectares of ground carry stocks of clams in this region.

Further upstream, adjacent to the Marchwood Power Station, an additional small area is held for clam fishing under Several Order (Marchwood Clam Fishery).

In the River Itchen a few localised areas were found with reasonably good densities of clams and it was calculated that about 3.0 hectares of ground contained clams at commercial densities in this locality.

2. Stocks of clams

About 90% of the total tonnage of clams was found on the Netley/Weston shore, 8% on the Gymp area and 2% in the R.Itchen (Table 2). Results from the calculations for the total numbers and weights for five categories of clams are given in Tables 1 and 2 respectively. The small (50-64mm), medium (65-79mm) and large (>80mm) categories used, correspond to grades of clams currently marketed. For each category the 95% confidence limit for the mean has been given for the results from the Netley/Weston and Gymp grounds. Insufficient samples were taken in the R.Itchen for similar calculations to be made, but it was apparent that this stock was a relatively insignificant proportion of the total stock.

From Table 1 and Figure 2, where the size composition of the stock obtained from the grabbed samples has been plotted, it can be seen that a very large proportion of the stock is within the sizes currently marketed. Using the mean figures in Table 1 for numbers of clams on Netley/Weston and Gymp grounds, 83% of the stock falls within the small, medium or large categories and only 17% below 50mm.

DISCUSSION

The stock estimate of 15 000 tonnes of marketable clams had 95% confidence limits of approximately ± 30%. The rather wide confidence limits (± 5 000 tonnes) are the result of the variable density of the stock on the ground. From this calculated stock estimate and the size distribution of clams given in Figure 2, it is evident that an extremely large proportion of the stock is derived from recruitment which occurred several years ago.

Previous work by Walne (1970) gave comparative growth rates for clams placed in a number of sites on the south and east coasts of England. These results (Table 3) were the mean growth rates from all the sites for clams of 10mm mean size when planted. They included some relatively poor growing areas. Clams planted on the Netley shore showed the fastest growth rate in these experiments so it can be anticipated that the clams in Southampton Water generally have a faster growth rate than that shown in Table 3. From this information the most likely age structure has been estimated for the population of clams given in Figure 2. Further work is being carried out to determine whether this interpretation is correct by examining shell sections for annual growth rings.

It can be seen from Figure 2 that in the past five years there have been two years (1976 and 1978) with little or no recruitment to the fishery. There was probably a very large recruitment in 1975 and in earlier years also, but ages of the larger clams are more difficult to determine.

Stock management has, until recently, not been a point of issue with this species as markets have been limited. However, additional outlets for clams are actively being sought and it seems likely that increased fishing effort may soon develop. Should these markets materialise it is clear that the uncontrolled fishing of clams from this area could deplete the fishable stock to a low level in a few years and conservation of a breeding population would then feature as an important management requirement. Recommendations regarding the future management of this resource are being made to the British Transport Docks Board (Southampton).

REFERENCE

WALNE, P. R., 1970. The growth of relaid American hard clams (quahogs) in England and Wales. Shellf. Inf. Leafl., MAFF Direct. Fish. Res., Lowestoft (16) 8pp.

Table 1. Total numbers of clams of various sizes calculated from grab samples taken in Southampton Water, June 1979 (with 95% confidence limits of mean values).

		Netley/Weston shore (350 Ha) (millions)	Gymp ground (67 Ha) (millions)	R.Itchen (3.0 Ha) (millions)	Size (mm)
SPAT	Upper limit	20.82	5.29	+	<35
	mean	15.75	3.28		
	Lower limit	11.90	2.01		
BROOD	Upper limit	6.82	5.86	0.1	35-49
	mean	5.60	3.72		
	Lower limit	4.55	2.37		
SMALL	Upper limit	39.02	11.35	1.2	50-64
	mean	29.57	6.70		
	Lower limit	22.00	3.99		
MEDIUM	Upper limit	102.90	9.08	1.2	65-79
	mean	78.40	4.89		
	Lower limit	52.15	2.61		
LARGE	Upper limit	19.60	1.81	0.1	>80
	mean	14.00	1.10		
	Lower limit	9.97	0.70		

Table 2. Total weights of clams of various sizes calculated from grab samples taken in Southampton Water, June 1979 (with 95% confidence limits of mean values).

