*Proc Soc Antiq Scot* 145 (2015), 307–340

# A medieval logboat from the River Conon: towards an understanding of riverine transport in Highland Scotland

Robert J C Mowat*, Trevor Cowie†, Anne Crone‡ and Graeme Cavers‡

ABSTRACT

*Three timbers held in store at the National Museums of Scotland have been identified as the incomplete remains of a logboat that was found in the River Conon near Dingwall in 1874. Notwithstanding their poor condition, they were felt to justify dating (by both radiocarbon and dendrochronology), laser scanning (to create a 'virtual' reconstruction) and re-publication, subsequent to that by Mowat (1996: 22, 24, no 28 and 86, nos A21–22).*

*Radiocarbon dating showed the vessel to be of medieval date, while tree-ring evidence indicated that it was probably fashioned in the late 13th or early 14th centuries from an oak tree of some 300 years growth. This is the first logboat in Scotland to be dated by dendrochronology, and the results significantly extend the coverage of Scottish medieval tree-ring dates north of Inverness.*

*Specific features suggest that the remains may have formed one element within a vessel of paired (or possibly multiple) form, intended for the cross-river transport of heavy loads. These results invite wider consideration of the role of simple or 'undeveloped' types of watercraft in riverine transport in Highland Scotland and elsewhere.*

## INTRODUCTION

Trevor Cowie

On 12 December 1881, the Society of Antiquaries of Scotland noted the following donation to the collections of what was then the National Museum of Antiquities of Scotland (NMAS):

> Canoe, of oak, hollowed out of the bole of a tree. It measures 16 feet 3 inches [4.95m] in length, 3 feet [0.91m] wide at the stem, 2 feet [0.61m] wide at the bow, and 2 feet [0.61m] in depth of the side. It was discovered in 1874 by the accidental change of the course of the River Conon, opposite Dingwall. There had been a great flood, which carried away the sandhills and excavated a new channel at the point where a strong tidal current meets that of the stream. The canoe was found sticking out of the silt, about 8 feet below the surface of a bank of gravel.
>
> (*Proc Soc Antiq Scot* 16 (1881–2): 11)

The 'canoe' – in modern terminology, a logboat – was donated by Dr William Bruce of Dingwall, through Sir Robert Christison, Bart. After starting his career in general practice in his native Aberdeenshire, Bruce moved to Ross-shire in 1870, where he lived until his death in 1920. He was responsible for the opening of the Ross Memorial Hospital in 1873, and from an early stage, he was also closely associated with the nearby Spa at Strathpeffer, where he did much to improve its facilities and standing (Obituary, *Ross-shire Journal*, 29 October 1920; Mowat 1981; Buchanan & Kean 2003).

At the time of the discovery of the vessel, Dr Bruce was therefore already a well-known public figure in Dingwall, but he is not known to have had any interest in antiquarian matters; instead, the reference to the role of the eminent

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Edinburgh physician and toxicologist Sir Robert Christison as intermediary suggests it was Bruce's growing medical reputation and connections that lay behind the presentation of the logboat to the museum. Christison certainly did have connections with the Society: elected a Fellow in 1853, he was a contributor to its *Proceedings* and the intermediary responsible for several donations to the museum. Most notably, he reported the discovery of the well-known wooden figurine found at Ballachulish, Inverness-shire (Christison 1881). How and why Dr Bruce had originally come to be in possession of the logboat is unknown, but the close proximity of his residence in Castle Street, Dingwall, to the 'Dingwall Canal' (the canalised River Peffery) may have been a factor (illus 1).

The acquisition of the vessel was also noted locally in Easter Ross at the time. We are grateful to Sandra and the late David Macdonald, Dingwall, for locating the following article published in the *Ross-shire Journal* earlier that year:

> AN ANCIENT CANOE – The Antiquarian Museum, Edinburgh, received a valuable addition to its store of antiquities on Monday in the shape of an ancient Scottish canoe, which has been presented by Dr Bruce, of Dingwall, in whose possession it has been for some time. The canoe, which it will be remembered was discovered embedded in the sand near the harbour here, some years ago, measures 16 feet in length, is hollowed out of a single tree, and is a much ruder specimen than any of those displayed in the museum. Instead of possessing a prow, the

Illus 1 Oblique aerial view of Dingwall from the NNW. The course of the Dingwall Canal (the canalised River Peffery) can be seen curving around the town towards its outlet at the harbour. The logboat appears to have been discovered in 1874 somewhere in the area of channels and sandbars where the Conon discharges into the inner Cromarty Firth. 

> bow has been roughly cut square across, and the stern board, which along with the prow usually distinguishes ancient Scottish canoes, is amissing.
>
> (*Ross-shire Journal*, 22 July 1881: 2, col 5)

Despite these two unambiguous references to its acquisition, there is no mention of the logboat in the museum's published catalogue (NMAS 1892) or subsequent records. However, recent research has permitted this 'lost' logboat to be re-identified. It now seems that at some point the vessel was sawn into two main portions, one of which has itself subsequently split into two; the date of this operation is unrecorded but it may have been intended to facilitate either its transportation to Edinburgh or storage in the cramped cellars of the NMAS building in Queen Street, where the three fragments remained until 2009 and were effectively inaccessible.

Although the fragments were described in his survey of logboats from Scotland, Mowat was circumspect about their identification and inter-relationship (1996: 86, nos A21–A22); there was then no reason to connect them with the River Conon find, which was presumed lost (ibid: no 28). In 2014 re-storage of the fragments made the timbers accessible for inspection and allowed their recognition as elements of a single logboat. Its recorded length suggested the River Conon logboat and this was confirmed by the discovery of the frayed remains of a dusty paper label adhering to part of the gunwale (illus 2).

A radiocarbon date was obtained which showed that the logboat was of medieval date (see below). As a rare surviving example of the small craft once widespread across Highland Scotland (cf Joass 1881; Cheape 1999), it was felt that it merited study and fuller publication. Funding was therefore obtained to permit two main additional strands of research:

- comprehensive laser scanning to create a 'virtual' reconstruction of the logboat and its surviving features;
- dendrochronological analysis; robust medieval tree-ring chronologies are now available for north-east Scotland, and


Illus 2 (a) View of two of the logboat timbers following rehousing in 2014; the prow section is on the lower tier of the trolley; (b) detail of label on gunwale permitting its conclusive identification as the 'lost' River Conon logboat. The label reads 'Canoe found in the River Conon, near Dingwall. By Dr. W. Bruce, Dingwall, through [ ] Christison'. © NMS/T Cowie

the logboat therefore offered an ideal opportunity to extend chronological coverage further north.

Coupled with an assessment of the significance of the context of the discovery, the results invite consideration of various aspects of riverine transport before the modern era, not only in the immediate setting of the Highland region but also elsewhere across Scotland.

## THE LOGBOAT

### 1. LASER SCANNING AND RECONSTRUCTION

Graeme Cavers

As physical reassembly of the remains of the logboat was impractical on grounds of cost and space, laser scanning was used to create an accurate record of the individual timbers and three-dimensional visualisations of the complete vessel (illus 3).

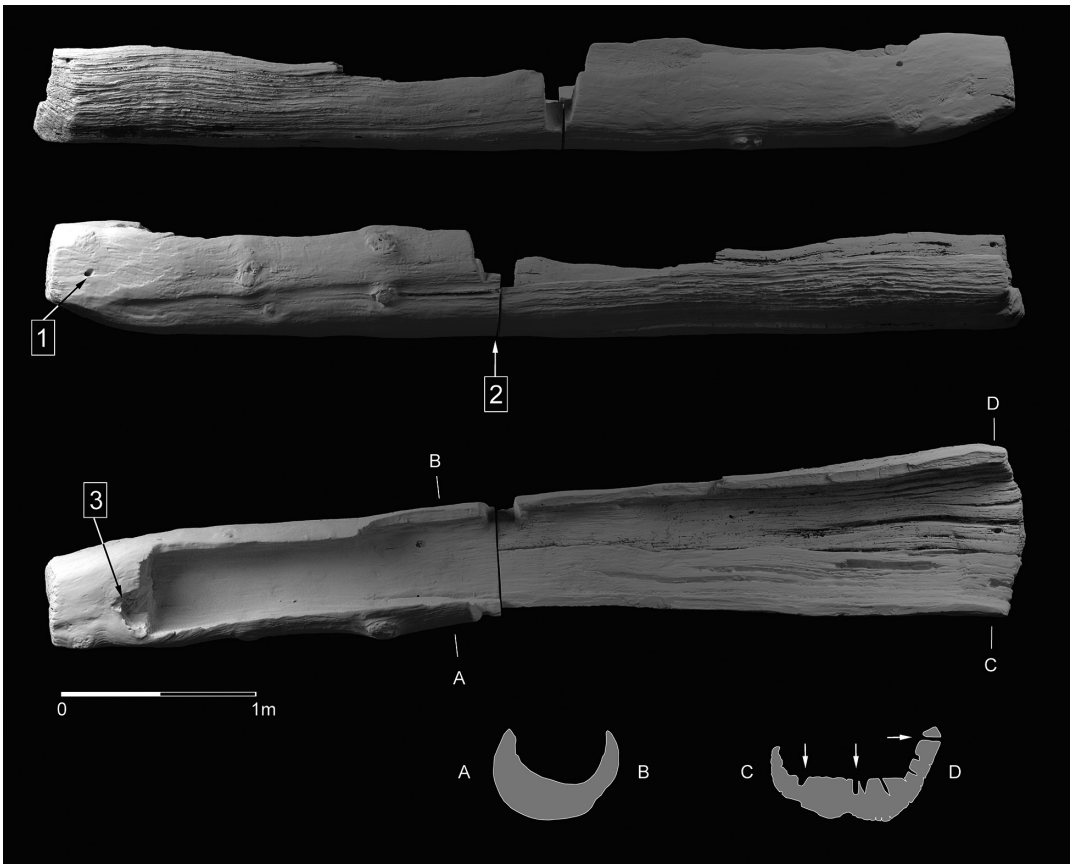
A Faro Platinum Arm self-positioning sub-mm object scanner was used at 0.5mm resolution; several hundred million point measurements were collected, totalling over 3 gigabytes of data. The completed scans were assembled digitally, so as to reconstruct the form of the logboat. The raw data and processed polygon meshes derived from the laser scan are archived with the Historic Environment Scotland (HES) National Record.

### 2. DESCRIPTION OF THE LOGBOAT TIMBERS

Robert Mowat

Three substantial timber fragments held in store at the National Museums of Scotland (NMS: X.IN 7) evidently constitute the greater part of a logboat, although previously recorded by the writer as unassociated timbers of uncertain significance (Mowat 1996: 86, nos A21–22). They measure about 5m in length, corresponding to the length recorded on discovery (illus 4). The three timbers have been divided by transverse sawing. The bow portion (A) displays evidence of abrasive wear, while the stern timbers (B & C) have suffered from longitudinal splitting (to


ILLUS 3 River Conon logboat. Laser scanning in progress. © NMS/T Cowie




ILLUS 4 Reconstruction of the River Conon logboat following laser scanning of the separate timbers. Features indicated on the image include: (1) artificially worked hole near port bow; (2) approximately amidships, the modern transverse saw cut is clearly visible, coinciding with the ancient notches cut in the sides; (3) irregular cavity, possibly unfinished working. The marked difference in condition between prow and stern is also apparent. © AOC

an extent best paralleled on the logboat from East Greens, Forfar, Angus (Mowat 1996: 32, 34, no 49)). No toolmarks, ornament or caulking material are apparent: timber-knots are few but substantial.

