Locating fish-traps on the Moray and the Forth

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Locating Fish-traps on the Firth of Forth and the Moray Firth

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Introduction

The use of traps has been one of the most important and efficient ways of catching fish since people first started to eat them as part of their diet. They work on the principal of using a static wall or net to either directly trap or channel fish into a place where they can be captured. Although their form and construction methods have evolved over time, traps were usually constructed of timber or stone. Stone traps are more likely to survive, but are harder to date using archaeological dating techniques (unless wood is associated with them). Timber traps can be dated using dendrochronology or radiocarbon dating, but are much less likely to survive unless located within anaerobic contexts, such as under intertidal silts.

Much work has been done on fish-traps in certain areas of Britain, especially in Wales and Ireland, but relatively little in Scotland. This is despite the early publication of papers on Scottish sites by Bathgate in 1949 and Ferrier in 1969. However, our knowledge of fish-traps in Scotland has increased significantly since the start of the Historic Scotland sponsored Coastal Zone Assessment Surveys (CZA surveys; Ashmore 1994) and the recent work of Hale (2000; forthcoming) and Hooper (2001).

This report will focus on fish-traps located on the Firth of Forth and the Moray Firth. Three CZA surveys have taken place in these areas (Kincardine - Dunbar, James 1996; Kincardine - Fife Ness, Robertson 1997; and Inner Moray Firth, Cressey 1998). In total, the two surveys of the Forth revealed seventeen fish-traps, whereas sixty-two were recorded during the Moray survey.

The paper will consider reasons for this apparent difference in distribution. In doing so, it will draw from published material on fish-traps from the entire British Isles, placing these structures in their archaeological and historical context and describing the different types located. It will examine references to their upkeep and operation and seek to explain the reasons behind the siting of traps in particular areas.

It will then detail the ways employed to locate fish-traps by other surveyors before looking at the results of the Moray and Forth CZA surveys. The report will conclude with the results of two new surveys undertaken as part of this project (referred to as the FTS survey within this report). The areas surveyed were the coast from Inverness - Fort George and selected areas of the Firth of Forth between the Kincardine Bridge and the Forth Bridge. The report will demonstrate the problems of locating fish-traps and will give recommendations for locating fish-traps during future surveys.

The development of fishing

Catching fish is not a straightforward task. It is a form of hunting that takes place out of the natural environment of humans, and fishermen are often attempting to catch a prey that they can not see. Despite this, it is known that people have been fishing from at least the Mesolithic (Pederson 1995) and it is easy to assume that all groups of people living by water have had the skill and technological knowledge to fish for thousands of years. This may not be so; Bede claims that when Bishop Wilfrid first arrived in the land of the South Saxons (Kent) in the seventh century, he found that the people were starving:

> *Although fish were plentiful in the sea and rivers, the people had no knowledge of fishing and caught only eels. So the Bishop's men collected eel-nets from all sides and cast them in the sea, where, by the aid of God's grace, they quickly caught three hundred fishes of various kinds* (Book 4, Chapter 13: Sherley - Price 1955 p. 228).

Sea fishing and river fishing

Fish can be caught in rivers and lakes; on the coast; and out at sea. In general, the types of fish caught in these places are different, although some species, notably the salmon, spend part of their life at sea and part in freshwater.

Before the development of efficient transport systems and methods of preservation, geographic location determined which fish were available at the market. People near the sea wishing to eat fresh fish were generally offered marine species; those inland ate freshwater fish. As methods of preservation developed, so certain types of fish were cured and traded far from their place of capture. However, tastes varied, and pickled herrings were more popular in Germany and Scandinavia than in Britain. Similarly, the English never developed a taste for Scottish salted salmon (Robertson 1998, p. 35).

In the Medieval period, both fresh and preserved fish were consumed. It appears that in general, sea fish were consumed in much larger quantities than fresh-water fish. Inventory records demonstrate this preference, as shown by the purchases for the household of John Hales in 1461 (Society of Antiquaries Ms no. 535). These included 'salt fish' (white fish of some kind); 'stock fish' (dried cod); herrings (either salted or smoked); and plaice and flounders. In all, the household consumed 639 sea fish and 258 freshwater fish over a four-month period; sea fish representing over 71% of the total consumed (Dyer, 1988).

More extreme are records showing that the household of John de Vere, Earl of Oxford, ate 215 freshwater and 26,000 sea fishes between 1431 and 1432 (Essex County Records Office D/DPr 137). Over 99% of all fish consumed were sea fish, although this is partly explained as his household spent much of their time close to the coast in Essex.

There is also an indication that certain species of fish were preferred. Records for the Cluniac Priory of Bromholm in Norfolk for the years 1415-1416 show that seventeen percent of the total expenditure on all foodstuffs was for the purchase of herring (Bond 1988, p. 74, quoting Redstone 1944). At Winchester (Kitchin 1892), records for 1492 and 1514 show that 'Dry Ling' was the most commonly consumed fish, with other popular fish including 'Salt Salmon', 'Dry Milwell' (cod) and 'Green Ling'.

Dyer (1988) suggests that one reason for the preference for sea fish is that they may have been cheaper, due to sea fishing providing higher yields.

Fishing techniques

Several techniques have been devised for taking creatures from the water and one of the simplest is to chase them onto land. This technique is still used in Japan and the Faroe Islands to trap cetaceans. In Shetland, the beaching of prey is called the *caa* and records show that the last *caa* took place at Weisdale in 1903, when 83 pilot whales were killed.

Hooks and lines can be used for both river and coastal fishing. Out at sea, they were often used to catch deep-water fish, such as haddock, cod and ling. Commercial fishermen typically had one long line with many smaller lines, or *snoods*, attached, each fitted with baited hooks.

Netting and trawling is used to catch many types of fish and the deployment of nets from boats has become the main method of fishing today. Nets can also be used from the shore, and a single person

can cast a small net. The hauling of larger nets may involve many members of the community and it is still common to see large groups of people pulling in a communal catch on Asian beaches.

Fish could be speared, although this form of fishing is more normally associated with poachers in Scotland, as is the blowing up or poisoning of fish. In the Far East, trained sea birds, such as cormorants, are used to catch fish. The birds are kept on a chain and forced to regurgitate their prey once they have returned to the surface.

Traps were formally of great importance in Britain, and are still commonly used to catch crustaceans (such as lobsters and crabs) in baited creels and pots. Traps for fish can be employed in rivers, estuaries and on the coast. There are a variety of designs, but they work on a similar principle, the confinement of fish within an enclosed space. In one method:

> *...fish come inshore on the flood tide, but on the returning ebb, come between the arms of the wedge-shaped trap and are gradually stranded* (Davis 1958).

Other types of fish-trap channel migrating or hunting fish into an enclosure where they can be taken with a net or by spearing.

Classification of fish-traps

Fish-traps often undergo continuous modification, making classification problematic. Despite the huge variation in design, Bannerman and Jones (1999, pp 77 - 79) identified seven distinct types of fish-trap around the coasts of Anglesey and Gwynedd. Most of these types are also commonly found around the coast in Scotland and it is useful to use their classification as a starting point when considering fish-trap design.

Type 1 Natural feature adapted as a trap

The simplest type of trap consisted of modifying a naturally occurring coastal feature into a fishing place. It could consist of no more than a tidal pool in which fish were trapped by the receding tide, or it could involve the use of a framework to trap fish in a natural hollow at high tide. These fishing places are often very difficult to locate as little modification was necessary.

The Skerries (Anglesey, N. Wales) may have acted as a natural fish-trap. These off-shore rocks have strong tidal streams running through channels leading to a central lagoon. Nets secured to either side of the exit channels would have enabled fish to be trapped.

Bathgate (1949) noted that in places such as Orkney and Shetland, many of the storm beaches enclosed lagoons which could have easily been converted into natural fish-traps. Ferrier (1969, p. 33) reported that many of the traps on the Isle of Bute consisted of short stretches of walling built across natural inlets. The walls were built of rough stones, stakes and wattle-work.

Type 2 Semi-permanent wattle and wood trap

These traps consisted of rows of wooden posts linked by wattle-work or nets. They extended from the high to low-water mark and could cover large areas, forming complexes of straight lines and right-angled structures. Stones were often placed at the base of the posts to keep them secure and to prevent scouring. It is not unusual to find that the wood has completely rotted away, leaving only the stone-work as evidence.

In Scotland, this type of trap included the ground drave (a rectangular net held in place by stakes to present a face to moving fish; Gray 1978, p 18) and the stage net (a barrier made of vertical stakes interwoven with twigs with a net placed at the low water end; Robertson 1998, p. 29).
Stake nets could also be included in this class of trap, but due to their importance and prevalence in Scotland, they are described in more detail below.

Type 3 Modified natural feature trap
This type of trap consisted of walls built between rock outcrops in the inter-tidal zone. The walls were fitted with sluices to allow fish escaping on the ebb tide to be trapped. The difference between these traps and the 'Type 1' is that they were more permanent, and most had walls were constructed of stone.

James and James (2003) noted in a study of the fish-traps of three Carmarthenshire estuaries that there were large hollows in the area into which fish would naturally move as the tide receded. The hollows were surrounded by ridges of stone and sand and the most long-lived and profitable of the weirs made use of these natural features. In many cases, the scars themselves were used to form one or more sides of the trap.

The stake net, destined to become the most successful of all traps for catching salmon (see below), originated with fishermen exploiting natural features within the bed of the Solway. At low tide, large pools were left by the receding tide and fishermen surrounded these with nets secured by stakes driven into the sand.

Type 4 Crescent-shaped trap (figure 1)
This is the classic shape for a fish-trap and is known as a *gorad* in Welsh literature. It was thought to be an early form of trap by Bannerman and Jones. Crescent-shaped traps were built of either wooden stakes connected by panels made of wattle, or of a stone base with a stake and a wattle superstructure. Often, one end abutted the shore and the structure curved in the direction of the ebb tide.

The larger traps generally had two rows of stones placed in roughly a straight line running parallel to the shore. The ends curved to form horns that often joined natural bedrock. The walls were on average 1.8m thick, although at Aberlleiniog they were 2.9m thick in places. The walls could be very long, and a *gorad* wall near Holyhead (Anglesey) is over half a mile long. The best preserved wall at the Gorad Ddu trap in the Menai Straits is 240m long. Many Welsh *goradau* had wooden posts up to 100mm in diameter within them (Jones 1983, p. 32).

Often, two traps were placed one below the other. One of the traps could be fished on both Spring and Neap tides, the other was sited lower down the contour, and could not be fished on certain Neap tides. Bathgate (1949) observed such a double yair close to the Kessock Ferry, Inverness, whilst passing in a train.

Other examples of this trap have been found in Scotland, and Ferrier (1969 p. 33) noted that many of the Ardmore yairs were semi-circular. At least two of the traps located during this project (as part of the FTS survey) were semi-circular traps (FTS 113 and 119, below).

Type 5 Rectilinear trap (figure 2)
These traps were formed of walls up to 1.4m thick and extending up to 600m in length. The main wall extended from the shoreline out to sea, where it turned at a right-angle in the direction of the flood tide, thereby trapping fish on the ebb. A second right-angled wall was sometimes added at the

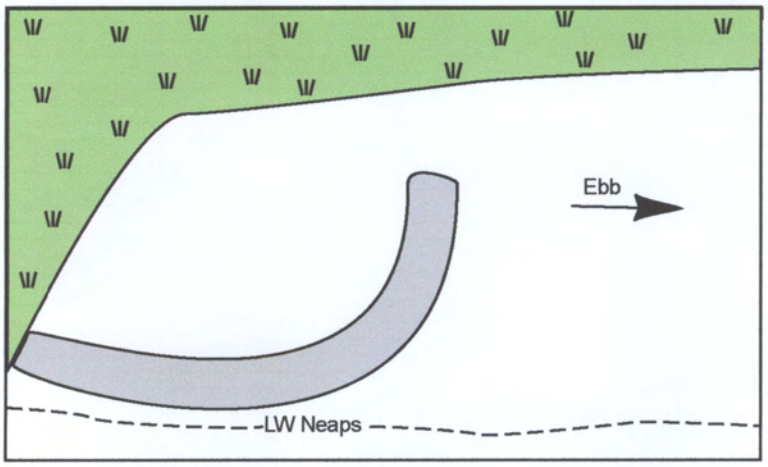


Figure 1 Type 4 Crescent-shaped trap (after Bannerman and Jones 1999).

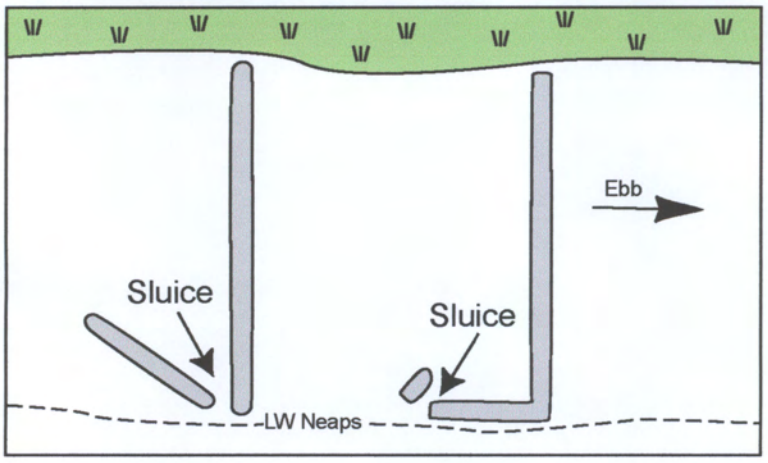


Figure 2 Type 5 Rectilinear trap (after Bannerman and Jones 1999).

end of the return wall, facing back towards the shore. Sluices, often called a *box* or *slap,* were positioned at one or both of these angles. Fish swam with the ebb tide through the box, getting caught in a trap or net positioned within it.

Ferrier (1969, p. 33) noted that many of the Lochbroom traps, or *yairs,* were rectangular, and many examples of this type of trap were located during the FTS survey (see below).

Type 6 The 'V' or 'Double V' shaped trap (figure 3)
These traps were similar in size and construction to rectilinear traps and were built of stone; of wood with a base of stone; or simply of wattle if in a sheltered position such as in an estuary. Two walls extended from the shore down to the low spring tide level where they met to form a 'V' shape. The sluice was placed at the apex of the 'V'. Sometimes two 'V' shaped traps were placed side by side to form a 'Double V' shaped trap (resembling a 'W').

Many river traps were of this form, and late nineteenth century descriptions and illustrations give some idea of the construction of fish weirs on the River Severn. They consisted of timber braces and piles running across the river to form a 'V' shaped funnel. The funnel pointed downstream and at its apex was a 'doorway', about 1.25m wide, within which was held a bag-like net. The net was attached to poles and controlled from above by a person standing on a catwalk (Pannett 1988, p. 371).

Two V-shaped coastal weirs were still in use at Minehead in 1988 (Aston and Dennison, 1988 p. 401). They had drystone walls composed of lines of beach boulders with pebbles and other stones used as infilling. The banks were about 100m long and along the outside of one weir was a line of stakes from which nets were hung to supplement the catch. The owners of these weirs reported favourable catches when compared to the use of stake nets.

Type 7 The 'S' shaped weir (figure 4)
These traps consisted of a long 'S'-shaped wall that ran out to sea from the shore. A spur was placed at the offshore end and the sluice was located at this junction. They were often made of wood with a stone wall at the base and some recent examples of these traps were over 4m high. No traps fitting this category were located during the FTS survey, but many of the rectilinear traps have curving walls, and are therefore similar.

In addition to the types of trap described by Bannerman and Jones for North Wales, the following trap types were employed in Scotland.

Eel Trap
Large conical wicker baskets were used to trap eels and a single basket could have and opening of over 3m in diameter. The baskets were often attached side by side and row upon row onto a sturdy wooden framework. An example appears to be depicted on the 1851 Admiralty Chart of the Forth (figure 11, below).

Conger Eel Trap
A different type of eel trap was constructed to trap conger eels. A pile of stones was built and surrounded by a circular stone wall, enclosing a pool around the stones. Conger eels would bed down in the pile of stones until being disturbed by the fishermen, when they would attempt to escape and become trapped in the pool. Many of the traps noted on the Moray CZA survey (below) consisted of piles of stone and may be the remains of either this type of trap structure or of croys.

Croy

The croy was a cairn of stones heaped on the riverbed that had its top projecting above the surface of the water (Robertson 1998, p. 27). They were between 3 and 13 metres in length and caused currents to eddy around them, creating backwaters which attracted salmon. A net, designed to enmesh salmon by the gills, was secured to one or more of the croys and anchored to the riverbed. The top of the net was lined with corks and floated to the surface.

Spirling Trap

The Statistical Account for Flisk, Fife (1845, vol. 9 p. 605) recorded two stations for catching spirling (smelt). They consisted of:

> ... *two or three nets at each. The net used is trumpet-shaped, and eight yards long. Its mouth is fixed to poles placed in the current, and across the stream; and the fish are caught in the ebbing tide.*

Seal Trap

A seal trap was noted in the parish of Nigg, Kincardine, (Statistical Account 1845, vol. 11, p. 207) Seals were regarded as competitors and were killed by fishermen to protect the fish that they had trapped. The trap was arranged on wooden poles and:

> *nearly resembles the net used in killing salmon, but is much less. A salmon, as a bait, is made fast in the bag of the net, and to the fish is fastened a cork, which floats on the surface. As soon as the seal catches hold of the fish, the cork instantly goes under water, which being observed from the shore, the door of the net is immediately closed by pulling a rope. The seal then becomes an easy prey, being confined in the net.*

Stake nets

Stake nets were developed in the Solway Firth at the end of the eighteenth century and were designed to catch salmon. Rows of stakes between four and six feet apart ran from the shore to the low water mark. The stakes were fastened together with strong ropes to which nets were attached. The nets acted as a barrier or *leader* that channelled the fish towards openings that led into net enclosures, known as a *courts* or *yards*.

Went (1964) depicted a schematic diagram of a stake net with a circular enclosure at the end of the leader. Once inside an enclosure, a labyrinth of nets prevented the fish from leaving again. The nets could be built very high to prevent fish from swimming over them. Sloan (1833) described nets at Dornoch, Dumfries-shire as being between a quarter of a mile to one mile long and rising from four feet at the shore to ten to twelve feet high at the seaward end.

Stake nets had to be checked regularly at low tide to remove the captured fish. Because of tidal variations, they could only be fished for about sixteen hours out of every twenty-four (Robertson 1998 p. 117).

They were a highly efficient way of catching salmon and soon spread throughout Scotland and abroad. In Ireland, they became known as Scotch nets (O'Sullivan 1994, p. 12) and evidence from Swansea Bay suggests that stake nets replaced the numerous stone fish-traps that were in use in the nineteenth century (James and James 2003).

Stake nets proved to be so successful that action was taken to suppress them. The huge numbers of fish caught in stake nets led to arguments that certain species were going to become extinct. Often, the bans were extended to all types of fish-trap in an area and led to the general decline in the use of traps (see below).

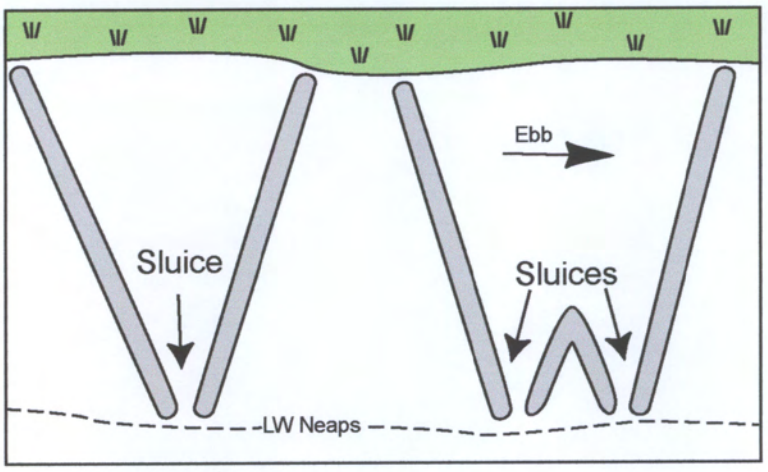


Figure 3 Type 6 'V' and 'Double V' shaped traps (after Bannerman and Jones 1999).

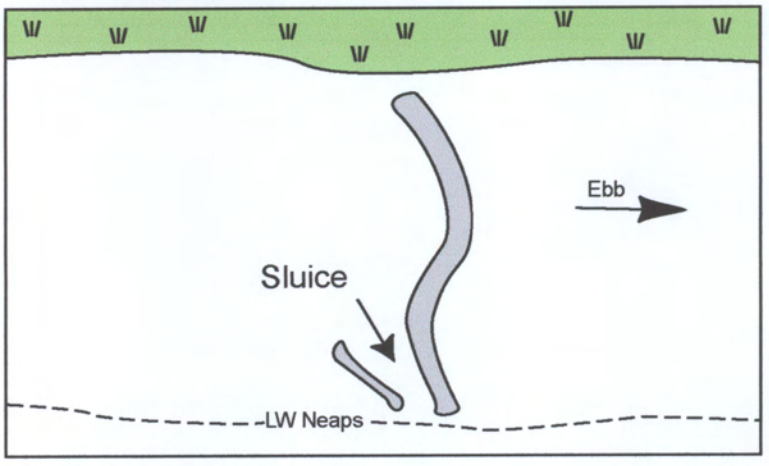


Figure 4 Type 7 'S' shaped weir (after Bannerman and Jones 1999).

Historical references to fish-traps

As noted above, fish-traps were positioned in rivers, estuaries and on the coast. There are numerous historical references relating to them in Britain and Ireland and in the following discussion, the references are from the entire British Isles, but can be taken as an indication of the development of the fishing industry and deployment of fish-traps in Scotland.

Early references to fish-traps

It has been argued by Losco-Bradley and Salisbury (1988, p. 345) that the earliest reference to a trap is in De Bello Gallico. Caesar stated that sharpened posts in the River Thames were used to defend a ford (Hadford 1951, p. 137). Losco-Bradley and Salisbury have speculated that the posts may have been then remains of a disused fishing weir. Although possible, it seems unlikely as Bede also mentions the episode (Book 1, Chapter 2: Sherley - Price 1955, p. 41), stating that the posts were still visible when he wrote his account and that they were encased in lead. This use of lead on a fish-trap is unique and would seem to confirm Caesar's opinion that the stakes were defensive.

A fish-trap featured in the account of a battle in Ireland of 1014 (Went 1964, p. 203). The Battle of Clontarf is recounted in the twelfth century historical saga Cogadh Gaedhel re Gallaibh. During the battle, Turlough O'Brien was struck by the incoming tide against a weir and drowned.

Another saga featuring a fish-trap is the Hanes Taliesin. Although surviving copies date to the sixteenth century, it probably refers to the life of a sixth century Welsh poet. It uses the Welsh word *gorad* for a stone trap, stating that:

> *...the gorad of Wyddno was located on the beach between the Dyfi and Aberystwyth* (Myrvyrian Archaeology 1801).

This weir, owned by King Wyddno, usually yielded fish to the value of one hundred pounds every May eve, but in one year it trapped no fish. Instead, a child was found in a leather bag hanging upon a pole of the weir. Although possibly exaggerating the value of the haul, the account contains details worthy of note: the weir was a royal possession; it was seasonally successful; and wood was used in at least part of the trap's construction.

Early charters also mentioned fish-traps, and a Saxon charter of 690 recorded a fish weir off Aust on the English side of the Bristol Channel (James and James 2003; Hooke 1981, p. 268 - 72). *Goredi* are noted at Caldicot, Gwent in a charter of c. 895 (James and James 2003).

The Domesday Book makes frequent references to both river and sea fisheries, especially in eastern England. The fens are recorded as having large numbers of traps, and numerous weirs are recorded on the river Severn, with at least eight fisheries in Shropshire and another six in Worcestershire (Pannett 1988, p. 375). Sea fishing was an important source of income for some Suffolk villages and a sea weir is mentioned at Southwold (Taylor, 1988 p. 466).

By the time of the Magna Carta, many *kidells* (fish weirs) were regarded as a nuisance. The main complaint against them was that they obstructed boats, especially in estuaries and rivers. It led to the order that:

> *All kidells for the future shall be removed from the Thames and Medway and throughout England, except upon the seashore* (Magna Carta, Article 33).

This exemption for fish-traps on the coast must have acted as a stimulus to the construction of coastal fish-traps, and is something that is repeated throughout the history of fish-trap legislation in Britain (see below).

Fishing and religion

The fishing industry as a whole was greatly stimulated by religious practices advising or enforcing abstinence from meat consumption. Although often thought of as a medieval monastic practice, the eating of fish on certain days predated the medieval church. The ritual of eating fish on Fridays was established by some Pagan cults and in the first quarter of the 4th century AD, Emperor Licinius issued a decree that fish had to be eaten instead of meat on certain days. The church later adopted the practice as a commemoration of Good Friday (Bond 1988, p. 69).

It was the Rule of St Benedict (c. 530) which made abstinence from the flesh of all four-footed beasts a special feature of monastic life. The imposition of religious fast days prompted an expansion of the fishing industry. Much of the fishing was either done by, or on behalf of, religious houses. Monasteries oversaw the development of both inland and coastal fisheries. They built fishing weirs in rivers; set eel traps in millstreams and created artificial fish ponds. They also constructed foreshore weirs and 'sea hedges' at the coast.

Records relating to the large estate at Tidenham in Gloucestershire demonstrate the scale of monastic interest in fisheries. The estate was owned by Bath Abbey and between c. 956 and 1060, included over one thousand fish weirs (Bond 1988, p. 78).

Many fish weirs were massive constructions requiring the resources of major landlords to build. They supplied the stone, timber and labour for the initial construction of the traps. Documentary records for the estuaries of Carmarthenshire (James and James 2003) show that it was the medieval Lords of Wales that controlled fishing in the inland waterways and on the seashore. Once built, the upkeep and operation of the traps was often leased out, although many owners granted fishing rights and traps to Abbeys and religious houses. In 1184, Rhys ap Gruffydd granted the coastal weirs at Aber-Arth to Strata Florida Abbey (Jones 1983, p. 35; James and James 2003); and Geoffrey de Marmion, Lord of Llanstephen gave a gift to the Knights of St. John which included a fishery at Llanstephen.

Anson (1950, p. 1) noted that it was common for the Kings and Lairds of Scotland to make such gifts to religious houses, and the Statistical Account for Newburgh, Fife (1845, vol. 9 p. 65) noted that Earl David granted in a charter:

> *...to the church of St Mary and St Andrew of Lindoris, and the monks there serving God, the island which is called Fedinch, and all the fishings in Tay, adjoining the said island, except one, viz. a yair at Tolcrik.*

King Alexander II granted the Black Friars of Inverness fishing rights on the River Ness in 1240 (Hale forthcoming, p. 9).

Relations between landowners and monastic houses weren't always good however. In 1282, the Welsh Prince Dafydd ap Gruffydd tried to obtain rent from monks for, amongst other things, herring from a fishery on the coast of the Lleyn peninsula at Neigwyl (Bond 1988, p. 78). The fish-traps on the Skerries, North Wales, were regained by the Bishops of Bangor in 1498 (Bannerman and Jones 1999, p. 75).

Fish-traps in particular areas were often controlled by a single Order. The Cardigan Bay traps were related to the Cistercians (Bannerman and Jones 1999, p. 75), with the Rhos on Sea trap being built in c. 1190 (Momber 1991). The Valliscaulian Priories of Pluscarden, Beauly and Ardchatten derived a large part of their income from the local salmon fisheries after their foundation in the early thirteenth century. At Wisbech in Cambridgeshire, surveys of the Bishop of Ely's manor made between 1251 and 1492 -93 refer to its sea and river fisheries on the Nene (Woodgate 1953, p. 243-44).

Monastic Orders were also linked with the distribution of fish. By the thirteenth century, Great Yarmouth had developed into a major herring market, which led to several Cistercian monasteries acquiring property either in or near the town so that they could buy and sell fish (Bond 1988, p. 76).

The prohibition on eating meat seems to have started to break down some time after 1200. Despite this, fish continued to play an important part in the monastic diet. At Canterbury Cathedral Priory in c. 1300, the dish for one monk consisted of two soles or one plaice; four herrings or eight mackerel (Bond 1988: quoting Smith 1943, p. 42). Even in the fifteenth and sixteenth centuries, fish formed a major part of the diet, and at St Swithuns Priory, Winchester in 1492 - 93, fish was the main meal for 139 out of 206 days. In 1514 - 15 it was the main meal for 165 days out of 278 (Bond 1988, p. 70).

Illustrations of fish-traps

The earliest representation of a fish-trap is an illustration of an eel trap on the fourteenth century Luttrell Psalter (Trevelyan 1958, plate 15). Another early depiction of a weir is on an estate map held in the archives of Westminster Abbey and dating from 1460 - 1470 (Westminster Abbey muniment 432). It shows two diagonal barriers stretching from either bank of the river Colne at Haresfield. The barriers form a 'V' pointing downstream, with a gap at the apex for a basket or net.

The longevity of fish-traps

Records relating to specific fish-traps help to illustrate the longevity of some of the structures. It is important to note that many traps were used over a long period and often underwent modification, and that any absolute dates obtained through archaeological dating techniques may relate to the last phase of use or reconstruction of the trap.

A set of documents relating to traps in the estuaries of Carmarthenshire were examined by James and James (2003). They spanned 150 years and demonstrated both that the fish-traps had a long life and that a single name could relate to a group of traps.

A document of 1411 named several weirs in the area, including *Ladywery*; *La Newere*; *Blanchard*; *Vincent* and *Edwere*. Two years later (1413) a document named only *Newere*; *Blanchard*; *Vycent* and *Edwere*. In 1481-2, the weirs were listed as *Vincentiswere*; *LeRoke* and *Ladiswere alias Embwer*. This seems to show that two of the weirs mentioned in 1411 (*Ladywere* and *Edwere)* had become amalgamated. This is also indicated in a document of 1532, when *Ladywere alias Ebewere* is noted. A final document of 1564 mentions only the *Ladyweren*, dropping the *Edwere* element of the name. James and James further noted that the Salmon Scar trap, known locally as Y Caj, had been built by a local family from the remains of a derelict weir in the third quarter of the nineteenth century, further prolonging the life of the trap.

A fishery at Limerick was named the Lax weir in a charter from the twelfth century (O'Sullivan 1994, p. 12). This name is derived from the Norse word for salmon and hints at an even earlier date

for its construction. It was still operating in the seventeenth century, where it was recorded in the Civil Survey of 1654 -56 as the:

greate salmon weare called Laxweare.

Archaeological evidence for fish-traps

Archaeological surveys throughout the British Isles have revealed the remains of numerous fish-traps. They have usually been located as a result of detailed coastal or intertidal surveys. Follow-up work has been undertaken at a number of sites, mainly concentrating on obtaining a detailed plan of the site and, where possible, a date. Many surviving fish-traps have elements that remain submerged at all times (except possibly at the lowest Spring tides) and it is not unusual to locate timbers surviving under water during the surveys. Some of these pieces of wood have been radiocarbon dated and the results are presented below.

Prehistoric fish-traps

Archaeological evidence indicates that the earliest fish-traps date back to the Mesolithic (Pederson (1995). A Neolithic eel trap made of woven dogwood was recovered from a wetland excavation at Bergschenhoek, Holland (O'Sullivan 1994, p. 12) and one of the fish-traps located during the survey at Wootton Quarr, Isle of Wight was radiocarbon-dated to the same period (English Heritage 1996).

A possible Bronze Age fish-trap was found during the Shannon coastal survey (O'Sullivan 2001). It comprised of two rows of posts supporting wattle fences. Also in Ireland, rows of wooden stakes joined by wattling found in an ancient river bed at New Ferry, Lough Begg (Mitchel 1965, p. 1) have been dated to 1000 BC.

Early Medieval fish-traps

The Shannon survey (O'Sullivan 2001) also revealed ten medieval fish-traps forming five discrete groups and dating from the fifth to the thirteenth century AD. A post and wattle fence was located eroding out of the clay on the Fergus Estuary, Co. Clare (O'Sullivan 1994). It consisted of a line of sharpened round-wood posts with stout rods woven between them to form a barrier and was radiocarbon dated to 534 - 646 AD.

A trap on the river Trent at Colwick, Nottinghamshire was dated to the 8th - 9th centuries by the excavators (Losco-Bradley and Salisbury 1988, pp. 329 - 338). This Saxon trap was formed of a double row of posts with wattle hurdles between them. The posts survived to a length of 1.4m, of which 1m was hammered into the riverbed. Two of the posts were oak and the majority of the other timbers were holly. The hurdles were made of hazel and comprised vertical 'sails' between which were woven horizontal 'rods'.

A survey of the Blackwater Estuary, Essex (Dix and Bull 2000) revealed numerous wooden fish-traps preserved due to submersion in the tidal waters. At one site in Collins Creek, over 20,000 stakes were located. The stakes were thought to have originally been up to 3 metres in length, although most survived to less than a metre. Radiocarbon dating placed the construction of these traps to the Saxon period. At the nearby site of Sales Point, a large, roughly rectangular fish weir measured over three hundred metres in length and was probably designed to catch fish on both the flood and ebb tides. The trap was C14 dated to the Middle Saxon period (late - 7th to the 9th centuries AD).

The most extensive structure revealed during the Wootton Quarr survey (English Heritage 1996) was a post alignment at the low water mark that extended over 1.25 km. It was thought to be a fish-trap and was C14 dated to the seventh - eighth centuries AD.

Twenty fish-traps were located on the foreshore of Strangford Lough (McErlean *et al* 2002), of which thirteen were constructed of stone and seven of wood. The wooden traps were C14 dated and ranged from the seventh to the thirteenth centuries AD, allowing a typological development to be proposed. A timber from one of the stone traps was C14 dated and was found to post-date the wooden structure. The excavators saw the stone traps as a later development.

