

LINDISFARNE

The Fish Remains

A total of 3,893 fish bones was recovered, of which 2,070 were recovered by handpicking, and 1,823 from sieved samples. Had sieving not been carried out roker, eel, herring, sprat/smelt, and bass would not have been recovered.

The following species were identified; elasmobranchs (cartilaginous fish), roker, (Raja clavata), eel (Anguilla anguilla), conger eel (Conger conger), herring (Clupea harengus), sprat/smelt (Sprattus sprattus/Osmerus eperlanus), salmon (Salmo salar), cod (Gadus morhua), haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus), saithe (Pollachius virens), ling (Molva molva), hake (Merluccius merluccius), tub gurnard (Trigla lucerna), bass (Dicentrarchus labrax), turbot (Scophthalmus maximus), plaice/flounder (Platichthys flesus/Pleuronectes platessa), and halibut (Hippoglossus hippoglossus).

The table indicates the number of bones of each species found in the separate phases (details of the individual bones recorded are available on request). The quantity of unidentifiable fragments emphasises both the degree of fragmentation fish bones suffer because of their friable nature, and the difficulty of assigning some bones to species, notably vertebrae and fin rays. Elasmobranch vertebrae cannot be identified to species level, but the presence of roker 'bucklers' suggests that some of these vertebrae could belong to this species.

Some biology notes follow on the different species recovered, these are largely based on Wheeler 1978.

Roker - the commonest ray in shallow water, on muddy, sandy or gravelly bottoms and is most common in depths of 10-60 m.

Eel - the eel is believed to breed in mid-Atlantic the larvae are transported to Europe by ocean currents, as elvers they enter rivers where they feed and grow, (although some eels stay in the mouth of the river and on the seashore). When they are sexually mature they descend the river to the sea.

Conger eel - common on rocky shores and offshore, although young fish can be caught in deep shore pools, particularly those with dense algal cover low down on the shore.

Herring - very common off northern Europe, different breeding stocks have distinct breeding grounds and seasons. The young form large schools and are very common inshore in their first year.

Sprat - very common in northern European inshore waters, the young (whitebait) are found in estuaries. In the summer sprats are found in 10-50 m, in winter they go deeper, sprats stay near the surface at night.

Smelt - an inshore migratory fish, common close to river mouths and in estuaries. They spawn in fresh water during the spring.

Salmon - possibly the most famous fish of the north Atlantic as a commercial resource, and for its sporting qualities. The salmon can be caught in rivers, estuaries or during its coastwise migrations in the sea.

Cod - found in a variety of habitats from the shoreline to well down the continental shelf to the depths of 600 m (the smaller fish tend to live nearer the shore). Cod usually school at least 30 to 80 m above the bottom.

Haddock - live close to the sea bed in depths of 40-300 m and are bottom feeders. In the middle North Sea haddock enter shallow water during the summer months.

Whiting - common in shallow waters, inshore, especially between 30 and 100 m. Whiting live both in midwater at these depths, and also inhabit sandy and muddy bottoms.

Saithe - live in large schools near the surface and in midwater in depths of 200-250 m, and are caught in trawls and seines.

Ling - a deep water fish, most abundant at depths of 300-400 m, although large numbers live in shallower water than this where the bottom is suitable on open ocean coasts. It is most common on rocky grounds.

Hake - a moderately deep water fish, inhabiting the middle and lower continental shelf at 165-550 m, living near the bottom and sometimes moving to shallower water in the summer.

Tub gurnard - relatively abundant in inshore waters of 20-150 m, often living in small schools on mud and muddy sandy bottoms.

Bass - relatively common in the sea around England and Wales and the southern North Sea coasts, it is much rarer to the north. An active, schooling fish in inshore waters entering estuaries almost into freshwater especially when young. It can be captured in offshore waters but is usually found in close proximity to reefs. The North Sea populations are usually summertime migrants from the south or south-west.

Turbot - a common fish in the southern North Sea, but it is scarce in the north where it is on the edge of its range. It lives in shallow waters from just below the shoreline to about 80 m on shell gravel and sandy bottoms. The turbot is a valuable, good flavoured food fish.