The individual timbers are as follows:

*Timber A*

This timber has evidently formed the bottom and most of the sides of the bow portion of the vessel, and is in much better condition than the other two. It measures 2.28m in length by 0.43m in beam and 0.38m in external depth; the bottom is some 0.22m thick at the saw-cut. The timber of this fragment is fairly heavily knotted, while the sides are smooth (most notably the exterior of the port side); only minimal radial splitting is apparent at the saw-cut (see illus 4 and 8).

The external form of this fragment indicates that the vessel has narrowed to a square-cut bow measuring about 0.43m transversely by 0.38m in the vertical plane. Internally, it has been eccentrically flat-bottomed, with a clear division between the bottom and the sides, particularly on the starboard side. The forward part of the interior has been left in the solid to a distance of 0.45m from the bow. Within the port side of this, an irregular cavity has been dug out, presenting the impression of unfinished working (see illus 4).

Two small holes in this fragment have evidently been artificially worked, but remain of

uncertain significance. The one that is low down on the exterior of the port bow faces forward, is about 130mm deep, and measures about 50mm in maximum diameter, having evidently become elongated in drying (see illus 4). The other was noted within the starboard side of the interior, and penetrates the side of the boat to a depth of about 70mm. The squared form of this hole indicates the use of a metal chisel or similar tool.

No evidence of timber rotting is apparent, but areas of smooth surface on the exterior of this timber presumably result from abrasion by river water.

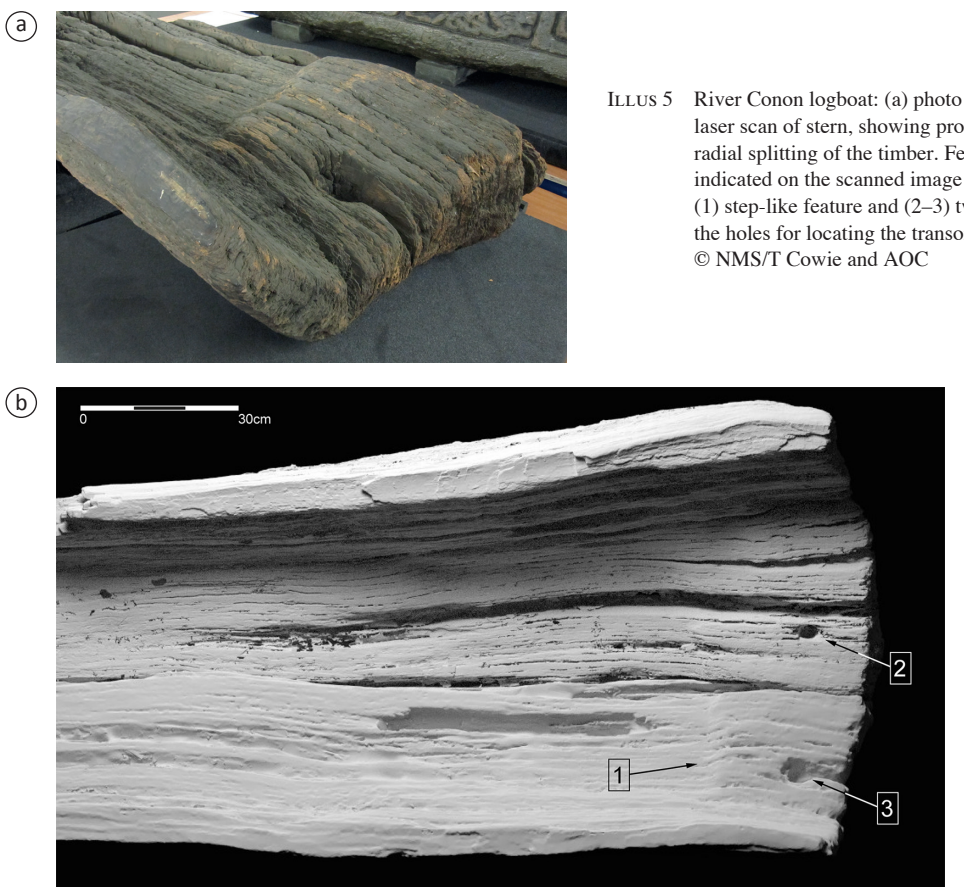
*Timber B*

This timber has formed the port quarter of the boat, and measures about 2.63m in length. It is heavily split, to the point of near disintegration; the poor condition of this timber precludes any estimate of the beam of the vessel at or near the stern.

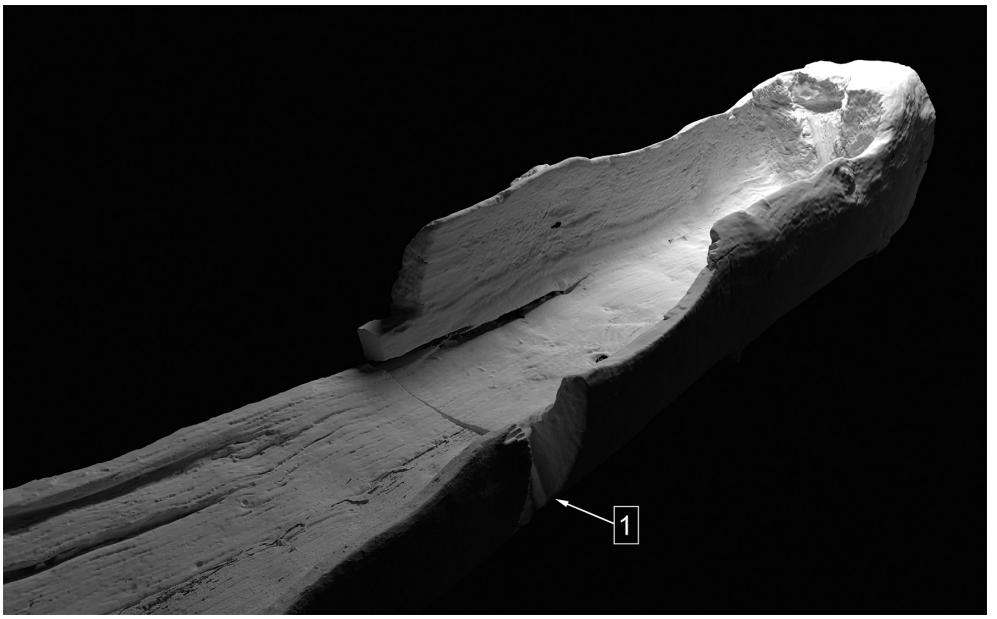
*Timber C*

This timber has formed the starboard quarter of the boat, measures about 2.7m in length, and is in similar condition to B. In this case, the surviving timber measures about 0.4m in external depth, but this presumably does not represent the full height of the side.

Both timbers B and C display a slightly raised internal step-like feature and are penetrated by holes, suggesting the former presence of an inserted transom, which was presumably retained by dowels passing through cleats left in the solid timber (illus 5). No transom-groove is apparent in the raised portion of the bottom of the boat. The two holes in the bottom appear to be situated at roughly even intervals across the boat and




ILLUS 5 River Conon logboat: (a) photo and (b) laser scan of stern, showing pronounced radial splitting of the timber. Features indicated on the scanned image include (1) step-like feature and (2–3) two of the holes for locating the transom. © NMS/T Cowie and AOC




ILLUS 6 River Conon logboat. Laser scan image showing the deep notches cut in sides of logboat, possibly indicating that it was used in a paired arrangement. The line of the modern transverse saw-cut is also visible; it presumably capitalised on the presence of the notches to reduce the effort of cutting through the boat. © AOC

measure about 25mm across by between 70mm and 80mm in depth; they were probably intended to penetrate the bottom. Timber C has a hole of similar size in the side, but the corresponding portion of B is missing. All these holes are of uncertain form, having been severely worn and rounded.

On both sides of the boat, and straddling the line of the transverse modern saw-cut which divided the boat into two portions, there are prominent square-cut notches of depth about 200mm and width between 100mm and 120mm. The significance of these features remains unclear, but they present the impression of having been cut, probably with a saw, before the deposition of the boat (illus 6).

The marked differentiation in condition between timber A, and timbers B and C indicates that they have been stored under very different conditions at some stage, and probably for a considerable period. As the contemporary accounts make clear, the logboat had been kept in private hands for six or seven years following its discovery and nothing is known of the circumstances or condition of the boat during that time.

## THE DATE OF THE LOGBOAT

Anne Crone

### 1. RADIOCARBON DATE

A radiocarbon date was obtained through SUERC (sampling was carried out by TC with advice from AC, who also confirmed the original 19th-century identification of the wood as oak). A sample removed from the outer edge of the hull can be presumed to derive from the outer margin of the original tree-trunk, close to the sapwood boundary. The results are shown in Table 1 and illus 7.

This result accords with the general picture across Britain and Ireland. Most logboat dates fall within the medieval period, while prehistoric examples remain relatively rare (Mowat 1996: 126, 128–9; Lanting 1998: 630–1).

TABLE 1
River Conon logboat: details of radiocarbon date

| *Material* | *Lab no* | *Date BP* | *$\delta^{13}C$‰* | *Calibrated date at 68.2% and 95.4% probability* |
|---|---|---|---|---|
| Wood (*Quercus* sp) | SUERC-49754 (GU32316) | 781 ± 31 | –28.0 | cal AD 1224–1269<br>cal AD 1206–1282 |

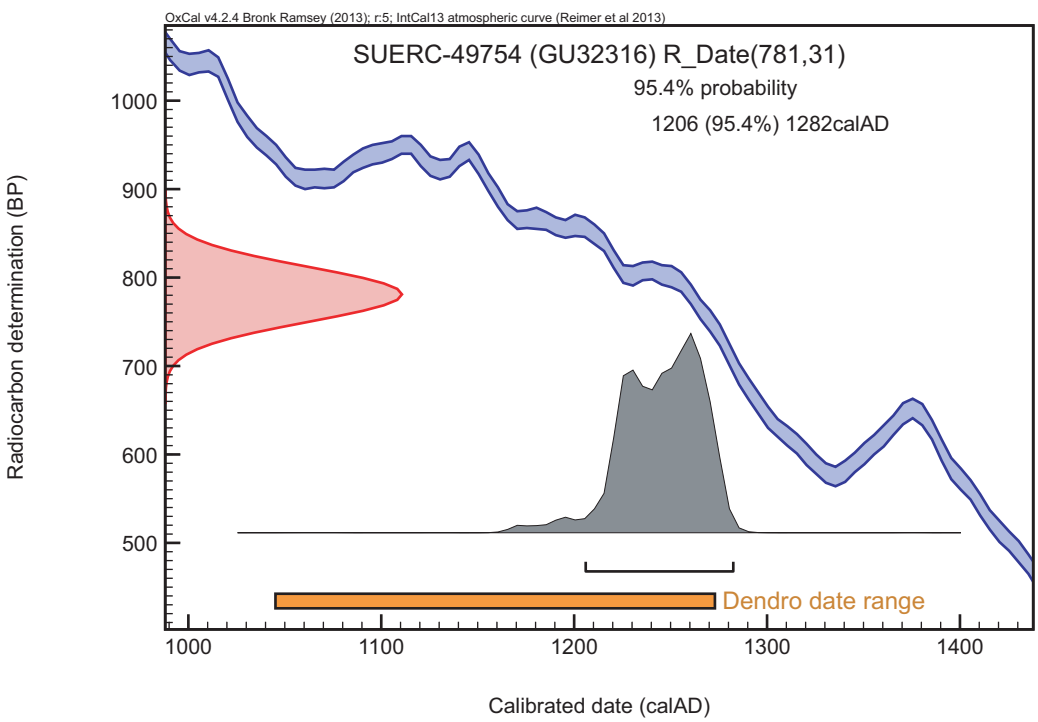
## 2. DENDROCHRONOLOGICAL ANALYSIS

### *Methodology*

The sawn face of logboat timber A was sanded to prepare a smooth surface on which the ring-pattern was clear, and the surface was then brushed to ensure that the pores of the ring-pattern were not clogged with dust. A series of four overlapping casts of the ring-pattern were then taken using FIMO, a polymer clay used for modelling (illus 8). The ring-pattern on each cast was individually measured and graphed and then joined at the correct overlapping position to form a continuous sequence for the log, RCLrm (River Conon Logboat raw mean).