Medieval fish-traps

Numerous medieval fish-traps have been surveyed and radiocarbon dated, and off Sudbrooke Point in the Severn Estuary, lines of stakes were C14 dated to the ninth to eleventh centuries.

A 'V' shaped fish weir located during the Wootton Quarr survey was C14 dated to the tenth century AD (English Heritage 1996). It was made of hurdle fences strengthened with limestone blocks and braced with wooden posts on both the inside and outside of the wall. At the apex of the weir was a circular pound, 3.5m in diameter.

Gravel extraction led to the discovery of a Norman fish-trap at Colwick, Nottinghamshire (Losco-Bradley and Salisbury 1988, p. 338 - 344). The structure was C14 dated to the late eleventh century and comprised a post alignment, originally 100m in length, which had been partially destroyed by quarrying. Wattle hurdles, surviving up to 0.65m high, stood against the posts and were held in place at the base with a packing of clay and brushwood. The alignment ran parallel to the riverbank and several shorter lines of posts came out from the bank to meet it at an angle, forming several 'V' shaped traps.

A 'V' shaped trap located on the beach at Whitepool Point, Camarthen Bay was dated to the thirteenth century (James and James 2003), as was a structure on the Deel Estuary, Co. Limerick (O'Sullivan, 1995). The Irish structure was constructed of closely-spaced wooden stakes with wattle woven between them (rather than using prefabricated wattle hurdles).

Later and Post Medieval fish-traps

A post from a trap at Deganwy, on the east shore of Colwyn Bay, was radiocarbon dated to AD 1460cal (Bannerman and Jones 1999, p. 73). A line of stakes at the Burry Inlet, Llanelli has been dated the seventeenth to nineteenth centuries (James and James 2003).

Two dates have been obtained for fish-traps in Scotland; both obtained by Hale (forthcoming p. 12) from the Moray Firth. A trap at Dingwall was built of alder stakes supporting wattle walls and was radiocarbon dated to 1667 - 1881 (sigma 1). An alder post taken from a trap at Corgrain Point was dated to 1530 - 1790 (sigma 1). Hale (forthcoming, p. 4) suggests that both dates relate to the last phase of construction of these traps.

Types of fish caught in traps

The trapping of fish is indiscriminate and a single trap can take many different species of fish. A trap will work whether it is tended or not, the fisherman's main effort being expended in maintaining the trap and removing the fish rather than doing anything to affect whether fish enter the trap or not. Abandoned traps will continue to trap fish unless totally removed, and Bathgate (1949) noted that a partially destroyed yair on Lochbroom continued to capture sea-trout and salmon.

Targeting species

The positioning of a trap in certain places resulted in a greater likelihood of target species of fish being caught, and the builders of traps used local knowledge to position their traps. Two of the most important fish that Scottish fishermen aimed to trap were the herring and the salmon. Both of these fish came close to the shore at certain times of year, although the movement of salmon was the more predictable. Many fishermen built traps in places where it was known that these fish would pass.

Herring

Herrings shoal in large numbers and migrate around the coast of Britain, visiting certain areas at about the same time each year. By following these shoals, huge numbers of fish could be caught, and its pursuit led to a dramatic, but short-lived, expansion of the Scottish fishing fleet. However, it was not until the second half of the eighteenth century that this fleet started to develop, and as late as 1767, Caithness fishermen caught herrings on iron hooks to use as bait for the more important white fish (Anson 1950 p. 3).

Before the development of the fleet, the herring industry was coastal and depended upon the herring chasing plankton within a narrowly defined area of water. This meant that the industry was unreliable as the fish didn't always come close to the shore. When they did, the results were dramatic and Parish records for Prestonpans of 1695 state that shoals of herring came so close to the coast that local people caught them in buckets (Anson 1930, p. 71).

Fish-traps could catch vast numbers of herring and a trap at Gorad Rhos Fynach, is reported to have taken 35,000 fish on a single tide (Momber 1991). A yair on Lochbroom was said to have trapped so many herring that even after all the people in the district had been supplied with fish, more than one thousand baskets of fish were left within the trap to rot (Bathgate 1949, p. 99).

Once captured, herrings decayed quickly, and those not sold fresh needed to be preserved rapidly. The intermittent arrival of the herring and the reliance upon small boats and coastal fisheries meant that there was no development of curing facilities on the east coast of Scotland until the late eighteenth century. This meant that the arrival of the herring could lead to a glut in the market, as all the fish captured had to be consumed immediately (Gray 1978, p 26). It was the dramatic arrivals of herring in the Firth of Forth at the turn of the nineteenth century, (starting in 1794 and returning each year thereafter until 1805) that led to the development of a large number of curing yards on the Forth. Over one hundred yards were set up around Burntisland alone (Gray 1978, p. 27).

The development of the herring fleet led to the use of larger boats. This meant that it became possible to process fish on board and allowed more flexibility in chasing the fish (Gray 1978, p. 21). The fishing industry rapidly expanded and the use of boats led to a reduction in the importance of fish-traps for catching herring.

Salmon

Salmon have a complex life cycle and seven distinct phases have been identified. They are born in fresh water and go to the sea as a smolt. They develop into salmon in the North Sea and return to spawn in their place of birth by following the coast until they reach their natal river. It is this migration that fishermen have exploited, taking fish as they journey either to or from their breeding grounds. Their passage meant that they could be caught in certain rivers, estuaries or on the coast.

Fresh salmon was a valuable fish commanding a high price and the traditional method of catching them was by net and coble (Robertson 1998, p. 26). One end of weighted net was paid out from a boat (the coble) whilst the other end was held on the shore. The net extended all the way to the riverbed and the boat made a semi-circular passage through the water before returning to the shore, capturing fish as it did so. The net and coble was most efficient in the upper reaches of rivers, where the water was calmer and the riverbed quite flat. Some fish-traps were also used, and Bathgate (1949, p. 101) noted that 2,560 salmon were taken at one time from a cruive pool near Thurso. However, it was he adoption of stake nets at the beginning of the nineteenth century that revolutionised salmon fishing. Vast numbers of fish could be captured, and 7,000 salmon were said to have been caught with a single stake net in the parish of Forgan in Fife (Statistical Account 1845, vol. 9, p. 510). Another account stated that there was a huge decline in numbers of fish caught after the suppression of stake nets on the Tay, with 20,000 to 30,000 fish captured annually before the ban and only 3,000 fish after (Statistical Account 1845, vol. 9 p. 589).

Other fish caught in traps

The types of fish caught in traps partly depended upon the type of trap. One argument used in favour of stake nets was that the net size used had a large mesh-size, allowing smaller fish to pass through it. Other traps were less discriminate, taking any fish that passed into them. Not all traps kept detailed records about the types of fish they caught, but accounts from around the British Isles give an indication of some of the species caught.

Trout were recorded as being taken in many traps and huge numbers were caught in fish-traps in Kilburnie, Ayrshire, (Statistical Account 1845, vol. 5 p. 696), and:

> *...one individual caught, by means of a stake-bag-net, no fewer than 150 stones.*

Sprats were caught in the Tay Estuary from December to February (Anson 1930, p. 108), and in the Forth. The Statistical Account for Dalmeny, Linlithgow (1845, vol. 2 p. 92) mentioned a fish resembling a sprat, known locally as a *garvey*, that appeared sporadically near Queensferry. It could not be relied upon to arrive in great numbers, but in certain years, huge shoals were caught at the coast:

> *...so as to glut the Edinburgh and Glasgow markets and the intermediate towns and country, and afford a surplus, which has been several times used by our farmers as a cheap and rich manure.*

The Statistical Account for Kincardine, Ross and Cromarty (1791-99, vol. 3 p. 508) recorded that the most important fish caught in a local yair were salmon, but that it also trapped:

> *...small fish ... of several kinds, some of which have no names, but such as the natives invent for them.*

The fish caught included whitebait, sturgeon, prawns, small rock cod, ware cod, gurnet, turbot, padles and flounders. The same account also noted that in 1783, whitebait were trapped in the yair:

...in such astonishing quantities, as to contribute very much to the support of those who fished the yair, as well as of many families from the neighbouring county and estates, who were invited to share the bounties of providence in that season of distress.

Sturgeon were reported as being trapped by a stake net at Portgordon, in Banff (Statistical Account 1845, vol. 13 p. 250).

Spirling (smelt) were caught in Scotland at a different time of year to salmon (Robertson 1998, p. 115) and the Statistical Account for Flisk, Fife (1845, vol. 9 p. 605) recorded two stations for the capture of this fish, one at Flisk Point, the other at Kincase.

Many of the traps set on Welsh beaches were intended to trap flat fish such as flounder (Jones 1983, p. 34). A local Moray fisherman told Hooper (2001, p. 8) that the stone-built fish-traps set on the beach at the south end of Ardersier Bay (FTS 108-111, below) were for flounders and other flat fish.

A 'V' shaped weir in Dundalk Bay, Co. Louth (Went 1964, p. 204) was constructed with stake and wattle walls. It was built before 1756 and an enquiry of 1864 described it as taking salmon and flat fish.

The Buttermilk Weir in Co. Wexford was still in use in the twentieth century and records indicate that it trapped large numbers of herring, salmon, cod and ling (O'Sullivan 1994, p. 12).

Traps located in Strangford Lough, Northern Ireland were recorded as having caught salmon, sea trout, flounders, plaice, mackerel, cod, grey mullet and skate (McErlean, McConkey and Forsythe 2002).

Records of the type of fish caught from the trap named Ynys Gorad Coch, Caernarfonshire, over a 42 year period indicate that herring was the predominant species trapped (Senogles 1969). The trap was no longer functioning when divers visited the site, but they reported that sea trout, pollock, coal fish, cod, mullet, whiting, bass and conger eels were within it at high tide. They noted that no herring were present, but the date of the dives was not recorded, so it is unsure whether the absence of herring was due to any other factor other than the dives not taking place at the right time of year.

James and James (2003) noted that in one bumper catch at one of the Carmarthenshire traps, eleven different species were collected. In general, the main fish caught in the winter at this trap were white fish (herring, whiting and Dover Sole) together with spats.

Factors influencing the design of fish-traps

Environmental factors

Fish-traps can vary from small frameworks of brushwood that exploit natural features to large and elaborate arrays of posts and walls. Twelve miles of shore trap were noted near Llanon, Cardigan Bay (Lewis 1924) and over 65,000 stakes were recorded at the Boylston Street fish weir in Boston, USA, enclosing an area of over 2 acres (Banks 1990). Bathgate (1949) noted that the smaller Scottish yairs were intended to catch fish for family groups; some of the enormous traps were for fishing on a commercial scale or for the supply of religious houses.

The form that a fish trap took was due to a number of factors including the direction of the run of the fish; local topography; the availability of building materials; and the skill of the builder. The walls of many traps were not regular, their shape depended upon the contours of the ground upon which they were built.

The most important factor was locating water that had the environmental conditions to attract fish. It is fruitless to fish in a location where there are no fish to catch. Although Bathgate (1949) made the point that fish were more common in the past, meaning there was more of a chance to catch them employing *'primitive means'*, there have always been some areas more conducive for fishing than others. Observation of these has led to the accumulation of local knowledge of good fishing spots, invaluable to any fisherman.

The siting of many yairs and nets was influenced by the migrations of salmon and herring. Observation of places where these fish were found in shallow water determined sites for traps, and often, several traps would be found on a spit or promontory whilst no traps would be found on the coast nearby. A good example of this is the large number of traps on Chanonry Point depicted on a chart of 1860 (RHP 634).

Local topography was also of importance and larger-scale fishing operations needed natural features upon which processing could take place. Fish become rotten very quickly and there was a need for either a market close by, or a place to preserve the catch. This could include flat beaches for drying fish, space to store barrels and good access to allow the catch to be taken away.

Access to a market could do away with the need for processing. The heyday of a trap in use South Wales from the nineteenth century until recently (James and James 2003) was between the 1880s and the First World War. Rail transport had allowed both access to new markets (such as Bristol) and had brought in tourists, creating a new local demand.

The proximity of a local market or places to undertake processing was not so important for smaller scale fishing, undertaken to supplement a family's diet. Such fishing was usually undertaken on a part-time basis, and was often opportunistic, for example when shoals of fish came close to the shore. Many traps built to supply such local demand would have been small and Bathgate (1949) noted that there were many such irregularly-shaped traps located in the Dornoch, Beauly and Cromarty Firths.

Traps needed to be constructed where there was an adequate tidal range to allow the fish to enter the trap on the flood tide but get stranded on the ebb (Bannerman and Jones 1999, p. 72). To help overcome the problem in areas with a large tidal range, some beach traps were arranged in two bands along the coast, one to cover spring tides, the other for neaps.

Another solution was to construct massive walls to trap the fish behind. The beach *goradau* of North Wales operated in areas of considerable tidal range, from 5m in south Gwynedd to 9m in the Menai Straits. A 6m - 7m range was usual and the tallest surviving stone walls of a *gorad* still stand to a height of 3m. During its working life, posts and nets would have extended the height considerably.

Traps located in estuaries often didn't need to be so large, and there are numerous fish weirs on the gently shelving mudflats of the Bristol Channel. They continued to be used until the end of the twentieth century at Porlock Bay, Blue Anchor Bay, and Bridgewater Bay (Aston and Dennison, 1988). Some of the best preserved of these traps are at Minehead and these have been scheduled.

Utilising natural features benefited the trap builder and the Salmon Scar weir (James and James 2003) was positioned to make best use of a hollow in the sandbanks. It enclosed an area of 2 hectares and had a maximum length of 270m. No walls were constructed in areas where the natural scar was at its highest, but at the seaward end approaching the cage, low stone banks with timber uprights supporting nets were built.

River weirs were normally sited on shallow gravely sites or riffles found along the channel, as this made the traps easier to build and manage (Pannett 1988, p. 378).

Building material

Traps were made of stone, wood or a combination of the two. Stone traps were stronger, and often better suited to withstand the strength of the waves, wind and tide when located on exposed beaches. A huge amount of labour went into their construction and upkeep and Lewis (1924) described the hard work that went into rebuilding the stone walls of the Aber-Arth goredi after a storm. Stone traps were built of locally available material, and many traps were built with rough walls made of uncoursed beach boulders. This meant that although stronger than a wooden trap, they were still liable to collapse. In some area, the local stone was more suitable for the construction of large traps, and the jointing of the limestone outcrops on Anglesey is such that when quarried, blocks of stone are produced that are virtually dressed. This made the construction of stone traps much easier and enabled many of the huge traps found around the North Wales coast to be constructed. Another advantage of a stone trap was that animals colonised the interstices of the building blocks. They acted as bait and attracted fish to feed within the trap upon the flood tide.

Went (1964) described two functioning stone traps in Doonbey, Co. Clare. The traps were sited on a flat beach and one had a wall over 350m long, the other over 600m. It would have taken a considerable effort to build these traps and it would have been much easier to construct them of wood rather than stone. When questioned on their choice of building material, the owners stated that the reason stone was used was twofold. Firstly, there was a local scarcity of timber, but stone was plentiful. Secondly, the traps were built on a natural outcrop of rock, meaning that wood could not be driven into the foreshore.

That it was not always possible to construct wooden traps is also demonstrated in the Statistical Account for Inverkeilor, Forfar (1845, vol. 11 p. 242), which noted that fishing was carried out in the sea:

> *...by a suspension net, as the rocky shore will not admit of stakes.*

Hale (forthcoming) noted that fish-traps located during the CZA survey of the Moray Firth were mainly concentrated in more sheltered areas, and that none were found on exposed coasts. He suggested that this might have been due to portable fishing engines being employed.

Wooden traps employed vertical posts upon which nets or wattle-work was supported. The posts could have been driven in using elaborate rams with pulleys and weights, or more likely, with a section of tree trunk with projecting handles for use by two men, called a *mall* or *mell* in some areas (Losco-Bradley and Salisbury, 1988 p. 346). Many wooden traps employed wattle fences to form a leader that channelled fish into the trap. The wattle-work was often made of willow and was either woven around the upright stakes *in situ* or was pre-prepared as hurdles that were slotted into place. The use of hurdles was especially useful for the lower reaches of the trap, as they were faster to fit and allowed more work to be done on the trap at low tide.

The upkeep of an eel trap at Toone on the Ban is recorded by Mitchel (1965). He noted that the wattle hurdles were taken out to the trap on a boat and slotted into place between the posts. As great pressure was exerted on the hurdles, they needed shoring with diagonal posts. This method of shoring was also noted on a nineteenth century trap on the Severn (Waters 1949, p. 89) and at a weir unchanged from the seventeenth century to the present day in Cork (Went 1969, p. 259).

The human factor

The design of individual traps was very much influenced by the builder of the trap. Some people were more skilled or had more time to spend on the design than others. Traps were also subject to continual modification as elements were replaced. James and James (2003) noted that the design of the weirs within their study area was highly variable. Some had significant stone-embankments with interior training walls leading to cages. They noted that even individual weirs employed different types of walling in their construction, and that only one of the fifteen or so weirs that they recorded employed just one form of walling. This variation in design was also noted at the traps related to the Cistercian Order in Cardigan Bay. Again, no uniform style was employed; the monks used different construction designs for the individual fish-traps.

Traps needed to be tended on every tide in order to remove the catch. There was also a need to thwart seals and poachers who might otherwise take trapped fish. Many traps were sited below dwellings; the people who worked the traps living in the house that overlooked them. This gave easy access at all times of the day and night and allowed the trap keeper to guard against unwanted visitors.

In addition to removing the catch, annual repairs to the walls and woodwork were needed. The owner or leaseholder of a trap usually undertook its upkeep. The Statistical Account for *Kincardine, Ross and Cromarty* (1791-99, vol. 3 p. 508) however recorded that tenants were obliged to repair a local yair annually. The landlord provided wood to enable the repairs and allowed the tenants to keep the small fish trapped in it, he retaining the salmon.

The decline of fish-traps

There are many reasons why an individual fish-traps may have been abandoned. It may have been unproductive; been destroyed in a storm; or silted up. The owner may have changed business or the fish may have stopped visiting the area. Some traps went out of use because of economic factors. Not all traps were successful at catching fish. Some were placed in the wrong location whilst others were too expensive to maintain. James and James (2003) noted that a trap built in the nineteenth century next to a very productive trap was closed down again soon after its completion. The trap didn't catch enough fish, demonstrating that even in a very localised area, one trap could flourish while another lay empty.

There are other accounts of traps being closed down due to a lack of fish at Largo Bay, Fife (Stat. Acc. 1845, vol. 9 p. 441); at Brighouse Bay, Kirkandrews and Knockbrex in the parish of Borgue, Kircudbright (Stat. Acc. 1845, vol. 4 p. 52); and at Glenshiel, Ross and Cromarty (Stat. Acc. 1845 vol. 14 p. 206). The Account for Dingwall sought to blame the poor construction of a trap for its lack of fish:

> *There is also belonging to the town a yair fishing in the frith, which pays a trifling rent, but, owing to malconstruction or some other cause, it has been for a few years past very unproductive.*

However, the main cause for the abandonment of many traps was legislation. The growing demands of navigation, conservation and sport fishing led to increased laws and the decline of many weirs (Pannett 1988, p. 382). New regulations dealt with many things, including where people could fish; the time of year they could fish; the types of net that could be used in traps; the types of fish caught and the types of engine used (Moorhouse 1988, p. 479).

Regulation of stake nets

The greatest impetus to the regulations was the introduction of stake nets at the end of the eighteenth century. These traps were intended to take salmon and were greatly despised as being too efficient by many people. The following account is based on the Tay, but is applicable to all major salmon rivers in Scotland.

As noted above, the traditional way of catching salmon was by net and coble. This form of fishing worked better in rivers than in estuaries or on the coast, as it relied on relatively deep water within a short distance of the shore and a bed which was smooth and free of holes and obstructions. Additionally, the method did not work well in a swell as the ground rope of the net was lifted from the bottom. The net and coble was well suited to the waters of the Upper Tay and the fishermen around Perth enjoyed the best catches of salmon. A comparison of fishing rentals from the estuary (Dundee eastwards) and the river (Perth to Dundee) illustrates this. Estuary rentals amounted to just £500 per annum; river rentals to £7,000. It wasn't that the estuarial proprietors weren't aware of the large numbers of fish that passed through their waters, it was that they hadn't devised an effective means of catching them.

The net and coble fishermen were subjected to regulation to protect salmon stocks, and a 'close time' that coincided with the breeding season was enforced. Additionally, a '*Saturday Slap*' (also known as the *Sunday Slap*) lasted from midnight Saturday to midnight Sunday, a period when fish weren't allowed to be trapped.

Stake nets were initially introduced to the Tay from the Solway in 1797 and proved successful immediately, capturing huge quantities of fish and alarming the fishermen and estate owners of the

Upper Tay. They successfully brought a court case against their use and the nets had to be removed again in 1805 (Robertson 1998, p. 59). The argument for the banning of stake nets was that they caused over-fishing and a decline in fish stocks.

Despite the initial ban, stake nets were soon reintroduced, leading to another court case (Atholl v Maule) in 1812. The verdict was again against the use of nets (Robertson 1998, p. 63), but it should be noted that the ban was widened to take in other types of trap. The ruling stated that the defendants had no right to:
...erect or use yairs, stake nets or other machinery of the same nature for the catching of salmon or other fishes.

Estuarial fishermen, having seen the huge profits that could be made, attempted to get around the ban by making slight modifications to their nets and, more importantly, changing the name. This forced new (and lengthy) court battles, during which time they continued to fish. They devised new fishing engines, such as the bag net, the pock net and the sole net. Another way around the ban was to catch the salmon before they ventured into the Firth, and stake nets were erected on the coast after 1821 (Robertson 1998, p. 65).

Arguments for and against fish-traps
The dispute between the traditional fishermen and the owners of stake nets led to the establishment of two Investigatory Select Committees to look at the problems associated with salmon fishing; one in 1824, the other in 1827. This was at a time when the life of the salmon was not fully understood, and both sides put arguments forth.

Supporters of the stake nets argued that the ground rope used by net and coble fishermen dragged on the river bed and caused damage to redds and salmon spawn. Another argument was that that there was a distinction between salmon in fresh waters (which were returning to breed), and fish in estuaries and on the coast (which were merely 'loitering'). These estuarial fish were thought liable to be taken by seals and other predators and were therefore fair game for the stake net fishermen (Second Report on the Salmon Fisheries of the UK 1825, Appendix 3, p. 81).
The Statistical Account for Balmerino, Fife (1845, vol. 9 p. 591) echoed this view, complaining that:
...the seals and grampuses have remained in undisturbed possession of the salt water fishing... and that *... the myriads of salmon which escape from the rivers and find their way to the sea...are totally lost, or only abandoned as a prey to the monsters of the deep.*

A contrary argument stated that fishing engines took fish **in addition to**, rather than **instead of**, them being taken by predators (Second Report on the Salmon Fisheries of the UK 1825, Appendix 3 p. 23).

Many of the various Statistical Accounts (1845) from parishes where salmon fishing was once important were opposed to the nets on the grounds that the numbers of fish had declined since their introduction. Opponents included authors of Accounts for Knockando, Elgin (vol. 13 p. 66); Kirkpatrick-Durham, Kirkcudbright, (vol. 4 p. 257); Kilwinning, Ayrshire, (vol. 5 p. 815) and Lochmaben, Dumfries, (vol. 14 p. 381). The author of the account of Dalry, Ayrshire, (vol. 5 p. 214) also blamed the traps for the decline in the number of trout.

The biggest attack on the traps was made by the author of the Account for Drumoak, Aberdeenshire (vol. 12 p. 892) who complained that not only do the stake-nets took too many fish, but that:

...by infringing the Sunday's slap, the ascent of the fish to the upper spawning-ground is in a great degree prevented.

To show the extent of the decline, the author presented a table showing the number of salmon exported from Aberdeen each year for a six-year period (Table 1, below). The figures included fish caught by net and coble and by stake nets, as well as all the coastal fisheries, and do suggest an alarming decline in salmon exports.

Year	1834	1835	1836	1837	1838	1839
B. B.	10,372	7,981	7,757	5,234	4,270	3,894

Table 1 Decline in the amount of salmon exported from Aberdeen over a six-year period

The ban on fish-traps

The conclusion of the Select Committees was that salmon stocks were decreasing and they recommended a series of measures, including an extension of the annual and weekly close time and regulation of net sizes. However, the reports did not mention modes of fishing, beyond a hope that it would be taken up in future sessions of parliament, and this failure to resolve the split between upper-river and estuarial fishers led to Parliamentary infighting on the subject. The proposals of the two Committees were not taken up in the Salmon Fisheries (Scotland) Act 1828 (otherwise known as the Home Drummond Act), leaving the dispute over fishing methods unresolved. Despite this lack of national legislation, many local acts were enforced banning the use of fish-traps in many of the Firths and estuaries of Scotland. The bans often extended beyond stake nets to encompass all types of trap and they were banned from many estuaries and rivers in 1812 (Statistical Account 1845 vol. 9, p 520). Traps were completely excluded from the Cromarty Firth in the 1840's (Alston 1999, p. 74).

This banning of stake nets led to a few of the authors of Statistical Accounts to lament their suppression. These sentiments are notably expressed from parishes bordering the Tay (Ferry Port-on-Craig, vol. 9. p. 85; Forgan vol. 9 p. 510; Balmerino vol. 9 p. 589; and Flisk vol. 9 p. 605). They bemoan the loss of livelihood brought about by preventing fishing by traps within their parishes, the author of the Balmerino account complaining that:
...many of the individuals employed in that amphibious kind of occupation have betaken themselves entirely to the trade of weavers, none of them has, however, as yet risen to the dignity and professional importance of manufacturers.

It was not until the 1860s that national legislation was enacted, with a series of Salmon Fisheries Acts, both for the UK (1861 and 1865) and specifically for Scotland (Salmon Fisheries (Scotland) Act 1862 and 1868). The Acts followed on from another Committee set up in 1860 which recommended that all cruives and fixed engines on rivers or coasts be abolished, or at least, no new ones be allowed.

The Acts established new annual and weekly closed times (Ferrier 1969; Robertson 1998, p. 126) and sought to modify existing fish weirs in rivers and estuaries and forbid new ones (James and James). The legislation and subsequent Acts virtually ended the construction of fish-traps (Bannerman and Jones 1999, p. 79).

The Elgin Commission of 1900 looked into Salmon fishing in England, Scotland and Wales. Its recommendations included a reduction of net fishing in narrow waters and an increase in coastal

netting. No legislation followed on from the Commission Report, but it gave an indication of opinion at the end of the nineteenth century.

Physical survival of fish-traps

The discussion above indicates that the use of fish-traps was once common on rivers, estuaries and at the coast. Many were in use during the medieval period or earlier and they remained an important method of fishing until their decline in the nineteenth century. We may, therefore, expect to see frequent evidence of them when visiting the water's edge. However, their remains are not as ubiquitous as might be imagined, and the CZA survey of the southern shore of the Firth of Forth (James 1996) located just one solitary fish-trap.

The following section details the factors influencing the survival of fish-traps.

Decay and collapse

The survival of a trap is partly related to the strength of the original structure. Wooden traps were generally more fragile than stone ones and any wood and wattle-work used in a trap's construction was subject to decay. Posts and hurdles had to be replaced frequently and once a trap stopped being maintained, its timber elements could be rapidly destroyed. In many cases, wood only survives where it has been protected by sediment in a waterlogged environment.

Stone traps were usually stronger than their wooden counterparts, but many were constructed in high-energy environments. Natural processes, such as storms and tidal currents, caused the walls to collapse and necessitated periodic rebuilding. Once abandoned, the walls of a trap could soon be levelled, with the action of the tide and currents shifting the stones and leading to a spread in the area were the trap used to be. Although physically still present, this stonework may not be recognised as being the remains of a trap. Ferrier (1969, p. 31) noted that only one of the Bute traps located during his survey was on the east coast of the island and believed that this was partly due to the east coast being more stormy.

Deliberate destruction

Traps sited in rivers and estuaries were often abandoned as a result of local or national regulations (see above). A fish-trap would continue to function despite being left untended, and many traps were levelled once they went out of use. The trap that Bathgate (1949) noted as capturing over one thousand baskets of herring in a single day (above) was deliberately destroyed by local fishermen. They broke down much of the outer wall of the trap after the fish caught within the disused yair were left to decay, leading to the localised pollution of the whole upper end of the loch. When Bathgate visited the site, only the seaweed-covered foundations were visible.

Many of the stakes noted on the Inverness to Fort George survey (FTS, below) displayed saw marks and flat tops, indicating that they had been cut down and not left to rot. Posts displaying evidence of having been cut down were located during the FTS survey and include FTS 67; 69; 70; 71; 72 and 73.

Erosion and accretion

There have been great changes to the coastline in many areas due to erosion, accretion and changing sea levels. Erosion can eat into the coast, leaving traps stranded far from the shore and unseen by surveyors. Of more significance, erosion leads to sediment being transported by the sea, and many traps have become covered with sand or silt, either during their use or after their abandonment.

A study of the estuarine weirs of Carmarthenshire (James and James 2003) showed that most of these traps were established by the thirteenth century, although many were probably much earlier. By the sixteenth century, most were returning no income and it is thought that the reason for this

was coastal change, especially the movement of sand. The authors noted that rents from a trap named *Broadwere* in 1443-4 amounted to 20 shillings. Forty years later, rents from the *Broad weir* amounted to only six shillings and eight pence and by 1504 the *Brodewere* was no longer functioning due to it being engulfed by sand.

The Statistical Account for Balmerino, Fife (1845, vol. 9 p. 589) noted that fishing for spirling was once very productive, but had declined:

> ...*probably on account of the increase of the sand-banks.*

Sometimes, the design of the trap itself led to it being engulfed, and one commentator noted that weirs not only trapped fish, but silt also. The Statistical Account for Dingwall, Ross and Cromarty (1845, vol. 14 p. 224) discussed the ease with which land could be reclaimed from the coast, noting that a yair in the neighbourhood, erected just a few years before, was already covered:

> ...*in a bed of mud of considerable depth.*

Rivers also change their course over time and it has been noted that in some areas, the greatest chance of finding the physical remains of traps is within relict river channels or under flood banks (White 1984). Quarrying in the Parish of Colwick, Nottinghamshire revealed a collapsed fish weir 200m from the present position of the River Trent. The Saxon trap lay under one metre of overburden and four metres of gravel (Losco-Bradley and Salisbury 1988, p. 329).

The Statistical Account for Kinloss, Elgin (1845, vol. 13 p. 209) noted that a trap was affected after the:

> ...*great flood of August 1829 so altered the course of the river at its confluence with the sea, that, for some seasons afterwards, it yielded not the same return* (of fish) *as before.*

It should be noted that the movement of sediment may also lead to traps being re-exposed, and a document of 1609 stated that the *Broad weir* (above) was again in operation. This possibly demonstrates that the sand had again shifted, although it is possible that at a new weir was built in another location, assuming the same name. The trap excavated by Hooper at Ardersier (2001, p. 5) had been visible at low tide in 1971, but had then disappeared until being re-exposed in the summer of 2000.

Rising sea levels

Some traps have been submerged by the sea and the survey of structures on the Blackwater Estuary, Essex revealed that the Saxon remains had been drowned by post-glacial rising sea-levels (Dix and Bull 2000). One of the traps, at Sales Point, was only exposed by the lowest tides of the year, but when in use would have been exposed at every low tide.

Fowler and Thomas (1979) have devised methods for plotting sea-level rise in Cornwall and the West Country by using the position of fish-traps and other intertidal features. These methods are contentious however, as noted by work in North Wales. The survey of the trap at Clynog Fawr, Caernarfonshire revealed it to lie 2.8m below Ordnance Datum, taken by the author to indicate a sea-level rise of about 3m in Caernarfon Bay over the last millennium (Momber 1991, p. 95). An earlier paper by Jones (1983) appears to refute this, stating that changes in sea level could not be plotted by studying fish-traps in Gwynedd, as there had not been a profound rise in the area.

Development

Many authors have noted that one of the best places to locate a fish-trap is at the mouth of a river. Bathgate (1949) observed that this is also the location favoured by many settlements. He noted that

there had often been much development in these areas, such as land reclamation and harbour and wharf construction, leading to many traps being destroyed or obscured. The problems of accretion and erosion have led to the dredging of shipping channels and the construction of floodbanks and coastal defences, which has also affected many traps.

Development has increased dramatically, even since the time of Bathgate. This is particularly true of the Firth of Forth, where there has been a great deal of reclamation along its banks (figures 5 and 6 below). The land has been used for the construction of, amongst other things, power stations at Longannet and Preston Island, an oil refinery at Grangemouth and the Naval dockyard at Rosyth. This has inevitably led to much evidence being lost and is discussed in more detail below.

Locating fish-traps

Despite the points raised above about the survival of fish-traps, many still await discovery. Hooper observed that no traps had been noted in the Sites and Monuments Record for the beach at Ardersier at the time of her excavation (Hooper 2001, p. 7). She noted that this was due to the absence of archaeological recording in the area rather than a lack of physical remains, and located several traps in the vicinity of the excavated site.

There are several techniques that can be employed to locate fish-traps and a combination of strategies is usually best. By using several methods, the chances of finding traps is increased and the danger of confusing fish-traps with other structures is minimised.

Desk based assessment

Plans

Plans, maps and Admiralty Charts can provide useful information on the location of some traps. However, maps and charts do not always depict the position of traps, even if they were still functioning when the cartographer surveyed the area. James and James (2003) noted that despite their extensive search of cartographic documents of the Carmarthenshire traps, none of the Admiralty Charts or Ordnance Survey maps showed any weirs, despite documentary evidence indicating that the fish-traps were still in use. They found only one depiction of a fish-trap on all the maps that they examined. A plan of 1807 by John Wedge showed a '*wear*', although the same cartographer did not record the fish-trap on a second chart made in 1814.

