

# *Greed and Stupidity: the end of the Forth Oyster Beds*

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[This paper was first published in Calatria 11, 89-94].

## **Preamble**

The towns of the central Forth Valley mainly owe their existence to their position as harbours, and for a long period, the Forth was the centre of a flourishing fishing industry, with centres at Stirling, Alloa, Kincardine, Abercorn, [Carriden](#), Dalmeny, [Bo'ness](#), and Queensferry. Commercial fishing within the estuary itself declined dramatically during the last 200 years, and had virtually ended by the middle of this century, as the result of pollution from industrial and domestic effluents.

Before this decline, however, a wide range of fish were exploited. The main fishery was for salmon (all along the estuary), with other species exploited being grilse and smelt (from Stirling), herring (Bo'ness and Queensferry), haddock, cod, skate, eels, sprats, and flounder.

This must obviously be seen as a sad, but all too common, story in the coastal areas of the industrialised world. Yet it was not simply pelagic fish which were exploited, and the estuary also supported various shellfisheries (mainly for mussels): one at Bo'ness was wiped out by non-local fishermen in 1803, and never recovered (McLusky 1978, 11). However, this brief paper is about the exploitation of one specific animal, the oyster, *Osrea edulis* L.

This species was exploited in the Forth for at least 7,000 years; sites in the [Grangemouth](#)/Falkirk area have produced radiocarbon dates as early as 4,000 B.C (c.5,000 B.C. calibrated). During the prehistory of the area, the oyster appears to have been the basic, dependable, resource which supported the local (coastal-based) economy. This economy was extraordinarily successful, as it lasted for at least 3,000 years until a drop in sea-level in the area made shore based collection of the oyster impossible. Fourteen shell-middens of this period have been identified in the area between Bo'ness and Falkirk (with more on the opposing shore of the Forth): three of these, all grouped round the mouth of the Avon, contain at *least* three thousand tons of oyster shells *each*, showing the massive amounts which were collected from a relatively short stretch of shore without over-exploiting the resource.

It is not known what happened in the succeeding periods: as relative sea-level dropped the oyster beds would have moved eastwards along the estuary - the fisheries of the recent past were in the waters east of Edinburgh. It would be surprising if this resource had not been exploited by the [Romans](#), who had a great passion for oysters, developing oyster cultivation in Italy, and even exporting them from Britain to central Europe. Pliny the Younger, in his 'Natural History,' wrote that: "Oysters have long been the prize delicacy of our tables," and the Emperor Vitellius is recorded to have eaten up to 1,000 at a sitting. Large numbers of oyster shells were found during various excavations of [Antonine Wall](#) forts, although it is not known if these were from the Forth.

## Ecological Background

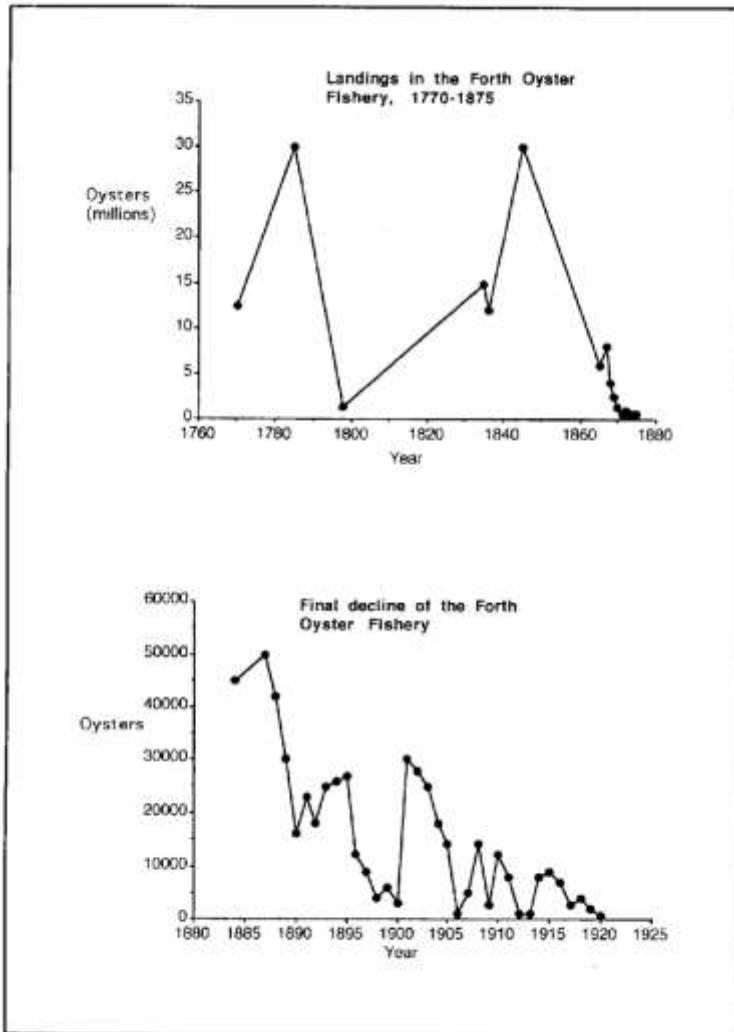
Oysters produce an average of 500,000 eggs per year: only about 1% of larvae survive to achieve fixation, and only about 10% of the spat (young oysters) survive the growing season up to October. However, only a very low survival rate is required for an oyster population to maintain itself - it has estimated that only 3 in a million need to survive to the same age as their parents.