### *Results*

The length of the measured ring-pattern was 229 years. The innermost rings of the log could not be measured because the surface on which they




ILLUS 7 OXCAL plot of result of radiocarbon date SUERC-49754. The span of the dated tree-ring sequence has been added to show the close correspondence of the end-dates. The date of the outermost ring, AD 1273, compares very closely with the radiocarbon date taken from the outermost rings, placing the actual date close to the most recent end of the 2-sigma radiocarbon range of cal AD 1206–1282 (SUERC-49754)

were visible, at the end of the logboat, was too decayed. It is estimated that there were up to 40–50 rings before the first measured ring. The outermost ring of the measured sequence lies on the heartwood/sapwood boundary, the sapwood having decayed away.

The ring-pattern was compared against all available native Scottish oak chronologies and this produced significant and consistent correlations (Table 2) dating the logboat sequence to AD 1045–1273.

As the heartwood/sapwood boundary is present, it is possible to estimate a felling range for the log by adding a sapwood estimate to the date of the outermost ring. The British sapwood estimate of 10–46 years (English Heritage 1998: 11) is used in Scotland. Thus, the log was probably felled sometime between AD 1283 and AD 1319. The date of the outermost ring, AD 1273, compares very closely with the radiocarbon date taken from the outermost rings, placing the actual date close to the most recent end of the 2-sigma radiocarbon range of cal AD 1206–1282 (SUERC-49754) (see illus 7).

Allowing for the missing inner and outer rings, a log of *c* 300 years of age was used to make the logboat. Oaks of this age were used to construct the wells in the backland properties behind the High Street, Elgin, in the early 14th century (Crone 2000: 213; Murray et al 2009: 222) and the roof of Darnaway Castle in the late 14th century (Stell & Baillie 1993), so this part of Scotland was clearly well-supplied with tracts of mature woodland during this period. Not surprisingly, it compares best with these local chronologies (see Table 2).

In summary, dendrochronological analysis indicates that the River Conon logboat was probably fashioned in the late 13th/early 14th century from a mature oak of some 300 years growth, and this suggests that we should perhaps envisage mature oak woodlands of the kind that survived along the Moray plain, extending up along the shores of the Cromarty Firth.

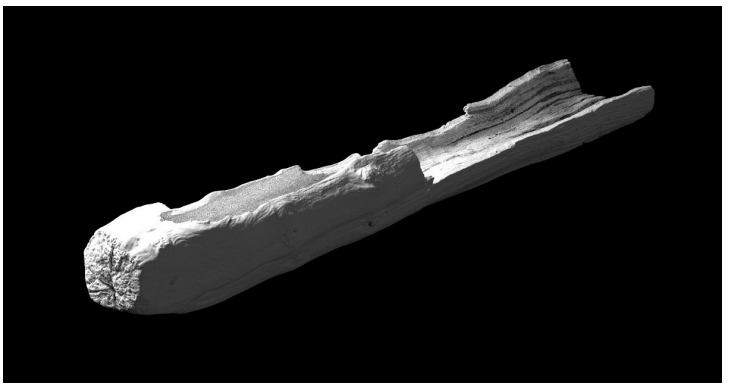
This is the first logboat to be dated by dendrochronology in Scotland and one of only a handful of dendro-dated examples in mainland Britain (Ian Tyers pers comm). These scattered examples display no periodicity, with dated examples from the Iron Age (Hasholme, Yorkshire) to the 13th century (Wasdale, Cumbria) and simply reflect opportunities for dating. In Ireland there are 14 dendro-dated logboats but these are also very dispersed chronologically, from 3000 BC to AD 1600 (David Brown pers comm).

Most dendrochronological work in Scotland has been concentrated in central and eastern Scotland (Crone & Mills 2012), with little work undertaken in northern Scotland simply because of the availability of suitable material in the former areas and the apparent lack of such material from both archaeological sites and historic buildings in the latter. The ease with which it has been possible to date a single sequence is testament to the growing robustness


ILLUS 8 River Conon logboat. The sawn ends of the boat timbers provided a convenient cross-section for the purposes of tree-ring dating. Images show (a) the preparation of the surface (b) the use of modelling clay to take a cast of the ring-pattern. © NMS/T Cowie

TABLE 2
Statistical correlations between RCLrm and Scottish native oak chronologies (the numbers listed are t-values which describe the degree of correlation; values greater than 3.5 are considered significant)

| *Native Scottish site chronologies* | *RCLrm AD 1045–1273* |
|---|---|
| ELGINW3 (AD 886–1301)<br>Well 3, High Street, Elgin (Murray et al 2009) | 5.96 |
| DARNAWAY (AD 946–1387)<br>Darnaway Castle, Moray (Stell & Baillie 1993) | 5.79 |
| ELGINW1&2 (AD 908–1290)<br>Wells 1 and 2, High Street, Elgin (Murray et al 2009) | 5.69 |
| BONACC38 (AD 867–1281)<br>Bon Accord, Aberdeen (Crone forthcoming) | 4.10 |
| PERTHx9 (AD 949–1204)<br>High Street, Perth (Crone & Baillie 2010) | 3.95 |
| GALGATE (AD 929–1191)<br>Gallowgate, Aberdeen (Crone 2000) | 3.89 |
| PERTHx3 (AD 1033–1150)<br>High Street, Perth (Crone & Baillie 2010) | 3.76 |
| SCOTLANDMN (AD 946–1975)<br>South-central Scotland master (Baillie 1977) | 3.63 |
| CHAPELRO (AD 1055–1406)<br>Chapel Royal, Stirling Castle (Crone 2008) | 3.60 |



ILLUS 9 River Conon logboat. Oblique view showing squared prow and differential survival of the stem and stern sections. © AOC

of the medieval tree-ring database for north-east Scotland and suggests that when the opportunity for dendrochronological analysis does arise north of Inverness, these north-east Scottish chronologies will provide a solid foundation for extending chronological coverage northwards, at least for the medieval period.

## DISCUSSION

Robert Mowat

> It is no ethnological secret that forms of transport of pre-industrial types are important pointers to the nature of life and work in the areas of their occurrence. Equally, forms of transport are themselves shaped by their environment and by the needs of those who use them. There is constant interaction between community, environment, equipment, and sometimes ways of doing things that involve no equipment. It is such interaction that quietly, and without outside interference, leads to cultural change.
>
> (Fenton 1981: 25)

### 1. THE CHARACTER OF THE LOGBOAT

*Quality of workmanship*

The workmanship displayed in the reduction of the logboat is of the poorest quality, to such an extent that only the 'designed' form of the bow and the apparent 'constructed' stern justify its classification as a logboat (of implicit 'planned' or 'deliberate' construction) as against a piece of timber which has been subject to unplanned hollowing. Specifically, the absence of thickness-gauge holes (which allow the controlled removal of timber from within the interior to form a bottom of uniform thickness) indicates that the working of this vessel did not take place within a tradition of recognised best practice (illus 9).

The poor condition of the remains precludes any meaningful analysis of the performance or carrying capacity of the vessel, or the determination of the percentage of the original log removed by reduction. The remarkable thickness of part of the bottom (some 0.22m out of the apparent external depth of 0.38m at the saw cut) reveals that a considerable quantity of timber was unnecessarily left in the solid, inevitably reducing the buoyancy (and thus the carrying capacity) of the vessel.

*General form and size*

The recorded length of 4.95m [16ft 3ins] for this vessel places it within the median part of the recorded range of sizes of Scottish examples of the type. Logboats are, by definition, worked by reduction and the size of any specific example is, accordingly, constrained by the size and form of the available length of straight timber. As noted by Mowat (1996: 125), the recorded sizes (specifically lengths) of Scottish examples of such vessels are slightly but significantly smaller than those of English and Welsh examples. This may reflect the scarcity of substantial oak timbers so far north, on or beyond the normal area of growth of the species. For comparison, Table 3 lists the Scottish logboats for which a length has been recorded, listed in descending order of size. The McGrail morphology code for this vessel was apparently 414:1xx:522 (McGrail 1978, ii: figs 205–6).

*Specific minor features of the River Conon logboat*

The functions or purposes of the small holes noted around the bow remain unclear.

*A possible paired vessel form?*

The significance of the square-cut notches that are noted across the modern transverse saw cut remains unclear. These may represent secondary use of an uncertain nature, have served to retain a thwart, or indicate that the boat formed one element of either a conjoined pair or a raft comprising several elements. Although the presence of only one such feature on each side may argue against the last hypothesis, the use of this vessel as one of a pair or group would be consistent with the low cargo or payload capacity that must have resulted from the incomplete and eccentric hollowing within the interior (illus 10).