The depiction of traps on maps depended upon the purpose of the map. Admiralty Charts would show traps if they were a hazard to shipping or were of such a size as to be an aid to navigation. As many traps were located in the intertidal zone above the Low Water Spring Tide mark (which was depicted on the charts), the surveyors didn't always see the necessity of depicting traps, especially if they were out of use. In the case of the Carmarthenshire Admiralty Charts, several barrel posts were marked. These would have alerted shipping to danger and meant that the depiction of individual traps was unnecessary.

Aerial photographs

Ferrier (1969, p. 33) recommended using a high viewpoint to locate fish-traps and gave the example of the large semi-circular trap visible when looking down on Lamlash Bay, Isle of Arran. The use of vertical aerial photography has the same advantage, and is well established as a tool for detecting archaeological sites in Britain. They are routinely used for plotting features during coastal surveys and no surveyor in Britain would admit to undertaking such a survey without looking at all available vertical aerial photographs.

Their utility depends upon two factors, the scale of the photograph and the state of the tide. Most vertical photographs of the coast are not commissioned by archaeologists and flights are often flown without regard to the state of the tide. This means that although many photographs exist, few are taken under optimum conditions for locating intertidal sites.

Some flights have been commissioned to coincide with low tide, and the Countryside Council for Wales (CCW) have produced a series of photographs as part of their Marine Intertidal Habitat Survey. This project mapped intertidal eco-zones and archaeologists worked with the natural heritage agency, identifying archaeological sites and areas of peat in a sub-project named the North

Figure 5: Changes to the coast of the Firth of Forth (Kincardine to Charlestown)

Start and finish of major changes marked with red arrows
Present day coast (blue) over Admiralty chart of 1851
Scale 1:50 000

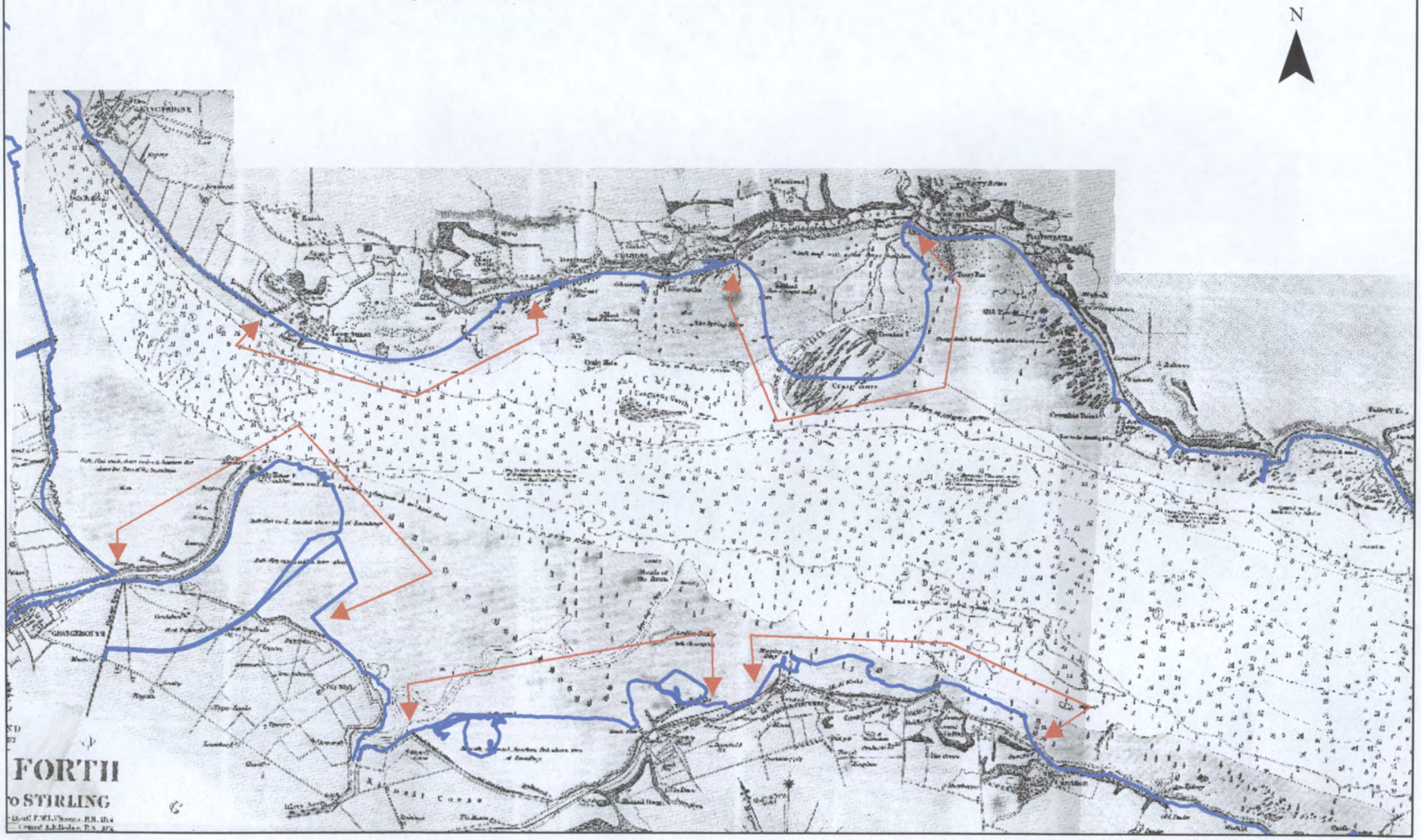
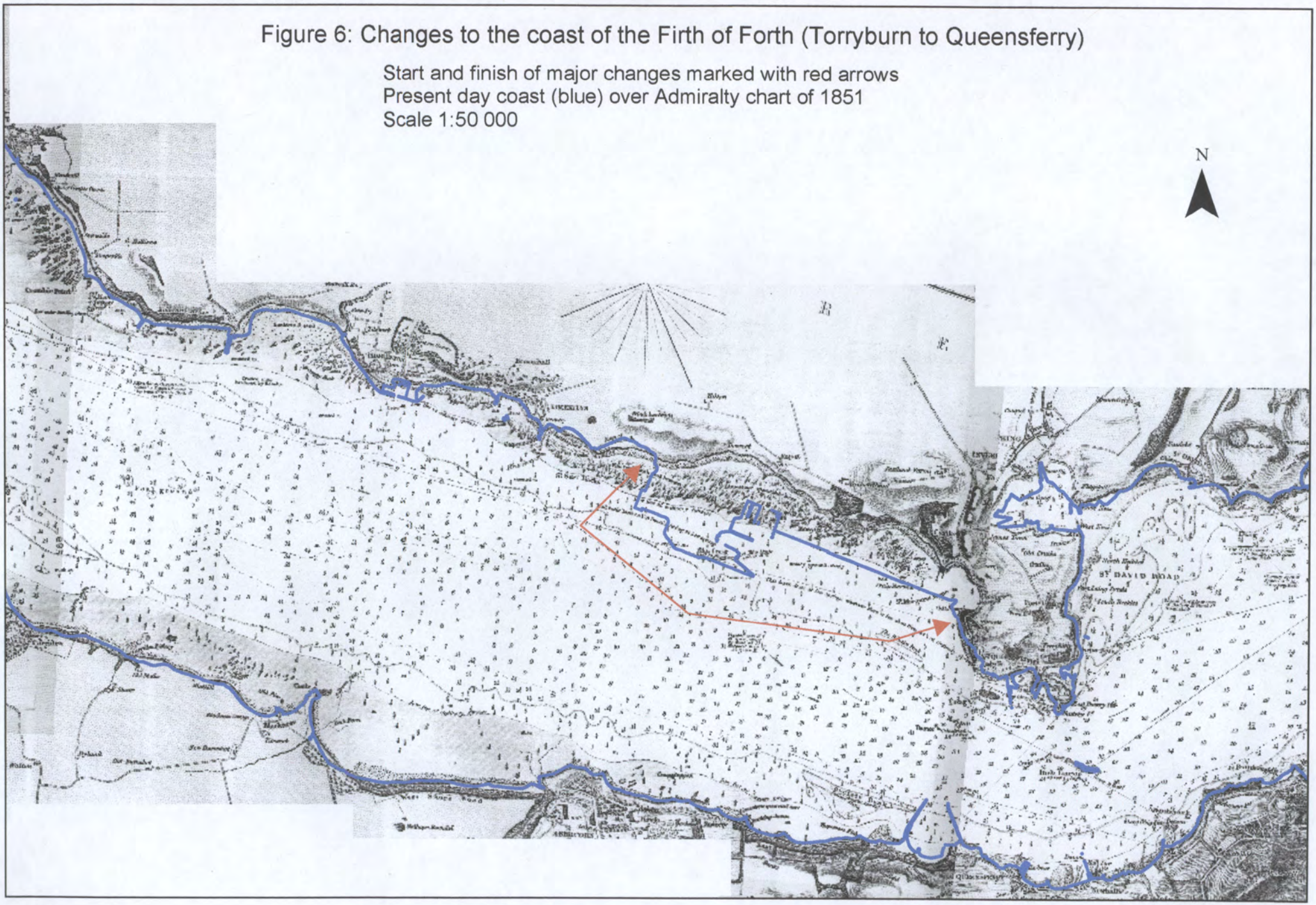


Figure 6: Changes to the coast of the Firth of Forth (Torryburn to Queensferry)

Start and finish of major changes marked with red arrows
Present day coast (blue) over Admiralty chart of 1851
Scale 1:50 000



West Wales Coastal Peat and Intertidal Survey (Smith 2002). A number of intertidal features were identified during the survey, including possible fish-traps, netting posts, jetties and breakwaters.

Some of these sites had already been noted in the local Sites and Monuments Record, although the records lacked detail due to problems with site accessibility. The use of the aerial photographs allowed features to be accurately mapped, giving an indication of their size and form.

Documentary sources

As noted above, there are numerous documentary sources relating to fish-traps in Scotland. These include charters, parish records, council session minutes and Statistical Accounts. Although many are not specific about location, they mention traps in relation to the mouths of rivers or villages. Documentary sources can be especially useful in providing details about traps that have been located by other means, as demonstrated by James and James (2003). Hale (forthcoming, pp. 4-6) has collected similar sets of records relating to a yair at Dingwall, dating from between 1732 and 1827.

Associated structures

As noted above, successful fishing operations often required structures for the processing of the catch. The location of structures associated with preserving fish, but sited away from ports or harbours, may indicate the presence of fish-traps.

To the east of Inverness there are remains of a salmon bothy and an ice house at Delnies (NH85 NW6), an ice house at Chanonry Point (NH55 NW5) and a boiling house at Alturlie Point. No ports are indicated on maps as existing at these locations, but several fish-traps are depicted on the coast.

Other evidence, more likely to be revealed during excavation, includes the recovery of artefacts associated with fishing. Discarded net sinkers may provide evidence of the existence of a destroyed weir; and it has been noted that fishermen tipped white china into rivers close to their nets to give them time to prepare after observing fish swimming over it.

Place name evidence

Place name evidence can provide clues about the location of traps. and the Statistical Account for *Renfrew* (1845, vol. 7 p. 8) refers to the place name of *'Garscadden'* as meaning the 'Herring Yair'. The place lay about one and a half miles from the Clyde and was taken as evidence that the area was once coastal.

The Welsh trap at Gorad Beuno was located through aerial photographs (Momber 1991); the search initiated due to the inclusion of the word *'gorad'* in the place name. The photographs demonstrated that the place locally thought to be the fish-trap was actually a natural reef, with the trap lying adjacent to the village of Clynog Fawr (Momber 1991, p. 95).

It was suggested by Mr IA Crawford that the place name Carrick may be derived from the Gaelic word for a trap, *caraidh* (Ferrier 1969, p. 32). He further thought that there should be evidence of a fish-trap in Kerrycroy Bay, due to the use of the word *'croy'* in the place-name (ibid, p. 34). No trap has yet been identified in this area.

The study of maps associated with the FTS survey of the area east of Inverness noted the presence of a hamlet called Fisherton, five kilometres from the nearest harbour at Ardersier. The 1851 Admiralty Chart of the Firth of Forth depicted a reef or bank close to the Hen and Chickens named

Craggau Garth. Ferrier (1969) noted that '*garth*' was a word used for a fish-trap on the west coast of Scotland.

Appendix 7 contains a list of all the names encountered for traps (and elements within them) noted during this project. This is not a definitive list and many dialect words must exist. A study to compile a full list of names for fish-traps would be of great benefit.

Local Knowledge

Coastal inhabitants often have an extensive knowledge of the archaeological features in the sub-tidal area around their houses. They are used to seeing the coast at all its different states, including at spring tides when the sea is at its lowest. They also see structures newly revealed after sediment has shifted.

In some cases, they may not realise the significance of the archaeological sites that they have observed, and projects have been set up to bring archaeologists and local communities together. The great help that local people can give to archaeologists has been acknowledged by Historic Scotland (Ashmore 2003) and projects such as Shorewatch (Fraser *et al* 2003) are aiming to work with local groups to learn more about coastal sites.

The trap at Ardersier (Hooper 2001) was brought to the attention of Highland Council archaeologists by local people and the Saxon traps on the Blackwater Estuary, Essex, only rarely exposed during very low tides, were first investigated by a local boat owner (Dix and Bull 2000).

Field survey

Previous archaeological surveys of the intertidal zone

Field survey remains one of the most successful ways of locating fish-traps and many detailed surveys have been undertaken around the coast of the British Isles. Fish-traps have been routinely located during CZA surveys, most notably during the Moray survey (Cressey and Hale 1998). Specific intertidal field surveys have also been commissioned. It should be noted that the most successful surveys were undertaken in estuaries.

The survey of the north-east coast of the Isle of Wight (Wootton Creek to Ryde Pier) led to the identification of more than 150 timber structures, including many fish-traps (English Heritage 1996). The North Munster project included an intertidal survey of the Fergus Estuary, Co. Clare (O'Sullivan 1995), locating 13th century weirs on the Deel Estuary that were only visible during extreme low tides. A detailed survey of Strangford Lough, Northern Ireland (McErlean 2002) located twenty fish-traps, and several fish-traps were revealed during the survey of the Shannon Estuary (O'Sullivan 2001). The survey of the estuaries of Carmafthenshire (James and James 2003) also led to the recording of numerous traps.

Health and Safety

Health and Safety is a major consideration when conducting work in the intertidal zone, and the recent unfortunate events that befell the cockle fishermen of Morecambe Bay must act as a warning. Awareness of the state of the tide is of paramount importance and surveying during the Scottish winter is very much hampered by the actual number of days when daylight coincides with low tide, as illustrated in Appendix 6.

Another health and safety issue is that many traps, especially in estuaries, are located in areas now covered with thick mud, making access to them either difficult or positively hazardous. This was

found to be the case with the surveys of the Forth between Kincardine and Queensferry (FTS, below).

Site visibility - sediment and vegetation

In rocky areas, weed may cover the intertidal zone, making features difficult to see. Many of the traps located during the Bute survey (Ferrier 1969) survived only as low foundations with weed anchored to the boulders of the wall. It was noted that often it was only this seaweed that was visible, floating in the water at certain states of the tide. High tide was not found to be a good time to survey, as both trap and weed were completely submerged. However, low tide was also poor as the weed obscured the walls. It was half tide that appeared to be best for locating traps, with the weed floating in the water indicating the line of the walls below the surface. This was also noted during the FTS survey (see below).

It was also noted that a covering of weed on some smaller structures, such as individual timbers of a stake traps, aided identification in aerial photographs, as it magnified the size of the underlying feature. This was noted with one of the stake traps at Fort George (FTS 041, see below).

The need for repeat visits

Structures identified by the presence of floating weed need to be recorded during a repeat visit undertaken at low water. Additionally, many traps are covered and re-exposed by shifting sediment. James and James (2003) have been observing the Carmarthenshire traps over a period of two decades and noted that the traps were only periodically visible due to the movement of mud and sand. No single weir has been completely revealed; elements being covered and uncovered over the years. This has led to them recording 'discrete and disparate' areas of stonework, placing these fragments together over time in order to build up a picture of the traps of the area.

Field visits to sites identified as part of the North West Wales Coastal Peat and Intertidal Survey (Smith 2002) demonstrated that many intertidal peat surfaces were hidden by sand and only rarely exposed. The conclusion of the project was that the identification of archaeological evidence required several visits, combining favourable tides and beach conditions and made over a number of years.

Site visibility - the state of the tide

Many of the CZA surveys in Scotland have been undertaken over the winter, partly due to the tendering procedure and the need to get projects finished by the end of the financial year. Both of the surveys of the Forth were undertaken at this time of year. This is often not a good time to undertake intertidal survey as the weather is often poor and the number of hours of daylight is limited.

The number of days that low tide coincided with daylight in Inverness for the winter of 2003/04 was recorded during the FTS survey (see Appendix 6). Low tide was plotted for the months of November, December, January and February (121 days) and compared to daylight hours (calculated from Edinburgh, so slightly longer than at Inverness). On average, there were two low tides per day for the 121 days, a total of 242 low tides. Of these, 62 fell during daylight hours. This indicates that survey of the intertidal zone would have been able to coincide with low tide on only half of the days available.

Additionally, the height of the tides was plotted. The spring tidal range at Inverness is 0.7m - 4.7m with the water level regularly dropping to below one metre during spring tides. There were fifty days when the water height dropped to below one metre, of which, only three coincided with

daylight. This demonstrates that even when a survey is undertaken at low tide, the water may still obscure features at the lower end of the intertidal zone (where wood is most likely to survive).

Some intertidal workers have advocated working during neap tides rather than springs. The excavation of the fish-trap at Ardersier (Hooper 2001; FTS 046) took place over five days during neap tides as this was thought to give the longest access to the site.

Misidentification of traps

Intertidal survey may reveal other structures which are confused with fish-traps. As an example, the large stone structure in the lee of St Ninian's peninsula located during the Bute survey (Ferrier 1969) looked like a trap, but was marked on a Bute Estate map as a harbour. Another prominent structure located at the mouth of the Kelly Bu, near Wemyss Bay pier, was found to be the remains of a small port.

Another potential cause of misidentification is a phenomena described as kelp rafting by Bannerman and Jones (1999, p. 71). This occurs when stones of nearly equal size and weight are colonised by seaweed. The weed grows until its size causes the stones to be dragged by the tide along the seabed. The stones continue to move until they encounter the shore, where they are deposited in rows. It is possible that some of the sites recorded during the FTS survey at Arlturlie Point represent stones deposited in this manner (see below).

Geophysical and remote sensing surveys

The isolated and dangerous position of the Blackwater fish-traps in Essex prevented them from being mapped accurately using field survey techniques. Although aerial photographs were taken of the sites, many posts remained covered by water and the size and full extent of the traps remained unknown. In 1998 the Royal Commission on the Historical Monuments of England sponsored the High Resolution Marine Seismology Group of Southampton University to undertake a geophysical survey. They used a boat to tow a side scan sonar and located many wooden posts not revealed by aerial photographs. This allowed detailed plans of the traps to be drawn.

Side scan sonar was also employed during the survey of Strangford Lough in order to examine some of the stone weirs located (McErlean 2002).

The acquisition and analysis of Airborne Remote Sensing (ARS) data has not yet been attempted for intertidal sites, but its use could prove very beneficial. ARS comprises obtaining a range of spectral data from an aeroplane, including thermal and infra-red images (Dawson and Winterbottom 2003). If low-level flights are undertaken, the resolution of the data is high enough to allow intertidal sites to be located. Flights undertaken during low spring tides should allow areas of intertidal peat to be identified, and may allow structures to be located through the canopy of overlying seaweed.

Part 2

Surveys of the Firth of Forth and the Moray Firth

The Coastal Zone Assessment Surveys of the Firth of Forth and the Moray Firth

The Firth of Forth and the Moray Firth

Factors influencing the location of fish-traps have been noted above. From these, it would appear that both the Firth of Forth and the Moray Firth would have been good places to construct these structures. Both areas have gently shelving intertidal zones with good access. The beaches are wide enough to build traps upon and there is a sufficient tidal range to allow them to be fully covered at high tide and dry at low. They both include sheltered stretches of coast, noted by Hale (forthcoming, p. 2) as favoured places for constructing traps. In the Forth, the most sheltered areas lie to the west of Queensferry, whereas much of the area covered by the Moray survey is sheltered.

Fish were attracted into both bodies of water and historical records indicate that salmon and herring ventured into the firths. The development of Edinburgh, Stirling and other large towns may have had a detrimental effect on the cleanliness of the water of the Firth of Forth, but this didn't appear to affect fish numbers at the beginning of the nineteenth century (as testified by records of huge numbers of herring venturing into the Forth).

Both areas had building material within the vicinity, with stone and wood available. Of the two areas, the Firth of Forth had better access to markets, but Inverness and other Highland towns would have taken fish. Despite this, far greater numbers of fish-traps were recorded during archaeological surveys of the Moray Firth than of the Firth of Forth.

In order to help explain the differences in numbers of traps revealed, it is necessary to look at the archaeological surveys themselves.

The Coastal Zone Assessment Surveys (CZA surveys)

Three Historic Scotland commissioned Coastal Zone Assessment surveys were undertaken within the two study areas. The north bank of the Forth (Kincardine to Fife Ness) was surveyed by Maritime Fife in January 1996 (Robertson 1996). The south bank of the Forth (Stirling to Dunbar) was surveyed by GUARD in February and March 1996 (James 1996) and the Inner Moray Firth was surveyed by CFA Archaeology in September 1998 (Cressey and Hale 1998).

All three surveys were undertaken according to guidelines laid out in Coastal Zone Assessment Survey: Archaeological Procedure Paper 4 (APP4: Historic Scotland 1996). Each involved a desk-based assessment followed by field survey.

The Firth of Forth survey

Kincardine to Fife Ness

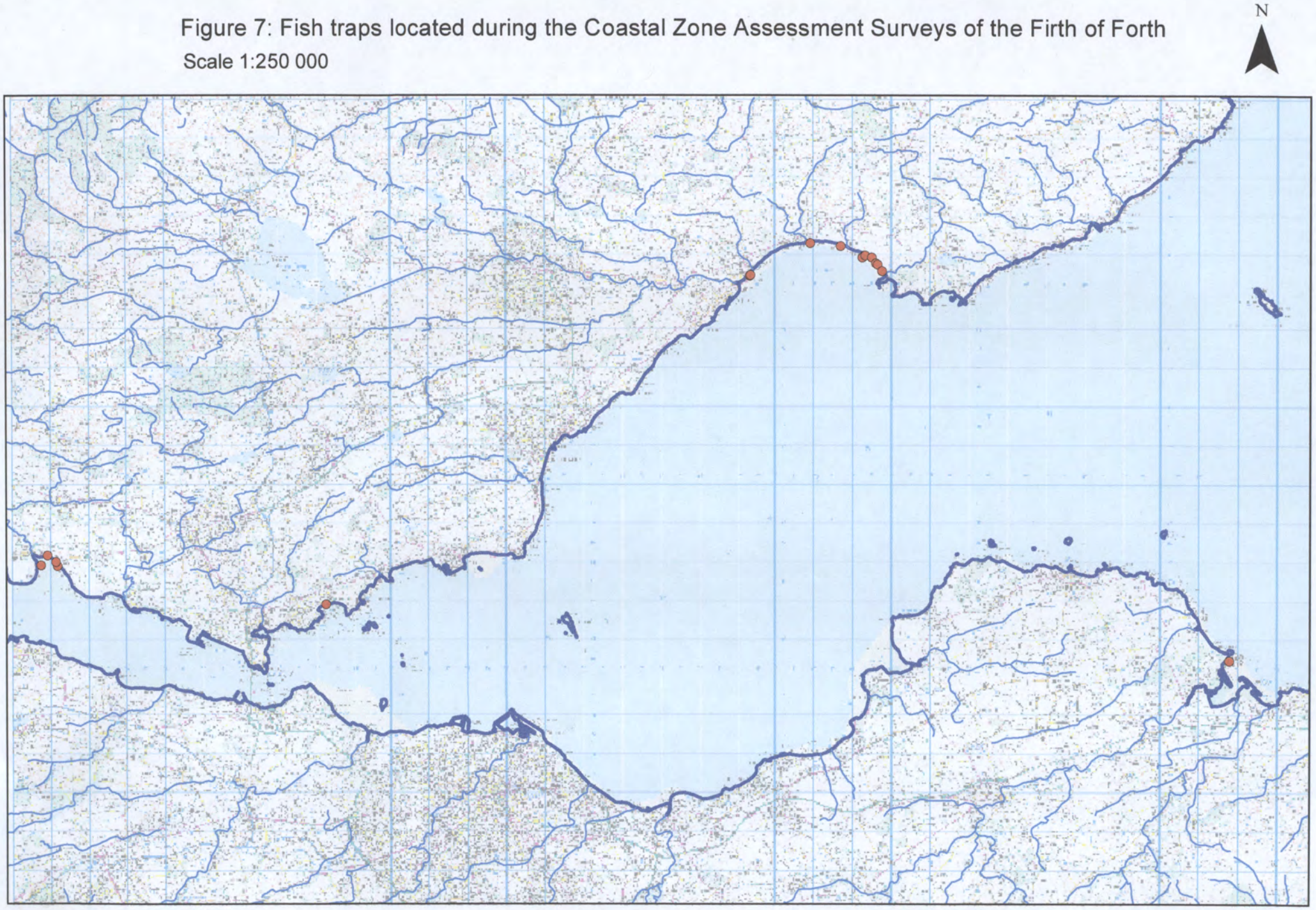
The Kincardine to Fife Ness survey covered 107km of coast. It was undertaken over twelve days in January, 1996. Two teams of two surveyors were used during the survey. In all, 724 sites were described in the report, of which 17 were fish-traps (figure 7). Of these, only four lay to the west of Queensferry (the point at which the Forth becomes much more sheltered), all at Torryburn. The surveyors noted that some intertidal sites may have bee missed due to tidal height fluctuations (Robertson 2003, p. 108).

Stirling to Dunbar

The length of the Stirling to Dunbar survey was 170km and was undertaken over ten days between February 12th and March 10th. Two teams of two surveyors were used during the survey. Ideally, the project manager would have preferred the teams to walk the coastline at different states of the tide and in different directions, but this was not possible due to time constraints (James 2003,

Figure 7: Fish traps located during the Coastal Zone Assessment Surveys of the Firth of Forth

Scale 1:250 000



p. 119). In all, 423 archaeological sites were described in the report, of which, there was a single fish-trap (figure 7). This was located on the Tyne Sands, near Dunbar (and therefore not strictly within the Forth).

Results of the Firth of Forth CZA survey

Descriptions of the fish-traps located during the CZA surveys of the Firth of Forth are presented in Appendix 1. Full entries, with information on the geology, geomorphology and erosion class for the stretches of coast surveyed, are given in the site reports (Robertson 1996; James 1996). Of the seventeen fish-traps located during the survey, the majority are made of wood. There are three stake nets and two areas of stakes. Five of the features described simply as 'fish-traps' are also made of wood.

Stone features include three cairns, a wall and a 'D' shaped trap at Torryburn (plate 1). Three of the sites are 'possible' fish-traps, the alternative explanation for the feature being a modern construction such as a glider trap.

There are two distinct groupings of sites, in Torry Bay (four traps) and Largo Bay (eleven). On the north coast of the Forth, no traps were located to the west of Torryburn, and none were found between Dalgety Bay and Largo Bay. The south coast was completely devoid of traps save the single possible trap noted on the western edge of the Firth of Forth.

The Inner Moray Firth CZA survey

The Inner Moray Firth survey covered 160km of coast. It was undertaken in September 1988 but the report does not detail how many days the survey took or the size of the survey team. It noted that September was chosen as it gave full advantage of the equinoctial tides and that no time was lost due to inclement weather. In all, 375 sites were described in the report, of which, 62 were fish-traps (figure 8). Descriptions of the fish-traps located during the CZA survey of the Moray Firth are presented in Appendix 2.

Results of the Inner Moray Firth CZA survey

There is a much wider distribution of traps located during the survey of the Moray Firth. Despite this, it is still noticeable that the traps are clustered in the Beauly and Cromarty Firths. No traps were located on the north shore of the Moray Firth, despite numerous traps being depicted on a chart of 1860 (RHP 6341). This map shows large numbers of stake traps between Munlochy Bay and the western side of Chanonry Point, with the main concentration being on the Point itself. The CZA survey report (Cressey and Hale 1998) described Chanonry Point as having a fringing sand and shingle beach, and it is possible that this is an area of accretion, with the remains of traps now covered by shifting sand. This is hinted at by comparing the present coastline with that depicted on the 1860 chart.

Hale (forthcoming, pp. 7-8) noted that the lack of traps on certain areas of coast may be due to their destruction as a result of exposure to more extreme coastal conditions. He noted, however, that the explanation may simply be that static traps in such places were portable (presumably to allow them to be stored safely away from winter storms).

The report does not give descriptions of any sites and so it is difficult to analyse the results of the survey in any detail. Two 'complex traps' and two double traps were recorded, together with three timber traps and two stone traps. Seven of the traps were mounds and another three were 'tidal traps'. All other examples are described simply as fish-traps, with eight of the structures recorded as

'possible'. Full details of the results of the survey are contained within the report (Cressey and Hale 1998).

Discussion of the results

The combined length of the Forth surveys was 277 kilometres, yet only 18 fish-traps were located. This gives an average of one trap every 15.3 kilometres. Within the Inner Firth of Forth (Queensferry - Kincardine), only four traps were located along c. 60 kilometres of coast examined, maintaining this average of one trap every 15 kilometres. The Moray survey length was 160 kilometres and revealed 62 fish-traps. This gives an average of one trap every 2.5 kilometres. Given that no traps were found outside of the Beauly and Cromarty Firths, the distribution of traps within these more sheltered locations is even more concentrated.

As noted above, the authors of the final reports for the Forth surveys noted that with more time, the surveys of the intertidal zone would have been more detailed. However, this is not the only reason for the enormous difference in the number of traps located in the two areas, and other factors are detailed below.

Reasons for the differences in the results - the desk-based assessment

Conducting a desk-based assessment prior to any field survey is of great importance, as it allows the field team to seek sites on the ground that have been identified by other means. It involves a consultation of drawn, photographic and documentary sources. Without this prior knowledge, some existing features may not be observed due to them being covered with seaweed or partially obscured by sediment. All three surveys undertook a study of aerial photographs and cartographic documents, together with an examination of records held in the local Sites and Monuments Record (SMR) and the National Monuments Record for Scotland (NMRS).

Coverage by aerial photographs

The use of aerial photographs is of huge importance when attempting to locate features in the intertidal zone, but is dependent upon the photographs being taken under optimal tidal conditions. Both study areas had comparable numbers of photographs taken of them, but the images of the Inner Moray Firth were, in general, taken under more favourable states of the tide.

The photographic coverage for the Inner Moray Firth included sets of photographs commissioned by Scottish Natural Heritage. Many of these were taken at low tide as the commissioning agency was interested in viewing natural features within the intertidal zone. Hale (2003, p. 99) noted that the time spent on a detailed analysis of these and other photographs repaid the investment.

Cartographic sources

There are several nineteenth century maps of the Moray Firth (including the Cromarty and Beauly Firths) which depict the location of fish-traps. Some of these were specifically drawn to plot the position of traps. The maps show that traps were once extensive within these waterways, and Hale (2003, p. 105) noted that over 70 sites were marked on cartographic sources dating between 1817 and 1909.

An examination of maps and charts for the Firth of Forth did not show the same concentration of traps depicted. However, no maps specifically prepared to record the position of traps were noted during searches of the archive, and the best cartographic source was an Admiralty Chart of 1851 which depicted seven fish-traps (figures 9 and 10).

