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Technical report: Fish remains from Holme Fen, Cambridgeshire

by

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Summary

The assemblage of fish remains from Holme Fen, a monastic fishing site on the shore of Whittlesey Mere, has provided evidence which points to use as a Medieval pike fishery. The small size of the specimens and the low species diversity along with evidence for surface etching on the bones has been interpreted as the discarded gut contents of pike, Esox lucius *(L.).*

The scenario proposed is that pike were landed on the shore and were then gutted and cleaned in the margins of the mere, thus depositing the material which makes up the assemblage. The cleaned pike carcasses were probably then taken elswhere for consumption.

Keywords: Holme Fen; Whittlesey Mere; Monastic; Medieval; Fishery; Pike

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Introduction

The fishbones from Holme Fen, Cambridgeshire, a site associated with the shoreline of Whittlesey Mere, form part of a vertebrate assemblage excavated from a deflated peat horizon (French 1992). The deflation means that the bone assemblage may include remains originating over a long time period. Pottery and other artifacts, including lead fishing weights, which were found during excavation of the plough soil horizon have revealed that the site was exploited by people. The find spots have been interpreted as landing stages or 'cotes' and were probably in use by monastic fishermen from the late 13th to the 16th centuries AD (French 1992).

Material

Bulk sediment samples were sieved to 0.5mm and the dried residues and vertebrate remains were sorted from them. Fifteen of the samples contained small mammals, birds and fishes. Approximately 99% of the assemblage consisted of fishes. All fish bone fragments were recorded and identifed to the lowest possible taxonomic level.

Methods

Identifications were made by comparison with modern reference material which forms part of the Environmental Archaeology Unit's vertebrate reference collection.

Results

A total of 1204 fragments of fish bone were recorded from fifteen sorted bulk sample residues. The amount of material in the samples was variable, the highest fragment count being 192, from Sample 2510/9960, and the lowest nine, from Sample 2539/9964 (Table 1 and Figure 1).

A total of eight species was identified (Tables 1 and 2) from cranial bones, teeth and scales. Scale fragments and vertebrae of the Cyprinidae were identified only to family level; these elements are similar across a range of species so identification to species is impossible.

The assemblage is dominated by remains of the Cyprinidae (466 fragments), although only the roach *Rutilus rutilus* (L.) (40 fragments) was identified to species. The perch, *Perca fluviatilis* L. (34 fragments), eel *Anguilla anguilla* (L.) (51 fragments), and pike *Esox lucius* L. (25 fragments) are represented by scales, vertebrae and cranial elements. Other species represented are trout/sea trout *Salmo trutta* L., three-spined stickleback *Gasterosteus aculeatus* L., bullhead *Cottus gobio* L. and burbot *Lota lota* L. all of which have four identified fragments (see Table 2 for a summary).

The species represented are typical of the fens at the present time with the exception of the burbot *Lota lota* (L.), which is now thought to be extinct in the British Isles (Maitland & Campbell 1992).

Without exception the remains are from small individuals, with an approximate maximum total length (TL) of 10 cm. This observation is based on visual comparison with reference material of known length. No measurements were attempted on the material as the bones were so small.

Some fragments, five in total from different samples, have been in contact with heat. The evidence for this varies from white (calcined) to black surface damage.

The general condition of the material is good with little damage to fragile cranial bones and scales. This good survival of fragile material suggests either quick burial with little aerial weathering or deposition on the lake bed where anaerobic conditions would ensure good bone survival. Bones from two

contexts, however, show pitting on their which is consistent with piscivore gut damage (Irving 1995). An eel cleithrum from Context 2480/9906 and all bones and scales from Context 2460/0000 are damaged in this way. No butchery or mastication damage was found.

Discussion

The assemblage from Holme Fen is interesting in a number of ways. An assemblage which has been subject to mixing and other taphonomic factors such as sediment dessication (peat deflation) may not be representative of any given time-frame and may, at the coarsest level, consist of materials from a range of archaeological periods.