No example of a paired or multiple logboat has been recorded in either the archaeological or ethnographic records across Scotland, but this is probably an effect of the low survival-rate (and resulting distorted distribution) of the logboat

TABLE 3
Summary list of logboats from Scotland for which a length measurement is available (arranged in descending order of recorded length)

| *Logboat* | *Location* | *Mowat 1996 page and gazetteer nos* | *Date* | *Length (m)* |
|---|---|---|---|---|
| Loch Arthur (Lotus) 1, New Abbey, Kirkcudbrightshire | Lacustrine | 50–2, no 92 | Probably later Iron Age or Roman period (1 $^{14}$C sample) | 13.7m (recorded on discovery) |
| Dumbuck, River Clyde | Intertidal – inner estuary | 26–7, no 35 | Possibly Iron Age/Early Historic (inferred date from crannog) | 10.9m |
| Carpow Bank, River Tay | Intertidal – inner estuary | | Late Bronze Age (*c* 1200 cal BC: 5 $^{14}$C samples) | 9.25m |
| Errol 2, River Tay | Intertidal – inner estuary | 28–30, no 38 | Early Historic (later 6th century cal AD: 2 $^{14}$C samples) | 8.9m |
| Erskine 1, River Clyde | Intertidal – inner estuary | 30–1, no 39 | Undated | 8.9m (recorded on discovery) |
| Lindores 1, River Tay | Intertidal – inner estuary | 49–50, no 87 | Undated | 8.5m (recorded on discovery) |
| Yoker 1, Glasgow, River Clyde | Riverine | 44–5, no 72 | Undated | *c* 7.6m (recorded on discovery) |
| Dowalton Loch 2, Wigtownshire | Lacustrine (drained area – possibly within crannog structure) | 24–5, no 30 | Possibly Iron Age/Early Historic (inferred date from crannog) | 7.3m |
| Glasgow, Hutchesontown Bridge, River Clyde | Riverine | 38–39, no 59 | Undated | *c* 7.3m (on discovery) |
| Bowling 1, River Clyde | Intertidal – inner estuary | 12, no 9 | Undated | 7.2m (recorded on discovery) |
| Buston 1, Ayrshire | Lacustrine (drained area – adjacent to crannog) | 13, no 11 | Probably Iron Age/Early Historic (inferred date from adjacent crannog) | 6.7m |

| *Logboat* | *Location* | *Mowat 1996 page and gazetteer nos* | *Date* | *Length (m)* |
|---|---|---|---|---|
| Erskine 6, River Clyde | Intertidal – inner estuary | 31–3, no 44 | Iron Age (*c* 4 cal AD: 1 $^{14}$C sample) | 6.5m |
| Dowalton Loch 1, Wigtownshire | Lacustrine (drained area – within crannog structure) | 24, no 29 | Possibly Iron Age/Early Historic (inferred date from crannog) | 6.4m |
| Cambuskenneth, River Forth | Intertidal – inner estuary | 15–17, no 14 | Early medieval (*c* 996 cal AD: 1 $^{14}$C sample) | >6.1m |
| Carse Loch, Dumfries-shire | Lacustrine (drained area – crannog in vicinity) | 18, no 17 | Undated | 6.1m (recorded on discovery) |
| Glasgow, Stobcross, River Clyde | Riverine (found at depth) | 44, no 69 | Undated [early date may be inferred from depth of deposition] | 6.1m (recorded on discovery) |
| Glasgow, Springfield 2, River Clyde | Riverine | 41, no 65 | Undated | 5.9m (recorded on discovery) |
| Dowalton Loch 3, Wigtownshire | Lacustrine (drained area) | 25, no 31 | Undated | 5.7m |
| Glasgow, London Road (River Clyde) | River gravel terrace | 40, no 60 | Undated (early date inferred from geological context) | 5.5m (recorded on discovery) |
| Kilbirnie Loch 1, Ayrshire | Lacustrine (near crannog) | 45, no 75 | Undated | *c* 5.5m (recorded on discovery) |
| River Conon (Dingwall) | Intertidal – inner estuary | 22, 24, no 28 and 86 (nos A21–22) | Late 13th/early 14th century | *c* 5m (recorded on discovery and in museum storage) |
| Garmouth, River Spey, Morayshire | Riverine (near mouth) | 35–6, no 51 | Undated | 4.9m |

| *Logboat* | *Location* | *Mowat 1996 page and gazetteer nos* | *Date* | *Length (m)* |
|---|---|---|---|---|
| Eadarloch, Loch Treig, Inverness-shire | Lacustrine (near crannog in deep loch) | 28, no 36 | Probably post-medieval: 16th century on basis of radiocarbon dates from basal timbers of crannog | 4.8m |
| Dalmuir, River Clyde | Intertidal – inner estuary | 22, no 26 | Undated | >4.6m (recorded on discovery) |
| Erskine 5, River Clyde [softwood example] | Intertidal – inner estuary | 31, no 43 | Possibly 8th millennium BP: inference from unverified geological stratigraphy | >4.6m (recorded on discovery) |
| Friarton, Perth, River Tay | Riverine | 34–35, no 50 | | >4.6m (local memory) |
| Dalmarnock, Perthshire | Riverine: upper River Tay | 21–22, no 25 | Undated | 4.5m (recorded in situ) |
| Glasgow, Clydehaugh 2, River Clyde | Riverine | 36–7, no 54 | Undated | 4.5m (recorded on discovery) |
| Glasgow, Clydehaugh 4, River Clyde | Riverine | 37, no 56 | Undated | 4.3m (recorded on discovery) |
| Lea Shun, Stronsay, Orkney (possible example) | Lacustrine (coastal loch) | 48–9, no 85 | Undated ['metal fittings' suggest recent date] | 4.2m (recorded on discovery) |
| Bowling 2, River Clyde | Intertidal – inner estuary | 12–13, no 10 | Undated | 4m (recorded on discovery) |
| Glasgow, Springfield 4, River Clyde | Riverine | 44, no 67 | Undated | 4m (recorded on discovery) |
| Littlehill, Cadder Moss, Lanarkshire | Lacustrine | 50, no 90 | Undated | 4m (recorded on discovery) |

| *Logboat* | *Location* | *Mowat 1996 page and gazetteer nos* | *Date* | *Length (m)* |
|---|---|---|---|---|
| Glasgow, Clydehaugh 1, River Clyde | Riverine (found at considerable depth) | 36, no 53 | Undated | 3.7m (recorded on discovery) |
| Glasgow, Rutherglen Bridge, River Clyde | Riverine | 40, no 63 | Undated | >3.7m (incomplete) |
| Glasgow, Point House, River Clyde | Riverine (possibly on shore) | 40, no 62 | Undated | 3.7m (recorded on discovery) |
| Loch Ard, (Trossachs), Perthshire (possible incomplete example) | Lacustrine (near crannog) | 50, no 91 | Undated | 3.7m (fragment recorded on discovery) |
| Castle Loch, Closeburn, Dumfries-shire | Lacustrine (drained area – crannog in vicinity) | 20, no 21 | Medieval (*c* 1235 cal AD: 1 $^{14}$C sample) | *c* 3.6m (recorded on discovery) |
| Glasgow, Springfield 5, River Clyde | Riverine | 44, no 68 | Undated | 3.6m (recorded on discovery) |
| Kilbirnie Loch 3, Ayrshire | Lacustrine | 45–47, no 77 | Undated | *c* 3.5m (recorded on discovery) |
| Glasgow, Springfield 1, River Clyde | Riverine | 40–41, no 64 | Medieval (*c* 1161 cal AD: 1 $^{14}$C sample) | >3.4m (recorded on discovery) |
| (Moss of) Knaven, New Deer, Aberdeenshire | Probably lacustrine | 48, no 83 | Undated | 3.4m (recorded on discovery) |
| Larg, Minnigaff, Kirkcudbrightshire | Probably lacustrine | 48, no 84 | Undated | 3.4m (recorded on discovery) |
| Glasgow, Clydehaugh 5, River Clyde | Riverine | 37–40, no 57 | Undated | 3.1m (recorded on discovery) |
| Glasgow, Springfield 3, River Clyde | Riverine | 41– 44, no 66 | Undated | >2.8m (incomplete: fragment recorded on discovery) |

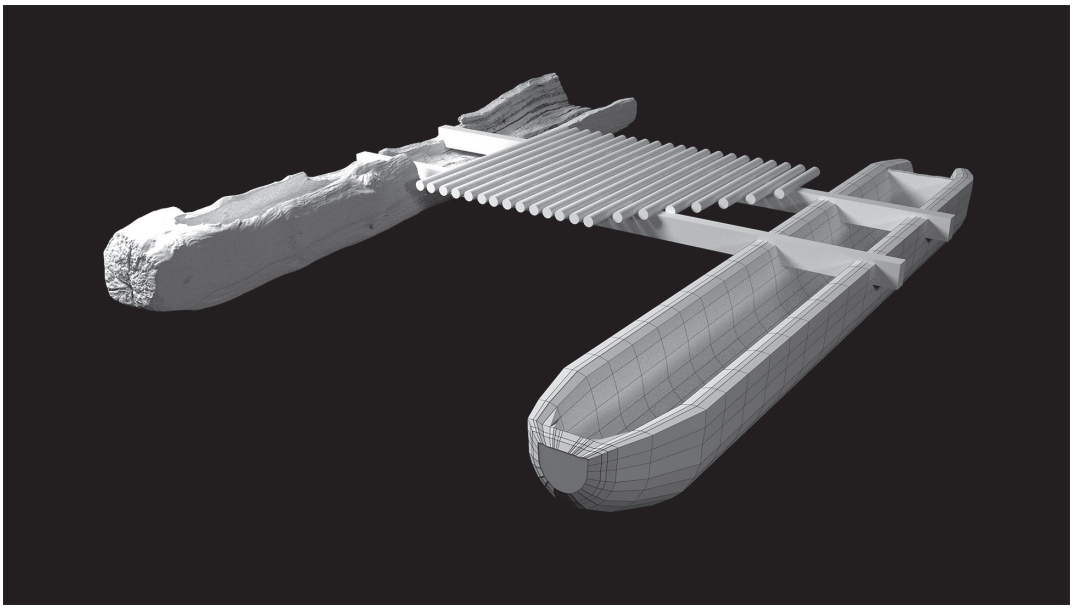
| *Logboat* | *Location* | *Mowat 1996 page and gazetteer nos* | *Date* | *Length (m)* |
|---|---|---|---|---|
| Kilblain 2, Caerlaverock, Dumfriesshire | Probably lacustrine | 47, no 80 | Undated | 2.7m (recorded on discovery) |
| [East Greens] Forfar 2, Angus | Lacustrine | 32–4, no 49 | Early medieval (*c* 1180 cal AD: 1 $^{14}$C sample) | >2.6m (incomplete) |
| Kilblain 1, Caerlaverock, Dumfriesshire | Probably lacustrine | 47, no 79 | Undated | 2.1m (recorded on discovery) |
| Kilbirnie Loch 4, Ayrshire | Lacustrine (near crannog) | 47, no 78 | Undated (possibly Sub-Boreal, *c* 3000/700 BC) on basis of pollen evidence) | 1.8m (incomplete) |
| Kilbirnie Loch 2, Ayrshire | Lacustrine (near crannog) | 45, no 76 | Undated | *c* 1.5–1.8m (incomplete: recorded on discovery) |
| Kirkmahoe, Nithsdale, Dumfriesshire | Possibly lacustrine | 48, no 82 | Undated | 1.5m (longest fragment: recorded on discovery) |

in general (Mowat 1996: passim esp 116–22), and of the limited documentary evidence. As is nearly universal in the evidence for early and 'primitive' watercraft, such sources as those cited by Mowat (1996: 129) and Cheape (1999) record boats in terms of their major types only, with little attention to their detailed characteristics. Further instances of the use of such craft probably also remain un-noted in travellers' tales of the 18th century.

In general terms, the significance and value of paired and multiple watercraft (both log- and plank-boats) has been described by McGrail (1998: 70–1 and fig 6.1). His illustration of a plank-built comparandum from north-west Germany indicates the value of such craft in conditions of slow-flowing water. In the present context, the possible identification of the ethnographically recorded *trow* of the Northumbrian river Tyne (Osler 1985) as a form of paired logboat is potentially significant; the type is specifically envisaged as comprising 'paired plank boats joined at the stem and connected across the divergent sterns by a flat board'. Application of this principle to the present example would explain the surviving provision for only a single transverse member. However, more detailed consideration of the use of paired logboats may be deferred to the discussion of the wider context of riverine transport.