The main cause of stress on an oyster population, apart from fluctuations in natural environmental conditions, is most certainly human predation. The native oyster beds of Great Britain, Germany, Holland and Denmark largely disappeared in the period between the end of the 19th century and the beginning of the 20th century, a period when the oyster was both popular and cheap. Given the extremely low survival rate needed to maintain a viable oyster population, some discussion of the effects of over-fishing and its effects on population dynamics is necessary, particularly the question of why an over-fished oyster stock may find it impossible to regenerate even if fishing is halted.

The destruction of the native oyster beds in those areas mentioned above was due to overfishing, not, as might be supposed, pollution. The relatively rapid depredations of human over-exploitation do not allow time for the mechanism to take effect. As the whole reproductive strategy of the oyster depends on massive egg production and the survival of only a small percentage of the fertilised ova, a much-reduced overall production of young will only lead to the rebuilding of a population under extremely favourable conditions, and the reduced stock will be far more vulnerable to competition from other species and changes in environment.

## Decline and Fall

Nothing is then known of the Forth oyster fishery until the medieval period, when it was formally established by a charter of Robert the Bruce and granted to the Burgh of Edinburgh in 1329. Historical records indicate that the oyster was cheap and plentiful during the medieval period,



and consumed by all classes of society; in 1379, 26,700 were bought for the king's use for £3-18-10. Quantitative records of the oyster harvest are first available in the late eighteenth century, when intensive exploitation began, and the first crisis of the industry occurred not long afterwards. Although this was ascribed to simple overfishing by various sources, the reasons for this first great decrease in the Forth oyster crop were more complex. It was known that oyster stocks required management; in England, it was recorded that:

*"In the month of May the Dredgers have liberty of all manner of oysters, of what size soever. When they have taken them, with a knife they gently raise the small brood from the culch, and then they throw the culch in again, to preserve the ground for the future, unless they be so newly spat that they cannot be safely severed from the culch.... After the month of May it is felony to carry away the culch, and punishable to take away any other oysters,*

*unless it be those of size about the bigness of a half Crown piece. or when the two shells being shut a fair shilling will rattle between them."* (Sprat 1667, writing of the Colchester fishery).

Severe penalties were laid down by the Admiralty Court for anyone who destroyed the culch or took undersized oysters. However, over-exploitation was certainly one cause of this first decline of the Forth oyster (large quantities were removed to oyster beds in Holland and England, including young animals), but a possibly more important one was the effects of large scale land-reclamation on the Carse of Stirling (McLusky, 1978, 1987; McKerracher 1987). This vast land clearance, in which twenty million cubic metres of peat bog, covering ten thousand acres, were cleared, had the effect of seriously clogging the Forth Estuary, as the excavated peat was dumped into drains which carried it into the Forth. The effects of this were so severe (that the silting it caused ended the life of Stirling as a seaport, and people used to scour the shores as far away as Bo'ness to pick up blocks of peal for use as fuel. This

greatly increased burden of silt was probably a greater factor in the sharp decline in the oyster crop than overfishing, although it is interesting that overfishing should have been seen as a cause at the time (O.S.A.). The effects of both overfishing and the clearance of the Carselands were counteracted by legislation banning fishing and the dumping of peat in the Forth, and the beds rapidly recovered. Fishing was resumed in the mid 1820s and the catch became huge: in 1869 some 5,000 tons were eaten in Edinburgh, at a rate of 100,000 oysters *per day* - even now, many oyster-bars may be seen in the city, though not serving their original function. Unfortunately, this rate of exploitation was far beyond the capacity for the population to replenish itself, and the catch dropped rapidly, until the fishery ceased entirely in around 1920.

In 1896, Fulton (*op cit*) carried out a survey of the Forth oyster beds, employing standard oyster dredges, and estimated a population density of between 7.3 and 14.6 per acre, or a *total* of only a quarter to half a million in the entire fishery. As a result of this survey, remedial measures were recommended, but none were undertaken: it may well be that any such measures would by then have been too late to allow the oyster to regenerate. Although small numbers of *Ostrea* were found along the southern shores of the estuary up to 1948, a replicate survey carried out in 1957 (Millar 1961) found no live oysters at all, and only one pair of valves still attached by the ligament - i.e. showing signs of having been alive in the recent past. It is a sad conclusion to draw for such a once rich resource, but the Forth oyster must now be regarded as extinct.

Granted that over-fishing was recognised as early as the late eighteenth century, this destruction of a resource, an important part of the ecosystem, and an industry which once supported many people, is particularly poignant. This over-exploitation was not restricted to the Forth alone - other Scottish oyster fisheries such as Loch Ryan, West Loch Tarbert, the Moray Firth, Wigtown Bay, etc. all show the same sad story. In the early 1980s about 1,000 oysters per week were consumed in Edinburgh, almost all of them cultivated *Crassostrea*, none of them local. In 1983, *Ostrea* were selling for over a pound a piece: a very great change from eighteenth century Edinburgh, when the Scottish oysters were advertised at 10d per 100 ("Caledonian Mercury 1764), and Dr Johnson fed his cat on oysters.

There is no extant population of *Ostrea* which might be used to restock the Forth; although there is a population in Spain which can develop at the low temperatures which prevail in the estuary, these could not survive the winter (Korringa 1976); although there are *Ostrea* in Norway, these live in sheltered shallow water conditions where they develop at high temperatures and they cannot survive very severe winters (*ibid*). After 5,000 years of being a valuable resource, the Forth oyster has become a part of history.

## References

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