Plaice - a bottom living fish, most abundant on sandy bottoms at 10-50 m. The most important European flatfish. The flounder lives in a similar habitat but it is not such an important food fish.

Halibut - a boreal flatfish found at depths of 100-1,500 m, migrating seasonally it is found on a wide variety of bottoms, and is an active predator which forages in midwater. The halibut is an important food fish.

Cod appears to be the most frequently occurring species, with ling second in importance. The numbers of haddock are increased by two partial skeletons in Phase 6, 89 bones from one individual, and 48 from another. It is possible that these were discarded as whole uneaten fish, and not as food remains. Measurements were taken whenever possible on the dentaries and premaxillaries according to the method outlined by Wheeler and Jones (1976). Estimations of age and length were calculated from fig 64 in the same paper.

The bulk of these measurements are from Phases 5, 6 and 7, spanning from 1600 AD until recent times. Examining the measurements in separate phases did not show any significant changes from the early to late periods mainly because there were few measurable bones in the early phases.

Most of the cod appear to be over 90 cms in length and over 8 years old, weighing over 6 kg gutted weight. These larger fish may be the produce of an offshore fishery, the smaller ones being caught closer inshore (see fig 1). Comparisons of the size of individual bones with those of specimens of known length and weight suggest that many of the ling were of a similar size or larger than a specimen weighing 10.67 kg.

The saithe were comparable to a specimen of 100 cms in length and according to Blacker's (1974) figures on modern fish from the North Sea this would indicate that they were over 13 years old.

Many of the haddock bones were similar in size to a specimen of tl 50 cms and therefore about 8 years old, with a gutted weight of approximately 1 kg (Blacker 1974). Many of the haddock cleithra were very swollen, this is quite common in large specimens (Wheeler 1977).

Butchery was noted on many bones, mainly those of cod. As well as knifecuts on vertebrae, small chops and knifecuts were present on premaxillaries around the ascending and articular process, and on the dentaries around the foramen. This may be evidence of splitting the whole fish, while knifecuts on the parasphenoid and basioccipital could be the result of throat slitting (which was practised in order to give whiter flesh), and also heading. All three processes were carried out while salting and drying cod (Cutting 1955).

Salting and drying is most likely to be associated with the distant water white fishery for cod, ling, saithe, haddock and hake. Before the advent of the steam ship in 1812 the slowness of transport meant that most fish had to be preserved in some way before they were marketed. Up until the C18th these fish along with halibut were probably caught on handlines. Handline fishing was carried out from an anchored boat, however long line fishing (a Dutch method) was introduced to Harwich in about 1770 and became very popular especially on the Dogger Bank (Cutting 1955). Long line fishing consists of a main line

set along the seabed, moored at each end, and sometimes at intervals by buoyed weights or anchors. Attached to the main line at intervals are 'snoods' each carrying a baited hook. These were set in deep water from steam (and later motor) vessels fitted with winches to haul in the line for cod, halibut and ling. Lines can be set on ground too rough to trawl, although it is sometimes difficult to haul in large fish (Kennedy 1954).

Cutting also mentions that the monks of Tynemouth, Farne and Holy Islands used to send salted and smoked haddock caught locally, and cod and ling caught and salted off the Shetlands to London by sea.

Herring formed part of a major inshore fishery, which after 1416 was prosecuted with drift nets, which are vertically suspended in the water by corks and buoys, the fish are trapped in the mesh by their gills. Herring were usually salted (after gutting and washing) or smoked (after hard salting they were hung over open fires of sawdust for several weeks, becoming very hard and dry) and packed in barrels (Cutting 1958). Sprats and smelts are often netted in great quantities in estuaries and inshore waters.

Plaice, whiting, conger eel and gurnard were probably the product of an inshore fishery using set lines and nets. Roker was also probably caught in shallow water on hooks. Both the premaxillaries of bass are small (the total lengths of the bones being 12.4 and 13.8 mm) and belong to young individuals.

The presence of turbot may indicate fish caught to the south, as today, this fish is very rare in the vicinity of Lindisfarne. Defoe mentioned turbot he saw at Scarborough 'three quarters of a hundred weight, and yet their flesh exceeding fine when taken new'. Turbot was also salted (Cutting 1955).