## 2. CHRONOLOGY

The dates obtained by different methods for this vessel appear mutually consistent and are in accord with the medieval dates noted for many examples of the type since the 1960s, to such an extent that a



ILLUS 10 Visualisation of logboats in a paired arrangement. © AOC

medieval date may now be expected for any new discovery of the type until specific and definitive evidence is obtained (Wilson 1996; Mowat, 1996: 126–35, passim; Strachan 2010: 89–95).

Neither the extremely poor standard of workmanship displayed in the vessel nor the form of the stern may be considered diagnostic or indicative of any specific chronological period (in Scotland or elsewhere) or of a defined stage within a quasi-universal scheme of typological evolution.

## 3. THE DISCOVERY IN ITS RIVERINE CONTEXT

As noted in the introduction, the information regarding the location of the original discovery is limited and can be summarised as follows. The logboat was discovered in 1874 following a change in the course of the River Conon 'opposite Dingwall'. This appears to have followed a major flood event 'which carried away the sandhills and excavated a new channel at the point where a strong tidal current meets that of the stream' (in this context, 'sandhills' may be taken to mean estuarine sandbanks rather than coastal dunes). Although the precise date of the discovery is not given, unusually severe and destructive storms are known to have affected Highland Scotland during August that year (as reported in the *Inverness Advertiser*, 18 August 1874).

The vessel was said to have been found 'sticking out of the silt, about 8 feet below the surface of a bank of gravel' (illus 11). The note in the *Ross-shire Journal* has a slightly different emphasis, as it refers to the discovery of the logboat 'embedded in the sand near the harbour here [Dingwall]'. We may also note here, if only to discount it, what we can assume to be a confused reference to the River Conon logboat in Norman Macrae's history of Dingwall, where he notes that 'while clearing out the bed of the Dingwall Canal, there was unearthed a dug-out canoe resting on a bed of fine gravel at a depth of 17 feet below the present surface' (Macrae 1974 [= facsimile of 1923 edition]: 337).

Quite apart from any inevitably esoteric theoretical discussion regarding the justifiability (or otherwise) of the placement of this crudely worked vessel within any recognised or formalised system of archaeological classification, a number of necessarily linked questions deserve consideration:


(a)

(b)

Illus 11 Extracts from the OS Six-inch 1st and 2nd edition maps, showing the general location of the discovery 'opposite Dingwall' and the changing nature over time of the river channels in this area. (a) Ross-shire and Cromartyshire (Mainland), Sheet LXXXVIII: survey date 1873; publication date 1881; (b) Ross and Cromarty Sheet LXXXVIII: revised 1904; publication date 1907. © National Library of Scotland

(a) the significance of the location of the discovery of this specific vessel;
(b) the wider riverine setting;
(c) the possible availability of suitable timber.

The related question of function will be discussed in the final section of the discussion.

*(a) Significance of the location of the discovery*

The reported discovery of the River Conon logboat at an ill-defined location within tidal waters at the head of the Cromarty Firth must be considered against the background of the circumstances that apparently occasioned the deposition of the Carpow Bank vessel in the Inner Tay estuary (Strachan 2010: 24–6, 30 and 163–5). Essentially, the location of deposition of the vessel may be seen as determined by the interaction of river flow (driving any loose and floating artefacts or debris downstream, most notably under flood conditions), tidal flow (operating in both directions, most notably under spring tide conditions) and the presence of estuarine sandbanks (to act as traps).

In the case of the Cromarty Firth, as elsewhere, there is apparently no published detailed study of the pattern of the present composite effects of these variable and opposing flows, which need not have been the same in antiquity. Nevertheless, the abrupt debouchment of the narrow River Conon into the much broader upper firth at NH 55 57 (to the south of Dingwall) would appear to make such an effect even more marked here than in the inner Tay Estuary, within which the inner end is much less clearly defined. This effect was presumably less marked before the embankment and reclamation of the extensive area of carseland to the south and east of Dingwall (presumably centred around NH 555 582) that is noted in the *New Statistical Account* (*NSA*, xiv (1845): 226). The continual reformation of extensive sandbanks in this area is itself indicative of the rapid diminution of the

Illus 12 An oblique aerial view of the mouth of the River Conon, looking south-west. It is probable that the vessel was washed downstream from a location of use upriver, rather than being used within the more open waters around the location of its discovery. © Historic Environment Scotland. Licensor canmore.org.uk

load-carrying capacity of the river as the flow diminishes rapidly when opposed by the tidal effects (illus 12). It thus appears highly probable that the vessel was washed downstream from a location of use upstream, rather than being used within the more open waters around its location of discovery.

Specifically, this argument bears comparison with the summary by Strachan (2010: 163) of the history of *The Larches*, a plank-built ferryboat of considerable size and unusual oval form (measuring about 15m in length by 6m in beam), which was built experimentally of larchwood in 1905 to transport livestock on the upper River Tay. In February 1922, the vessel broke free from moorings at Burnmouth, Stanley, when the river was in spate and was washed some 10km downstream to become wedged under Victoria Bridge, Perth. Although severely damaged, it was subsequently taken further downriver to be used as a sheep transport between Newburgh, Fife, and Mugdrum Island, in the inner estuary. It remained in this service until 1972, when it was replaced by an iron vessel, and laid up in the intertidal area. This history is one that illustrates both the significance of minor watercraft on Scottish rivers and that of the downstream movement of debris.

Significantly, Reid (1913: 231) cites the wording of the application (dated 16 March 1649) by the magistrates of the burgh of Lanark to the Scottish Parliament seeking assistance (presumably financial) for the construction of a bridge across the Clyde at Clydesholm, near Lanark, after the loss of several boats in this way, which:

> with the speit of water hes bene loist and carried over Clydis Lin [Stonebyres Fall], which has bene the death of many honest men both of neighbouris and strangferis, and in tyme of great raine or tempestuous weather thair is no passage throw the water, to the great hinderance of all that travel that way.

*(b) The wider riverine setting*

In considering the interaction of any credible function, deposition and timber supply within the specific context of the Conon Basin, it is worth remembering that the availability of information is highly uneven, both by virtue of the very limited material remains and the uneven coverage of the subject in the available early accounts.

The topography and regime of the river-system are now overlain and obscured by the heavily dammed loch-reservoirs and massive construction works of the post-war Conon Valley Hydro-electric Scheme (Mountain Environments 2000), but the River Conon and its tributaries clearly resemble the Rivers Tay and Tummel in forming a relatively short but steeply graded highland river system within a discrete basin. Similarly, the national watershed (in this case between Wester and Easter Ross) is well to the west, beyond the conceivable limit of human settlement at any period.

The river would inevitably have been divided into short lengths (commonly termed 'pools') by impassable rapids or waterfalls, indicating that watercraft were used for transport within and across short lengths of river rather than for travel over longer distances up and down river.

There is no apparent record of the river regime before the 20th century, but the normal effect of the presence of deep peat unaffected by modern forestry ploughing would be to soak up the winter snowfall and release it over the summer, thus equalising the river flow across the year and making the river more amenable to use by basic watercraft. First Edition six-inch Ordnance Survey maps note the use of small watercraft at several locations within the basin (Table 4).

In general, this suggestion may be supported by the evidence of placenames. The basic Ordnance Survey 1:50,000 map series ([Ordnance Survey] 1992) commonly records 'boat' names across Scotland, indicating river ferries at suitable locations. Further, successive parish descriptions within the *Old* and *New Statistical Accounts* (*OSA* and *NSA*) record the construction and use of river crossings across the Conon and its tributaries in some detail, but not necessarily comprehensively. In the case of the parish of Contin, *OSA* (vii, 1793: 164) notes 'Two ferry-men, one over the Rafay [River Garve or Black Water] at Contin, and another over the Connon [Conon], three miles to the west of Contin, at a place called Little Scatwell' [NH 387 565]. The

TABLE 4
Evidence of small watercraft in the Conon basin (based on features recorded on First Edition six-inch Ordnance Survey maps)

| *NGR & OS 1:10,560 map sheet* | *Placename and location* | *Notes* |
|---|---|---|
| NH c. 5144 5362<br>*Ross and Cromarty (Mainland), lxxxviii (surveyed 1904: published 1907)* | *Ferry Pool* [Balnain], River Conon (placename) | *Boat House* (probably associated with Brahan House) noted on north shore |
| NH 4281 5516<br>NH 4274 5525<br>NH 4267 5526<br>NH 4320 5489<br>*Ross and Cromarty (Mainland), lxxxvii (surveyed 1902: published 1907)* | River Conon: within dammed area of Loch Achonachie | *Jetties* noted on south-west shore |

corresponding account for the parish of Urquhart and Logie Wester (*OSA* xiii, 1793: 215–16) notes 'Towards the west end of the parish on the river of Conan [Conon], and beyond where the tide at any time flows, is the ferry of Scuddale [unlocated], on the post road from Beauly to Dingwall' [presumably in the area of the Telford bridge of 1809 and the later (A862) bridge of 1969]. Support was sought for the construction of a bridge in the area of the latter ferry on account of recent fatalities.

On the basis of this limited evidence, it appears justifiable to accept that, in general terms, the use of small and simple watercraft would have been feasible (for whatever purpose) within short and clearly defined areas of the river course.

No consideration of water transport in Highland Scotland can omit reference to the well-documented 'floating' of timber down the River Spey (and to some extent elsewhere) in the 18th century and later (Fenton 1972: passim). It is, however, necessary to recognise the essentially specialised nature of this apparently short-lived practice during the unparalleled conditions engendered by the rapid economic development of the region in the 18th century, specifically, the demands of the short-lived Speymouth shipbuilding industry. In general, this distinct practice may have been over-emphasised by contrast with the more normal and generalised use of rivers, which no doubt continued simultaneously but was less well recorded.

In general, the use of skin boats (with their inherent extreme fragility) would appear incompatible with the direct steering or control (inevitably involving repeated and violent contact) of heavy, unwieldy and rapidly moving timbers, whether floating individually or assembled into rafts. Presumably for this reason, Fenton (1972: 73, 77–8) notes that rafting generally superseded the use of coracles on the Spey soon after the York Buildings Company started its programme of exploitation (1728), although the practice continued on tributary streams. Logboats might appear to have been preferable on account of their heavy weight, but this would also render them deficient in freeboard and so prone to swamping in turbulent conditions.

Recorded material evidence for this practice appears to be surprisingly rare, none of the specialised ironwork (chains and spikes) used to retain such rafts in Canada or elsewhere having been recognised in Highland Scotland. Recognition and recording of any surviving remains of sawmills, 'sluices', 'channels' (in some cases produced by fire-setting) or other fixed structures must be considered more significant

than that of any supposedly associated vessels. There was also an evident conflict of interests (commonly resulting in litigation) between the timber-floaters and the builders of salmon-weirs (*yairs* or *cruives*) in the lower parts of the rivers.

In general, therefore, the small skin boat may be seen (like the logboat) as primarily a vessel of choice for short-distance and cross-river transport within pools.

*(c) Possible availability of suitable timber*

The discovery of a substantial oak trunk may appear anomalous within an area of Highland Scotland which is now heavily dominated by coniferous arboreal cover. However, it is consistent with the recognition of oak logboats during the excavation of a crannog in Eadarloch, Loch Treig, near Tulloch in Glen Spean (Mowat 1996: 28, no 36), and (forming an ill-defined group) in Loch Laggan (Mowat 1996: 62–5, nos 109–15). (See also Appendix 2 for an account of a possible oak logboat from Loch Oich, previously unrecorded in the archaeological literature.)