This investigation has, however, established that preservation of all bone fragments is good. Other recorded variables (such as colour) are constant over all samples. This suggests that the bones are broadly contemporaneous and probably accumulated over a shorter timespan than that provisionally envisaged by French (1992).

The species represented, eight in all, show a relatively low diversity. Other, older, archaeological sites from East Anglia (Irving 1995) have produced fish assemblages of moderate to high species diversity. This is possibly a result of either low species diversity within Whittlesey Mere, or species selection. This selection may be human or, more probably, a product of prey selection by predatory fishes. Each possibility is considered in turn below.

(1) Natural low diversity.

The fish fauna of a large body of freshwater like Whittlesey Mere would normally be of moderate to high species diversity. The colonisation of such a water body would have occurred naturally during the Holocene.

At least 25 species of freshwater fishes, regarded as natural Holocene colonisers have been recorded from East Anglia (Irving 1995; Wheeler 1977). All of the species recorded from East Anglia would be capable of living within the mere. In order to achieve and maintain a high species diversity the environment must be stable over long periods of time. Written records show that this is not the case for Whittlesey Mere (Heathcote 1876). The mere has completely dried out on a number of occasions and these events have been so catastrophic that eyewitnesses report 'fish laying on the lake bed like snow drifts' (Heathcote 1876). It would seem that these periods of drying out would sterilise the mere, which would then be subject to natural re-colonisation or artificial restocking by people running fisheries.

The low species diversity may thus be a result of the duration of restocking by natural processes. This is based on the timespan available for colonisation between drying out periods. Alternatively, it may be the result of artificial stocking, the low diversity being created by those managing restocking of the sterile mere.

Before the advent of 'sport angling', managed fisheries would concentrate on those species preferred at table. Pike, during the Medieval period, were an important food fish, and any management of their habitat would include introduction of species on which they could prey. The pike is a piscivore and its diet includes, roach, perch and smaller pike. It is very unlikely, however, that both tench *Tinca tinca* (L.) and bream *Abramis brama* (L.)would be excluded from a fishery of this period in a mere of this size as these species could flourish alongside the pike fishery. Indeed bream, roach and chub were recorded from the natural death assemblage when the mere dried out in 1826 (Heathcote 1876).

(2) Natural prey selection.

All of the specimens identified from the assemblage are small, being no larger than approximately 10 cm. This average size across the assemblage is striking and leads to the conclusion that some type of size sorting has occurred. The excavation at Holme Fen has identified the area as a fishing site. If pike

were landed here then they would probably be gutted and cleaned at the water's edge. Within the gut of piscivorous predators such as the pike are the partly digested remains of their prey (Irving 1995, Irving in press). This creates a fish bone assemblage of the type described above within a very discreet area which does not include the bones of the predator, as this would be taken elswhere for consumption.

Within a population of fishes there are discreet size classes, which correlate with age. In predators such as the pike, each size class of predator will take a distinctive size class of prey fish (Frost 1954).

(3) Human prey selection.

The estimated size of the fish in the assemblage from Holme Fen is very small. Small freshwater fish may have been eaten by peasants, but it is unlikely that their bones would have been discarded into the margins of the mere. A more feasible scenario is that the fish were used as bait to catch pike. The use of live and dead baits to catch pike is first discussed in English literature by Dame Juliana Berners (Berners 1496) where both roach and herrings are described as the best baits when angling for pike. The finds of lead weights (whether for nets or rod and line angling) attests to the possibility that fishing may have been conducted from the shore. Inevitably when pike are caught with rod and line the flesh of the bait fish is ripped and semi-masticated and this may be a reason for discarding their bodies at the edge of the lake before fresh bait is attached to the line.

The scenarios outlined above are summarised in Figure 2.

Finally, some of the material is burned, but this is not necessarily as a result of human activity. Any fluctuations in lake levels would periodically expose the bone material to natural fires.