Figure 8: Fish-traps located during Moray Coastal Zone Assessment Survey

Scale 1:250 000

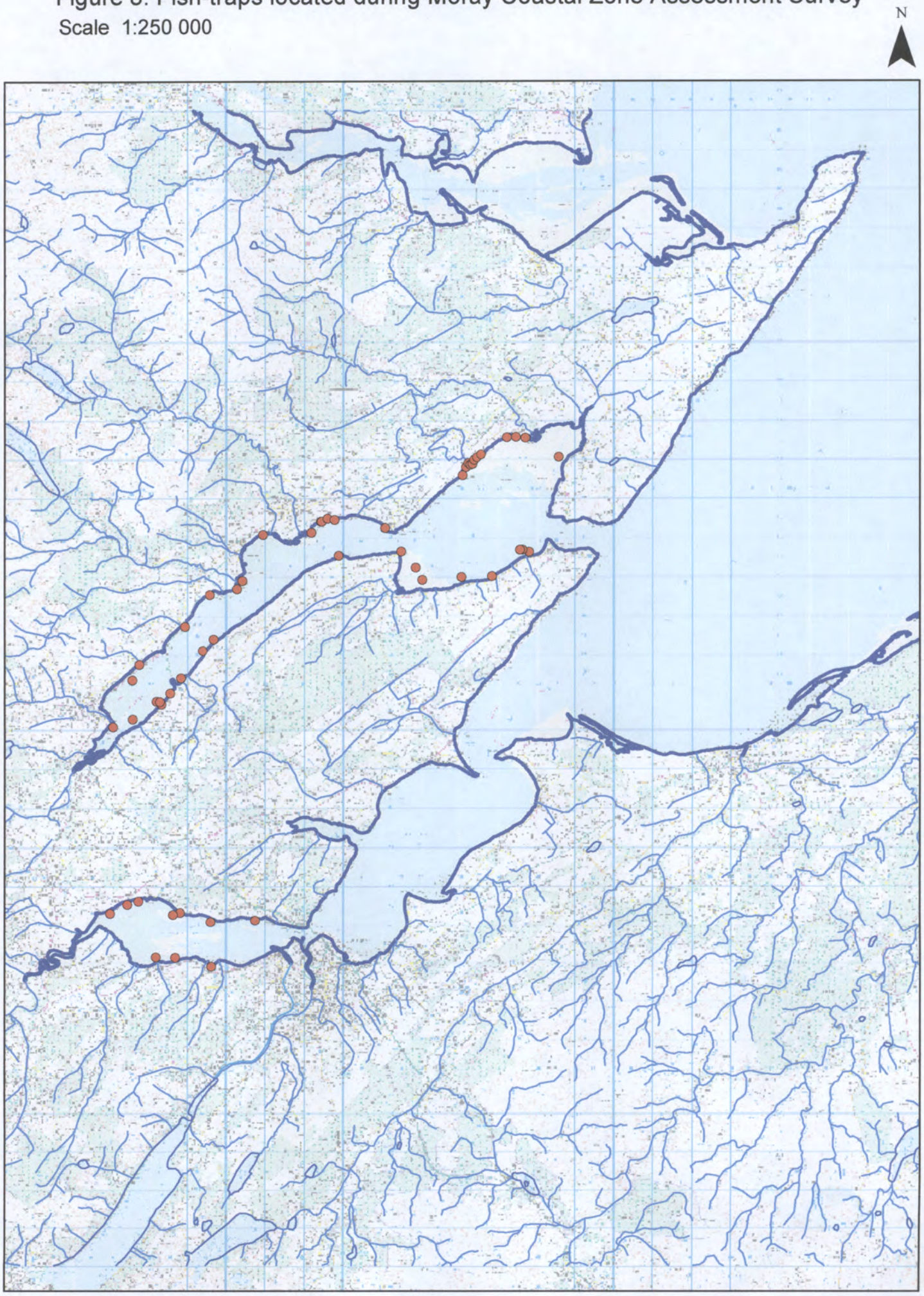


Figure 9: Location of fish traps marked on the 1851 Admiralty chart (Longannet to Charlestown)

Fisheries marked with yellow stars
Fish-traps marked in red
Scale 1:50 000

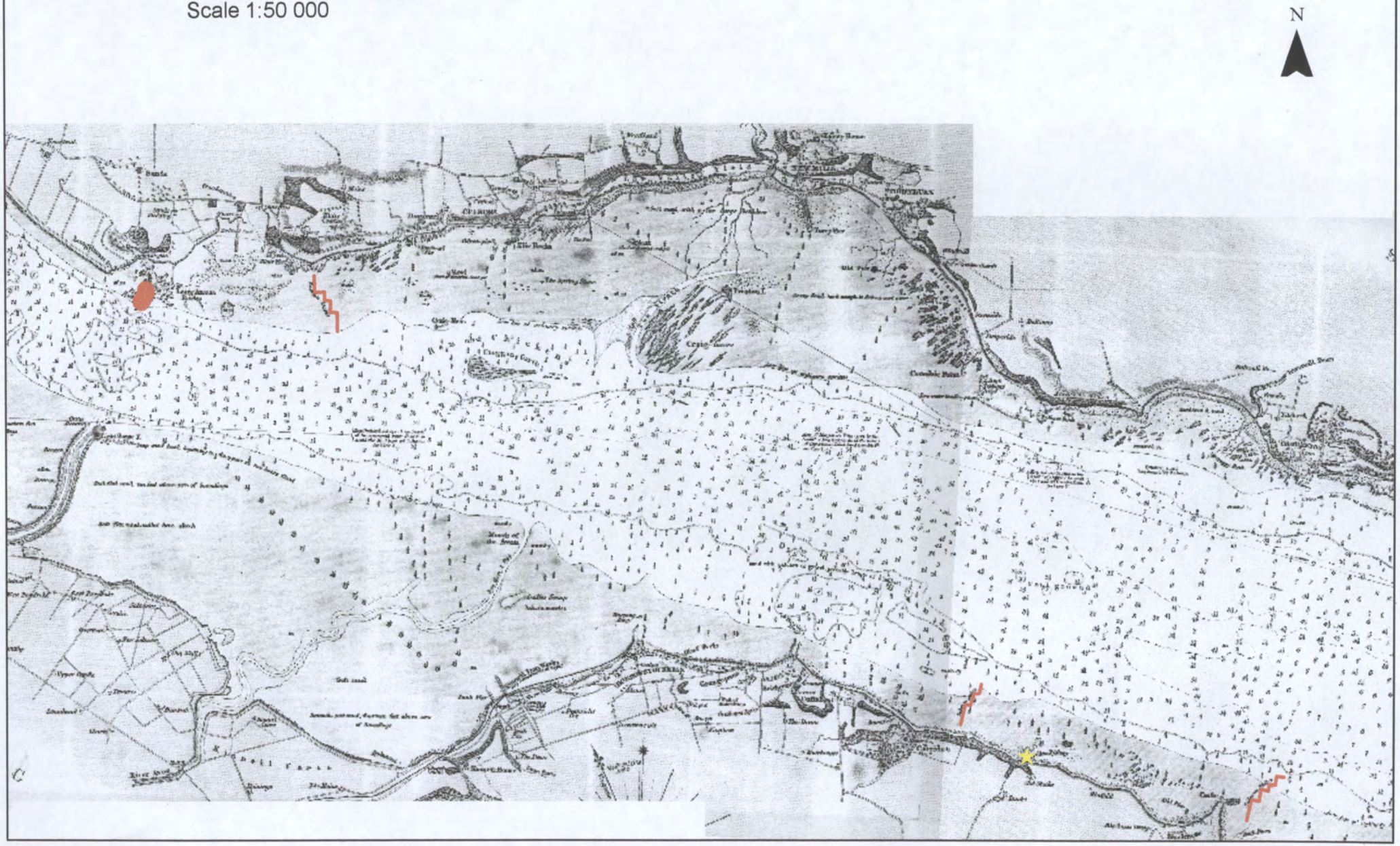
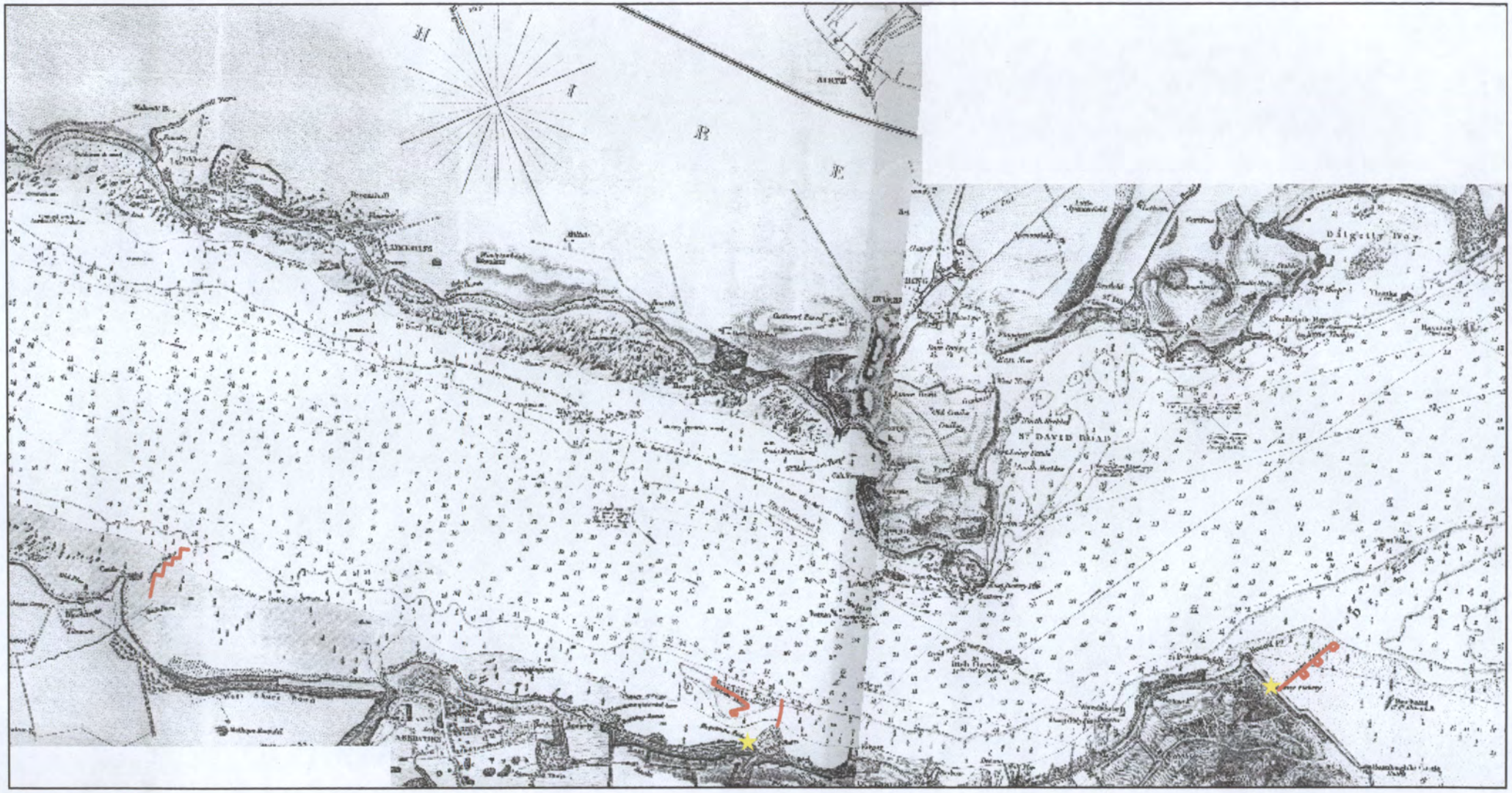


Figure 10: Location of fish traps marked on the 1851 Admiralty chart (Charlestown to Dalgety Bay)

Fisheries marked with yellow stars
Fish-traps marked in red
Scale 1:50 000

N



Results of the desk-based assessments
The large number of sites revealed during the desk-based assessment for the Moray CZA survey gave the field teams an indication of areas worthy of detailed examination. The field teams on the Forth CZA surveys were not furnished with this information and depended solely on locating sites during the survey.

Reasons for the differences in the results - field survey
Despite the lack of sites revealed during the desk-based assessment of the Forth, it might be expected that any sites existing within the intertidal zone should have been located during the CZA survey. However, there are two further factors that may have affected the number of traps located, coastal development and visibility. These are especially relevant for the area between the two bridges of the Forth.

Coastal development
Several major cities are located on the Firth of Forth and it has been subject to far greater development than the Moray Firth. Not only have coastal defences and other embankments been erected along much of the coast, there has been far greater land reclamation. The huge amount of coastal realignment of the Inner Firth of Forth has been indicated in figures 5 and 6.

The north bank of the Cromarty Firth has seen significant development in connection with the Offshore Fabrication Yards at Nigg, but this has been mainly confined to the coast edge and hinterland (Cressey and Hale 1998, p. 11). There has also been land reclamation around Inverness, but this did not form part of the CZA survey area. In all, about 2 km of the Moray CZA survey area has been altered by land reclamation.

In comparison, approximately 21 km of coast has been changed solely within the area between Kincardine and Queensferry. As noted above, only seven traps were depicted on an Admiralty Chart of the Forth dating from 1851; of these, two have been covered by coastal development (figure 11).

Lack of visibility - state of the tide
The CZA survey of the Moray Firth was timed to coincide with favourable states of the tide (Cressey and Hale 1998, p. 12). The survey was undertaken in September, a time of year when the days are still reasonably long which allowed a better chance of low tide falling during daylight hours.

The surveys of the Forth were both undertaken in the winter, the north shore being surveyed in January and the south shore in February and early March. Although the precise dates of the two surveys are not given, it can be expected that working during these months would have lessened the likelihood of the fieldwork coinciding with low tide.

Lack of visibility - sediment
The inter-tidal zone between Kincardine and Queensferry is covered in a thick layer of mud. The north Forth survey noted that the mud was over 2 metres deep in places, and that it was probably derived from agricultural activity along the higher reaches of the River Forth (Robertson 1996, p. 1). During the FTS survey, a local person stated that the mud had come down the river when the Flanders Moss, near Stirling, was drained.

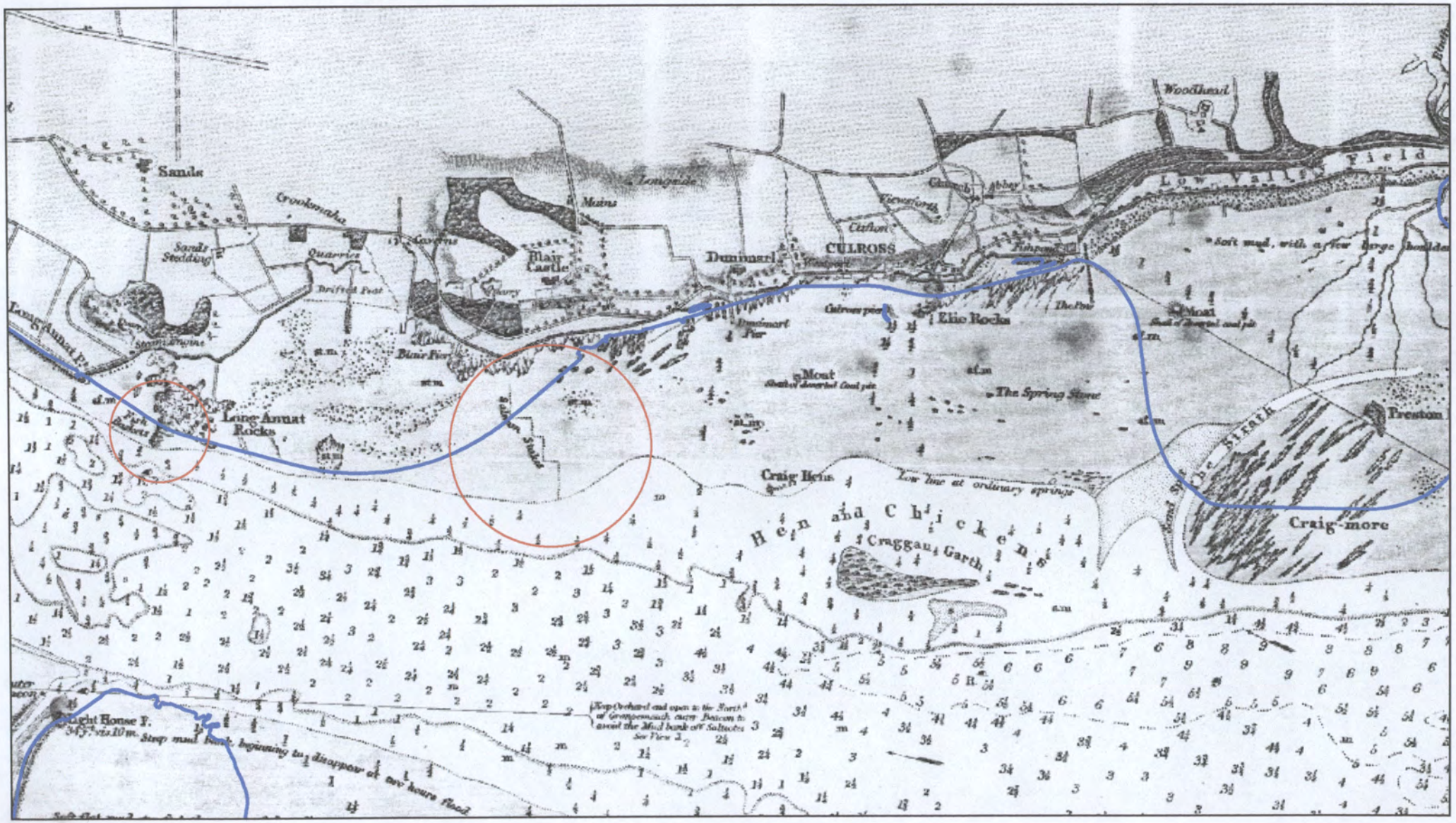
The mud has undoubtedly obscured many sites and the large curvilinear trap at Dunimarle (FTS 113) is a good case in point. This trap is barely visible at ground level unless actually standing upon it. It appears vaguely in an aerial photograph of 1948 (58/A/384), but was much clearer in a

photograph taken in 2003 by a local pilot (Sayers, *pers com*). This appears to indicate that the site is periodically exposed and covered.

The thick mud of the Inner Firth of Forth also posed health and safety problems, and would have prevented walk-over survey in some areas. A site, if previously known about from the desk-based assessment, may have been specifically searched for, but no concentrated walk-over survey with the aim of fortuitously locating structures would have taken place in large parts of the survey area.
figure 11 old map traps

Figure 11: Changes to the coast of the Firth of Forth (Longannet to Preston Island)

Note how reclamation at Longannet has covered fish baskets and salmon stakes
Present day coast (blue) over Admiralty chart of 1851
Scale 1:25 000



Field survey 2003 (FTS)

As part of this project, a new study was undertaken to attempt to locate fish-traps. Three survey areas were explored, two on the Forth and one on the Moray. The aim of the surveys was to determine whether we have a full picture of the distribution of fish-traps in the two estuaries. It also endeavoured to explore problems associated with intertidal survey and to recommend best practice for locating sites in the intertidal zone during future surveys.

Survey areas

A survey of selected parts of both banks of the Forth was undertaken. On the north bank, an area extending from Dunimarle Castle (297600 685700) to Torryburn (302700 685500) was examined, a distance of 5 kilometres. The south coast of the Forth has been adopted by the Edinburgh Archaeological Field Society (EAFS) as part of a Shorewatch project. They surveyed from Blackness Castle (305500 680200) to Carriden (303300 680800), a distance of 2.5 kilometres. Their surveys of the coast are on-going and will continue throughout 2004.

As there were already a large number of traps located during the Moray survey, and as parts of that coast remained unexplored, it was decided to concentrate the Moray survey in an area not covered by the CZA survey. The area of coast examined extended from east of Inverness (269400 846000) to Fort George (275900 856650), a distance of 19 kilometres.

Desk based assessment

A full desk-based assessment was undertaken, and visits were made to the NMRS, the National Map Library, West Register House and the SNH offices in Dingwall. The Fife and Highland SMRs were also searched.

Aerial photographs.

The aerial photographs examined are listed in Table 2. Where recorded, the date and time of the photograph was also noted. This allowed the state of the tide to be calculated using the TideWizard program. Where the time of the photograph was not recorded, an estimation of the state of the tide is given.

Ten sets of photographs covered the survey area of the Moray Firth. Of these, one set was taken when the tide was at a height of four metres. The tide was half out for another two sets and was not determined for another set. However, six sets of photographs were taken under good conditions and displayed the coast with the tide out.

Ten sets of photographs were examined of the Firth of Forth. The tide was at a height of over three and a half metres for six sets of photographs, and was half out on another. It was only the three photographic sequences taken on the 7th June 1988 that displayed the coast with the tide out.

Maps and plans

The maps and plans examined are listed in Table 3. In general, there were more plans relating to fisheries from the Moray than from the Forth. The only plans to depict fish-traps in the Forth were Ordnance Survey maps and Admiralty Charts.

Table 2 Aerial Photographs consulted during FTS survey.
Where known, the time of the photograph and the height of the tide is also recorded.

Sortie	Frames	Scale	Date	Time	Height of water	Area
106G/DY17	60033-60039	1:30,000	13/09/1944	not known	out	Moray
OS/68/120	249-252	1:23,000	22/05/1968	13:30	1.72m	Moray
OS/68/123	319-371	1:23,000	24/05/1968	09:30	4.05m	Moray
61188	150-147; 171-172	1:24,000	14/05/1988	13:57	2.30m	Moray
62688	110-111	1:24,000	13/06/1988	16:42	1.28m	Moray
Fairey 7343/6	572-602	1:10,000	12/08/1973	not known		Moray
Fairey 7343/10	028-041	1:10,000	05/09/1973	not known	half out	Moray
Fairey 7343/31	627-630	1:10,000	16/05/1975	not known	out	Moray
WHEKIW job 58/59	Runs 1-3	c. 1:7500	23/06/1999	not known	out	Moray
RC8-CG	146-151	1:10,000	07/08/1977	12:40	1.8m	Moray
58/A/384	5237-5268	1:15,800	20/05/1948	10:45	4.85m	Forth
540/A/449	5050-5066	1:20,400	14/03/1950	14:00	3.66m	Forth
Meridian 106/71	238-248	1:24,000	07/07/1971	16:07	3.81m	Forth
Meridian 112/71	012-016	1:24,000	10/07/1971	13:26	3.72m	Forth
Meridian 114/71	062-068	1:24,000	10/07/1971	16:51	5.43m	Forth
51988	028-033	1:24,000	07/06/1988	14:23	1.12m	Forth
51988	073-083	1:24,000	07/06/1988	15:07	1.25m	Forth
51988	110-115	1:24,000	07/06/1988	15:33	1.37m	Forth
Fairey 7343/14	862-899	1:10,000	15/10/1973	not known	half out	Forth
Fairey 7343/24	112-148	1:10,000	26/09/1974	not known	in	Forth

Table 3 Plans and maps consulted during the FTS survey

Reference	Title	Date
RHP 1462	O.S.1 inch plan, marked to show fishings on Moray Firth, Cromarty Firth and River Conon:	1876
RHP 561	Plan of the Firths of Beauly and Inverness with part of the Moray Firth accurately extended from the land and aquatic survey by M/s Telford and Downie with the stations of the stake net fishings marked	1820
RHP 2505	Plan of the Duke of Gordon's salmon fishing on the River Ness and of the corn lands adjacent to Inverness Castle	1764
RHP 1297	Plan of the farm of Dalcataig, property of Mr. Grant of Glen Morrison. Taken from plan made in 1840 by McLean and Morrison, Inverness	1854
RHP 6341	Plan of the mouths of the Rivers Ness and Beauly, the Beauly and part of the Moray Firths, and coasts adjoining, showing stake and other fishing nets. (1-3)	1860
RHP 770	Plan and Sections of the River Leven showing state of levels on the Leven from high flood mark at Loch Leven down to the medium, high and low water marks on the Forth: 1830	1830
	O.S. 1 inch plan (sheet 32) marked to show oyster fisheries in the Firth of Forth	1773
RHP 1429/1	Plan of the Water of Nairn, Stell fishings in the sea and lands adjacent	1794
	Admiralty Chart: The Firth of Forth, Fisherrow to Queensferry	Survey 1851 Pub 1860
	Admiralty Chart: The Firth of Forth, Queensferry to Stirling	Survey 1850/1 Pub 1860
	Admiralty Chart: The Firth of Forth, Fisherrow to Port Edgar	Survey 1897 Pub. 1899
2167	Admiralty Chart: The Firth of Cromarty	Survey 1845 Pub 1853
3547	Admiralty Chart: Logie Head to Tarbat Ness	1853
	Ordnance Survey: Inverness-shire (sheets I and IV)	1870
	Ordnance Survey: Inverness-shire (sheets I and IV)	1874
	Ordnance Survey: Fife and Kinross (sheet 38 and 39)	1856
	Ordnance Survey: Fifeshire (sheet XXXVII)	1896

Field Survey
All field survey was undertaken by a minimum of two people for health and safety reasons. Surveys were timed to coincide with low tide (see discussion, above). Sites were recorded on *pro-forma* Shorewatch recording forms (Appendix 8). Site location was plotted using a hand-held Garmin GPS. In general, accuracy was better than 10m. In order to verify accuracy, readings were taken at specific locations on different survey days; the results were almost identical.

Surveys of the Moray were undertaken on 1st- 4th November 2003; 14th and 15th December 2003; and 14th and 15th March 2004. Eight days were spent undertaking the survey of 19 kilometres of coastline. Surveys of the Forth were undertaken on 11th November; 29th November; 10th January; and 23rd February, a period of four days to cover 7.5 km.

In all, this represents 12 days of field survey in order to cover 26.5 km of coast, an average of just over two kilometres per day. This is a significantly shorter length of coast than is surveyed during a normal CZA survey. This is partly explained by some of the survey taking place as part of a Shorewatch project, and being more thorough than could be expected during a rapid coastal survey. However, it illustrates that surveying in the intertidal zone, especially within estuaries, can take much longer than dry-land surveys.

There are several reasons for this, and most important amongst them is the limited number of hours available when field survey is possible. This is due to the state of the tide, with survey only effective in the hours before and after low tide. This resulted in a maximum of five hours per day that could be spent undertaking field survey in the intertidal zone.

Another factor is that the terrain is often much more difficult walk over. Sandy beaches can be a joy to survey, with features easily visible upon the relatively flat sand. Within estuaries, however, there can be thick deposits of mud that are difficult to walk through. Rocky areas are often covered in seaweed, which also makes walking difficult and may hide features.

A third factor is that in some areas, once the tide is out, the intertidal zone can present a large expanse, far wider than the 50-100 metres prescribed as the survey zone for the hinterland during coastal survey (Historic Scotland 1996, p. 10). However, the lower margins of the intertidal zone should not be ignored, as this is where much evidence survives.

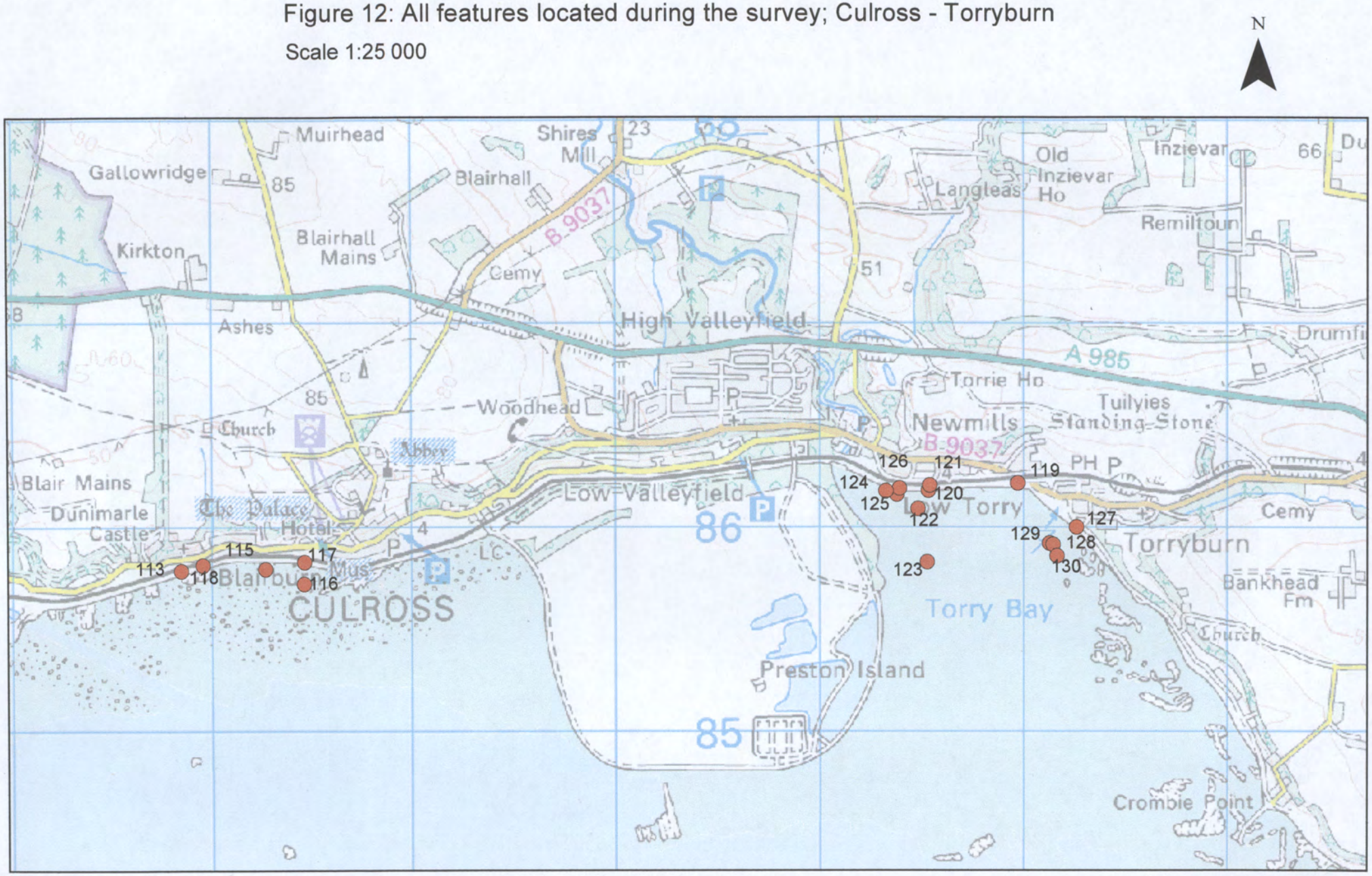
Results of the FTS survey
Firth of Forth, north bank (figure 12)
This area was examined during the 1996 CZA survey by Maritime Fife (Robertson 1996). Figure 12 shows the distribution of all sites located during the FTS survey. Summary details of the sites recorded are given in Appendix 3.

In total, eighteen sites were recorded during the survey, of which, eleven were fish-traps or possible traps. The other sites were, in general, connected with shipping and included the remains of two large piers; Culross Pier (FTS 116) and Torry Pier (FTS 123). These two impressive structures are being affected by coastal erosion and a comparison of the present state of the Culross pier with an aerial photograph of 1948 shows that there has been rapid degradation over the last fifty years, especially at the seaward end.

The area was difficult to survey due to the depth of mud, which was too dangerous to traverse in places. There was a limited amount of seaweed, and in the few places where it was present, it often

Figure 12: All features located during the survey; Culross - Torryburn

Scale 1:25 000



gave a good indication of an underlying structure. In many cases, the seaweed was found to be adhering to collapsed walls or half-submerged posts.

Firth of Forth, south bank (figure 13)

This area was examined during the 1996 CZA survey by GUARD (James 1996). The Edinburgh Archaeological Field Society, as part of a Shorewatch Project, undertook the FTS survey. Nine sites were located, of which three were fish-traps or possible fish-traps. Summary details of the sites located are presented in Appendix 3. The area surveyed included the site of the Carriden fishery, marked on the 1851 Admiralty Chart. Two notable features located were enormous stone walls running out into the Firth. (FTS 154 and FTS 159). One was over four hundred metres long, the other over two hundred metres. Neither appears on Admiralty Charts, and it is not known whether they are piers or associated with fishing.

The intertidal zone of the survey area consisted of deep deposits of mud overlying a rocky foreshore. The mud was of variable depths.

The Moray Firth, Inverness - Fort George (figures 14-16)

This area was not included in the 1998 CZA survey by the CFA (Cressey and Hale 1998). Summary results of the FTS survey are presented in Appendix 3. The main concentration of sites was in the bay between Inverness and Arlturlie Point (figure 14). This wide expanse had a considerable tidal range and was formed of sandy silt and thick deposits of mud. Numerous single posts were located within the bay. These must have had a variety of functions and some were mooring posts, though others may have been connected with fishing. Several of the posts were very large, and several survived to over two metres in height (FTS 23, FTS 24, FTS 25, FTS 51, FTS 52, FTS 53, FTS 59). It was difficult to see alignments of posts as there were so many within the area. This led to each post being plotted separately, which is why there is such a concentration of sites within the bay. The co-ordinates given by the GPS (on average, accuracy within 10 metres), were not precise enough to allow any patterns to be seen once the results were plotted.

The rocky beach around Arlturlie Point (figure 14) was notable due to the large number of fish-traps located; these are discussed below. To the east of Arlturlie Point, the deep bay below Castle Stuart was dominated by thick deposits of mud, and few features were noted here. The coast to the south of Ardersier (figure 15) was mainly seaweed-covered rocks and a boulder beach. A few features were noted, including several alignments of boulders (FTS 142, 143, 144, 145). It was thought that several of these alignments were the remains of groynes, although it was unsure why anyone would have gone to the trouble of constructing them. Around the village of Ardersier, and stretching up to Fort George (figure 16), a sandy beach dominated the coast. Within the sand, the remains of numerous stake traps were located, discussed below.

Fish-traps located during the FTS surveys

Firth of Forth, north shore (figure 17)

Details of the fish-traps located during the FTS survey are presented in Appendix 4 and are plotted on figure 17. In all, eight possible or definite fish-traps were located.

The most spectacular of the traps located was the enormous curvilinear trap at Dunimarle (FTS 113: plate 2) The stone-built trap had walls over 2 metres thick and was more than 150m metres wide. It curved eastwards from near the end of Dunimarle Pier and returned to shore against a natural outcrop of rock. The site was of such a size that an association with the monastery at Culross should be considered.

Details of this site were passed on to the survey team by a local pilot and student at the University of St Andrews (A. Sayers *pers com*). The site is virtually invisible from the shore as it barely breaches the thick deposit of mud that surrounds it. It is only once out on the site that it is easily observed. The layer of mud may be covering a significant amount of the site, thus keeping it in a good state of preservation. No timber was noted during the field visit, but the gap between the two faces of the wall was covered by silt and it is possible that wood has survived.

On the beach at Low Torry, several stretches of walling were located under a thick cover of seaweed (FTS 120, FTS 124, FTS 125: plates 3 & 4). It was the presence of the weed that alerted the surveyors to the areas in the first place, as the surrounding area was devoid of vegetation, consisting of thick deposits of mud. The walls were not immediately obvious as collapsed stone obscured their shape, but became easier to see once the seaweed had been cleared away. Once their location had been determined, the aerial photographs for the area were re-examined. Although the individual walls were still not clear, the spreads of stone were seen to define areas that may have been rectangular fish-traps. Despite this, they are substantially covered in drifted deposits and the only way of being able to ascertain their true form and extent would be by excavating test trenches across them.

A sizeable stake trap was located at Torryburn (FTS 127: plate 5). The stake trap extended c. 100 metres from the shore and terminated at a massive boulder. The stakes were set in two parallel rows and the individual stakes were protected by a line of boulders which measured up to 0.8m x 0.6m. It is surprising that this site was not located during the CZA survey, although it is possible that site NT02358591 is the same feature, although the grid reference and description are slightly at odds with observations on the ground.

Firth of Forth, south shore (figure 18)

Three possible fish-traps were located during the FTS survey and are detailed in Appendix 4. The survey revealed a definite stake trap and a circular feature that may be a trap. The stake trap (FTS 158) was located just below the old Carriden fishery. It was mainly the seaward end of this structure that was visible, and it could only be seen at low tide. Over twenty substantial posts and many much smaller stakes were noted, together with the remains of wattle-work. The remains represent a leader, but the actual trap was not located.