Further, the evidence of successive *Statistical Accounts* indicates that Highland Scotland supported mixed woodland containing a significant oak component until recent times in greater quantities and at a higher altitude than might otherwise have been envisaged. Several *OSA* and *NSA* accounts of parishes in the Conon basin mention the presence of oak, although without indicating the sizes of trunks or timbers. Specifically, the parish of Contin (around the headwaters of the river) is noted (*OSA*, vii (1793): 162–3) as containing Loch Luichart (at a contemporary altitude of about 90m OD), which was 'lined on both sides with a ridge of high hills, covered with oak and birch wood, with some firs …'. Subsequently, the soil in the parish is noted (*NSA*, xiv (1845): 237) as being 'congenial to oak, elm, birch, plane, alder, and beech also'. Lower down, the parish of Dingwall is noted (*NSA*, xiv (1845): 225) as containing 'a great deal of very fine wood, consisting of beech, elm, oak, ash, sycamore, &c. dispersed all over the parish in the form of clumps, rows, and borders'. The recorded distribution of this timber suggests the survival of residual trees in parkland. The parish of Urquhart and Loggy or Loggie [Logie] Wester is also noted (*OSA*, xiii (1793): 205) as containing 'oak wood … of considerable extent' at Ferintosh (NH c. 57 57).

As noted above, dendrochronological evidence is accruing for the presence of large, mature oaks well into the medieval period in north-east Scotland and it seems likely that this was similarly the case around Dingwall. The River Conon find must indicate the desirability of further research into the availability of timber resources across specific areas of Scotland.

## 4. THE ROLE OF SIMPLE OR 'UNDEVELOPED' WATERCRAFT-TYPES IN HIGHLAND SCOTLAND

The varied uses of logboats in Highland Scotland have been well documented (Cheape 1999) and need no repetition, but any consideration of the potential value of riverine watercraft must recognise the general significance of crossing (vis-à-vis passing along) the many rivers, of widely differing types, capacities, flows and regimes, that characterise the local topographies of all parts of Scotland. Both Highland and Lowland Scottish rivers are generally divided transversely by areas or 'bars' of (inherently impassable) rapids or waterfalls into lengths which may be crossed with relative ease, commonly termed 'pools'. In general, crossing Scottish rivers was much easier than passing along them, the more so in highland areas where transverse barriers to navigation are always accompanied by pronounced changes in altitude, to such an extent that Canadian-style *voyageur* exploitation of the interior (based on the carriage of such high-value cargoes as furs in lightweight watercraft, with portages around rapids) must have been rare, if not unknown.

Some understanding of the earlier use of ferries in Highland Scotland may be gained from accounts written in the 19th century, although these are inconsistent in their coverage. Surprisingly, Sir Thomas Dick Lauder (1830), in writing the classic study of river use in Highland Scotland, gives no systematic account of ferries on the Grampian rivers, concentrating instead on the bridges (which presumably had greater status) and making only occasional references to

boats and ferrymen. More significantly, Elizabeth Grant of Rothiemurchus (Lady Strachey 1911: 43) gives a revealing account of the use of small watercraft on the River Spey in 1804, although, as so often in the archaeology of boats, the details of their construction, fittings and equipment are not addressed:

> Our two dwellings were little more than a mile apart, but as I have said, the river was between us, a river not always in the mood for assisting intercourse. There were fords which allowed of carriage and pony communication at several points, but only when the water was low. At flood times passengers had to go down the stream to Inverdruie, or up the stream to near Loch Inch to the big boats, when they carried their vehicles with them; those who walked could always find a little boat near every residence, for no day passed without a meeting between the Doune and Kinrara.

Unfortunately for our purpose, ferries are mobile links which leave little trace. No associated structures are necessary, but there may be associated piers, tollhouses, inns, stables or ferrymen's houses. Prepared approaches may be provided for the passage of vehicles (including carriages) or animal droving. They may be of early date or constantly replaced, and may go out of use on account of changing patterns of traffic or land ownership, or supersession by fixed structures.

Historically, ferries are recorded as having been in either public or private (estate) service, in the former case under the patronage of recognised 'proprietors' (generally town councils or religious houses); 'church ferries' may have been of particular significance in some cases. In consequence, documentary evidence may pre-date the first edition of the Ordnance Survey map. They may also have had considerable influence on geography and distribution of human settlement in antiquity.

Riverine or inland ferries are rarely built to any recognised standard of seaworthiness, and are potentially dangerous in unsuitable locations. Their use is dependent on the variable factors of the breadth, depth and flow of the river. Proximity to falls or weirs may present a threat, especially in spate conditions, while they may be rendered unusable by ice formation. In consequence, they are of greatest potential value on narrow middle- and upper-course rivers with relatively slow flows or within marshy (bog) areas, but are unsuitable for fast-flowing upper-course rivers except within defined 'pools'.

Ferries used within such contexts are commonly of beamy form, being essentially pontoons intended for the carriage of animals (travelling standing), wheeled vehicles and bulky cargoes (notably peat and hay). They are also characteristically shallow-draught, this form allowing the boat to go close inshore, for easier loading and unloading. Realistically, cargo capacity and ease of loading must have been considered more important than performance and ease of navigation. The design requirements of a vessel intended to cross a river were fundamentally distinct from those of one intended to travel along it.

Such vessels may be usefully compared with specialist vessels, sometimes of considerable size and capacity, used by military engineers to transfer vehicles, stores and personnel across broad rivers and between ships and unprepared beaches in sheltered conditions. The current British example of this general type is the *Mexeflote*, which is essentially a diesel-powered flat raft of rectangular form, and 1.45m nominal draught. The standard version measures 20.1m in length by 7.3m in beam and has a payload of 60 tonnes.

The following vessel types will be considered in turn:

(a) Logboats
(b) Paired logboats
(c) Box boats and other flat-bottomed types

### *(a) Logboats*

In general, logboats were presumably used as ferries for want of realistic alternatives. Their size was inevitably limited by that (those) of the parent log(s), while their use in pairs (with superimposed platforms to carry the cargo) would have been a convenient and efficient way to carry a wide variety of payloads, both light and heavy, including people, animals and wheeled

vehicles. Their capacity was, however, limited by the high density of oak (the timber apparently most commonly used) but the fitting of a platform would potentially allow the more effective use of timber trunks than would otherwise have been the case. The unwieldy forms and intrinsically heavy weight of such vessels must have made their removal from the water in advance of river spates laborious in the extreme.

Terminologically, logboats must be clearly differentiated from log rafts. Being without any construction features as such, these latter were not watercraft in the true sense of the word. They were essentially unmanned and carried no cargoes, being loosely assembled and intended solely as a means of moving timber downstream under specific conditions of seasonal flow. As such, they demonstrate the extent to which the requirements of navigation along (down) rivers differed from those of cross-river ferries at recognised locations. Within such areas, the use of logboats may be considered feasible, if with some restrictions.

The discoveries of numerous logboats of all periods have been documented in such contexts, although the possibility of redeposition may be recognised. Notable examples include:

*on the River Carron*
River Carron (Mowat 1996: no 148)

*on the River Clyde*
Bowling (Mowat 1996: nos 9–10)
Dalmuir (Mowat 1996: no 26)
Dumbuck (Mowat 1996: no 35)
Erskine (Mowat 1996: nos 39–44)
Finlaystone (Mowat 1996: no 46)
within the area of Glasgow harbour (Mowat 1996: nos 53–7, 59 and 64–8)
Rutherglen Bridge (Mowat 1996: no 63)
Yoker (Mowat 1996: nos 72–3)

*on the River Forth*
Cambuskenneth (Mowat 1996: no 14)
River Forth 'below Alloa' (Mowat 1996: no 150)

*on the River Tay*
Errol (Mowat 1996: nos 37–8)
Friarton (Mowat 1996: no 50)
Lindores (Mowat 1996: no 87–8)
River Tay 'near Perth' (Mowat 1996: no 151)
Sleepless Inch (Mowat 1996: no 152)

*on the River Spey*
Garmouth (Mowat 1996: no 51)

The Irish evidence may also be cited by way of parallel, most notably that from the inland waters of the South-East. Tully (2008: 581–2) follows AT Lucas in recognising *cots* or *coite* as 'small, open canoe-like boats' of a type seen as derived from logboats. He quotes from Gerald Boate, who visited Ireland in 1652:

> Both Oure [Nore] and Barrow are portable many miles into the country, the Oure only with little boats and with cots, they call in Ireland things like boats, but very unhappily being nothing but square pieces of timber made hollow, very common throughout Ireland both for to pass rivers and to carry goods from one place to another.

In this context, the 'square pieces of timber made hollow' are presumably logboats, while the distinction made between the uses of watercraft 'to pass rivers and to carry goods from one place to another' is significant, indicating that the functions of crossing rivers (ferrying) and passage along them are distinguishable. It follows that, under conditions found more commonly in Scotland than in Ireland, use might be made of boats to cross rivers within small 'pools' between rapids which precluded travel up and down stream.

Boate also notes that a distinction was normally made in medieval and early modern sources between cots and other types of boat. In 1537, the Irish Parliament passed a statute regulating traffic on the River Suir '… by necessairie boates, scowts, wherries, clarans, cottes, and other vessels loden and bestowed with goods, merchandzes, and other stuffe'. It remains unclear to what extent logboats and the better-documented bundle (reed) boats were used together.

Tully also suggests that the apparent transition from the use of logboats to that of plank-built vessels (also termed *cots*) may

have been necessitated by the decline of native woodlands in the 17th and 18th centuries. As ever, an understanding of the available timber supply is essential to that of logboat construction at any specific period.

It is readily apparent that the simple logboat, with its narrow beam, limited draught and near-circular cross-section, is of inherently limited stability and thus ill-suited to the carriage of either heavy cargoes or standing animals. The use of timbers of exceptional size, the 'extension' of the vessel by the fitting of washstrakes along the sides, and the physical restraint of transported animals may alleviate this problem to some extent, but the point remains generally valid. Further, the naturally limited size of logboats renders them of limited value for the transport of such bulky cargoes as agricultural products (notably hay or straw), and, probably more significantly, such water-derived products as reeds, the collection of which was presumably long a significant activity in Scottish lacustrine, riverine and estuarine contexts. The simple logboat may thus be seen as best suited to the carriage of one or two people, with a small quantity of equipment and preferably seated. It may be seen as a waterborne motorcycle, vis-à-vis a Transit van (illus 13).

Both common sense and ethnographic parallelism indicate that there are two types of watercraft which appear suitable for the transport of heavy, bulky or unstable loads (the last type including standing animals) in riverine and lacustrine situations: the paired logboat and the box boat.