		Netley/Weston shore (350 Ha) (tonnes)	Gymp ground (67 Ha) (tonnes)	Total (tonnes)	Marketable stocks (tonnes)	River Itchen (3 Ha) (tonnes)	Average weight/clam (g)	Size (mm)
	Upper limit	145	37	182				
SPAT	mean	110	23	133		+	7	<35
	Lower limit	83	14	97				
	Upper limit	148	127	275				
BROOD	mean	121	81	202		2	21.7	35-49
	Lower limit	99	52	151				
	Upper limit	2 341	681	3 022	)			
SMALL	mean	1 774	402	2 176	)	75	60	50-64
	Lower limit	1 323	239	1 562	)			
	Upper limit	12 348	1 089	13 437	) 20 741			
MEDIUM	mean	9 408	587	9 995	) 15 192	148	120	65-79
	Lower limit	6 258	314	6 572	) 9 270			
	Upper limit	3 920	362	4 282	)			
LARGE	mean	2 800	221	3 021	)	37	200	>80
	Lower limit	1 995	141	1 136	)			
% stock		90.5	7.8			1.7		

Table 3. Average growth of 10mm seed clams relaid on 17 sites in England and Wales (After Walne, 1970)

	Increase in length during year (mm)
First year	10.0-23.2
Second year	23.2-35.6
Third year	35.6-47.2
Fourth year	47.2-58.0

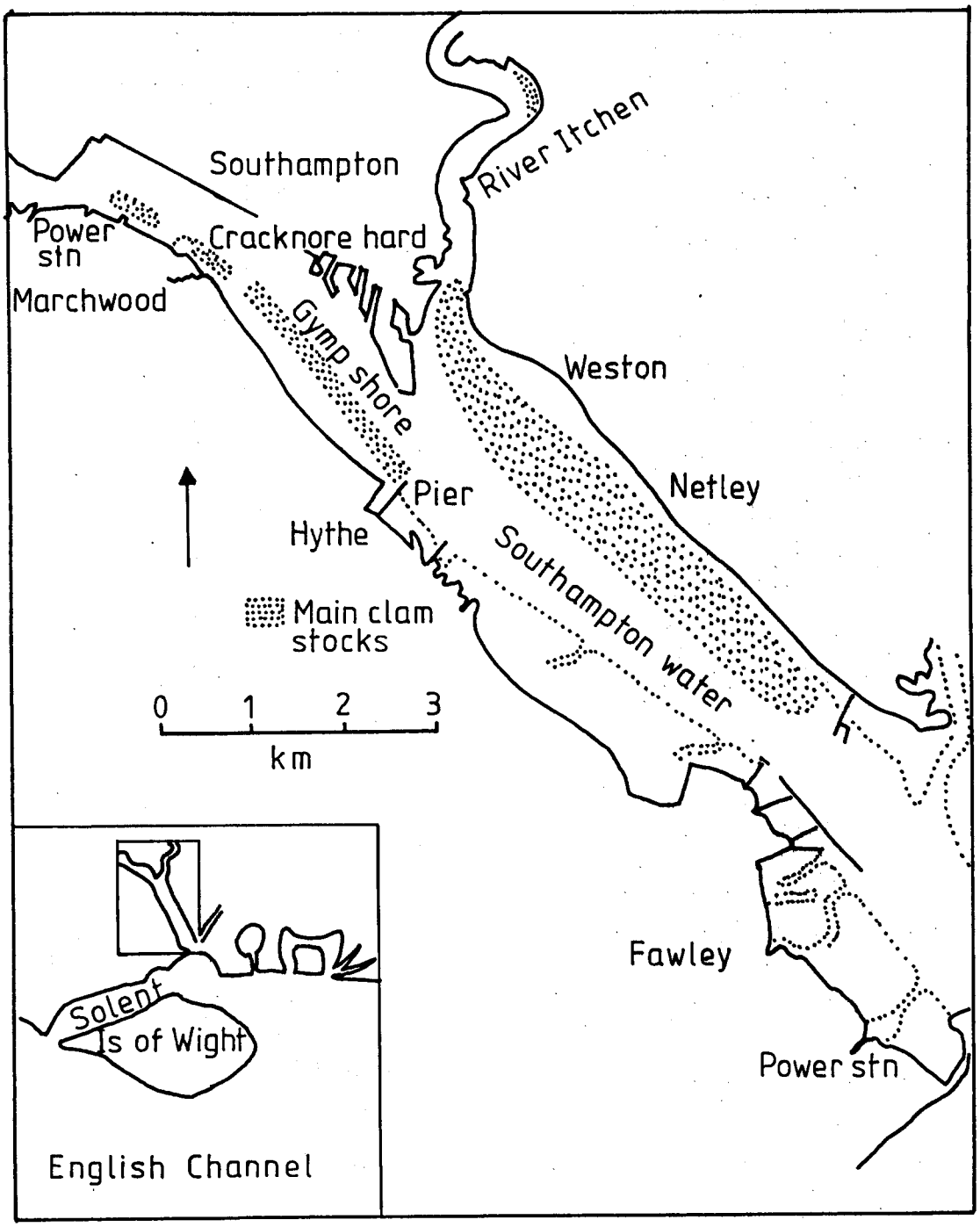

Figure 1 Southampton Water showing positions of main stocks of American clams, (Mercenaria mercenaria).