The circular feature (FTS 156) was much smaller than the fish-trap excavated by Hooper (2001) on the beach at Ardersier and measured just 7.5 metres in diameter, (the Ardersier feature was 20 metres in diameter). Its location of the beach close to the stake trap, and in the area of the Carriden fishery, led to the supposition that is either some form of trap or storage pen associated with fishing.

Figure 13: All features located during the survey; Blackness - Carriden

Scale 1:25 000

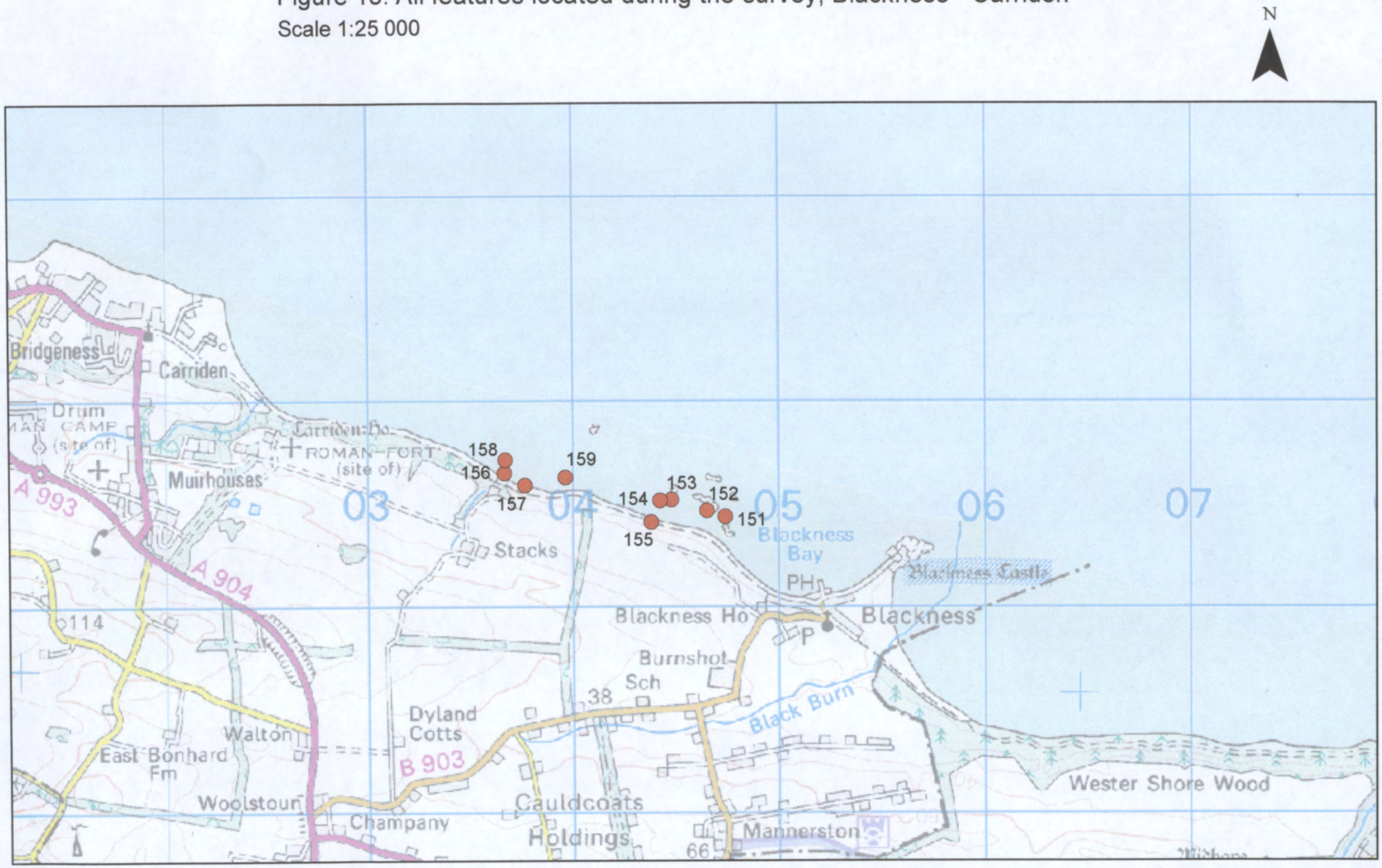


Figure 14: All features located during survey; Moray Firth, Inverness - Castle Stuart

Scale 1:25 000

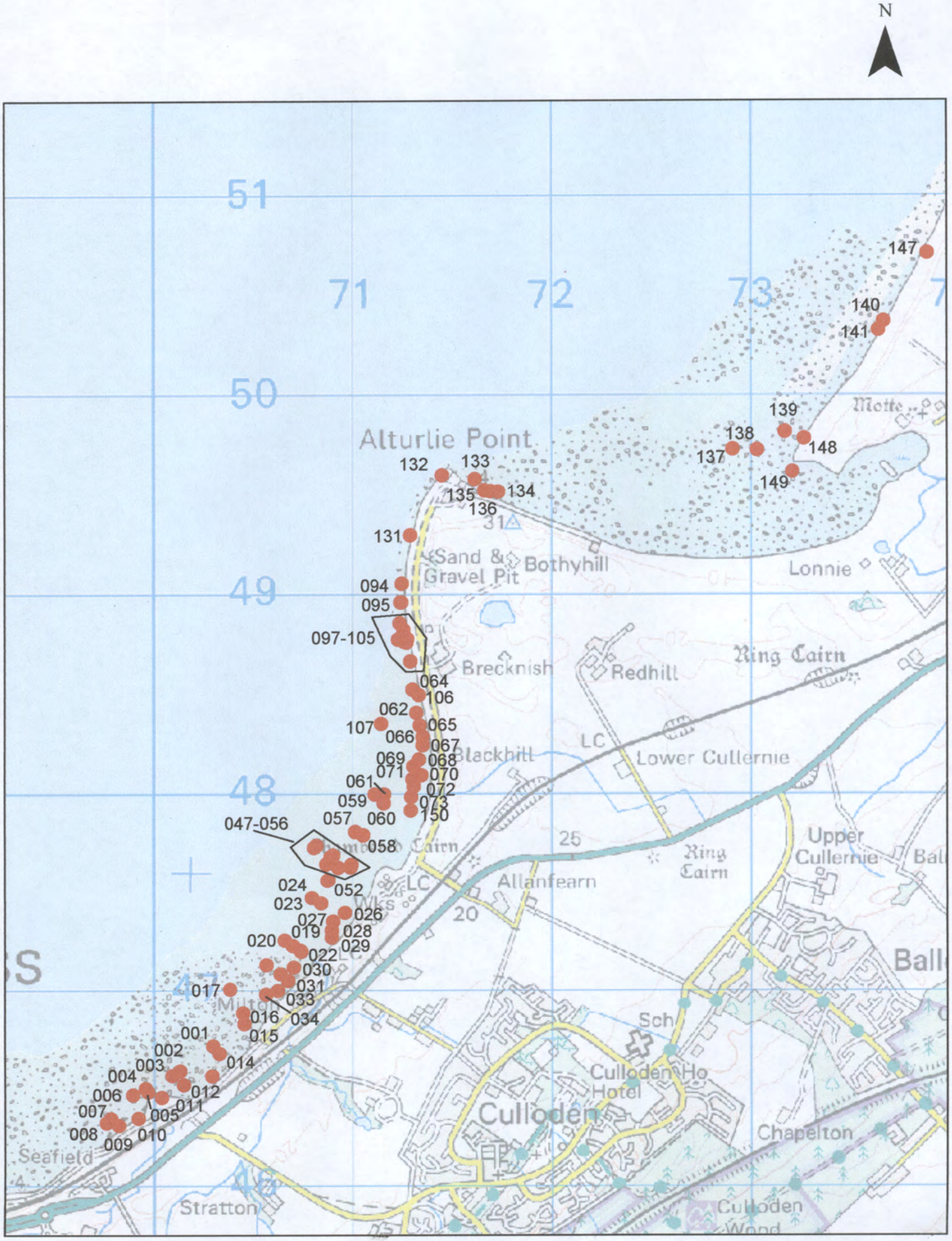


Figure 15: All features located during survey; Moray Firth, Castle Stuart - Ardersier

Scale 1:25 000

Figure 16: All features located during survey; Moray Firth, Ardersier - Fort George

Scale 1:25 000

Figure 17: Fish traps located during the survey; Culross - Torryburn
Scale 1:25 000

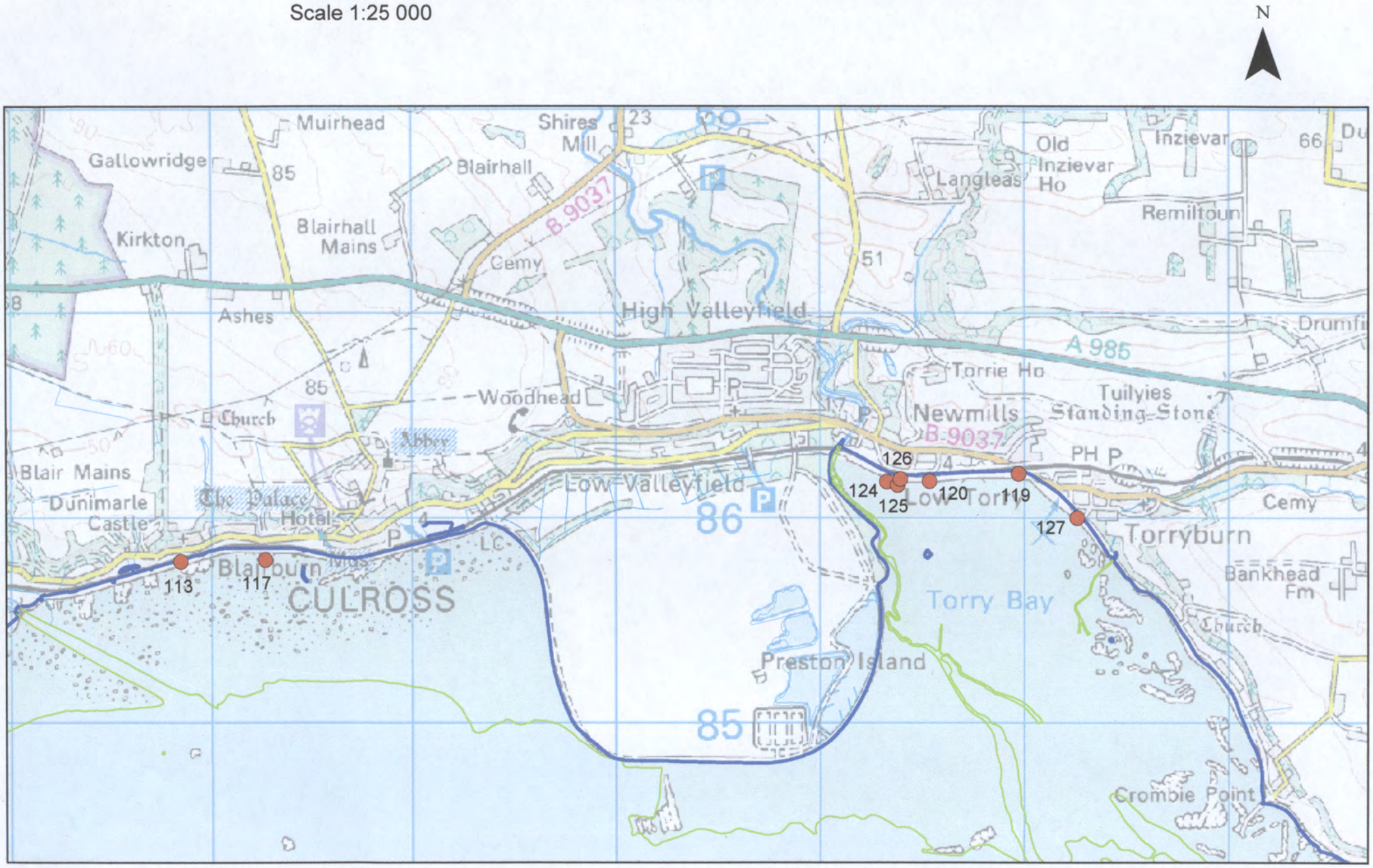


Figure 18: Fish-traps located during the survey; Blackness - Carriden

Scale 1:25 000

Moray (figures 19 - 21)
Numerous fish-traps were noted during the FTS survey of the Moray Firth, and the results are presented in Appendix 5. A few of the traps had already been added to the Highland SMR by Deanna Groom after an examination of aerial photographs. Some others had been noted by Janet Hooper in the report on the excavation of the fish trap at Ardersier. No field recording had previously been undertaken at any of these sites.

In all, thirty-one possible or definite fish-traps were located. There were three main categories of trap present, stake traps, linear traps and rectilinear traps. The stake traps were mainly concentrated on the sandy beach between Fort George and Ardersier. The definite remains of at least seven stake traps were recorded in the area, together with two other possible alignments. Only one of these traps was visible on aerial photographs (FTS 041), thought by several commentators (including Hooper 2001, p. 8) to be the same as a stake trap depicted on a chart of 1860 (RHP 6341). The aerial photographs show a line of stakes extending from the shore out into the Firth for 180m, with a short return to the east. A second line of stakes starts at the end of this return, and continues out into the Firth for a further 100m, with a return at its end of 25m. This design was intended to trap fish swimming towards Fort George, i.e. out of the Firth.

The map depiction also shows a line of stakes with a hooked return at the end with a second line of stakes and a return starting at the end of the first. However, the two returns face west and not east, and the trap was intended to trap fish swimming into the Firth. The cartographer depicted the ends of all the traps that he surveyed, and it seems unlikely that he would have made such a basic mistake. All stake traps located between Fort George and Arlturlie Point are shown on the chart as trapping fish coming into the Firth. Traps on the north shore are generally intended to catch fish going out to sea.

The remains of a second stake trap (FTS 042) lie very close to the trap discussed above (plate 6). This could be the one depicted on the 1860 map. It should be noted that this second trap does not appear on any of the aerial photographs, despite both traps being constructed of timber stakes that are 100mm in diameter and 0.2m high.

Several of the aerial photographs depicting the stake trap were scanned at high resolution and added to a Geographic Information System. Despite the resolution of the images, each pixel equated to between 0.5m and 0.9m (depending upon the scale of the original photograph). At this resolution, it would be impossible to distinguish a single stake measuring just 0.1m, yet the lines of stakes of FTS 041 are clearly visible. It is suggested that what is being looked at is not in fact the timbers of the stake trap, but seaweed that is adhering to those timbers.

The second set of fish-traps were constructed of linear walls, and four traps of this type were recorded at Connage (FTS 108-111: plate 7). These were not noticed during the initial walk-over survey, despite the tide being low and the survey being conducted twice, in opposite directions. The walls were only noticed from the road (situated on a raised beach overlooking the site) when the tide was at half flood. It was weed adhering to the walls that was seen floating in straight lines in the water. When the site was again revisited, this time with the position known, the walls were easy to locate. Similar linear walls were also thought to exist at Arlturlie Point (FTS 094, FTS 095, FTS 099). Of these, FTS 099 was built of boulders and contained several wooden posts within it. It was unsure if these were definitely fish-trap and further survey coinciding with spring tides is needed.

The third class of traps noted were the large rectangular traps located at Arlturlie Point (FTS 105, FTS 106: plates 8 &9). These stone-built structures had walls up to 140 metres long and enclosed

large areas of beach. Both had 'boxes' at their north-eastern corners and were intended to capture fish leaving the Firth. Several other possible walls were noted in the vicinity, and these may represent the remains of other structures, possible partially robbed to help construct the two surviving traps. A third rectangular structure (FTS 150) was noted on aerial photographs held by Scottish Natural Heritage in Dingwall, but was not seen during the initial survey. The site was revisited and proved very difficult to locate, despite prior knowledge of the location of the structure. The walls were barely discernible, but were eventually identified. This structure would not have been located without evidence from the aerial photographs.

The survey area also included the circular trap excavated in 2001 (Hooper 2001: plate 10). Whether this was a fish-trap or not is still unresolved, as indicated by the title of the excavation report, 'Excavation of a possible fish-trap'. The trap is located quite high up the beach, and therefore dry for much of the time. If it functioned as a trap, it must have had a leader that extended from the trap out to sea, with a second leader going in to the shore to prevent fish from by-passing the trap. No sign of these stakes were noted during the excavation, and although possible that they were totally removed or are covered by sand, it is also possible that this structure had another function. For a full discussion of this structure, please refer to the excavation report.

Figure 19: Fishtraps located during survey; Moray Firth, Inverness - Castle Stuart

Scale 1:25 000

Figure 20: Fish-traps located during survey; Moray Firth, Castle Stuart - Ardersier

Scale 1:25 000

Figure 21: Fish-traps located during survey; Moray Firth, Ardersier - Fort George
Scale 1:25 000

Conclusion

The aim of the FTS survey was to determine whether the large difference in the concentration of fish-traps noted during the CZA survey of the Moray, compared to the surveys of the Forth, reflected the original distribution of such structures. The FTS survey examined three stretches of coast, chosen at random, on the Moray Firth and the north and south banks of the Forth. In all, 26.5 km of coast was walked and 41 fish-traps or possible fish-traps were located.

On the Moray Firth, thirty-one possible traps were noted in a survey of 19 km, of which fourteen were definite traps. If we only regard the definite traps, this gives an average of one trap every 1.35 km.

On the north bank of the Forth, eight possible traps were noted in a survey of 5 km, of which three were definite traps. This gives and average of one definite trap every 1.6 km.

On the south bank of the Forth, three possible traps were noted in a survey of 2.5 km, of which one was a definite trap. This gives an average of one definite trap every 2.5 km.

The combined average for definite traps on the Firth of Forth is one trap every 1.87 km.

Table 4 presents the results of the CZA surveys and the FTS survey, showing the average distance between traps located during the surveys.

Area	CZA survey	FTS survey
Moray	2.5 km	1.35 km
Forth, north	6.2 km	1.6 km
Forth, south bank	170 km	2.5 km
Forth, north and south banks	15.3 km	1.87 km

Table 4 Number of kilometres between traps located during the different surveys.

The results of the FTS survey indicates that the distribution of traps located in the Firth of Forth and the Moray Firth is similar. This is in stark contrast to the frequency of traps suggested by the results of the CZA surveys. However, this is partly due to the FTS surveys being undertaken in areas without significant coastal development. The loss of intertidal areas in much of the Inner Forth means that the average distance between traps becomes much greater.

One reason for the improved distribution of traps in the Forth as a result of the FTS survey is that intertidal features were being specifically searched for. The intertidal zone of the Firth of Forth presents a challenging survey environment. Thick deposits of mud obscure many features while others are hidden by weed. Additionally, much of the intertidal zone is quite hazardous to traverse. The CZA surveys were always intended to be ***rapid***. As such, time was limited and it was not possible for the surveyors to invest a great deal of effort in trying to locate features within this difficult terrain.

Additionally, both of the surveys of the Forth were undertaken during the winter, when daylight hours coinciding with low tide were almost certainly limited. Work undertaken when the tide was high would have prevented the surveyors from locating many features. A third reason for the difference in results is that the material unearthed during the desk-based assessments prior to the Forth surveys would not have been very helpful in furnishing the surveyors with information about

the existence of possible of sites. There are very few aerial photographs of the area taken under optimum tidal conditions and the wealth of cartographic material relating to fish-traps that exists for the Moray Firth is lacking.

The results of the FTS survey seem to indicate that there is not a huge difference in the density of fish-trap location between the Firth of Forth and the Moray Firth. It indicates that in order to obtain a full picture of the distribution of sites in the intertidal zone, surveys will have to be more targeted. Rapid coastal surveys, which aren't able to take full advantage of spring tides and a coincidence of daylight hours with low water, are always going to give an incomplete picture, and will skew results. As has been noted above, it is often people living locally who can take most advantage of the states of the tide; and the involvement of the Edinburgh Archaeological Field Society in this project has shown the value that local groups can play in such surveys. With due regard to health and safety matters, it is hoped that similar surveys by other local groups, combined with further targeted survey of selected intertidal areas, will help us to add to the picture of intertidal site distribution.

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Plates

Plate 1
A curvilinear fish-trap at Torryburn, Fife

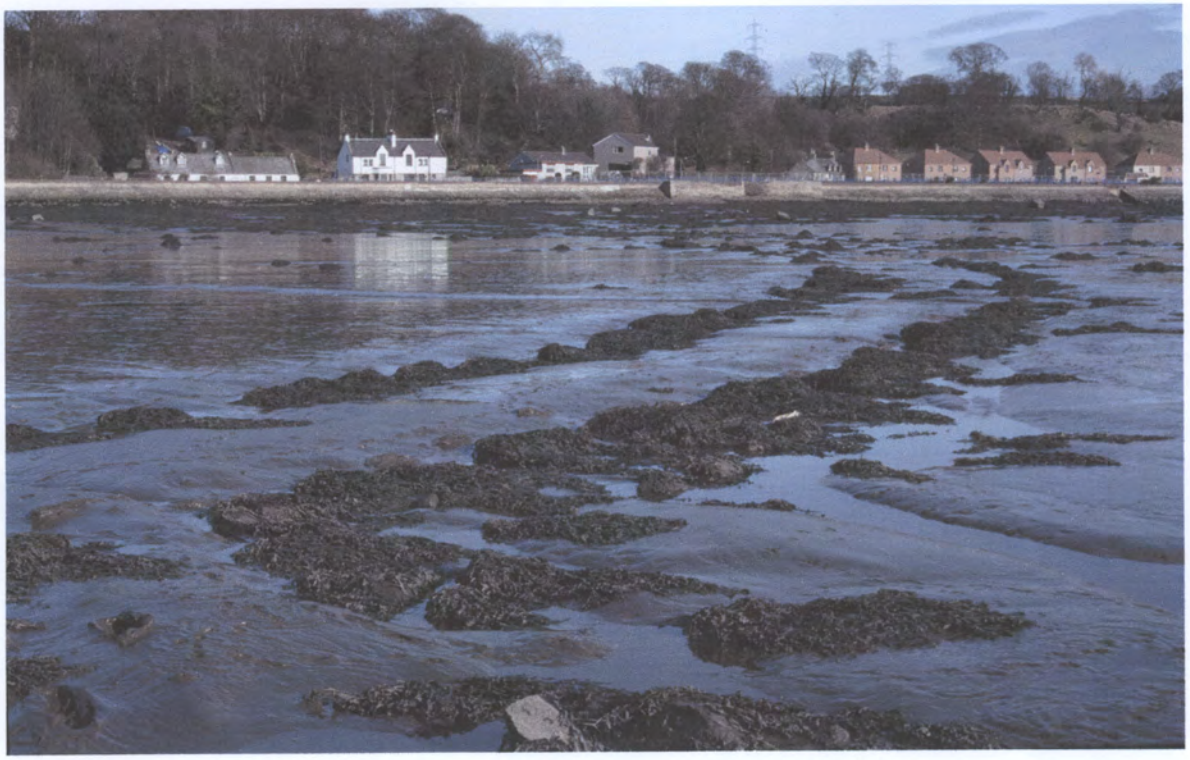

Plate 2
A large curvilinear fish-trap at Dunimarle, near Culross, Fife. This fish-trap is almost totally covered in a layer of thick mud.

Plate 3 A wall on the foreshore hidden under a layer of weed.

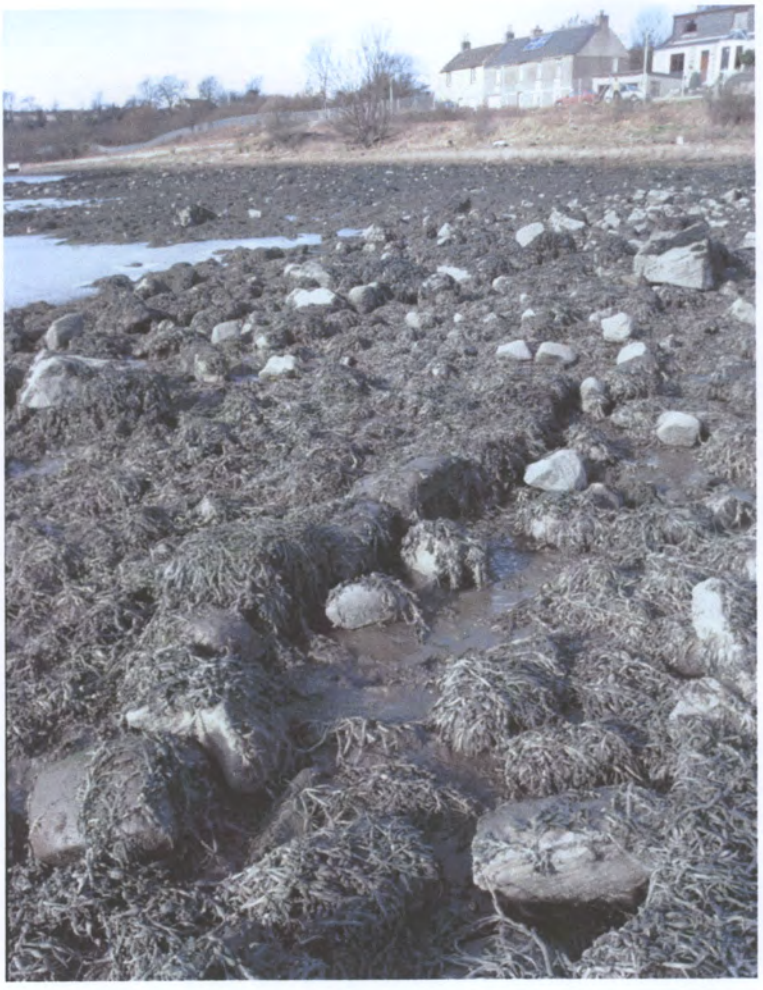

Plate 4 A wall on the foreshore after the covering of weed has been partially cleared.

Plate 5 The remains of a substantial stake trap at Torryburn, Fife

Plate 6 Two stake traps near Fort George. One of these traps is visible on aerial photographs. The stakes of the trap on the right are covered in weed, whereas those on the left are not. It is thought that it is the weed that is seen from the air, and not the individual timbers.

Plate 7 Linear traps at Connage, near Inverness Airport, seen from the road above the beach. The walls of two traps can be seen when the tide is half in as the weed covering them is floating

Plate 8 A large rectangular fish-trap at Arturlie Point, near Inverness. A second trap, plate 9, lies directly to the west.

Plate 9 A large rectangular fish-trap at Arturlie Point, near Inverness, lying next to the trap shown in plate 8. The Kessock Bridge can be seen in the background.

Plate 10 The circular fish-trap excavated by Janet Hooper on the beach at Ardersier.

Appendix 1

Fish-traps located during the Coastal Zone Assessment Surveys of the Firth of Forth

Site No NT01558570 **Map** 3 **Easting** 301550 **Northing** 685750 **Site Name** Torryburn

Site Type stakes

Description line of three wooden stakes

Site No NT01908625 **Map** 3 **Easting** 301900 **Northing** 686250 **Site Name** Torryburn

Site Type fish trap

Description D shaped fish trap

Site No NT02428569 **Map** 3 **Easting** 302420 **Northing** 685690 **Site Name** Torryburn

Site Type cairns

Description 2 cairns of small stones on mud flats. 2 metres diameter

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Site No NT02358591 **Map** 3 **Easting** 302350 **Northing** 685910 **Site Name** Torryburn

Site Type stakes

Description line of three circular wooden stakes set in a stone dyke

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Site No NT16638370 **Map** 7 **Easting** 316630 **Northing** 683700 **Site Name** Dalgety Bay

Site Type wall

Description rough stone dyke or groyne

Site No NT38750075 **Map** 14 **Easting** 338750 **Northing** 700750 **Site Name** Leven

Site Type fish trap

Description U shaped wooden fish trap

Site No NT38790080 **Map** 14 **Easting** 338790 **Northing** 700800 **Site Name** Leven

Site Type cairn

Description stone cairn with cells visible, possible fish trap

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Site No N041900245 **Map** 15 **Easting** 341900 **Northing** 702450 **Site Name** Lower Largo

Site Type fish trap

Description fish trap, u-shaped line of wooden stakes

Site No NO43480230 **Map** 15 **Easting** 343480 **Northing** 702300 **Site Name** Largo Bay

Site Type fish trap ?

Description metal and wooden posts, fish trap or glider traps

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Site No NO44700180 **Map** 16 **Easting** 344700 **Northing** 701800 **Site Name** Largo Bay

Site Type fish trap

Description fish trap, u-shaped line of wooden stakes

Site No NO44600170 **Map** 16 **Easting** 344600 **Northing** 701700 **Site Name** Largo Bay

Site Type fish trap

Description fish trap, u-shaped line of wooden stakes

Site No NO44750180 **Map** 16 **Easting** 344750 **Northing** 701800 **Site Name** Largo Bay

Site Type fish trap

Description fish trap consisting of concrete set wooden posts in pattern

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Site No NO45100170 **Map** 16 **Easting** 345100 **Northing** 701700 **Site Name** Largo Bay

Site Type stake nets

Description 2 lines of wooden posts, salmon stake nets

Site No NO45300140 **Map** 16 **Easting** 345300 **Northing** 701400 **Site Name** Largo Bay

Site Type stake nets

Description 2 lines of wooden posts, salmon stake nets

Site No NO45380135 **Map** 16 **Easting** 345380 **Northing** 701350 **Site Name** Largo Bay

Site Type stake nets

Description Salmon stake nets and posts

Site No NO45600100 **Map** 16 **Easting** 345600 **Northing** 701000 **Site Name** Largo Bay

Site Type fish trap?

Description possible fish trap, mixed in with several glider traps.

Site No NT 6365 8080 **Map** GUARD **Easting** 363650 **Northing** 680800 **Site Name** Tyne Sands

Site Type fish trap?

Description On the rocky foreshore at the west of Belhaven Bay in front of Links Wood is a linear stone feature. The feature is composed of a double row of large boulders with a core of smaller stones, it is approximately 70m in length and 1m wide. The feature is less well preserved to the east and is little more than a scatter of boulders. The function of this feature is unclear, the Ranger from the John Muir Country Park suggested it was related to improvements carried out by the estate in the 1820's.