Conclusion

The assemblage may have accumulated as a result of gutting pike which were cleaned on the edge of the Mere. The consistent small size of the individuals points strongly to such a conclusion. The species identified all form part of the diet of pike (Frost 1954), and the surface pitted bones are also strong evidence for this. The complete drying out of the mere was probably very rare but fluctuations in level, possibly on an annual (seasonal) basis, would periodically expose submerged buried bone material to dessication and burning by natural or man-made fires.

References

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TAXON	2460/0060	2480/0000	2480/9960	2480/9980	2500/0000	2500/9960	2500/9980	2510/9960	2520/9940	2520/9960	2520/9980	2520/9990	2530/9960	2530/9980	2539/9904	Grand Total
CYPRINIDAE (carp family)	15	12	43	16	18	40	68	48	66	71	59	7	0	0	3	466
Rutilus rutilus (L.) roach	0	2	1	0	1	16	2	9	0	4	1	3	0	0	1	40
Salmo trutta L. sea/brown trout	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	4
Perca fluviatilis L. perch	0	0	0	0	1	10	6	6	2	6	1	0	0	0	2	34
Gasterosteus aculeatus L. three-spined stickleback	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	4
Lota lota (L.) burbot	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	4
Anguilla anguilla (L.) eel	0	0	1	0	2	22	3	17	0	4	0	2	0	0	0	51
Esox lucius L. pike	0	3	5	0	1	4	2	4	2	0	3	0	0	0	1	25
Cottus gobio L. bullhead	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	4
Indeterminate	11	46	35	23	19	86	49	105	56	50	19	11	29	31	2	572
Grand Total	26	63	85	40	43	181	130	192	126	138	85	23	32	31	9	1204

Table 1. *List of species and number of bones per bulk sample*

TAXON	PREMOVIER	BASIOCCIPITAL	PARASPHENOID	ARTICULAR	DENTARY	PALATINE	QUADRATE	OPERCULAR	PREOPERCULAR	CERATOBRANCHIAL	SUPRAPHARYNGEAL	FIRST VERTEBRA	CERVICAL VERTEBRA	ABDOMINAL VERTEBRA	CAUDAL VERTEBRA	CENTRUM	RIB	CLEITHRUM	POSTTEMPORAL	SCALE	CRANIAL FRAG	PHARYNGEAL TOOTH	PHARYNGEAL BONE + TEETH	TOOTH	FIN SPINE	DORSAL FIN SPINE	HAEMALNEURAL ARCH	Grand Total
CYPRINIDAE (carp family)	0	1	0	0	0	0	1	0	0	1	2	1	1	26	45	0	1	0	1	384	0	2	0	0	0	0	0	466
Rutilus rutilus (L.) roach	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	20	8	0	0	0	0	40
Salmo trutta L. sea/brown trout	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	4
Perca fluviatilis L. perch	1	0	0	2	1	0	1	0	1	0	0	0	0	5	12	0	0	0	1	10	0	0	0	0	0	0	0	34
Gasterosteus aculeatus L. three-spined stickleback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	0	4
Lota lota (L.) burbot	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	4
Anguilla anguilla (L.) eel	0	0	0	1	1	0	0	0	0	0	0	0	0	1	47	0	0	1	0	0	0	0	0	0	0	0	0	51
Esox lucius L. pike	0	0	0	0	1	2	0	0	0	0	0	0	0	1	9	0	0	0	0	4	0	0	0	6	0	0	0	25
Cottus gobio L. bullhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Indeterminate	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	5	296	0	0	24	101	0	0	0	182	25	7	572
Grand Total	1	1	1	3	3	2	2	1	1	1	3	2	1	36	121	1	6	297	2	2	422	101	22	8	6	113	26	7	1204