*(b) Paired logboats*

The paired (or multiple) logboat offers a reasonably convenient means of supporting a broad and level platform for use in sheltered

ILLUS 13 Staff of the Northern Lighthouse Board unloading a tractor for use on the Isle of May, with the NLB tender *Pharos* in the background (the date of photograph is uncertain – but *Pharos* was in service between 1993 and 2006). Although from a maritime, rather than a riverine, context, this picture illustrates well the potential value of the use of paired watercraft in calm conditions. If used in multiple, the potential carrying capacity of relatively small vessels could have greatly exceeded that apparent from their remains. © Fife Council/Peter Yeoman

inland waters within the constraints of the limited availability of large and heavy timbers and avoiding the inherent complexity of plank construction. Further, the possibility of the disassembly of the paired vessel into two hulls for separate use offers a degree of flexibility. The definition of the point at which such a logboat becomes a platform-fitted log raft is a classic instance of the ever-present restrictions of typological terminology in archaeology.

The available ethnographic evidence for such craft has been considered in general terms by McGrail (1978, i: 44–51, tab 3.2; 1998: 56, 59, fig 6.5, 70–1 and also 72, fig 6.12; 2014: 108). He divides (1998: 70–1) the ethnographically recorded paired logboats into three broad functional types:

1. *Those used for transporting cattle or other animals standing athwartships with a pair of legs in each vessel.*

The two hulls are held at a fixed distance by transverse beams at the ends and a longitudinal plank or beam between them. The hulls are generally parallel-sided and the craft may be loaded while parallel to the shore. Ethnographic examples are recorded from Denmark and Albania, while the *trow* recorded on the River North Tyne (Northumbria) in the late 19th century appear broadly comparable, although of plank construction, convergent at the bow, divergent at the stern, and connected by a flat board aft.

2. *Those used with a platform connecting the two vessels*

Examples of this type are noted from Galicia, Spain (the *barco de dormas* of the River Miño). As described, these vessels are held together by three transverse timbers, in such a way that the vessels are closer together at the stern. The forward and after transverse beams pass through rectangular holes in the sides of both boats and are secured by a wooden locking pin at the outer sides, while the central beam slots into a dovetail at the sheer. These three beams support a platform of longitudinal planks, which carries equipment; the crewman sits in one of the vessels and uses asymmetric oars. The individual vessels are roughly 'boat shaped' and have near-parallel sides along most of their length. They are not double-ended, having fixed transoms at the stern and sheer at the bow.

Platform-type paired logboats reported in Albania at various dates in the 20th century had two vessels joined in such a way as to touch at the bow and be held apart at the stern; these vessels were evidently 'handed', rather than identical. The transverse timber at the bow was seen to extend through the solid ends of both vessels, while the vessels were linked at the stern by a beam passing through horizontal holes in projections from the transom sterns. In each case, a platform of transverse planks was noted. In some cases, this was fastened to the inner edges of the constituent vessels from about amidships to the stern, leaving the hollow of each vessel open to use, while in others the platform extended across both vessels.

3. *Multiple joined logboats*

Logboats comprising more than two constituent vessels have been noted in use on the River Dunajec, Poland, and may be considered as rafts rather than boats as attempts are made to make the gaps between the vessels watertight. Examples are recorded having four or five dugout vessels of poplar (*Populus* sp), measuring about 5.7m in length, and tapering slightly towards the bow where they are joined by lashing a transverse bar, fitted through holes inside each bow, to a transverse pole laid across the top edge of all the boats. At the stern, the boats are lashed together through horizontal holes of about 12mm diameter, below the top edges in each side of every boat. This somewhat flexible mode of attachment provides sufficient flexibility to allow the individual vessels to override obstacles in the shallows.

The most comprehensive available survey available for such specialised watercraft is that for Poland, where Ossowski (2000) has summarised the available evidence for the use of logboats. In general, the picture presented is broadly comparable to that within the British Isles. There is evidence for some 300 logboats, most of which are poorly recorded and only 64 of which have been subjected to radiocarbon or

dendrochronological dating. In Poland, as in the British Isles, the great majority of these vessels are of medieval or later date, but, by contrast, the earliest dated example is of Late Neolithic/Early Bronze Age date, while there is an unexplained lack of dated examples from between about 2900 and 1700 BP (950 BC and AD 250); these results may be considered illusory, being derived from the uneven nature of the evidence.

Boczar (1966) provides a detailed and authoritative ethnographic record of the contemporary use of multiple logboats or rafts along the Dunajec river within the Pieniny or Rivergate gorge in the Tatra mountains along the southern border of Poland. This river forms a major routeway across southern Poland, and offers conditions for navigation which appear broadly comparable to those in highland Scotland. These vessels typically comprised four or five hulls beneath a platform: the individual hulls were worked from poplar (*Populus* sp), measured between 5.6 and 5.8m in length, and were evidently too narrow for individual use. Crumlin-Pedersen (1967) notes the discovery of the undated remains of eight pine (*Pinus* sp) or spruce (*Picea* sp) logboats found 'close together' at Skatamark, northern Sweden, in 1932, which he considers to represent comparable vessels used in a similar manner to those on the Dunajec).

More significantly in the present context, Weski (2005) has published recent discoveries in Bavaria, southern Germany, an area which is largely comparable to highland Scotland, being a heavily glaciated upland area with a dense and largely coniferous forest cover, many upper-course rivers and numerous lakes.

He specifically notes (2005: 271–5) the discovery, in 1993, of what was apparently an unfinished logboat at Wessobrunn-Blaik (Lkr. Weilheim-Schongau, Bavaria) during ploughing 'in a very wet meadow' within the area of a former lake. The vessel was neither recorded in situ nor archaeologically excavated, and its context was not determined. As recorded some time after discovery, the vessel measured 6.77m in length, 0.38m in 'breadth' and 0.25m in 'depth' (both these measurements being presumably external). It was noted as 'round' in section, and the bottom was observed to rise sharply (measured as 22°) at the presumed bow. At the other end, there were external 'plain surfaces' which may have been saw-cut. The presumed port side was noted as 'fairly well preserved' while the other side was 'very degraded'. The sides were noted as being between about 30 and 40mm thick, while the log is hollowed out to a depth of only about 100mm. The vessel was of fir (*Abies* sp). A radiocarbon determination of AD 1385±21 (Hd 16854–16391) was obtained, which may be calibrated to AD 1325–1335 (1σ) or AD 1315–1350 AD (2σ), and supported a dendrochronological date of AD 1343.

The timber was self-evidently too small for independent use as a (monohull) logboat, being too narrow to float on its own without capsizing, and was worked from timber of a species generally considered too small for logboat manufacture. It can only be envisaged as one hull-element of a paired or multiple-hulled vessel. Weski (2005: 275) notes that it may be considered as a 'buoyancy-timber' (*monoxyler Schwimmkörper*), both the missing sheer and the roughly finished interior being consistent with this suggestion. The absence of recorded joining-fittings can be explained by the deficiencies of the upper sides.

The available evidence for the documented use of logboats in Scottish contexts has been summarised by Mowat (1996: 128–9) and Cheape (1999), although these accounts should not be considered comprehensive.

It would be a mistake to exaggerate either the significance of these continental parallels or the degree of their similarity with the Scottish examples of the type. The twin dangers of over-detailed categorisation and theoretical rigidity are ever present while the infrequency of discoveries (which are, in any case, heavily distorted by the variable nature of the remains) invalidates any valid attempt at statistical analysis. In the specific consideration of suspected paired logboats, it should be noted that:

(a) in some cases, a single dugout vessel or hull might credibly be used either as a single logboat or as one unit within a paired- or multiple-hulled watercraft;

(b) alternatively, a single hull or vessel of a paired craft might be of such small dimensions (particularly in the breadth and depth of the dugout cavity) as to be unusable as an individual logboat, but not readily recognised as part of a paired vessel;
(c) the joining fittings of a paired logboat (most notably any transverse beams) will, almost necessarily, be attached to or penetrate the upper part of the sides of the vessel, which is the part least likely to survive to discovery; and
(d) it is entirely feasible that a paired logboat might be held together by lashing rather than by iron nails or spikes, treenails and/or joinery features (including slots or holes) in the solid.

For these reasons, it appears likely that the use of paired logboats was significantly more common in antiquity than the limited available evidence might suggest. Given that softwood trunks are typically slighter than oak (*Quercus* sp), the same considerations would also appear to reinforce the apparent, but arguably misleading, predominance of oak in the material evidence for logboat use.

In general terms, the following characteristics might be considered evidence of a paired logboat:

(a) the discovery of associated fittings (decking or planking and/or poles or lashings);
(b) the discovery of two similar logboats close together;
(c) the recognition of horizontal holes through both sides of a boat, these probably being larger than other holes recorded piercing the timber; and
(d) any evidence of a transverse platform.

*(c) Box boats and other flat-bottomed types*

Any consideration of the use of logboats (whether or not paired) must at least note the flat-bottomed 'box boats' of plank construction that offer an alternative approach to the problem (McGrail 1998: 120–2, 217, fig 6.12; 2014: fig 3.13).

Such vessels have not received the scholarly attention they deserve, but are ethnographically recorded in such contexts as the rivers of the North European Plain (notably in Poland), within which areas they may be seen as forming a major component of a recognised assemblage of low-technology ('peasant') artefact-types, being the equivalent of disc-wheeled vehicles. Although essentially well-adapted to the slow-flowing rivers of that extensive area, they are significant worldwide as the classic specialised river ferry being shallow, straight-sided and broad-beamed, with a generous floor area and correspondingly high capacity. They are easy to load from a bank and well suited to the carriage of such bulky and awkward cargoes as animals, hay or grass and wheeled vehicles, while their construction is inherently less demanding of timber resources than any logboat.

Confusingly, such vessels may appear to be rafts (vessels which kept afloat by the natural buoyancy of their timbers), and are sometimes mis-identified as such. They are unseaworthy in the extreme and may be considered as highly specialised to calm conditions, being best adapted to the calm and slow-flowing waters of Poland, Germany and European Russia. Within the British Isles, they would appear to be well suited to navigation on the slow-flowing rivers of eastern England (the Ouse, the Trent, and Fenland and its rivers) and the Shannon river-system of midland Ireland. The lack of recorded material evidence for their use may be attributed to the relative fragility of their remains, and the similarity of any recovered timbers to those of conventional plank-built vessels. The apparent absence of direct (material) evidence for such vessels in Scotland may be attributed to the relatively low survival value of their lightweight timbers, as they are eminently susceptible to re-use as timber or firewood.

In considering the putative use of such craft against the present topography, it should be noted that almost all these rivers have been heavily canalised (even if not locked, as such). In the course of their being embanked, straightened, cleared of vegetation and restricted in width

without a corresponding increase in depth, the speed of flow is dramatically increased. As a result, their present riverine topography is a poor representation of their slow-flowing, weedy, winding and semi-lacustrine form in antiquity.

Vessels of this type grade into the 'raft' or 'box' type ferries that were evidently in common use into recent times, serving to supplement suspension bridges and cableways across smaller rivers at minimum cost, generally by transporting animals or wheeled vehicles. These might be of either *platform* (single-hulled) or *pontoon* (twin-hulled) types.

Within this category, there developed the use of chain ferries, having limited mobility within the constraints imposed by their being retained by a chain linked to the river bed and propelled (generally by hand power applied through turning a large wheel along it). The provision of the simple but effective riverbed chain equipment must have been significant in removing the danger of vessels being washed away downstream, as was presumably the case in earlier times. Such vessels were most suitably used in crossing slow-flowing rivers between slipways, and Weir (1988) illustrates their use into relatively recent times at several such locations (Table 5).