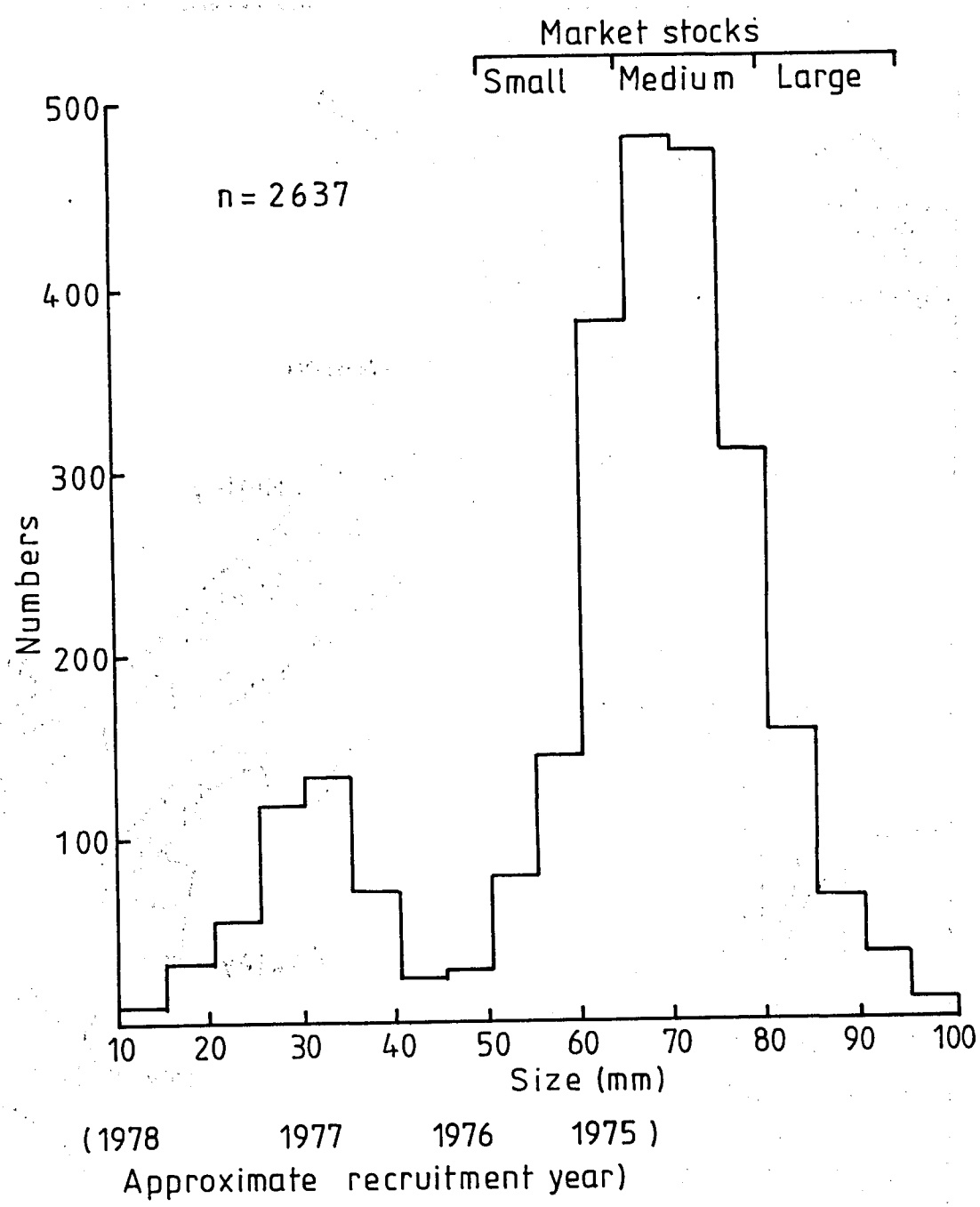

Figure 2 Size distribution of American hard shelled clams (Mercenaria mercenaria) in Southampton Water, June 1979.