Table 2. *List of species and number of bones by skeletal element*

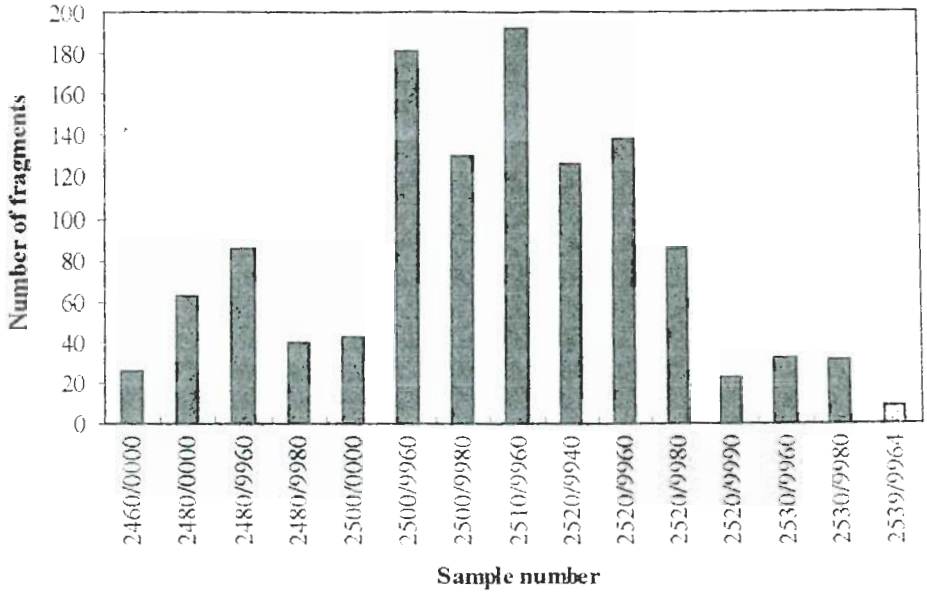

Figure 1. *Number of fish bones per bulk sample*

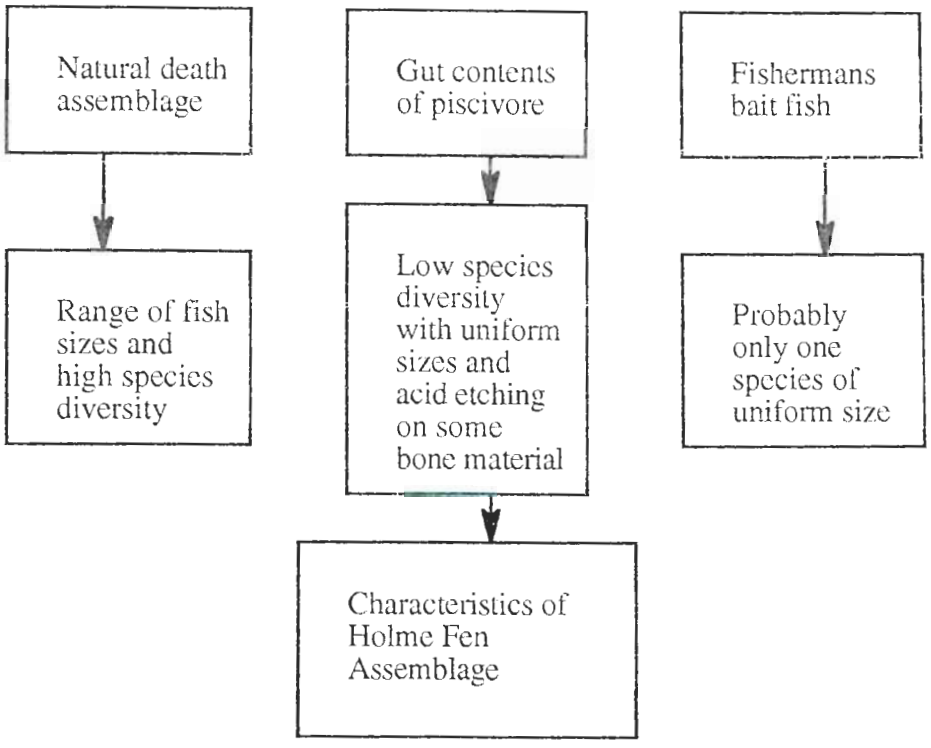

Figure 2. *Flow chart showing the possible assemblage accumulating agents*