Appendix 2

Fish-traps located during the Coastal Zone Assessment Surveys of the Moray Firth

Site No NH 6130 4574 **Map** 1 **Easting** 261300 **Northing** 845740 **Site Name** BUNCHREW

SiteType Wooden posts across inlet, possible fish trap

Site No NH54NE 30 **Map** 2 **Easting** 259390 **Northing** 846200 **Site Name** WHINBRAE

SiteType Double tidal fish trap

Site No NH54NE 29 **Map** 2 **Easting** 258410 **Northing** 846220 **Site Name** LENTRAN POINT

SiteType Tidal fish trap

Site No NH54NE 34 **Map** 4 **Easting** 256040 **Northing** 848550 **Site Name** SPITAL SHORE

SiteType Tidal fish trap

Site No NH54NE 33 **Map** 4 **Easting** 256930 **Northing** 849030 **Site Name** SPITAL SHORE

SiteType Possible fish trap

Site No NH54NE 31 **Map** 4 **Easting** 259650 **Northing** 848600 **Site Name** CORGRAIN POINT

SiteType Tidal fish trap

Site No NH 6124 4812 **Map** 5 **Easting** 261240 **Northing** 848120 **Site Name** COULMORE

SiteType Stone fish trap

Site No NH 6355 4820 **Map** 5 **Easting** 263550 **Northing** 848200 **Site Name** TORGORM POINT

SiteType Four fish traps

Site No NH 7769 6720 **Map** 12 **Easting** 277690 **Northing** 867200 **Site Name** CROMARTY

SiteType Fish trap

Site No NH 7735 6731 **Map** 12 **Easting** 277350 **Northing** 867310 **Site Name** CROMARTY

SiteType Fish trap

Site No NH 7723 6730 **Map** 12 **Easting** 277230 **Northing** 867300 **Site Name** CROMARTY

SiteType Fish trap

Site No NH 7577 6595 **Map** 12 **Easting** 275770 **Northing** 865950 **Site Name** ROSEFARM

SiteType Fish trap

Site No NH 7418 6590 **Map** 13 **Easting** 274180 **Northing** 865900 **Site Name** WOODSIDE

SiteType Fish trap

Site No NH 7218 6576 **Map** 13 **Easting** 272180 **Northing** 865760 **Site Name** JEMIMAVILLE

SiteType Complex fish trap

Site No NH 7185 6640 **Map** 13 **Easting** 271850 **Northing** 866400 **Site Name** UDALE BAY

SiteType Fish trap

Site No NH 7110 6723 **Map** 13 **Easting** 271100 **Northing** 867230 **Site Name** NEWHALL POINT

SiteType Fish trap stake net mound

Site No NH 6785 6702 **Map** 14 **Easting** 267850 **Northing** 867020 **Site Name** FERRYTON POINT

SiteType Fish trap

Site No NH 6140 6270 **Map** 16 **Easting** 261400 **Northing** 862700 **Site Name** WESTER TOBERCHURN
SiteType Fish trap

Site No NH 6083 6212 **Map** 16 **Easting** 260830 **Northing** 862120 **Site Name** WESTER SHORETOWN
SiteType Fish trap

Site No NH 5970 6071 **Map** 16 **Easting** 259700 **Northing** 860710 **Site Name** FINDON
SiteType 4 fish traps

Site No NH 5915 5922 **Map** 16 **Easting** 259150 **Northing** 859920 **Site Name** BALCLADAICH
SiteType Possible fish trap

Site No NH 5870 5935 **Map** 16 **Easting** 258700 **Northing** 859350 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5862 5947 **Map** 16 **Easting** 258620 **Northing** 859470 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5844 5949 **Map** 16 **Easting** 258440 **Northing** 859490 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5722 5859 **Map** 16 **Easting** 257220 **Northing** 858590 **Site Name** OLD FERINTOSH
SiteType Fish trap

Site No NH 5915 5922 **Map** 16 **Easting** 259150 **Northing** 859920 **Site Name** BALCLADAICH
SiteType Possible fish trap

Site No NH 5870 5935 **Map** 16 **Easting** 258700 **Northing** 859350 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5844 5949 **Map** 16 **Easting** 258440 **Northing** 859490 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5862 5947 **Map** 16 **Easting** 258620 **Northing** 859470 **Site Name** BALLOAN
SiteType Fish trap

Site No NH 5722 5859 **Map** 17 **Easting** 257220 **Northing** 858590 **Site Name** OLD FERINTOSH
SiteType Fish trap

Site No NH 5619 5818 **Map** 17 **Easting** 256190 **Northing** 858180 **Site Name** DINGWALL
SiteType Fish trap

Site No NH 5720 6060 **Map** 18 **Easting** 257200 **Northing** 860600 **Site Name** MOUNTGERALD
SiteType Complex fish trap

Site No NH 5755 6140 **Map** 18 **Easting** 257550 **Northing** 861400 **Site Name** MOUNTGERALD
SiteType Double fish trap

Site No NH 5992 6335 **Map** 19 **Easting** 259920 **Northing** 863350 **Site Name** FOULIS POINT
SiteType Fish trap

Site No NH 612 650 - 6 **Map** 19 **Easting** 261200 **Northing** 865000 **Site Name** KILTEARN BEACH
SiteType Fish trap

Site No NH 6261 6529 **Map** 19 **Easting** 262610 **Northing** 865290 **Site Name** KILTEARN BEACH
SiteType Fish trap

Site No NH 6288 6571 **Map** 20 **Easting** 262880 **Northing** 865710 **Site Name** EVANTON AIRFIELD
SiteType Fish trap stone mounds

Site No NH 6395 6810 **Map** 20 **Easting** 263950 **Northing** 868100 **Site Name** BALLACHRAGGAN
SiteType Possible fish trap

Site No NH 6645 6820 **Map** 21 **Easting** 266450 **Northing** 868200 **Site Name** DALMORE PIER
SiteType Fish trap mound

Site No NH 6695 6878 **Map** 21 **Easting** 266950 **Northing** 868780 **Site Name** DALMORE
SiteType Fish trap

Site No NH 6698 6878 **Map** 21 **Easting** 266980 **Northing** 868780 **Site Name** DALMORE
SiteType Fish trap

Site No NH 6729 6892 **Map** 21 **Easting** 267290 **Northing** 868920 **Site Name** BELLEPORT
SiteType Possible fish trap

Site No NH 6765 6885 **Map** 21 **Easting** 267650 **Northing** 868850 **Site Name** BELLEPORT
SiteType Possible fish trap mound

Site No NH 7425 7115 **Map** 22 **Easting** 274250 **Northing** 871150 **Site Name** BALINTRAID PIER
SiteType Fish trap mounds

Site No NH 7028 6843 **Map** 22 **Easting** 270280 **Northing** 868430 **Site Name** INVERGORDON
SiteType Fish traps

Site No NH 7442 7158 **Map** 22 **Easting** 274420 **Northing** 871580 **Site Name** POLLO HOUSE
SiteType Fish trap mound

Site No NH 7455 7180 **Map** 23 **Easting** 274550 **Northing** 871800 **Site Name** BARBRAVILLE
SiteType Fish trap mounds

Site No NH 7466 7170 **Map** 23 **Easting** 274660 **Northing** 871700 **Site Name** BARBRAVILLE
SiteType Possible fish trap mound

Site No NH 7475 7175 **Map** 23 **Easting** 274750 **Northing** 871750 **Site Name** BARBRAVILLE
SiteType Fish trap mounds

Site No NH 7485 7196 **Map** 23 **Easting** 274850 **Northing** 871960 **Site Name** BARBRAVILLE
SiteType Fish trap

Site No NH 7500 7209 **Map** 23 **Easting** 275000 **Northing** 872090 **Site Name** BARBRAVILLE
SiteType Fish trap

Site No NH 7521 7224 **Map** 23 **Easting** 275210 **Northing** 872240 **Site Name** BARBRAVILLE
SiteType Fish trap

Site No NH 7655 7312 **Map** 23 **Easting** 276550 **Northing** 873120 **Site Name** TARBAT HOUSE
SiteType Possible fish trap

Site No NH 7700 7316 **Map** 23 **Easting** 277000 **Northing** 873160 **Site Name** TARBAT HOUSE
SiteType Timber posts, possible fish trap

Site No NH 7750 7310 **Map** 23 **Easting** 277500 **Northing** 873100 **Site Name** TARBAT HOUSE
SiteType Timber posts, possible fish trap

Site No NH 7922 7210 **Map** 24 **Easting** 279220 **Northing** 872100 **Site Name** TIGH NA MARA
SiteType Fish traps

Site No NH54NE 32 **Map** NOT ON **Easting** 257500 **Northing** 849200 **Site Name** Tarradale
SiteType Stone fish trap

Site No NH54NE 51 **Map** no desc **Easting** 259300 **Northing** 848500 **Site Name** Corgrain Point
SiteType timber fish trap

Appendix 3

All sites located during the

FTS survey of the

Firth of Forth and the Moray Firth

Site No FTS 001 **Map** NH **Easting** 270296 **Northing** 846714

SiteType Post **Cond** Fair **Action** nil

Single, rounded post with the top broken or eroded. Totally covered at high tide.

Site No FTS 002 **Map** NH **Easting** 270128 **Northing** 846586

SiteType Wooden post **Cond** Fair **Action** nil

Single rounded timber post, cleanly broken at the top. Covered at high water. Does not appear to be a marker post.

Site No FTS 003 **Map** NH **Easting** 270091 **Northing** 846564

SiteType Single wooden post **Cond** Fair **Action** nil

Single rounded timber post. Top broken cleanly. Covered at high water.

Site No FTS 004 **Map** NH **Easting** 269956 **Northing** 846498

SiteType wooden stake **Cond** Fair **Action** nil

Single squared stake. Top eroded but appears to have been sawn off. No fastenings visible. Dry at low water, covered at high water.

Site No FTS 005 **Map** NH **Easting** 269969 **Northing** 846481

SiteType Linear alignment of boulders **Cond** Fair **Action** determine if archaeological or geological

Line of seaweed-covered boulders extending for more than 50 metres. Boulders are rounded and aligned N-S (extending from shore out into water). Each boulder up to 1 metre apart. Alignment is single boulder's width. Extends from 269969 / 846481 to beyond 269942 / 846505

Site No FTS 006 **Map** NH **Easting** 269892 **Northing** 846464

SiteType Single wooden post **Cond** fair **Action** nil

Single circular timber post. Top sawn (visible saw marks). No sign of fixtures. On edge of a gravel bank. Timber at 45 degree angle, pointing to south.

Site No FTS 007 **Map** NH **Easting** 269780 **Northing** 846344

SiteType Single wooden post **Cond** very poor **Action** nil

Single rounded post. Top broken. Dry at low water, covered at high water. No fixtures.

Site No FTS 008 **Map** NH **Easting** 269760 **Northing** 846323

SiteType Single wooden post **Cond** fair **Action** nil

Single rounded wooden post. Top broken. No fixtures. Dry at low tide, covered at high tide.

Site No FTS 009 **Map** NH **Easting** 269822 **Northing** 846310

SiteType Single wooden post **Cond** fair **Action** nil

Single rounded wooden post. No fixtures. Covered at high tide, dry at low tide.

Site No FTS 010 **Map** NH **Easting** 269920 **Northing** 846345

SiteType Single wooden post **Cond** fair **Action** nil

Single rounded wooden post. Top broken. No fixtures visible. Dry at low tide, covered at high tide.

Site No FTS 011 **Map** NH **Easting** 270038 **Northing** 846452

SiteType Possible wall **Cond** fair **Action** determine if archaeological or geological

A possible wall, dry at low tide and covered at high tide. Sits on eastern edge and north eastern corner of pebble bank. Oriented north - south, curving slightly to west at north end. May not be a wall, but line of larger stones pushed up onto pebble bank.

Site No FTS 012 **Map** NH **Easting** 270149 **Northing** 846517

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 013 **Map** NH **Easting** 270292 **Northing** 846561

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 014 **Map** NH **Easting** 270327 **Northing** 846677

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 015 **Map** NH **Easting** 270455 **Northing** 846828

SiteType Single wooden post **Cond** poor **Action** nil

Single rounded wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 016 **Map** NH **Easting** 270450 **Northing** 846883

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 017 **Map** NH **Easting** 270383 **Northing** 847002

SiteType Single wooden post **Cond** poor **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at very low water only, covered at high tide. No fixtures visible.

Site No FTS 018 **Map** NH **Easting** 270567 **Northing** 847128

SiteType single wooden post **Cond** very poor **Action** nil

Single circular wooden post. Top eroded, but may originally have been sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 019 **Map** NH **Easting** 270700 **Northing** 847227

SiteType concrete post, part of alignment **Cond** fair **Action** nil

Rectangular, wedge-shaped, concrete post. Part of an alignment of 6 concrete and timber posts - only FTS 20 and 21 accessible. No fixtures visible, but concrete contains metal reinforcing rods. Dry at low water, covered at high water.

Site No FTS 020 **Map** NH **Easting** 270659 **Northing** 847256

SiteType concrete post, part of alignment **Cond** fair **Action** nil

Rectangular, wedge-shaped, concrete post. 53m north of FTS 19. Part of an alignment of concrete and timber posts - with FTS 19 and 21. Three further posts visible to north, but not accessible due to water, except at low spring tides. No fixtures visible, but concrete contains metal reinforcing rods. Dry at low water, covered at high water.

Site No FTS 021 **Map** NH **Easting** 270741 **Northing** 847198

SiteType concrete post, part of alignment **Cond** fair **Action** nil

Rectangular, wedge-shaped, concrete post. Part of an alignment of 6 concrete and timber posts - with FTS 19 and 20. 53m to south of FTS 19. Appears to have metal fastenings. Dry at low water, covered at high water.

Site No FTS 022 **Map** NH **Easting** 270738 **Northing** 847204

SiteType Single wooden post **Cond** fair **Action** nil

Single rounded wooden post. Top broken. No fixtures.

Site No FTS 023 **Map** NH **Easting** 271842 **Northing** 847448

SiteType Tall timber post **Cond** fair **Action** survey, with other tall posts

Very tall timber post. Barnacles appear up to 1.5m from bottom of post. Incised marks going around circumference in various places (from ropes/lines?). One of several posts, including FTS 24, FTS 25, FTS 59, FTS 51, FTS 52 and FTS 52. Dry at low tide.

Site No FTS 024 **Map** NH **Easting** 270795 **Northing** 847474

SiteType Tall timber post **Cond** fair **Action** survey, with other tall posts

Very tall timber post. Barnacles and weed up to 2.2m from bottom of post. Incised marks going around circumference in various places (from ropes/lines?). One of several posts, including FTS 23, FTS 25, FTS 59, FTS 51, FTS 52 and FTS 52. Dry at low tide.

Site No FTS 025 **Map** NH **Easting** 270878 **Northing** 847567

SiteType Tall timber post **Cond** fair **Action** survey, with other tall posts

Very tall timber post. Barnacles appear up to 1.5m from bottom of post. Incised marks going around circumference in various places (from ropes/lines?). One of several posts, including FTS 23, FTS 24, FTS 59, FTS 51, FTS 52 and FTS 52. Dry at low tide.

Site No FTS 026 **Map** NH **Easting** 270961 **Northing** 847398

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. No other posts visible nearby. Top broken. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 027 **Map** NH **Easting** 270901 **Northing** 847354

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top broken. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 028 **Map** NH **Easting** 270895 **Northing** 847306

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. No other posts visible nearby. Top broken, though probably originally sawn off. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 029 **Map** NH **Easting** 270895 **Northing** 847269

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top broken. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 030 **Map** NH **Easting** 270703 **Northing** 847116

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. No other posts visible nearby. Top broken, though probably originally sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 031 **Map** NH **Easting** 270676 **Northing** 847047

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top broken. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 032 **Map** NH **Easting** 270637 **Northing** 847081

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top broken. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 033 **Map** NH **Easting** 270624 **Northing** 846996

SiteType Single wooden post **Cond** fair **Action** nil

Single circular wooden post. Top broken, though probably originally sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 034 **Map** NH **Easting** 270564 **Northing** 846978

SiteType Single wooden post **Cond** Poor **Action** nil

Single circular wooden post, three quarters surviving (east side split off). Top broken, though probably originally sawn. Dry at low water, covered at high tide. No fixtures visible.

Site No FTS 035 **Map** NH **Easting** 276018 **Northing** 856553

SiteType Fish trap? Alignment of posts **Cond** fair **Action** Survey - detailed plan of position of each post.

Alignment of pairs of rectangular posts. Average size of post - 0.2m N-S / 90mm E-W. Height from 0.25m high stumps to 1.3m. Parallel lines c. 0.2m apart, distance between pairs of posts c. 1.5m. 5 pairs visible. Extending North - South (shore to north, sea to south). Southern-most post has a metal bolt at 1.2m high. A bracing post lies to the West of this post. The bracing post is angled 45 degrees. Southern end of alignment at 276017 / 856559. Note that the GPS grid ref almost exactly the same as FTS 36

Site No FTS 036 **Map** NH **Easting** 276017 **Northing** 856552

SiteType fish trap? Jetty? Alignment of posts. **Cond** fair to poor **Action** Survey - detailed plan of position of each post.

Line of 8 circular posts, arranged in two alternating lines, aligned north (shore) - south (sea). Lines 0.2m apart and average distance between posts: 1.50m. Average diameter of posts: 0.20m. Northern most (shore end) post sawn off at ground level. Several of the posts have metal wires at 1.05m height. One bracing post to east of alignment. This post is broken and not fixed to alignment. Note that the GPS grid ref is almost exactly the same as FTS 35.

Site No FTS 037 **Map** NH **Easting** 276229 **Northing** 856492

SiteType Jetty **Cond** fair to poor **Action** survey.

Jetty constructed of timber uprights and side walls, with concrete slabs forming platform at shore end. Metal poles also used to construct side walls. Wooden uprights are 1.8m apart and support up to 3 horizontal timbers to form side wall. Concrete slabs are 1.2m NS x 1.6m EW and 0.2m thick. Slabs contain bullets in mix. Site uncovered at low tide, covered at high tide. Uprights continue into sea, but no horizontal timbers visible at sea end.

Site No FTS 038 **Map** NH **Easting** 276255 **Northing** 856481

SiteType posts associated with jetty **Cond** fair **Action** survey

Nine timber posts associated with a stone pier that is above high tide mark. Sandstone blocks of the pier also visible to East, though covered by beach cobbles. Posts are roughly aligned N-S, turning to west at the north (shore) end. Three of the posts are large and squared (0.25m x 0.3m) and four are rounded, up to 0.15m.

Site No FTS 039 **Map** NH **Easting** 276599 **Northing** 856606

SiteType Jetty or pier associated with Fort George **Cond** fair - poor **Action** Survey

11 standing posts and 4 stumps lying within 2m of outer sea wall of Fort George. All posts taper at bottom due to erosion. Presumably part of a pier or jetty running along wall edge. All posts are squared - 0.25m x 0.3m. Max surviving height of posts is 2.3m. Arranged in two parallel lines of alternating posts, 0.4m apart, parallel to the sea wall (E-W). A single post at the western end is offset to the north (shore). All posts have traces of metal wire at a height of 1.1m.

Site No FTS 040 **Map** NH **Easting** 276643 **Northing** 856602

SiteType jetty? **Cond** Good **Action** nil

Double line of concrete pillars extending out to sea. Other end at 276638 / 856582. Note, they are visible on APs.

Site No FTS 040A **Map** NH **Easting** 276729 **Northing** 856580

SiteType Jetty? **Cond** good **Action** nil

Line of concrete pillars extending out to sea. Centre at 276714 856557. Seaward end covered by water. Note, they appear on APs.

Site No FTS 041 **Map** NH **Easting** 276759 **Northing** 856558

SiteType Fish trap (stake trap) **Cond** Poor **Action** Survey exact position of stakes

Double line of timber stakes, west end interspersed with small, weed-covered boulders. Stakes surviving to less than 0.2m high and 0.1m in diameter. Occasional stake not in line. Lines less regular at south (sea) end - and continues into water, to beyond 276726 /856472 . Covered at high tide. South (sea) end may never be dry. Stakes set in sand. APs show that there is a second row of stakes further out in the water beyond the first row. The first row of stakes is 180m long, with a return to east of 15m at it end. The second row starts at the end of this return and is 100m long with a similar return at the end, c. 25m long. Note, these two returns face in the opposite direction from those depicted on the plan of 1860 (RHP 6341).

Site No FTS 042 **Map** NH **Easting** 276780 **Northing** 856544

SiteType Fish traps - stake traps **Cond** Poor **Action** Accurate survey of position of all stakes

Line of timber stakes, with a possibly related line 2m to the east. Line continues into water beyond 276726 / 856472. Eastern line has more stakes to south (sea end), with fewer visible at the shore end. Average stake size is 0.1m diameter and 0.2m high. Distance between stakes varies from 0.25m - 2m. Other stakes visible to east of the eastern line, but these are not in a noticeable alignment. All stakes set in sand.

Site No FTS 043 **Map** NH **Easting** 277424 **Northing** 856135

SiteType Fish trap - stake trap **Cond** Very poor **Action** Accurate survey of position of all stakes

Two stakes visible at shore end, then a gap of 35m, then line continues for at least another 30m. Stakes continue to at least 277323 / 856023. There appears to be a second alignment to the west, though only a few stakes remain, mainly at the seaward end. The seaward end stakes are covered at low water. Average size of stakes is 0.1m in diameter and 0.3m high. Stakes set in sand. In area of SMR NH75NE0052

Site No FTS 044 **Map** NH **Easting** 277375 **Northing** 856087

SiteType Fish trap - stake trap **Cond** Very poor **Action** Accurate survey of position of stakes

Line of rectangular stakes, though no particular orientation to the individual stakes. Line not visible at shore end, though may be covered by sand (or may have been removed). If the stakes did continue to shore, the alignment would converge with FTS 43. Seaward end of stakes at 277320 / 856039. Stakes set in sand. In area of SMR NH75NE0052

Site No FTS 045 **Map** NH **Easting** 277381 **Northing** 856111

SiteType Fish trap - stake trap **Cond** poor **Action** Accurate survey of position of stakes

Line of squared stakes. Gap of up to 9m between stakes. Does not continue to shore - perhaps covered by sand or removed. Line is c. 10m north of FTS 44. Stakes are 50mm x 40mm and up to 100mm high. Seaward (western) end of alignment is at 277337 / 865060. In area of SMR NH75NE0052

Site No FTS 046 **Map** NH **Easting** 277711 **Northing** 855717

SiteType Fish trap pound? **Cond** **Action** Ensure survey drawing made, then monitor

Complex site consisting of a circular stone 'wall' covered by sand. Site better preserved to south. At eastern (shore) end, numerous timbers in poor condition. These are not similar to stakes used in FTS41 - 45. Wall formed of rounded boulders. No coursing visible. Some stakes visible on inner side of wall. A single stake is visible to west (seaward). This is rectangular - at 276688 / 855684. This site is probably the one excavated by Janet Hooper, although the Grid Ref is over 100m different.

Site No FTS 047 **Map** NH **Easting** 270806 **Northing** 847732

SiteType Concrete post **Cond** Good **Action** nil

Concrete post, part of two parallel lines. To south lie FTS 49 and FTS 54. Another post appears to lie to north, but was covered with water. Further posts may exist beyond this. The posts in this line are 90mm x 90mm and are between 1.2m and 1.35m tall. They have wedge-shaped tops.
To the east (5m) is a second row comprising FTS 48 (due east of FTS 47) and FTS 50 with FTS 55 to the south of this. These posts are between 0.55m and 0.75m tall. Between FTS54 and FTS 55 is a 4m long stretch of wall made of boulders (FTS 56).

Site No FTS 048 **Map** NH **Easting** 270818 **Northing** 847741

SiteType concrete post **Cond** Good **Action** nil

Part of second alignment of concrete posts. See FTS 47 for description of alignments. This post has two circular holes piercing it, one at 0.40m from the base, the other at 0.6m. The holes are oriented east-west.

Site No FTS 049 **Map** NH **Easting** 270888 **Northing** 847684

SiteType concrete post **Cond** Fair **Action** nil

Part of alignment of concrete posts, see FTS 47 for description of alignment. This post is damaged on the top, showing it to be reinforced with 3 vertical iron bars.

Site No FTS 050 **Map** NH **Easting** 270901 **Northing** 847692

SiteType concrete post **Cond** Good **Action** nil

Part of alignment of concrete posts, see FTS 47 for description. Post pierced by round holes at 0.22 and 0.47m from base.

Site No FTS 051 **Map** NH **Easting** 270868 **Northing** 847648

SiteType very tall wooden post **Cond** poor **Action** survey, with other tall posts

Very tall wooden post (tree trunk with branches trimmed). Barnacle cover up to 2m. Horizontal grooves incised around the trunk. Set in sand. Base in poor condition. Trunk has not been straightened and curves at top. Associated with FTS 52, FTS 53, FTS 59, FTS 23, FTS 24, FTS 25. Dry at low tide.

Site No FTS 052 **Map** NH **Easting** 270875 **Northing** 847565

SiteType very tall wooden post **Cond** fair **Action** survey, with other tall posts

Very tall wooden post (tree trunk with branches trimmed). Barnacle cover up to 2m. Horizontal grooves incised around the trunk. Set in sand. Associated with FTS 51, FTS 53, FTS 59, FTS 23, FTS 24, FTS 25. Dry at low tide.

Site No FTS 053 **Map** NH **Easting** 270928 **Northing** 847631

SiteType very tall wooden post **Cond** fair **Action** survey, with other tall posts

Very tall wooden post (tree trunk with branches trimmed). Barnacle cover up to 2m. Horizontal grooves incised around the trunk. Set in sand. Associated with FTS 52, FTS 51, FTS 59, FTS 23, FTS 24, FTS 25. Dry at low tide.

Site No FTS 054 **Map** NH **Easting** 270990 **Northing** 847632

SiteType Concrete post **Cond** Good **Action** nil

Part of alignment of concrete posts, see FTS 47 for description.

Site No FTS 055 **Map** NH **Easting** 270993 **Northing** 847645

SiteType concrete post **Cond** Good **Action** nil

Part of alignment of concrete posts, see FTS 47 for description.

Site No FTS 056 **Map** NH **Easting** 270992 **Northing** 847639

SiteType rough wall **Cond** Fair **Action** nil

East - west aligned stretch of rough wall, lying between concrete posts FTS 54 and FTS 55. Function unknown, but presumably associated with the two lines of concrete posts

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Site No FTS 057 **Map** NH **Easting** 271013 **Northing** 847810

SiteType Single wooden post **Cond** poor **Action** nil

Single round wooden post. Top possibly originally sawn off, but now broken. Lower part of post very eroded. Covered at high tide, dry at low tide.

Site No FTS 058 **Map** NH **Easting** 271053 **Northing** 847793

SiteType Single wooden post **Cond** Very poor **Action** nil

Single round wooden post. Almost destroyed.

Site No FTS 059 **Map** NH **Easting** 271110 **Northing** 847995

SiteType Very tall wooden post **Cond** fair **Action** Survey with other tall posts

Very tall wooden post (tree trunk with branches trimmed). Barnacle cover up to 1.2m. Horizontal grooves incised around the trunk. Set in sand. Associated with FTS 51, FTS 52, FTS 53, FTS 23, FTS 24, FTS 25. Dry at low tide.

Site No FTS 060 **Map** NH **Easting** 271157 **Northing** 847954

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. Top probably originally sawn off. No fixtures. Covered at high water, dry at low.

Site No FTS 061 **Map** NH **Easting** 271160 **Northing** 847996

SiteType Single wooden post **Cond** very poor **Action** nil

Single wooden post. Top probably originally sawn off. No fixtures. Covered at high water, dry at low.

Site No FTS 062 **Map** NH **Easting** 271323 **Northing** 848407

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. Top originally sawn off. No fixtures. Covered at high water, dry at low.

Site No FTS 064 **Map** NH **Easting** 271303 **Northing** 848526

SiteType Single wooden post **Cond** fair **Action** nil

Single round wooden post. 5 copper nails hammered into post on shore side with c.20 mm of nails protruding from surface of wood. Note, this post revisited one month later to check co-ords generated by GPS. Second position = 271303 / 848521 (6m)

Site No FTS 065 **Map** NH **Easting** 271340 **Northing** 848343

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off. Covered at high tide, dry at low.

Site No FTS 066 **Map** NH **Easting** 271355 **Northing** 848287

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off at angle of 30 degrees. Covered at high tide, dry at low.

Site No FTS 067 **Map** NH **Easting** 271354 **Northing** 848244

SiteType Single wooden post **Cond** good **Action** nil

Single wooden post. No fixtures. Top sawn off. Covered at high tide, dry at low.

Site No FTS 068 **Map** NH **Easting** 271336 **Northing** 848171

SiteType Single wooden post **Cond** poor **Action** nil

Single wooden post. No fixtures. Leaning at an angle of 20 degrees. Covered at high tide, dry at low.

Site No FTS 069 **Map** NH **Easting** 271307 **Northing** 848137

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off. Covered at high tide, dry at low.

Site No FTS 070 **Map** NH **Easting** 271349 **Northing** 848092

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off. Covered at high tide, dry at low.

Site No FTS 071 **Map** NH **Easting** 271304 **Northing** 848072

SiteType Single wooden post **Cond** good **Action** nil

Single wooden post. No fixtures. Top clearly sawn off. Covered at high tide, dry at low.

Site No FTS 072 **Map** NH **Easting** 271309 **Northing** 848037

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off. Post leaning at an angle of 30 degrees. Covered at high tide, dry at low.

Site No FTS 073 **Map** NH **Easting** 271296 **Northing** 847982

SiteType Single wooden post **Cond** fair **Action** nil

Single wooden post. No fixtures. Top sawn off. Covered at high tide, dry at low.

Site No FTS 080 **Map** NH **Easting** 277916 **Northing** 854099

SiteType Fish trap? - stake trap? **Cond** fair **Action** Monitor to see if rest of alignment becomes exposed

Two small rectangular wooden stakes, 2.85m apart. They are possibly part of a line with the rest being covered by sand. Cobbles and pebbles with weed on them surround the stakes. Covered at high tide, dry at low.

Site No FTS 081 **Map** NH **Easting** 277872 **Northing** 854100

SiteType single wooden stake **Cond** fair **Action** Monitor area to see if connected with other stakes

A single rectangular stake, similar to FTS 80, but not on the same alignment.

Site No FTS 082 **Map** NH **Easting** 277914 **Northing** 854436

SiteType single wooden stake **Cond** fair **Action** nil

single rectangular stake to north of possible wall FTS 93. Dry at high tide, covered at low.

Site No FTS 083 **Map** NH **Easting** 278088 **Northing** 854830

SiteType Line of posts to support pipe. **Cond** good **Action** nil

Alignment of rectangular wooden posts in sand. Single line of posts, each post measuring 0.2m x 0.3m and up to .35m high. Posts are 2.5m apart. Shore end of alignment at 278125 / 854819. Some posts have metal bolts within them. All tops of posts shaped to support a round pipe (no longer present).

Site No FTS 084 **Map** NH **Easting** 278158 **Northing** 854842

SiteType Pier **Cond** Fair **Action** survey position of posts, local history project

Triple line of rectangular posts, average dimensions 0.25m x 0.25m and up to 1.7m high. Posts extend for c. 160m All posts have large metal bolts secured onto them. At the shore end, 8 posts survive in the northern and central row; 7 posts survive of the southern row. Beyond this, all the posts have been sawn off at ground level, surviving only as stumps. A short fourth row of three posts survives to the north of posts 9, 10 and 11. At the western (sea) terminal, the pier dog-legs to the north for c. 15m to 278024 / 854878.

Site No FTS 085 **Map** NH **Easting** 278905 **Northing** 854905

SiteType fish trap? - stake trap? **Cond** poor **Action** monitor for further stakes

Single line of four round wooden stakes. Other associated stakes are probably covered by sand. Dry at low water, covered at high

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Site No FTS 086 **Map** NH **Easting** 277838 **Northing** 855544

SiteType single wooden stake **Cond** poor **Action** nil

Single round wooden stake

Site No FTS 087 **Map** NH **Easting** 277809 **Northing** 855530

SiteType single wooden stake **Cond** fair **Action** nil

Single square wooden stake

Site No FTS 088 **Map** NH **Easting** 277806 **Northing** 855534

SiteType single wooden stake **Cond** fair **Action** nil

Single wooden rectangular stake. Buried in the sand and only visible due to weed growing off it (noticed as a clump of weed growing in an area of sand).

Site No FTS 089 **Map** NH **Easting** 277792 **Northing** 855552

SiteType Fish trap ? - stake trap **Cond** fair **Action** Recheck for more stakes and plot positions

2 lines of wooden stakes, both round and square. At seaward end, the stakes are in pairs. The stakes are small, c. 10mm in diameter and 10mm high. More stakes may be covered by sand

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Site No FTS 090 **Map** NH **Easting** 277756 **Northing** 855624

SiteType Fish trap - stake trap **Cond** fair **Action** Survey

A series of stakes, possible arranged in two or three rows. Many stakes are missing or covered with sand, so pattern is hard to determine. One of the stakes appears to be protected by a metal hoop. Stakes extend to 27772(0?) 855638

Site No FTS 091 **Map** NH **Easting** 277758 **Northing** 855715

SiteType single wooden stake **Cond** fair **Action** nil

Single round wooden stake, surrounded by lumps of shell concretion

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Site No FTS 092 **Map** NH **Easting** 278088 **Northing** 854421

SiteType Groyne? **Cond** good **Action** check local records to determine function

Line of large rectangular posts, closely spaced to form a wall. Runs from shore out to sea (278063 / 854427), with a short dog-leg at terminal to south.

Site No FTS 093 **Map** NH **Easting** 277915 **Northing** 854426

SiteType fish trap?- wall? **Cond** fair **Action** determine if archaeological or geological

A possible wall, running parallel to the coast edge. Made of boulders, but is very tentative and may be a natural deposition of boulders on the edge of a sand bank. East end at 277950 / 854510

Site No FTS 094 **Map** NH **Easting** 271250 **Northing** 849052

SiteType fish trap?- wall? **Cond** fair **Action** survey, determine full extent

Possible wall, made of large rounded boulders. Extending from HWM out into water, extent not seen due to tide, but extends at least 10m. Wall is 5m wide and boulders are 0.4m x 0.4m. Wall is covered by weed. No wood is visible.

Site No FTS 095 **Map** NH **Easting** 271247 **Northing** 848961

SiteType fish trap?- wall? **Cond** fair **Action** Survey and determine extent

Area of rounded stones forming a possible wall, though extent not seen due to tide. Boulders used smaller than FTS 94, average size is 0.3m x 0.3m. No posts or stakes in area.

Site No FTS 096 **Map** NH **Easting** 271243 **Northing** 848961

SiteType fish trap? Curvilinear **Cond** fair **Action** Detailed survey

Appears to be a curvilinear fish trap, though tide too high to confirm. Extends out into water at least 15m, then appears to return to shore 20m to the south (wall FTS 97). Constructed of large rounded boulders, 0.7m x 0.5m. Covered by weed, it is the weed that indicates the position of the wall in the water. A small curvilinear wall is possibly visible on APs, with a larger one to the outside. Needs to be surveyed during spring tides.

Site No FTS 097 **Map** NH **Easting** 271239 **Northing** 848857

SiteType fish trap? Curvilinear **Cond** **Action** nil

Wall made of large boulders. Very indeterminate due to weed cover and state of tide, but may be the south wall of a curvilinear trap, the north wall formed by FTS 96. Needs to be surveyed during spring tides.

Site No FTS 098 **Map** NH **Easting** 271258 **Northing** 848821

SiteType fish trap? wall? **Cond** fair **Action** Survey, determine full extent

Boulder wall, may be the north end of a curvilinear fish trap (south wall formed by FTS 99?) - see FTS 99 for discussion. Extends from HWM into the Firth. Boulders average size 0.5m x 0.5m. Hard to determine shape due to tide. Needs to be surveyed during spring tides.

Site No FTS 099 **Map** NH **Easting** 271231 **Northing** 848776

SiteType fish trap? wall? **Cond** fair **Action** survey to determine full extent.

A wall, or finger' of boulders extending into Firth. Boulders 0.5m x 0.5m. No real structure to 'wall', but several posts present (FTS 100 -103) that seem to be associated with these boulders. May be the southern side of a curvilinear trap, north wall formed by FTS 98. However, this is difficult to determine due to the state of the tide and the weed cover. On APs, there is a hint that this wall is the north wall of a third rectangular fish trap in area (other two are FTS 105 and FTS 106 to the south). The APs may indicate a wall c. 90m long, with a return to south of 80m. However, it is not clear and the area needs to be surveyed during spring tides. The presence of the timber in this possible trap is of significance.

Site No FTS 100 **Map** NH **Easting** 271258 **Northing** 848766

SiteType wooden post **Cond** fair **Action** Survey, with other posts and wall FTS 99

Round post, covered with weed. Appears to be in wall FTS 99. May be part of an alignment with FTS 101-103.