Eels were commonly caught in streams in 'eel bucks', which were wicker baskets fixed to weirs often associated with mills, these caught the eels as they descended seawards (Wheeler 1979). They were also caught in river mouths while migrating downstream, on multipronged spears, or taken on hooks and in shoreline traps such as 'kiddles'.

Like the distant water white fishery and the inshore fishery, salmon fishing was important in the later Middle Ages (Cutting 1955). Until the development of the railways in the C19th most of the salmon were marketed pickled, and were still common in London in 1836. However with improved transport and the use of ice as a form of packing, pickling, as a means of preservation became obsolete (Cutting 1955). Defoe mentions salmon caught on the Tweed as one of the chief trades of Berwick, much of it was sent to Newcastle for curing and pickling before being sent to London.

However it is also likely that fish caught locally could have been eaten fresh, as Lindisfarne's position on the coast of the northern North Sea minimised transport problems from the fishing grounds, the surplus fish being dried, pickled or smoked for later consumption, or marketing elsewhere.

Nearly all these species are valuable food fishes of the medieval and post medieval period (the likely exceptions being tub gurnard and bass). Unfortunately it is not possible to detect from the bone material any of the changes in fishing techniques, transport etc that took place during this time. The improvement of roads, development of the railways, invention of steam ships, together with the exploitation of distant fishing grounds and the use of ice for packing fish are just some of the reasons why fresh fish became easily accessible to a greater cross-section of the population, who hitherto had been unable to afford it. The salting and drying industry was also badly affected by the introduction of a duty on foreign salt in the 1690s, even though there was an exemption on duty for salt imported for fish curing the salt still had to be accounted for in such detail that it had a deleterious effect on the industry.

However these changes were probably not greatly felt at Lindisfarne, where much of the fish supply was probably local. The increased availability of fresh fish would have had most effect on inland communities.

I would like to thank Mr A Wheeler (British Museum, Natural History)
for all his help, comments and the use of his reference collection.

REFERENCES

- R W Blacker (ed) 1974. Fishing prospects 1974-5. Fisheries Laboratory Lowestoft.
- C L Cutting 1955. Fish Saving; a history of fish processing from ancient to modern times. Leonard Hill.
- C L Cutting 1958. Fish Preservation. in A History of Technology.
Vol IV The Industrial Revolution C1750-1850. Eds C Singer,
E J Holmyard, A R Hall, T I Williams. Oxford University Press.
- D Defoe 1724-6. A tour through the whole island of Great Britain. Penguin
English Library. Reprinted 1978.
- M Kennedy 1954. The Sea Anglers Fishes. Hutchinson.
- A Wheeler and A Jones 1976. 'The Fish Remains', in East Anglian Report No 2
Norfolk Archaeological Unit. Excavations at
Fullers Hill. Great Yarmouth.
- A Wheeler 1977. 'The Fish Remains', in Excavations in Kings Lynn 1963-70
by A Clarke and A Carter. Society for Medieval Archaeology.
Monograph Series No 7.
- A Wheeler 1978. Key to the Fishes of Northern Europe. Warne
- A Wheeler 1979. The Tidal Thames. Routledge and Kegan Paul.