The well-documented (and illustrated) example at Lampits (NS c. 967 442) on the River Clyde (Reid 1913: 217–18, fig 3; Weir 1988: 9 illus 20–1) is significant in this regard. Reid notes this vessel as follows:

> The Clyde in its upper course above Thankerton Bridge flows with a rapid, lively, sparkling current. Soon thereafter it assumes along with increased depth a much slower motion, and continues so for several miles as it circles round the secluded parishes of Covington and Pettinain, winding in many a link and loop. fringed with rich haughland and meadows. On one of these placid reaches, in the track of a road leading from Pettinain to Carnwath, there has plied for many years the only ferry-float to be found in the Upper Ward, called the 'Lampits Float', so named from the adjacent farm on the Carnwath side of the river.
>
> The depth and placidity of the water are well adapted at this spot for a fairly constant service of transport for passengers, carts, and cattle. Occasionally the river has been known to rise to the threshold of the boathouse, and to render crossing both difficult and dangerous. Once in recent times the float was torn from its moorings and carried a considerable distance down stream. In 1905 a new ferry-float was placed on the river at a cost of £400, and this, too, will soon be a thing of the past, for the County Council of the district are making a new road with bridge, intended to give a more direct passage to Carstairs Junction. The illustration was taken on the 2nd January 1913.

Reid's illustration depicts a chain ferry of broad form and of sufficient size to carry heavy vehicles and considerable numbers of animals, which is presumably that dating from 1905. Weir (1988: 15, 21, 23, 25, 35 and 43) illustrates comparable vessels at Waulkmill Mill (undated, on the Tay), Burnbank, near Stanley (in the 1890s, on the

TABLE 5
Locations of chain ferries in Scotland recorded by Weir (1988)

| *Place* | *Type* | *Date* | *Weir 1988* |
|---|---|---|---|
| Lampits, near Carnwath (River Clyde) | Platform | 1890s | p 9 |
| Waulkmill (River Tay) | Pontoon | [Undated] | p 15 |
| Burnbank, near Stanley (River Tay) | Platform | 1890s | p 21 |
| Caputh (River Tay) | Pontoon | 1890s | pp 23 and 25 |
| Logierait (River Tay: next to railway bridge) | Pontoon | 1909 | p 35 |
| Boat of Garten (River Spey) | Pontoon | 1898 | p 43 |

Tay), Caputh (in the 1890s and 1903, on the Tay), Logierait (in 1909, on the Tay), and Boat of Garten (in 1898, on the Spey).

In the present context, the significance of such vessels lies in their comparability to, and possibly direct replacement of, paired logboats.

## GENERAL CONCLUSIONS

Two general points may be made by way of summary. The nature and significance of Scottish ferries of all types has been recently considered by Veitch and Gordon (2009: 192) who stress the role of '… "traditional ferries", ie small boats that went from shore to shore, or from ship to shore, and whose motive power came from the strength of the ferryman or the power of the wind'. The available evidence appears to justify the acceptance of this principle across Scottish inland waters at all periods. Further, it is evident that transport across rivers must have been as significant as that along them in pre-industrial times. The division of a river into short stretches or 'pools' between rapids or shallows may have inhibited or precluded travel up and down river, but need not indicate that watercraft of some sort were not essential to the common transport requirements of the population. Such watercraft may functionally be divided between those capable or incapable of carrying such heavy and/or bulky cargoes as animals or wheeled vehicles, and those only suitable for foot passengers. Paired logboats would have been suitable for the former purpose and simple logboats for the latter, assuming the availability of adequately sized timbers of suitable species for their manufacture.

The circumstances of the loss of the River Conon logboat are unknown. However the last word can perhaps be left to Sir Thomas Dick Lauder, who chronicled the impact of the great Findhorn floods of 1829. Describing pre-Improvement Moray, Lauder (1830: 399) wrote:

> The great thoroughfares, though naturally firm and hard in substance, were unnecessarily winding in line, waving in level, and rough in surface – the cross-roads were impassable by any wheeled carriage except the light carts of the country, rudely constructed, and altogether without iron – and, with the exception of a very few bridges, there were no means of passing the many deep and rapid rivers, but by ferries and fords, always troublesome and frequently fatal.

## ACKNOWLEDGEMENTS

On various occasions, Jim Wilson and Craig Angus of the Scottish History and Archaeology Department, National Museums Scotland (NMS) have kindly facilitated access to the timbers for study, scanning and analysis. The staff of the NMS Research Library have been unfailingly helpful in the course of research for this paper, while in Dingwall, Dr Susan Kruse, Sandra Macdonald and the late David Macdonald all provided extremely useful information relating to the discovery of the logboat. The laser scanning was co-ordinated by Graeme Cavers and carried out with the invaluable assistance of Gemma Hudson and Jamie Humble of AOC Archaeology Group. We are grateful to Peter Yeoman for permission to reproduce illus 13; the image was sourced with the kind assistance of Steve Liscoe, Fife Council. Special thanks also go to Lawrie Law for all his help during the editing and production stages of this paper. We are grateful to National Museums Scotland for funding the radiocarbon date and to Professor Gordon Cook and his staff at SUERC for undertaking the dating. Finally, we are especially indebted to the Hunter Archaeological and Historical Trust for awarding us a generous research grant which enabled AOC Archaeology Group to undertake the laser scanning, dendrochronological analysis, and to create a webpage summarising the results (www.aocarchaeology.com/key-projects/river-conon-logboat).

## APPENDIX 1

## ALCAIG AND DINGWALL FERRY

Robert Mowat

An instructive local contrast to riverine ferries may be identified in the *Alcaig and Dingwall Ferry* that is noted at (name centred) NGR NH 560 579 on the first edition of the Ordnance Survey 25-inch map (sheet lxxxviii.4, combined edition, surveyed 1873, published 1881; see this paper, illus 11). This crosses about 0.75km of comparatively open, even if not exposed, estuary

between Dingwall Harbour (NGR NH 558 581, to the SW of Dingwall itself) and Alcaig (within Urquhart and Logie Wester parish, on the Black Isle, at NGR NH 563 574). A lengthy 'Boat Pier' is noted at Alcaig. This must be assumed to have been intended for a larger vessel of conventional form, presumably sail-driven; a ketch-rigged vessel or gabbart may be considered possible.

This is presumably the ferry that is noted in the *Old Statistical Account* (xiii (1793): 215–16) of the United Parishes of Urquhart and Loggy [Logie] Wester, in which it is described as a

> small boat for foot passengers, which, at high water, plies between Dingwall and Ferrintosh [Ferintosh]. On the tide's retiring, and when the river is not high, there is access to Dingwall from this side of the water by different fords. Some of these fords have a zig-zag direction, which they retain amidst partial variations, to which all of them are very subject, from the united force of high tides and frequent swellings of the river. These circumstances, together with the rapid flowing of the tide at particular times, render this a hazardous passage, which proves fatal to many. Since the settlement of the present minister, in 1774, scarce a year has passed without a loss of some life on it. Some years it has brought 2, 3, or more, to an untimely end.

Significantly, the OS map annotation indicates that this ferry, for all its limitations, remained in use for some years after the construction (in 1806–9) of Telford's Conon Bridge, some 3km upstream.

HES concordance:

| | *HES site ref* | *Site-type* | *Notes* |
|---|---|---|---|
| North-west side:<br>(south of) Dingwall | NH55NE 170<br>(1288984) | Landing-place<br>Pier | No detailed RCAHMS record in either case: noted by CFA/MORA Coastal Assessment Survey 1998 |
| Soth-east side:<br>Alcaig, Black Isle | NH55NE 179<br>(289006) | Causeway [or]<br>Pier | |

## APPENDIX 2

## PREVIOUSLY UNRECORDED FINDS FROM LOCH OICH

Trevor Cowie and Robert Mowat

The *Inverness Journal* of 21 June 1844 records the discovery of at least one possible logboat in Loch Oich (name centred NH 325 015), the central and smallest loch within the Great Glen (Glen More) and a major constituent of the Caledonian Canal system.

Under the combined circumstances of drought conditions and reconstruction work on the canal, the water level of the loch 'had fallen to a lower level than remembered … in the memory of man' revealing 'what may be termed a submarine forest' which was removed from the course of the channel through the lake. 'Some hundreds of trees of all sizes [were] dragged out from their watery bed' and were noted as 'consisting chiefly of the finest black oak–some of the blocks 3½ feet [1.1m] in diameter, and other logs 25 to 30 feet [7.6 to 9.1m] in length'; several were 'in high preservation' and others 'charred by fire'.

Among these timbers, there were found 'a few logs artificially hollowed out, apparently to serve the purpose of canoes'. Most of these were 'almost completely destroyed by the irons' during recovery, but one was noted as being in a better state of preservation (although damaged) and was termed an 'old Celtic canoe'. It was apparently not examined or recorded in detail, but was noted as being about 15 feet [4.6m] long. The sides of the (presumably dugout) hollow were between 15 and 18 inches [381 and 457mm] deep, and curved 'inwards a little at one end'. The 'width at bottom' was 9 or 10 inches [229 to 254mm], presumably measured internally.

The present whereabouts of the timber (if it survives) are unknown. It was apparently intended to deposit it in the museum of the Northern Institution for the Promotion of Science and Literature, but there is no evidence that was ever done (Cait McCulloch, Inverness Museum, pers comm).

FULL TRANSCRIPT FROM *INVERNESS JOURNAL* 21 JUNE 1844:

> *Caledonian Canal operations – and discoveries in Loch Oich*
>
> The completion of this national work, and of the repairs found necessary on it, are in active progress – about 1500 workmen being busily employed on different parts of the line, chiefly at the west end, where we learn, with regret, that many of the locks at Bannavie require to be wholly reconstructed. An additional lock is also being formed at Gairlochy, whereby the pressure of the waters of Loch Lochy will be rendered less straining and dangerous. In consequence of the late drought, the waters of Loch Oich had fallen to a lower level than remembered, we understand, in the memory of man, thus giving facilities for the removal of what may be termed a submarine forest in the course of the channel through that lake. Some hundreds of trees of all sizes have been dragged out from their watery bed, where they have lain for centuries, consisting chiefly of the finest black oak – some of the blocks 3½ feet in diameter, and other logs 25 to 30 feet in length, and several of them in high preservation, others charred by fire. Imbedded amidst these remnants, doubtless of the ancient forests of Caledonia, were found a few logs artificially hollowed out, apparently to serve the purpose of canoes, contrivances in keeping with the also aboriginal curraghs, which were of wicker work and covered with hides. These interesting relics were unfortunately almost completely destroyed by the irons in being fished up; but one though materially injured, is in a better state of preservation. It is about 15 feet in length – the sides of the hollow 15 to 18 inches deep curving inwards a little at one end, and the width at bottom being 9 or 10 inches. Such a contrivance would afford a very precarious mode of crossing even a fresh water Highland loch. Still, not much more flimsy than such a shooting punt as may be seen moored in our river below the wooden bridge, belonging, we believe, to Sir George Gore. Mr Jackson, the spirited contractor for the Canal works, has, we understand, considerably signified his intention to have the pieces of this old Celtic canoe put together, and most becomingly deposited in the museum commenced by the Northern Institution for the promotion of Science and Literature, now in the Hall of the Academy, and which has served for the collection of a very curious series of Highland antiquities.

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