Site No FTS 101 **Map** NH **Easting** 271262 **Northing** 848764

SiteType wooden post **Cond** fair **Action** Survey, with other posts and wall FTS 99

Round wooden post, on shore side of FTS 100. Appears to be surrounded with packing stones. Probably assoc with wall FTS 99 and posts FTS 100 - 103

Site No FTS 102 **Map** NH **Easting** 271262 **Northing** 848764

SiteType wooden post, pos part of an alignment a **Cond** fair **Action** Survey, with other posts and wall FTS 99

Single wooden post, same co-ord as FTS 101 (lies on shore side and within 0.8m of it). Probably assoc with wall FTS 99 and posts FTS 100 - 103

Site No FTS 103 **Map** NH **Easting** 271274 **Northing** 848760

SiteType wooden post, pos part of an alignment a **Cond** fair **Action** Survey, with other posts and wall FTS 99

Wooden post, leaning at an angle of 30 degrees. Probably assoc with wall FTS 99 and posts FTS 100 - 102

Site No FTS 104 **Map** NH **Easting** 271278 **Northing** 848777

SiteType Jetty? **Cond** fair **Action** nil

A possible jetty, constructed of bricks and boulders, and with a large single post. The post is square and measures 150mm x .70m high. The bricks are of a specialised type, measuring 400mm x 100mm x 60mm and perforated horizontally by 8 round holes. The bricks are laid flat to form a path - and continue from the post down towards the sea. Bricks laid out in two lines, and extend at least 4m, after which, much of the brick structure is buried under sand and gravel. The bricks are edged by a squared timber (150mm square and over 3m long). Other timbers may be buried. To the shore side of the post there are a number of large stones, perhaps part of a collapsed wall.

Site No FTS 105 **Map** NH **Easting** 271293 **Northing** 848666

SiteType fish trap- rectangular **Cond** good **Action** Survey

A rectangular fish trap. Wall constructed of boulders, average dimensions 0.2m x 0.2m x 0.2m. Wall is 5m wide and extends out into sea for c. 80m to 271210 / 864655. To south of this point there is a gap of c. 15m, this may have been where the 'box' was. A straight wall, 2m wide and made of boulders .4m x .3m running parallel to the shore, starts at 271220 / 848660 and continues southwards for c. 65m to 271224 / 848605. There is then another possible gap, and another curving wall starts at 271237 / 848594 and curves towards the shore. It is only visible to 271248 / 848592, beyond which point it is lost in weed and sand. The trap was seen to remain dry inside whilst tide flooded outside. Interior filled with silty sand. No timbers visible in wall.

Site No FTS 106 **Map** NH **Easting** 271336 **Northing** 848498

SiteType Fish trap - rectangular **Cond** fair **Action** Detailed survey

Rectangular stone fish trap, to south of FTS 105. A linear wall extends from 271336 / 848498 out to sea for c. 140m to at least 271200 / 848517 where it joins another straight wall running parallel to the shore. The gap for the 'box' is at this north-western corner of the trap. The wall is mainly visible due to floating weed. It appears to be 2m wide and constructed of small rounded boulders .3m x .2m. The wall running parallel to the coast extend to c. 271203 / 848419. It is 2m wide and made of boulders up to .3m in diam. The wall is not really visible from the shore, but is clearly seen in the sea. The southern wall of this trap was not seen, and is thought to have been destroyed. The end of the trap is now formed by FTS 107, but it is possible that originally FTS 107 was part of a separate trap, and has been recorded separately (see FTS 107 for discussion).

Site No FTS 107 **Map** NH **Easting** 271145 **Northing** 848353

SiteType Fish trap **Cond** Fair **Action** Survey

Fish trap, formed of curving wall running parallel to shore. Wall made of boulders (.3m x .3m) and is about 2m wide. Its southern end, is barely discernible. Wall mainly visible due to weed floating in water. The northern end is also not visible, but the impression is that any wall joining this wall to the shore was removed, and an extension wall built to join this curving trap with rectangular trap FTS 106. The joining wall extends from c. 271203 / 848419 - 271192 / 848401. The only way to determine whether this is part of a separate trap from FTS 106 is by full survey.

Site No FTS 108 **Map** NH **Easting** 277298 **Northing** 853303

SiteType fish trap? - Wall **Cond** Fair **Action** Survey

Straight line of walling extending out to sea. Formed of rounded boulders, max size 1m x .5m x .5m. Could be asociated with FTS 109 to the south. Distance between walls is 15m. State of tide and weed cover means that it was not possible to determine full extent of wall, but on APs, it was seen to be at least 40m long. Associated with FTS 109, 110 and 111. None of these walls were seen during the original walk over survey. This was undertaken at low tide and the large amount of seaweed obscured the walls. They are all much easier to see from up high, with the weed floating in the water helping to indicate their position.

Site No FTS 109 **Map** NH **Easting** 277279 **Northing** 853292

SiteType fish trap? Wall **Cond** Fair **Action** Survey

Wall, as FTS 108. May be associated with FTS 108. Wall is c. 35m long. See FTS 108 for more discussion.

Site No FTS 110 **Map** NH **Easting** 277329 **Northing** 853343

SiteType fish trap? Wall **Cond** Fair **Action** Survey

Wall made of boulders, average size 0.3m x 0.2m x 0.2m. Some of the boulders are much larger, up to 1m. Wall is 40 m long and may be associated with FTS 111 to the north. The distance between the two walls is 20m. See FTS 108 for more discussion.

Site No FTS 111 **Map** NH **Easting** 277346 **Northing** 853353

SiteType fish trap? Wall **Cond** Fair **Action** Survey

Wall made of boulders, average size 0.3m x 0.2m x 0.2m. Some of the boulders are much larger, up to 1m, one at shore end is 1m x 1m. The wall is c. 40m long and may be associated with FTS 110 to the south. See FTS 108 for more discussion.

Site No FTS 112 **Map** NS **Easting** 292493 **Northing** 687829

SiteType Revetment **Cond** poor **Action** survey

A revetment that mirrors, but is offset by several metres, the present coast edge. Consists of a line of timbers fronting the water's edge with revetment boxes behind. Local person stated that new stone revetment replaced timbers in 1950s, when the power station was built. A series of piles in parallel lines come off from revetment and once supported piers for boats. Local person claims the thick mud in area came when the Flanders Moss, near Stirling, was drained. No sign of fish trap noted by CZAS, though local person says a stake net is visible at extreme low tides.

Site No FTS 113 **Map** NS **Easting** 297846 **Northing** 685784

SiteType Fish trap - curvilinear **Cond** fair **Action** survey and determine extent

A large semi-circular fish trap located below Dunimarle castle. It is c. 160m across and extends out from the shore for up to 150m. Its midpoint is at 297796 / 685591, and the curving wall more indistinct after 297847 / 685631. Formed of two parallel curving walls constructed of rounded boulders, with a few squared, but unworked stones included. Max size of boulders 1m x 0.5m. Gap between walls is c. 2m, but covered in silty mud so not possible to see if filled with rubble. No timbers visible. It is possible that a substantial amount of this structure is buried under the silt, where it may be well preserved.

Site No FTS 114 **Map** NS **Easting** 298462 **Northing** 685826

SiteType Pier **Cond** Fair **Action** survey with FTS 115 and 116

Pier built of worked masonry with a rounded end. Apparently cut by railway as stonework also visible in park on other side. If this stonework is included also, the pier's length would be c. 60m long. It was originally connected to pier FTS 116 by a walkway supported on posts FTS 115. The pier is marked on an Admiralty chart of 1851.

Site No FTS 115 **Map** NS **Easting** 298462 **Northing** 685826

SiteType posts associated with piers **Cond** poor **Action** survey with FTS 114 & 116

Two parallel rows of posts, between 0.8m - 2.2m high and are 0.20m in diameter. They are 1.2m apart and with 3m between each pair. There are c. 12 pairs of post surviving, leading from pier FTS 114 to another stone pier (FTS 116). Last pair of posts at NS 298445 685741

Site No FTS 116 **Map** NS **Easting** 298460 **Northing** 685720

SiteType **Cond** fair **Action** survey with FTS114 and 115

Stone pier, originally joined to FTS 114 by walkway supported on posts (FTS 115). Well-built pier constructed of worked masonry blocks, although affected by erosion and many blocks disturbed, especially at the seaward end. The level of destruction at this end is apparent when compared with an AP (58/A/384) taken in 1948. Marked on 1851 Admiralty chart, although the timber joining the two elements not marked, indicating that either the pier was being constructed at this date, or had already gone out of use.

Site No FTS 117 **Map** NS **Easting** 298268 **Northing** 685792

SiteType **Cond** fair **Action** Survey

At least two large timbers laid end to end with several planks around, concentrated on east side. The main timbers are worked and are 0.30m wide with a rebate on either side along the top. The structure was completely obscured by weed, which alerted the surveyor to the presence of the structure (as the rest of the area is mud flats). Numerous large stones and boulders also in the area, but unsure whether these are related to the structure or have rested against it after drifting.

Site No FTS 118 **Map** NS **Easting** 297955 **Northing** 685811

SiteType **Cond** fair **Action** confirm what this structure is

Part of a wall lying under the railway. Has two rounded buttresses. Unsure if it is part of the railway (unlikely), or is an old sea wall or part of a demolished building.

Site No FTS 119 **Map** NT **Easting** 301976 **Northing** 686213

SiteType Fish trap **Cond** fair **Action** survey

A semi-circular fish-trap constructed of unworked boulders. Maximum size of boulders 1m x 0.5m. Two courses of stonework visible, but further courses may be buried. The walls are randomly coursed, and there are frequent gaps between the boulders. The trap - if that is what it is, is very high up the beach, and probably continues beneath the silty-sand banked up against the side of the railway. The Admiralty Chart of 1851 indicates that the railway was built on reclaimed land, so the trap may continue under the railway also. There is a breach in the wall at NT01955 86201 which may be the box.

Site No FTS 120 **Map** NT **Easting** 301537 **Northing** 686176

SiteType Fish trap **Cond** poor **Action** survey

A possible rectangular fish trap (main wall parallel to the beach with a return coming in to the shore at the west end) with a second arm running out to sea. The structure is very indistinct and was mainly seen due to the large amount of stone inside the wall - on an otherwise silty-sand beach. The main wall is c. 20m long, the beach return is 11m long and the seaward arm is 23m long. No timber visible in the construction, the walls constructed of a single course of rounded stones, average size c. 0.5m x 0.6m. The stones are also weed covered, but when weed pulled back, the stones can be seen to be deliberately set together. The end of the seaward arm is at 301533 686150; the west end of the main wall is at 301158 686172; and the end of the beach return is at 301515 686184. The east side of the trap is harder to see as it is covered in silty sand, but it may continue beyond the location given.

Site No FTS 121 **Map** NT **Easting** 301544 **Northing** 686202

SiteType Old sea wall? **Cond** fair **Action** survey

A wall running parallel to the coast edge constructed of large, well worked masonry blocks fitted close together. The blocks are at lest 1m x 0.6m, but are partially covered. Only the very tops of the blocks are visible. A face is visible facing the sea, but the back of the wall is not visible as it is covered by small pebbles. Unsure what the purpose of the wall is, but the Admiralty chart of 1851 shows that its position is close to the original end of the destroyed Torry Pier, so it could have been associated with this structure.

Site No FTS 122 **Map** NT **Easting** 301485 **Northing** 686087

SiteType mound **Cond** fair **Action** nil

A mound of cobbles and pebbles with a small wall constructed at one end. The wall is roughly built and appears to be modern. It gives the impression of being a hide for shooting, but unsure if this is likely in such a built up area.

Site No FTS 123 **Map** NT **Easting** 301530 **Northing** 685825

SiteType pier **Cond** poor **Action** Full survey

Torry Pier, connected to mainland by a causeway c. 350m long and 2m wide. The end of the pier is rounded in shape and measures 50m NS and 50m EW. The sea wall is well built, 3m wide and survives 5 courses high. Several wooden posts are situated on the end of the pier (301538 685822; 301399 686203).

Site No FTS 124 **Map** NT **Easting** 301330 **Northing** 686175

SiteType Fish trap? **Cond** fair **Action** full survey, with FTS 125 and 126

A possible fish-trap made of two walls covered by weed. A well-faced wall, at least 20m long, runs out from coast (seaward end at 301316 686187) to the vicinity of a second wall- running parallel to the coast (west end c. 301330 686175) and also about 20m long. These wall are very difficult to see and were only detected due to the large amount of collapsed rubble and weed in an area of otherwise silty mud. Several large boulders helped to distinguish the course of the walls, and squared blocks were revealed when weed pulled back. Much of the site is obscured by mud, and it is difficult to determine if this is a crescent shaped trap or a rectangular one (or even two separate features). More survey is needed to determine the extent of the features.

Site No FTS 125 **Map** NT **Easting** 301381 **Northing** 686158

SiteType fish trap? **Cond** **Action** survey with FTS 124 and 126

A wall running out from the coast within a spread of stone 10m wide. The wall is at least 20m long, and may be connected to the walls described in FTS 124. Alternatively, it may be part of an old pier. Nothing visible on an Admiralty chart of 1851 however.

Site No FTS 126 **Map** NT **Easting** 301395 **Northing** 686188

SiteType fish trap? **Cond** unknown **Action** locate to determine if a true feature, if so, survey with 124

A possible rectangular feature, not seen on the ground, but noted on the digital image of the county of Fife held by Fife Council. A wall running parallel to the coast and c. 25m long has a return towards the sea at its eastern end (301419 686180). This return is c. 8m long and ends at 301419 686172. This feature may be related to walls FTS 124 and 125.

Site No FTS 127 **Map** NT **Easting** 302264 **Northing** 685997

SiteType stake trap **Cond** poor **Action** full survey

A line of stakes with boulders on either side, extending c. 100m out from the shore. The boulders are up to 0.8m x 0.6m. The stakes are round and range from 60-100mm in diameter. They survive to a height of 0.2m. No sign of saw marks on the stakes. The stakes are set in two parallel lines which are 1m apart. At least ten stakes survive. The alignment of stakes and boulders extends from the shore out to a massive boulder at 302199 685933

Site No FTS 128 **Map** NT **Easting** 302132 **Northing** 685919

SiteType single stake **Cond** **Action** nil

A single round stake

Site No FTS 129 **Map** NT **Easting** 302149 **Northing** 685911

SiteType night fishing posts **Cond** fair **Action** nil

One of several square timbers. Others at 302140 685872; 302155 685899, 302140 685853 and 302160 685862. The posts are 50mm square and are 0.5m high. All have sawn tops and appear to be modern. Several have fishing line attached to them, and it is thought that they are for night fishing. They are not aligned, but are spread out randomly.

Site No FTS 130 **Map** NT **Easting** 302168 **Northing** 685856

SiteType night fishing post **Cond** fair **Action** nil

2 small round posts with fishing line attached to them. The base of the post for which the co-ords are given is protected with stones set around it. The posts are 100mm high and 30mm in diameter. The other post is at 302139 685859

Site No FTS 131 **Map** NH **Easting** 271293 **Northing** 849297

SiteType small promontory of stone **Cond** fair **Action** determine if archaeological or geological

A 'finger' of stone running out from the shore into the sea. It is seaweed covered and it is hard to distinguish any actual walling. At the shore end it is 10m wide, and it extends out into the sea for at least 10m. It is formed of rounded cobbles and small boulders, although the beach around is also made of the same material.

Site No FTS 132 **Map** NH **Easting** 271452 **Northing** 849599

SiteType small promontory of stone **Cond** fair **Action** determine if archaeological or geological

A ' finger' of stone, as FTS 131, which is 5m wide at the shore end and extends into the sea for at least 6m. May be connected with another 'finger' at 271465 849621. However, these two are the least likely observed, and may be natural features, especially considering how close to the tip of Arlturlie Point they are situated.

Site No FTS 133 **Map** NH **Easting** 271615 **Northing** 849579

SiteType fish trap - possible **Cond** **Action** determine if archaeological or geological

A possible wall, only seen due to the weed adhering to stone in an area of silty sand. Wall extends to at least 271638 849575, after which point was covered in water at time of site visit. May be result of 'rafting'.

Site No FTS 134 **Map** NH **Easting** 271694 **Northing** 849518

SiteType possible wall **Cond** fair **Action** determine if archaeological or geological

A possible wall, of which just 10m was visible. Extended to 271697 849524. Strong possibility that more of this feature is buried under sand. Could be natural 'rafting' of stones, but stones appear to be closely set.

Site No FTS 135 **Map** NH **Easting** 271665 **Northing** 849523

SiteType mound **Cond** fair **Action** determine if archaeological or geological

A mound of rounded cobbles. Lies close to the upper beach (which is composed of rounded cobbles), so may be natural, but is located in intertidal zone and is surrounded by silty sand, so may be an archaeological feature.

Site No FTS 136 **Map** NH **Easting** 271732 **Northing** 849516

SiteType possible wall **Cond** fair **Action** determine if archaeological or geological

A possible wall composed of rounded boulders. Runs out to sea, and has a possible return that runs parallel to the coast edge. Very hard to distinguish and may be natural.

Site No FTS 137 **Map** NH **Easting** 272911 **Northing** 849729

SiteType Probably natural **Cond** fair **Action** determine if archaeological or geological

A possible alignment of stones, noted due to seaweed. Almost certainly natural, photographed to show how the mind (and nature) can play tricks.

Site No FTS 138 **Map** NH **Easting** 273032 **Northing** 849726

SiteType fish trap? **Cond** fair **Action** survey

A possible fish-trap. The inside has filled with sand and is dry, whereas the outside was still wet at the time of the visit. This trapping of the sand was one reason the alignment of stones was noted. Only the tops of the boulders forming the alignment are visible. They are 0.5m x 0.5m and there is no indication of any jointing. The wall can be traced to 272996 849746. A second possible wall joins at 273050 849787 and extends to 273032 849726. The gap between the ends of the two walls is about 40m. The walls lie on the south bank of the Rough Burn, and could be connected - however, their shape resembles a yair.

Site No FTS 139 **Map** NH **Easting** 273171 **Northing** 849816

SiteType single metal bar **Cond** good **Action** nil

A round metal bar driven into the sand

Site No FTS 140 **Map** NH **Easting** 273666 **Northing** 850367

SiteType stake trap -possible **Cond** fair **Action** survey

A line of rounded boulders running from the shore out to sea. Maximum dimensions 1m x .4m, but average size 0.4m x 0.3m. Could be packing stones for a line of stakes or could be a wall. Noted that no houses were visible in the area, but site does lie directly below Castle Stuart. Extends to 273647 850385. Covered in weed, unlike surrounding area. No timbers noted.

Site No FTS 141 **Map** NH **Easting** 273640 **Northing** 850324

SiteType fish trap -possible **Cond** poor **Action** determine if archaeological or geological

A section of possible curving wall, covered in sediment and weed. Only way to determine if this really is a structure would be to excavate a trench through it. Extends to at least 273630 850324. Built of rounded boulders 0.4m x 0.4m.

Site No FTS 142 **Map** NH **Easting** 274402 **Northing** 851522

SiteType groyne **Cond** **Action** nil

An alignment of boulders stretching from a huge boulder resting in the grass. Could be a silted up groyne? Extends into sea to at least 274378 851549.

Site No FTS 143 **Map** NH **Easting** 274360 **Northing** 851531

SiteType groyne **Cond** fair **Action** nil

A similar alignment to FTS 142. Extends to 274370 851523. Stones are covered in weed and average size is 1m x 1m

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Site No FTS 144 **Map** NH **Easting** 274904 **Northing** 851938

SiteType groyne **Cond** fair **Action** nil

Another alignment of stone. Formed of stone 0.8m x 1m, only top 0.2m exposed from surrounding cobbles. Appears to be a groyne. Extends to 274987 851956.

Site No FTS 145 **Map** NH **Easting** 274982 **Northing** 851970

SiteType groyne **Cond** fair **Action** nil

Gabion baskets, perhaps confirming that sites FTS142 -144 are groynes. Extend to 274978 851976.

Site No FTS 146 **Map** NH **Easting** 275741 **Northing** 852411

SiteType metal pole **Cond** good **Action** nil

A scaffolding pole rammed into the sand.

Site No FTS 147 **Map** NH **Easting** 273885 **Northing** 850711

SiteType sheep pen on beach **Cond** fair to poor **Action** nil

A series of posts which are part of a structure for getting sheep into a field, but which could be confused with a fish-trap as comprises timbers in the intertidal zone. All timbers have staples on them, indicating they supported wire. The timbers lowest down the beach are in poor condition, the others are in a fair condition.

Site No FTS 148 **Map** NH **Easting** 273270 **Northing** 849782

SiteType sheep pen on beach **Cond** fair to poor **Action** nil

An alignment of posts used to herd sheep. 5 posts in all. Those lowest down the beach are in very poor condition and could be confused with a fish-trap if other posts removed.

Site No FTS 149 **Map** NH **Easting** 273209 **Northing** 849617

SiteType single post **Cond** poor **Action** nil

Single post on north bank of the Rough Burn.

Site No FTS 150 **Map** NH **Easting** 271295 **Northing** 847916

SiteType Rectangular fish trap **Cond** poor **Action** survey

A rectangular fish trap - with main wall parallel to coast and a return at the eastern end that comes back to the shore. As a result of identifying the feature on several APs, a visit was made to record the structure. The surveyor went to the general location of the structure, and independently located some possible walls. However, it was noted that they were very difficult to see and would not have been spotted if it wasn't known that there should be a feature in the area. Consists of two lines of weed-covered boulders, although there was more weed than boulder. The boulders were buried in the sandy silt, and on average there were only 2 stones every one metre. Only the tops of the rounded boulders were visible. After returning to the office, the co-ords taken on the field visit were plotted on the GIS and were found to match those of the site identified on the APs. This indicates that field survey alone may not be enough to locate some fish traps.

Site No FTS 151 **Map** NH **Easting** 304740 **Northing** 680435

SiteType **Cond** fair **Action**

Wooden post with iron hoop next to it

Site No FTS 152 **Map** **Easting** 304650 **Northing** 680464

SiteType Stone mound **Cond** **Action** determine if archaeological or geological

Roughly circular deposit of stones with one large one in middle (1.5m x 1.10m). Possible wall or line of stones extending westwards from mound

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Site No FTS 153 **Map** NT **Easting** 304480 **Northing** 680518

SiteType single post **Cond** **Action**

Single wooden post

Site No FTS 154 **Map** NT **Easting** 304424 **Northing** 680514

SiteType fish trap or causeway **Cond** fair **Action** monitor and survey

Low collapsed stone walls. A section of wall 2.2m wide and 6.5m long runs parralel to the coast. It returns towards shore at east and west ends. Western return is 6m long and 0.7m wide. The walls appear to enclose a hollow. The walls are within a causeway. NOTE AP 51988 -077 taken at low tide (1.25m) and shows a short stretch of the S. coast of Forth. The low light picks up causeway clearly, and it is over 440m long and 6m wide, though much stone spread out on eastern side - making it 15m wide. Its full dimensions only visible at very low tide and it extends to at least 304590 680846

Site No FTS 155 **Map** NT **Easting** 304383 **Northing** 680410

SiteType **Cond** fair **Action** clear weeds and survey

Stone built enclosure or basin with a semi circular wall around it, and a ramp outside of the wall giving access from the coast edge down to the beach. The site lies above the high water mark, and the southern end (shore-side) may be truncated by a coastal defence. Wall survives three courses high. Could be related to causeway FTS 154.

Site No FTS 156 **Map** NT **Easting** 303668 **Northing** 680648

SiteType pound? **Cond** fair **Action** survey

Circular setting of stones, 7.5m in diameter. Wall is 1m thick and the average size of stones used is 100-150mm. Stones are rounded. Located just below site marked as Carriden Fishery on 1851 Admiralty Chart.

Site No FTS 157 **Map** NT **Easting** 303768 **Northing** 680588

SiteType revetment wall **Cond** poor **Action**

Old concrete revetment/coastal defence. Wall is 0.4m thick and is collapsing. It holds back a a filling of boulders and is intended as a coastal defence. It is collapsing at western end (NT 03768 80588).

Site No FTS 158 **Map** NT **Easting** 303673 **Northing** 680712

SiteType fish trap - leader **Cond** poor **Action** detailed survey

A fish trap with at least 20 posts with many smaller stakes and what appears to be the remains of wattle hurdles. Probably the remains of a leader. Unsure if a stake trap or earlier form of trap. Extends from shore out into the Firth. Southern end at 03673 80712; northern end at 03705 80761.

Site No FTS 159 **Map** NT **Easting** 303967 **Northing** 680628

SiteType causeway or fish trap **Cond** fair **Action** survey

A second causeway or wall in sea, to the west of FTS 154 and extending c. 280m from shore to 304090 680880. Noted on AP 51988 - 077. Wall c. 5m wide with a large spread to the east.

Appendix 4

Fish-traps located during the FTS survey of the Firth of Forth

Site No FTS 113 **Map** NS **Easting** 297846 **Northing** 685784 **Site Name** Dunimarle fish trap

SiteType Fish trap - curvilinear **Cond** fair **Action** survey and determine extent

A large semi-circular fish trap located below Dunimarle castle. It is c. 160m across and extends out from the shore for up to 150m. Its midpoint is at 297796 / 685591, and the curving wall is more indistinct after 297847 / 685631. Formed of two parallel curving walls constructed of rounded boulder, with a few squared, but unworked stones included. Max size of boulders 1m x 0.5m. Gap between walls is c. 2m, but covered in silty mud so not possible to see if filled with rubble. No timbers visible. It is possible that a substantial amount of this structure is buried under the silt, where it may be well preserved.

Site No FTS 117 **Map** NS **Easting** 298268 **Northing** 685792 **Site Name** Culross fish trap (possible)

SiteType Fish trap? **Cond** fair **Action** Survey

At least two large timbers laid end to end with several planks around, concentrated on east side. The main timbers are worked and are 0.30m wide with a rebate on either side along the top. The structure was completely obscured by weed, which alerted the surveyor to the presence of the structure (as the rest of the area is mud flats). Numerous large stones and boulders also in the area, but unsure whether these are related to the structure or have rested against it after drifting.

Site No FTS 119 **Map** NT **Easting** 301976 **Northing** 686213 **Site Name** Low Torry curvilinear trap

SiteType Fish trap **Cond** fair **Action** survey

A semi-circular fish-trap constructed of unworked boulders. Maximum size of boulders 1m x 0.5m. Two courses of stonework visible, but further courses may be buried. The walls are randomly coursed, and there are frequent gaps between the boulders. The trap - if that is what it is, is very high up the beach, and probably continues beneath the silty-sand banked up against the side of the railway. The Admiralty Chart of 1851 indicates that the railway was built on reclaimed land, so the trap may continue under the railway also. There is a breach in the wall at NT01955 86201 which may be the box.

Site No FTS 120 **Map** NT **Easting** 301537 **Northing** 686176 **Site Name** Low Torry rectangular trap 4

SiteType Fish trap **Cond** poor **Action** survey

A possible rectangular fish trap (main wall parallel to the beach with a return coming in to the shore at the west end) with a second arm running out to sea. The structure is very indistinct and was mainly seen due to the large amount of stone inside the wall - on an otherwise silty-sand beach. The main wall is c. 20m long, the beach return is 11m long and the seaward arm is 23m long. No timber visible in the construction, the walls constructed of a single course of rounded stones, average size c. 0.5m x 0.6m. The stones are also weed covered, but when weed pulled back, the stones can be seen to be deliberately set together. The end of the seaward arm is at 301533 686150; the west end of the main wall is at 301158 686172; and the end of the beach return is at 301515 686184. The east side of the trap is harder to see as it is covered in silty sand, but it may continue beyond the location given.

Site No FTS 124 **Map** NT **Easting** 301330 **Northing** 686175 **Site Name** Low Torry rectangular trap 1

SiteType Fish trap - probable **Cond** fair **Action** full survey, with FTS 125 and 126

A possible fish-trap made of two walls covered by weed. A well-faced wall, min 20m long, runs out from coast (seaward end at 301316 686187) to the vicinity of a second wall- running parallel to the coast (west end c. 301330 686175) and also about 20m long. These wall are very difficult to see and were only detected due to the large amount of collapsed rubble and weed in an area of otherwise silty mud. Several large boulders help to distinguish the course of the walls, and squared blocks were revealed when weed pulled back. Much of the site is obscured by mud, and it is difficult to determine if this is a crescent shaped trap or a rectangular one (or even two separate features). More survey is needed to determine the extent of the features.

Site No FTS 125 **Map** NT **Easting** 301381 **Northing** 686158 **Site Name** Low Torry rectangular trap 2

SiteType fish trap or pier **Cond** **Action** survey with FTS 124 and 126

A wall running out from the coast within a spread of stone 10m wide. The wall is at least 20m long, and may be connected to the walls described in FTS 124. Alternatively, it may be part of an old pier. Nothing visible on an Admiralty chart of 1851 however.

Site No FTS 126 **Map** NT **Easting** 301395 **Northing** 686188 **Site Name** Low Torry rectangular trap 3

SiteType fish trap -possible **Cond** unknown **Action** locate to determine if a true feature, if so, survey with 124

A possible rectangular feature, not seen on the ground, but noted on the digital image of the county of Fife held by Fife Council. A wall running parallel to the coast and c. 25m long has a return towards the sea at its eastern end (301419 686180). This return is c. 8m long and ends at 301419 686172. This feature may be related to walls FTS 124 and 125.

Site No FTS 127 **Map** NT **Easting** 302264 **Northing** 685997 **Site Name** Torryburn stake trap

SiteType fish trap -stake trap **Cond** poor **Action** full survey

A line of stakes with boulders on either side, extending c. 100m out from the shore. The boulders are up to 0.8m x 0.6m. The stakes are round and range from 60-100mm in diameter. They survive to a height of 0.2m. No sign of saw marks on the stakes. The stakes are set in two parallel lines which are 1m apart. At least ten stakes survive. The alignment of stakes and boulders extends from the shore out to a massive boulder at 302199 685933

Site No FTS 154 **Map** NT **Easting** 304424 **Northing** 680514 **Site Name** Gledhill trap (possible)

SiteType fish trap - walls **Cond** fair **Action** monitor and survey

Low collapsed stone walls. A section of wall 2.2m wide and 6.5m long runs parallel to the coast. It returns towards shore at east and west ends. Western return is 6m long and 0.7m wide. The walls appear to enclose a hollow. The walls are within a causeway. NOTE AP 51988 -077 taken at low tide (1.25m) and shows a short stretch of the S. coast of Forth. The low light picks up the causeway clearly, and it is over 440m long and 6m wide, though much stone spread out on its eastern side - making it 15m wide. Its full dimensions only visible at very low tide and it extends to at least 304590 680846

Site No FTS 156 **Map** NT **Easting** 303668 **Northing** 680648 **Site Name** Carriden fish pound

SiteType fish trap - pound? **Cond** fair **Action** survey

Circular setting of stones, 7.5m in diameter. Wall is 1m thick and the average size of stones used is 100-150mm. Stones are rounded.

Site No FTS 158 **Map** NT **Easting** 303673 **Northing** 680712 **Site Name** Carrriden stake trap

SiteType fish trap - leader **Cond** poor **Action** detailed survey

A fish trap with at least 20 posts with many smaller stakes and what appears to be the remains of wattle hurdles. Probably the remains of a leader. Unsure if a stake trap or earlier form of trap. Extends from shore out into the Firth. Southern end at 03673 80712; northern end at 03705 80761.

Appendix 5

Fish-traps located during the FTS survey of the Moray Firth

Site No FTS 005 **Map** NH **Easting** 269969 **Northing** 846481 **Site Name** Seafield Fish Trap

SiteType Fish trap Linear alignment of boulders **Cond** Fair **Action** determine if archaeological or geological

Line of seaweed-covered boulders extending for more than 50 metres. Boulders are rounded and aligned N-S (extending from shore out into water). Each boulders is up to 1 metre apart. Alignment is single boulder's width. Extends from 269969 / 846481 to beyond 269942 / 846505

Site No FTS 035 **Map** NH **Easting** 276018 **Northing** 856553 **Site Name** Fort George trap 1 (possible)

SiteType Fish trap? Alignment of posts **Cond** fair **Action** Survey - detailed plan of position of each post.

Alignment of pairs of rectangular posts. Average size of post - 0.2m N-S / 90mm E-W. Height from 0.25m high stumps to 1.3m. Parallel lines c. 0.2m apart, distance between lines of posts c. 1.5m. 5 pairs visible. Extending North - South (shore to north, sea to south). Southern-most post has a metal bolt at 1.2m high. A bracing post lies to the West of this post. The bracing post is angled 45 degrees. Southern end of alignment at 276017 / 856559. Note that the GPS grid ref almost exactly the same as FTS 36

Site No FTS 036 **Map** NH **Easting** 276017 **Northing** 856552 **Site Name** Fort George trap 2 (possible)

SiteType fish trap? Jetty? Alignment of posts. **Cond** fair to poor **Action** Survey - detailed plan of position of each post.

Line of 8 circular posts, arranged in two alternating lines, aligned north (shore) - south (sea). Lines 0.2m apart and average distance between posts: 1.50m. Average diameter of posts: 0.20m. Northern-most (shore end) post sawn off at ground level. Several of the posts have metal wires at 1.05m height. One bracing post to east of alignment. This post is broken and not fixed to alignment. Note that the GPS grid ref is almost exactly the same as FTS 35.

Site No FTS 041 **Map** NH **Easting** 276759 **Northing** 856558 **Site Name** Fort George stake trap 1

SiteType Fish trap - stake trap **Cond** Poor **Action** Survey exact position of stakes

Double line of timber stakes, west end interspersed with small, weed-covered boulders. Stakes survive to less than 0.2m high and 0.1m in diameter. Occasional stake not in line. Lines less regular at south (sea) end - and continues into water, to beyond 276726 /856472 . Covered at high tide. South (sea) end may never be dry. Stakes set in sand. APs show that there is a second row of stakes further out in the water beyond the first row. The first row of stakes is 180m long, with a return to east, 15mlong at its end. The second row starts at the end of this return and is 100m long with a similar return at the end, c. 25m long. Note, these two returns face in the opposite direction from those depicted on the plan of 1860 (RHP 6341).