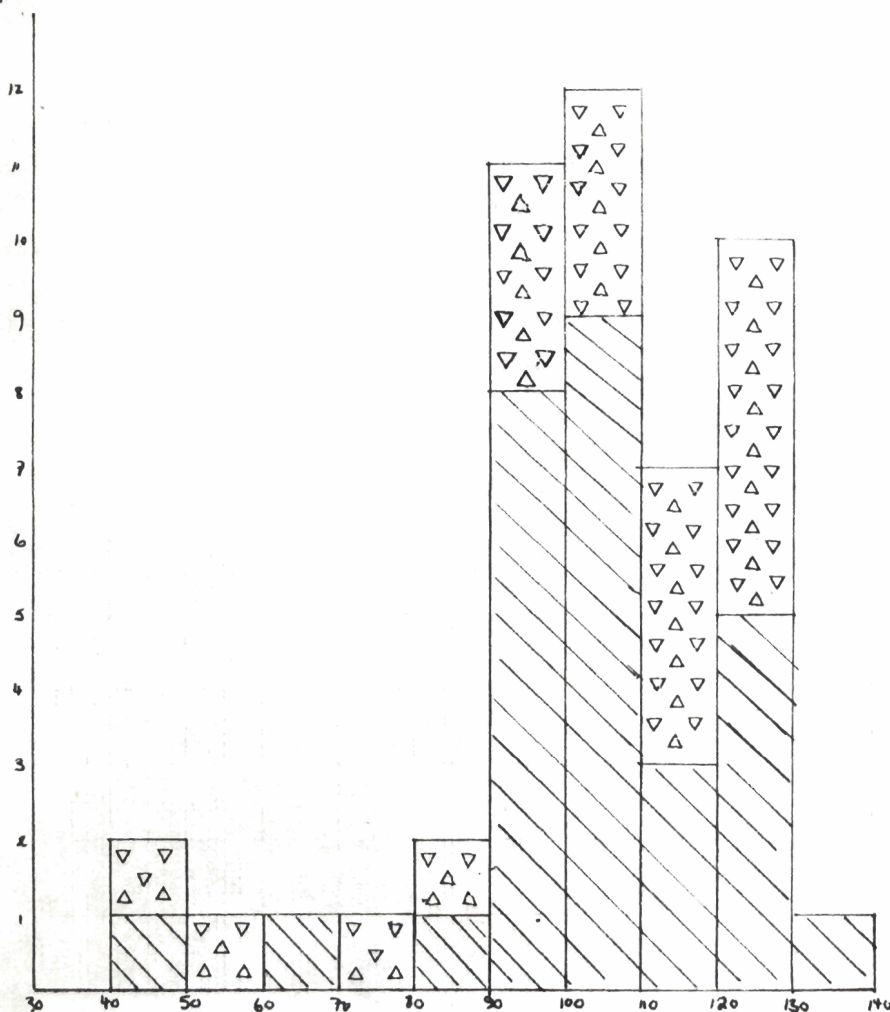
Size distribution of cod as estimated from the jawbone measurements

LINDISFARNE

Fig 1

KEY
 OBTARY $\nabla \Delta$
 P~~B~~EMAXILLA $////$

No of Occurrences



Total length (cms)

LINDISFARNE

H = Handpicked

S = Sieved

	Elasmo	Roker	Bel	Conger Bel	Herring	Sprat/Smelt	Salmon	Cod	Haddock	Whiting	Saithe	Ling	Hake	Tub Gurnard	Bass	Turbot	Plaice/Flounder	Hallibut	Gadoid	Flatfish	Unident	Total	
Phase 2 (Abandonment of Site Post Saxon to Early Med 900-1100 AD)	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1 19	2 21	H S
Phase 3 (Stratified Med levels C13th-1530 AD)	-	-	-	-	-	-	-	29	2	-	-	7	-	-	-	-	-	-	3	-	26 200	67 235	H S
Phases 3 and 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	9	10	H
Phase 4 (Post Med pits and rubbish dumps 1550-1600)	-	-	-	-	-	-	-	6	1	-	-	3	-	-	-	-	-	-	2	-	14	26	H
Phase 4 and 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	H
Phase 4 and 6	-	-	-	-	-	-	-	15	2	-	3	7	-	-	-	-	1	-	73	-	23 1303	24 1487	H S
Phase 5 (Construction Structures A and B 1600-1650 AD)	1	-	-	-	-	-	-	70	7	-	-	11	-	-	-	-	1	2	39	-	87 77	218 80	H S
Phase 5 and 6	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	3	H
Phase 6 (Post Med use after A and B abandoned (1650-1750))	7	-	-	3	-	-	-	78	145	-	3	52	-	-	-	5	4	-	97	-	264	658	H
Phase 7 (Recent use as a garden C18-1977)	1	-	-	-	-	-	1	100	33	1	1	20	7	1	-	1	14	-	196	-	580	956	H
TOTAL	12	3	5	3	11	22	1	338	238	52	11	100	8	3	2	6	22	2	429	16	2609	3893	