Site No FTS 042 **Map** NH **Easting** 276780 **Northing** 856544 **Site Name** Fort George stake trap 2

SiteType Fish trap - stake trap **Cond** Poor **Action** Accurate survey of position of all stakes

Line of timber stakes, with a possible related line 2m to the east. Line continues into waterbeyond 276726 / 856472. Eastern line has more stakes to south (sea end), with fewer visible at the shore end. Average stake size is 0.1m diameter and 0.2m high. Distance between stakes varies from 0.25m - 2m. Other stakes visible to east of the eastern line, but these are not in a noticeable alignment. All stakes set in sand.

Site No FTS 043 **Map** NH **Easting** 277424 **Northing** 856135 **Site Name** Kirkton stake trap 1

SiteType Fish trap - stake trap **Cond** Very poor **Action** Accurate survey of position of all stakes

Two stakes visible at shore end, then a gap of 35m, then line continues for at least another 30m. Stakes continue to at least 277323 / 856023. There appears to be a second alignment to the west, though only a few stakes remain, mainly at the seaward end. The seaward end stakes are covered at low water. Average size of stakes is 0.1m in diameter and 0.3m high. Stakes set in sand. In area of SMR NH75NE0052

Site No FTS 044 **Map** NH **Easting** 277375 **Northing** 856087 **Site Name** Kirkton stake trap 2

SiteType Fish trap - stake trap **Cond** Very poor **Action** Accurate survey of position of stakes

Line of rectangular stakes, though no particular orientation to the individual stakes. Line not visible at shore end, though may be covered by sand (or stakes may have been removed). If the stakes did continue to shore, the alignment would converge with FTS 43. Seaward end of stakes at 277320 / 856039. Stakes set in sand. In area of SMR NH75NE0052

Site No FTS 045 **Map** NH **Easting** 277381 **Northing** 856111 **Site Name** Kirkton stake trap 3

SiteType Fish trap - stake trap **Cond** poor **Action** Accurate survey of position of stakes

Line of squared stakes. Gap of up to 9m between stakes. Does not continue to shore - perhaps covered by sand or removed. Line is c. 10m north of FTS 44. Stakes are 50mm x 40mm and up to 100mm high. Seaward (western) end of alignment is at 277337 / 865060. In area of SMR NH75NE0052

Site No FTS 046 **Map** NH **Easting** 277711 **Northing** 855717 **Site Name** Ardersier circular fish trap

SiteType fish trap pound? **Cond** **Action** Ensure survey drawing made, then monitor

Complex site consisting of a circular stone 'wall' covered by sand. Site better preserved to south. At eastern (shore) end, numerous timbers in poor condition. These are not similar to stakes used in FTS41 - 45. Wall formed of rounded boulders. No coursing visible. Some stakes visible on inner side of wall. A single stake is visible to west (seaward). This is rectangular - at 276688 / 855684. This site is probably the one excavated by Janet Hooper, although the Grid Ref is over 100m different.

Site No FTS 080 **Map** NH **Easting** 277916 **Northing** 854099 **Site Name** Ardersier stake trap 1

SiteType fish trap? - stake trap? **Cond** fair **Action** Monitor to see if rest of alignment becomes exposed

Two small rectangular wooden stakes, 2.85m apart. They are possibly part of a line with the rest being covered by sand. Cobbles and pebbles with weed on them surround the stakes. Covered at high tide, dry at low.

Site No FTS 085 **Map** NH **Easting** 277905 **Northing** 854905 **Site Name** Ardersier stake trap 2

SiteType fish trap? - stake trap? **Cond** poor **Action** monitor for further stakes

Single line of four round wooden stakes. Other associated stakes are probably covered by sand. Dry at low water, covered at high

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Site No FTS 089 **Map** NH **Easting** 277792 **Northing** 855552 **Site Name** Ardersier stake trap 3

SiteType Fish trap - stake trap **Cond** fair **Action** Recheck for more stakes and plot positions

2 lines of wooden stakes, both round and square. At seaward end, the stakes are in pairs. The stakes are small, c. 10mm in diameter and 10mm high. More stakes may be covered by sand

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Site No FTS 090 **Map** NH **Easting** 277756 **Northing** 855624 **Site Name** Ardersier stake trap 4

SiteType Fish trap - stake trap **Cond** fair **Action** Survey

A series of stakes, possible arranged in two or three rows. Many stakes are missing or covered with sand, so pattern is hard to determine. One of the stakes appears to be protected by a metal hoop. Stakes extend to 27772(0?) 855638

Site No FTS 093 **Map** NH **Easting** 277915 **Northing** 854426 **Site Name** Ardersier rectangular trap 1

SiteType fish trap?- wall? **Cond** fair **Action** determine if archaeological or geological

A possible wall, running parallel to the coast edge. Made of boulders, but is very tentative and may be a natural deposition of boulders on the edge of a sand bank. East end at 277950 / 854510

Site No FTS 094 **Map** NH **Easting** 271250 **Northing** 849052 **Site Name** Alturlie linear trap 1

SiteType fish trap?- wall? **Cond** fair **Action** survey, determine full extent

Possible wall, made of large rounded boulders. Extending from HWM out into water, extent not seen due to tide, but extends at least 10m. Wall is 5m wide and boulders are 0.4m x 0.4m. Wall is covered by weed. No wood is visible.

Site No FTS 095 **Map** NH **Easting** 271247 **Northing** 848961 **Site Name** Alturlie linear trap 2

SiteType fish trap?- wall? **Cond** fair **Action** Survey and determine extent

Area of rounded stones forming a possible wall, though extent not seen due to tide. Boulders used smaller than FTS 94, average size is 0.3m x 0.3m. No posts or stakes in area.

Site No FTS 096 **Map** NH **Easting** 271243 **Northing** 848961 **Site Name** Brecknish curvilinear trap 1

SiteType fish trap? Curvilinear **Cond** fair **Action** Detailed survey

Appears to be a curvilinear fish trap, though tide too high to confirm. Extends out into water at least 15m, then appears to return to shore 20m to the south (wall FTS 97). Constructed of large rounded boulders, 0.7m x 0.5m. Covered by weed, it is the weed that indicates the position of the wall in the water. A small curvilinear wall is possibly visible on APs, with a larger one to the outside. Needs to be surveyed during spring tides.

Site No FTS 097 **Map** NH **Easting** 271239 **Northing** 848857 **Site Name** Brecknish curvilinear trap 1a

SiteType fish trap? Curvilinear **Cond** **Action** nil

Wall made of large boulders. Very indeterminate due to weed cover and state of tide, but may be the south wall of a curvilinear trap, the north wall formed by FTS 96. Needs to be surveyed during spring tides.

Site No FTS 098 **Map** NH **Easting** 271258 **Northing** 848821 **Site Name** Brecknish curvilinear trap 2

SiteType fish trap? wall? **Cond** fair **Action** Survey, determine full extent

Boulder wall, may be the north end of a curvilinear fish trap (south wall formed by FTS 99?) - see FTS 99 for discussion. Extends from HWM into the Firth. Boulders average size 0.5m x 0.5m. Hard to determine shape due to tide. Needs to be surveyed during spring tides.

Site No FTS 099 **Map** NH **Easting** 271231 **Northing** 848776 **Site Name** Brecknish curvilinear trap 2a

SiteType fish trap? wall? **Cond** fair **Action** survey to determine full extent.

A wall, or 'finger' of boulders extending into Firth. Boulders 0.5m x 0.5m. No real structure to 'wall', but several posts present (FTS 100 -103) that seem to be associated with these boulders. May be the southern side of a curvilinear trap, north wall formed by FTS 98. However, this is difficult to determine due to the state of the tide and the weed cover. On APs, there is a hint that this wall is the north wall of a third rectangular fish trap in area (other two are FTS 105 and FTS 106 to the south). The APs may indicate a wall c. 90m long, with a return to south of 80m. However, it is not clear and the area needs to be surveyed during spring tides. The presence of the timber in this possible trap is of significance.

Site No FTS 105 **Map** NH **Easting** 271293 **Northing** 848666 **Site Name** Brecknish rectangular trap 1

SiteType fish trap- rectangular **Cond** good **Action** Survey

A rectangular fish trap. Wall constructed of boulders, average dimensions 0.2m x 0.2m x 0.2m. Wall is 5m wide and extends out into sea for c. 80m to 271210 / 864655. To south of this point there is a gap of c. 15m, this may have been where the 'box' was. A straight wall, 2m wide and made of boulders 0.4m x 0.3m running parallel to the shore, starts at 271220 / 848660 and continues southwards for c. 65m to 271224 / 848605. There is then another possible gap, and another curving wall starts at 271237 / 848594 and curves towards the shore. It is only visible to 271248 / 848592, beyond which point it is lost in weed and sand. The trap was seen to remain dry inside whilst tide flooded outside. Interior filled with silty sand. No timbers visible in wall.

Site No FTS 106 **Map** NH **Easting** 271336 **Northing** 848498 **Site Name** Brecknish rectangular trap 2

SiteType Fish trap - rectangular **Cond** fair **Action** Detailed survey

Rectangular stone fish trap, to south of FTS 105. A linear wall extends from 271336 / 848498 out to sea for c. 140m to at least 271200 / 848517 where it joins another straight wall running parallel to the shore. The gap for the 'box' is at this north-western corner of the trap. The wall is mainly visible due to floating weed. It appears to be 2m wide and constructed of small rounded boulders 0.3m x 0.2m. The wall running parallel to the coast extend to c. 271203 / 848419. It is 2m wide and made of boulders up to 0.3m in diam. The wall is not really visible from the shore, but is clearly seen in the sea. The southern wall of this trap was not seen, and is thought to have been destroyed. The end of the trap is now formed by FTS 107, but it is possible that originally FTS 107 was part of a separate trap, and has been recorded separately (see FTS 107 for discussion).

Site No FTS 107 **Map** NH **Easting** 271145 **Northing** 848353 **Site Name** Brecknish rectangular trap 3

SiteType Fish trap - possible **Cond** Fair **Action** Survey

Fish trap, formed of curving wall running parallel to shore. Wall made of boulders (0.3m x 0.3m) and is about 2m wide. Its southern end is barely discernible. Wall mainly visible due to weed floating in water. The northern terminal is also not visible, but the impression is that any wall joining this wall to the shore was removed, and an extension wall built to join this curving trap with rectangular trap FTS 106. The joining wall extends from c. 271203 / 848419 - 271192 / 848401. The only way to determine whether this is part of a separate trap from FTS 106 is by full survey.

Site No FTS 108 **Map** NH **Easting** 277298 **Northing** 853303 **Site Name** Connage linear trap 1

SiteType fish trap - linear **Cond** Fair **Action** Survey

Straight line of walling extending out to sea. Formed of rounded boulders, max size 1m x 0.5m x 0.5m. Could be associated with FTS 109 to the south. Distance between walls is 15m. State of tide and weed cover means that it was not possible to determine full extent of wall, but on APs, it was seen to be at least 40m long. Associated with FTS 109, 110 and 111. None of these walls were seen during the original walk over survey. This was undertaken at low tide and the large amount of seaweed obscured the walls. They are all much easier to see from up high, where the weed floating in the water helps to indicate their position.

Site No FTS 109 **Map** NH **Easting** 277279 **Northing** 853292 **Site Name** Connage linear trap 2

SiteType fish trap - linear **Cond** Fair **Action** Survey

Wall, as FTS 108. May be associated with FTS 108. Wall is c. 35m long. See FTS 108 for more discussion.

Site No FTS 110 **Map** NH **Easting** 277329 **Northing** 853343 **Site Name** Connage linear trap 3

SiteType fish trap - linear **Cond** Fair **Action** Survey

Wall made of boulders, average size 0.3m x 0.2m x 0.2m. Some of the boulders are much larger, up to 1m. Wall is 40 m long and may be associated with FTS 111 to the north. The distance between the two walls is 20m. See FTS 108 for more discussion.

Site No FTS 111 **Map** NH **Easting** 277346 **Northing** 853353 **Site Name** Connage linear trap 4

SiteType fish trap - linear **Cond** Fair **Action** Survey

Wall made of boulders, average size 0.3m x 0.2m x 0.2m. Some of the boulders are much larger, up to 1m, one at shore end is 1m x 1m. The wall is c. 40m long and may be associated with FTS 110 to the south. See FTS 108 for more discussion.

Site No FTS 133 **Map** NH **Easting** 271615 **Northing** 849579 **Site Name** Alturlie Point fish trap

SiteType fish trap - possible **Cond** **Action** determine if archaeological or geological

A possible wall, only seen due to the weed adhering to stone in an area of silty sand. Wall extends to at least 271638 849575, beyond which it was covered in water at time of site visit. May be result of 'rafting'.

Site No FTS 138 **Map** NH **Easting** 273032 **Northing** 849726 **Site Name** Alturlie Bay fish trap

SiteType fish trap? **Cond** fair **Action** survey

A possible fish trap. The inside has filled with sand and is dry, whereas the outside was still wet at the time of the visit. This trapping of the sand was one reason the alignment of stones was noted. Only the tops of the boulders forming the alignment are visible. They are 0.5m x 0.5m and there is no indication of any jointing. The wall can be traced to 272996 849746. A second possible wall joins at 273050 849787 and extends to 273032 849726 The gap between the ends of the two walls is about 40m. The walls lie on the south bank of the Rough Burn, and could be connected - however, their shape resembles a yair

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Site No FTS 141 **Map** NH **Easting** 273640 **Northing** 850324 **Site Name** Castle Stuart fish trap

SiteType fish trap -possible **Cond** poor **Action** determine if archaeological or geological

A section of possible curving wall. Very covered in sediment and weed. Only way to determine if this really is a structure would be to excavate a trench through it. Extends to at least 273630 850324. Built of rounded boulders 0.4m x 0.4m.

Site No FTS 150 **Map** NH **Easting** 271295 **Northing** 847916 **Site Name** Allanfearn fish trap

SiteType fish trap - Rectangular **Cond** poor **Action** survey

A rectangular fish trap -with main wall parallel to coast and a return at the eastern end that comes back to the shore. As a result of identifying the feature on several APs, a visit was made to record the structure. The surveyor went to the general location of the structure, and independently located some possible walls. However, it was noted that they were very difficult to see and would not have been spotted if it wasn't known that there should be a feature in the area. Consists of two lines of weed-covered boulders, although there was more weed than boulder. The boulders were buried in the sandy silt, and on average there were only 2 stones every one metre. Only the tops of the rounded boulders were visible. After returning to the office, the co-ords taken on the field visit were plotted on the GIS and were found to match those of the site identified on the APs. This indicates that field survey alone may not be enough to locate some fish traps.

Appendix 6

Table showing time of low tide (Inverness)

and the hours of daylight

November 2003 - February 2004

Appendix 6: The time of low tide at Inverness.

Times in red indicate days when low tide coincides with daylight.

Tide heights marked yellow are 1 metre or lower

Moon	Date	Low tide Inverness		Daylight (calculated from Edinburgh)	
		Low	Height	Sunrise	Sunset
	30-Oct-04	9.07	1.4	7:15 AM	4:38 PM
	30-Oct-04	21.31	1.4		
	31-Oct-04	9.41	1.8	7:17 AM	4:36 PM
	31-Oct-04	22.38	1.7		
	1-Nov-03	10.35	2.2	7:19 AM	4:33 PM
	1-Nov-03	XXX	XXX		
	2-Nov-03	1.18	1.8	7:21 AM	4:31 PM
	2-Nov-03	14.06	2.2		
	3-Nov-03	2.39	1.5	7:23 AM	4:29 PM
	3-Nov-03	15.12	2		
	4-Nov-03	3.38	1.3	7:25 AM	4:27 PM
	4-Nov-03	16.04	1.8		
	5-Nov-03	4.26	1.2	7:27 AM	4:25 PM
	5-Nov-03	16.45	1.7		
	6-Nov-03	4.20	1.1	7:29 AM	4:23 PM
	6-Nov-03	16.39	1.3		
	7-Nov-03	5.31	1.2	7:32 AM	4:21 PM
	7-Nov-03	16.27	1.4		
	8-Nov-03	5.07	1.1	7:34 AM	4:19 PM
	8-Nov-03	17.07	1.2		
FULL	9-Nov-03	5.29	1.1	7:36 AM	4:17 PM
	9-Nov-03	17.50	1.1		
	10-Nov-03	6.05	1.1	7:38 AM	4:15 PM
	10-Nov-03	18.32	1.1		
	11-Nov-03	6.38	1.2	7:40 AM	4:13 PM
	11-Nov-03	19.06	1.2		
	12-Nov-03	7.03	1.4	7:42 AM	4:11 PM
	12-Nov-03	19.25	1.4		
	13-Nov-03	7.22	1.5	7:44 AM	4:10 PM
	13-Nov-03	19.41	1.5		
	14-Nov-03	8.30	1.5	7:46 AM	4:08 PM
	14-Nov-03	21.04	1.3		
	15-Nov-03	9.10	1.7	7:48 AM	4:06 PM
	15-Nov-03	21.53	1.4		
	16-Nov-03	10.02	1.9	7:50 AM	4:04 PM
	16-Nov-03	22.57	1.5		
	17-Nov-03	11.13	2	7:52 AM	4:03 PM
	17-Nov-03	XXX	XXX		
	18-Nov-03	0.14	1.4	7:54 AM	4:01 PM
	18-Nov-03	12.38	2		
	19-Nov-03	1.30	1.3	7:56 AM	4:00 PM
	19-Nov-03	13.55	1.8		
	20-Nov-03	2.35	1.1	7:58 AM	3:58 PM
	20-Nov-03	14.58	1.5		
	21-Nov-03	3.33	0.9	8:00 AM	3:57 PM
	21-Nov-03	15.55	1.2		
	22-Nov-03	4.26	0.7	8:02 AM	3:55 PM
	22-Nov-03	16.48	0.9		

NEW	23-Nov-03	5.18	0.6	8:04 AM	3:54 PM
	23-Nov-03	17.40	0.7		
	24-Nov-03	6.05	0.5	8:06 AM	3:52 PM
	24-Nov-03	18.28	0.5		
	25-Nov-03	6.49	0.6	8:08 AM	3:51 PM
	25-Nov-03	19.13	0.5		
	26-Nov-03	7.30	0.8	8:10 AM	3:50 PM
	26-Nov-03	19.57	0.6		
	27-Nov-03	8.20	1.2	8:12 AM	3:49 PM
	27-Nov-03	20.52	1		
	28-Nov-03	8.50	1.5	8:14 AM	3:48 PM
	28-Nov-03	21.43	1.3		
	29-Nov-03	9.19	1.8	8:15 AM	3:47 PM
	29-Nov-03	23.05	1.5		
	30-Nov-03	10.04	2.1	8:17 AM	3:46 PM
	30-Nov-03	XXX	XXX		
	1-Dec-03	0.43	1.6	8:19 AM	3:45 PM
	1-Dec-03	11.08	2.2		
	1-Dec-03	13.17	2.3		
	2-Dec-03	1.59	1.6	8:20 AM	3:44 PM
	2-Dec-03	14.30	2.1		
	3-Dec-03	3.00	1.5	8:22 AM	3:43 PM
	3-Dec-03	15.24	2		
	4-Dec-03	3.49	1.4	8:24 AM	3:42 PM
	4-Dec-03	16.06	1.8		
	5-Dec-03	4.25	1.4	8:25 AM	3:41 PM
	5-Dec-03	15.31	1.7		
	5-Dec-03	16.25	1.7		
	6-Dec-03	3.47	1.4	8:27 AM	3:41 PM
	6-Dec-03	16.03	1.5		
	7-Dec-03	4.15	1.3	8:28 AM	3:40 PM
	7-Dec-03	16.48	1.3		
FULL	8-Dec-03	4.56	1.3	8:29 AM	3:40 PM
	8-Dec-03	17.35	1.2		
	9-Dec-03	5.39	1.3	8:31 AM	3:39 PM
	9-Dec-03	18.22	1.2		
	10-Dec-03	6.20	1.3	8:32 AM	3:39 PM
	10-Dec-03	19.03	1.2		
	11-Dec-03	6.54	1.4	8:33 AM	3:39 PM
	11-Dec-03	19.33	1.3		
	12-Dec-03	7.16	1.6	8:34 AM	3:39 PM
	12-Dec-03	19.44	1.4		
	13-Dec-03	7.35	1.7	8:35 AM	3:38 PM
	13-Dec-03	20.04	1.5		
	14-Dec-03	8.05	1.8	8:36 AM	3:38 PM
	14-Dec-03	20.42	1.5		
	15-Dec-03	8.48	1.9	8:37 AM	3:38 PM
	15-Dec-03	21.36	1.6		
	16-Dec-03	9.48	2	8:38 AM	3:38 PM
	16-Dec-03	23.10	1.6		
	17-Dec-03	11.15	2.1	8:39 AM	3:38 PM
	17-Dec-03	XXX	XXX		
	18-Dec-03	1.21	1.5	8:40 AM	3:39 PM
	18-Dec-03	12.44	2		
	19-Dec-03	2.17	1.3	8:41 AM	3:39 PM

	19-Dec-03	14.10	1.7		
	20-Dec-03	3.08	1.1	8:41 AM	3:39 PM
	20-Dec-03	15.26	1.5		
	21-Dec-03	4.01	1	8:42 AM	3:40 PM
	21-Dec-03	16.28	1.2		
	22-Dec-03	4.54	0.9	8:43 AM	3:40 PM
	22-Dec-03	17.26	1		
NEW	23-Dec-03	5.43	0.8	8:43 AM	3:41 PM
	23-Dec-03	18.13	0.6		
	24-Dec-03	6.31	0.8	8:43 AM	3:41 PM
	24-Dec-03	19.03	0.5		
	25-Dec-03	7.16	0.9	8:44 AM	3:42 PM
	25-Dec-03	19.50	0.5		
	26-Dec-03	7.57	1	8:44 AM	3:43 PM
	26-Dec-03	20.35	0.6		
	27-Dec-03	8.38	1.2	8:44 AM	3:44 PM
	27-Dec-03	21.20	0.8		
	28-Dec-03	9.22	1.4	8:44 AM	3:45 PM
	28-Dec-03	22.07	1		
	29-Dec-03	10.10	1.6	8:44 AM	3:45 PM
	29-Dec-03	22.57	1.1		
	30-Dec-03	11.05	1.7	8:44 AM	3:47 PM
	30-Dec-03	XXX	XXX		
	31-Dec-03	0.00	1.3	8:44 AM	3:48 PM
	31-Dec-03	12.08	1.9		
	1-Jan-04	0.55	1.5	8:44 AM	3:49 PM
	1-Jan-04	13.17	1.9		
	2-Jan-04	1.56	1.5	8:44 AM	3:50 PM
	2-Jan-04	14.24	1.8		
	3-Jan-04	2.53	1.5	8:43 AM	3:51 PM
	3-Jan-04	15.22	1.7		
	4-Jan-04	3.43	1.4	8:43 AM	3:53 PM
	4-Jan-04	16.12	1.5		
	5-Jan-04	4.28	1.4	8:43 AM	3:54 PM
	5-Jan-04	16.57	1.3		
	6-Jan-04	5.09	1.3	8:42 AM	3:55 PM
	6-Jan-04	17.38	1.2		
FULL	7-Jan-04	5.47	1.2	8:41 AM	3:57 PM
	7-Jan-04	18.17	1		
	8-Jan-04	6.06	1.4	8:41 AM	3:58 PM
	8-Jan-04	18.57	1.1		
	9-Jan-04	6.48	1.4	8:40 AM	4:00 PM
	9-Jan-04	19.34	1.1		
	9-Jan-04	XXX	XXX		
	10-Jan-04	7.21	1.4	8:39 AM	4:01 PM
	10-Jan-04	20.04	1.1		
	11-Jan-04	7.43	1.4	8:38 AM	4:03 PM
	11-Jan-04	20.20	1.1		
	12-Jan-04	8.07	1.5	8:38 AM	4:05 PM
	12-Jan-04	20.45	1.1		
	13-Jan-04	8.41	1.5	8:37 AM	4:07 PM
	13-Jan-04	21.25	1.2		
	14-Jan-04	9.28	1.6	8:36 AM	4:08 PM
	14-Jan-04	22.25	1.3		
	15-Jan-04	10.32	1.7	8:35 AM	4:10 PM

	15-Jan-04	23.45	1.3		
	16-Jan-04	11.53	1.8	8:33 AM	4:12 PM
	16-Jan-04	XXX	XXX		
	17-Jan-04	1.18	1.3	8:32 AM	4:14 PM
	17-Jan-04	13.22	1.7		
	18-Jan-04	2.34	1.3	8:31 AM	4:16 PM
	18-Jan-04	15.06	1.5		
	19-Jan-04	3.37	1.2	8:30 AM	4:18 PM
	19-Jan-04	16.20	1.3		
	20-Jan-04	4.37	1.2	8:28 AM	4:20 PM
	20-Jan-04	17.22	1		
NEW	21-Jan-04	5.34	1.1	8:27 AM	4:22 PM
	21-Jan-04	18.18	0.8		
	22-Jan-04	6.27	1.1	8:26 AM	4:24 PM
	22-Jan-04	19.10	0.6		
	23-Jan-04	7.13	1.1	8:24 AM	4:26 PM
	23-Jan-04	19.57	0.6		
	24-Jan-04	7.52	1.1	8:23 AM	4:28 PM
	24-Jan-04	20.41	0.6		
	25-Jan-04	8.24	1.2	8:21 AM	4:30 PM
	25-Jan-04	21.21	0.8		
	26-Jan-04	8.50	1.3	8:19 AM	4:32 PM
	26-Jan-04	21.55	1		
	27-Jan-04	9.19	1.4	8:18 AM	4:34 PM
	27-Jan-04	22.10	1.3		
	28-Jan-04	9.54	1.6	8:16 AM	4:36 PM
	28-Jan-04	22.21	1.5		
	29-Jan-04	10.43	1.7	8:14 AM	4:38 PM
	29-Jan-04	23.08	1.7		
	30-Jan-04	11.54	1.9	8:12 AM	4:40 PM
	30-Jan-04	XXX	XXX		
	31-Jan-04	0.20	1.9	8:11 AM	4:42 PM
	31-Jan-04	13.23	1.9		
	1-Feb-04	1.58	1.9	8:09 AM	4:45 PM
	1-Feb-04	14.37	2		
	2-Feb-04	3.08	1.9	8:07 AM	4:47 PM
	2-Feb-04	15.44	1.8		
	3-Feb-04	4.05	1.7	8:05 AM	4:49 PM
	3-Feb-04	16.37	1.5		
	4-Feb-04	4.51	1.6	8:03 AM	4:51 PM
	4-Feb-04	17.22	1.3		
	5-Feb-04	5.33	1.4	8:01 AM	4:53 PM
	5-Feb-04	18.03	1		
FULL	6-Feb-04	6.11	1.3	7:59 AM	4:56 PM
	6-Feb-04	18.42	0.9		
	7-Feb-04	6.48	1.2	7:57 AM	4:58 PM
	7-Feb-04	19.20	0.8		
	8-Feb-04	7.23	1.1	7:55 AM	5:00 PM
	8-Feb-04	19.57	0.7		
	9-Feb-04	7.58	1.1	7:53 AM	5:02 PM
	9-Feb-04	20.33	0.7		
	10-Feb-04	8.32	1.1	7:51 AM	5:04 PM
	10-Feb-04	21.09	0.8		
	11-Feb-04	9.08	1.2	7:48 AM	5:06 PM
	11-Feb-04	21.47	1		

	12-Feb-04	9.49	1.3	7:46 AM	5:09 PM
	12-Feb-04	22.30	1.2		
	13-Feb-04	10.39	1.5	7:44 AM	5:11 PM
	13-Feb-04	23.23	1.4		
	14-Feb-04	11.44	1.6	7:42 AM	5:13 PM
	14-Feb-04	XXX	XXX		
	15-Feb-04	0.33	1.7	7:40 AM	5:15 PM
	15-Feb-04	13.10	1.7		
	16-Feb-04	1.59	1.8	7:37 AM	5:17 PM
	16-Feb-04	14.43	1.6		
	17-Feb-04	3.39	1.5	7:35 AM	5:20 PM
	17-Feb-04	16.27	1.2		
	18-Feb-04	4.45	1.4	7:33 AM	5:22 PM
	18-Feb-04	17.26	0.9		
	19-Feb-04	5.39	1.3	7:30 AM	5:24 PM
	19-Feb-04	18.16	0.7		
NEW	20-Feb-04	6.24	1.1	7:28 AM	5:26 PM
	20-Feb-04	19.01	0.5		
	21-Feb-04	7.00	1	7:26 AM	5:28 PM
	21-Feb-04	19.41	0.4		
	22-Feb-04	7.31	1	7:23 AM	5:30 PM
	22-Feb-04	20.16	0.5		
	23-Feb-04	8.01	0.9	7:21 AM	5:33 PM
	23-Feb-04	20.48	0.7		
	24-Feb-04	8.29	1	7:18 AM	5:35 PM
	24-Feb-04	21.07	0.9		
	25-Feb-04	8.51	1.1	7:16 AM	5:37 PM
	25-Feb-04	20.53	1.2		
	26-Feb-04	9.09	1.3	7:14 AM	5:39 PM
	26-Feb-04	21.13	1.4		
	27-Feb-04	9.36	1.6	7:11 AM	5:41 PM
	27-Feb-04	21.49	1.6		
	28-Feb-04	10.57	1.9	7:09 AM	5:43 PM
	28-Feb-04	23.33	2		
	29-Feb-04	12.09	2.1	7:06 AM	5:46 PM
	29-Feb-04	XXX	XXX		

Appendix 7

Words used for fish-traps and their elements

Appendix 7 Names for fish-traps

Cairidh - fish-trap (Gaelic) (Jones 1983) or *Caraidh* (Ferrier 1969)
Coraoe Cora Eisc - fish-trap (Irish) (Jones 1983)
Coret - fish-trap (old Breton) (Jones 1983)
Croy- fish-trap (W. coast of Scotland) (Ferrier 1969)
Croy - a cairn of stones heaped on the river bed (Robertson 1998).
Cruive- a coop or enclosure of wickerwork or spars placed in tideways and openings in weirs (Bathgate 1949); a rubble dam fitted with a gap, known as a cruive box or a slap, for the trapping of salmon (Robertson)
Cytweras - probably projects out into stream and contain putts or basket traps (Bond 1988, p 78).
Fishgarth - an enclosure for catching fish (Losco-Bradley and Salisbury, 1988)
Garth - fish-trap (W. coast of Scotland) (Ferrier 1969)
Gored (*Goredau*) something curved (Welsh) (Jones 1983)
Grigs - basketwork trap used in Wales in nineteenth century (Bond 1988).
Gurgite - weir (White 1984)
Haecweras - wattled fences or 'hedges' (Bond 1988, p 78).
Haias vivarii - stake nets or fish garths recorded in Royal records (Steane 1988).
Heia Maris - may be a corral type weir, similar to the one recorded at Southwold by Hervey (1911, p. 508).
Hives - basketwork trap used in Wales in nineteenth century (Bond 1988).
Kiddle - weir (Pannett 1988) - weir made from green willow or osier common from late twelfth century (Bond 1988).
Laccwer - Anglo Saxon for hedge weir (Losco-Bradley and Salisbury, 1988)
Pound - fish-trap (W. coast of Scotland) (Ferrier 1969)
Putchers - basketwork trap used in Wales in nineteenth century (Bond 1988).
Putts - basketwork trap used in Wales in nineteenth century (Bond 1988).
Stake Net - a net attached to stakes stretching out at a right angle to the shore and acting as a barrier to force salmon into an enclosure. *R*eferred to as strem nets and kettle nets (Wales) and Scottish nets (Ireland)
Totum truncagium - may be a trap, or 'fish box', in Royal records relating to the mere at Soham (Steane 1988).
Wele - weir made from green willow or osier common from the early fourteenth century (Bond 1988).
Wera - the Anglo Saxon form of weir, a fixed structure for catching fish (Losco-Bradley and Salisbury, 1988)
Yair - fish-trap (W. coast of Scotland, especially Solway) (Ferrier 1969)

Elements of a fish-trap

Eye - place where wings converge and basket or net placed.
Goote - a gap a fish can pass through (Losco-Bradley and Salisbury, 1988)
Hedge - a wattle fence forming a wing of a trap
Wing - a barrier used to channel fish into a trap

Appendix 8

Shorewatch Recording Form

SHOREWATCH - RECORDING FORM

Use this form on your FIRST visit to a site

SITE ID This information will be used to distinguish the site from others

* Your Site no.	NMRS no.	SMR no.	Other nos.

LOCATION OF THE SITE This information will help you and others to return to the site

*** Site Name and Location (address or description)**

Parish / District		Local Authority Area		
National Grid Reference (NGR)	Map Square	* Easting	* Northing	Accuracy of NGR
NGR obtained how		Map scale		Map date
Point used to establish NGR		Distance to coast edge		

SITE DESCRIPTION The description will help to identify the site type, function and date

Site Dimensions	Length	Width	Height/Depth

*** Full description**

continue over if necessary

Site type	
Estimated period	How has the period been estimated?

SITE CONDITION This information will help to assess the condition of the site and threats to its survival

Soil type and vegetation on site	Soil type and vegetation around site
Condition of site	
Threats to site	
Further action required?	If so, what?

YOUR RECORDS This will to help cross reference to other records and to things that you have found

Plan nos.	Section nos.	Other drawings

Photos taken? If so, record film no. and fill in log	B/W	Slide	Colour print	Digital

Finds: no. of pieces	Pottery	Animal bone	Human bone	Wood	Metal	CBM	Other BM	Stone	Glass	Shell

Special Finds	Other finds

FIELDWORK INFORMATION to remind you and others about the actual survey

Group name	* Form recorded by	* Survey date

SHOREWATCH - RECORDING FORM

Sketch drawings

SKETCH LOCATION DRAWING: Please show the location of the site in relation to other features, (with distances) the location of the coast edge (if relevant) and the approximate position of north (usually the top of the drawing faces north).

SKETCH PLAN / SECTION: Please make a more detailed drawing showing the principle elements of the site, either in plan, section, or both. Please show the dimensions of the features and the approximate position of north.