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Galmisdale Wreck Eigg, Small Isles, Highlands

Undesignated Site Assessment



Ref: 109130.03
March 2016



**Galmisdale wreck
Eigg, Small Isles,
Highlands**

Undesignated Site Assessment

Prepared for:

Historic Environment Scotland
Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Prepared by:

WA Coastal & Marine
7-9 North St David Street,
Edinburgh,
Midlothian
EH2 1AW

www.wessexarch.co.uk

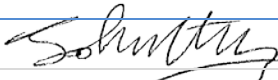
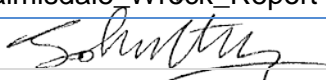
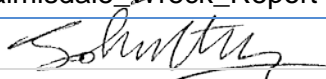
March 2016

Ref: 109130.03



Quality Assurance

Project Code	109130	Accession Code	N/A	Client Ref.	HS/C/3804
Planning Application Ref.	N/A	Ordnance Survey (OS) national grid reference (NGR)	148497, 783888.		

Version	Status*	Prepared by	Checked and Approved By	Approver's Signature	Date
v02	I	IVS	JKM		21/03/2016
File:	T:\Projects\109130\Reports\Drafts\109130_Galmisdale_Wreck_Report				
v03	E	IVS	JKM		30/03/2016
File:	T:\Projects\109130\Reports\Drafts\109130_Galmisdale_Wreck_Report				
v04	F	AH	JKM		31/03/2016
File:	T:\Projects\109130\Reports\Drafts\109130_Galmisdale_Wreck_Report				
File:					
File:					

* I = Internal Draft; E = External Draft; F = Final

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Summary

WA Coastal & Marine was commissioned by Historic Environment Scotland to complete a range of tasks relating to the Galmisdale wreck. These tasks including the retrieval of previously recovered timbers believed to be from the Galmisdale wreck, as well as a monitoring inspection and sandbagging of the wreck. The timbers, recovered from local storage on Eigg as well as some in the care of the Highland Council in Inverness were to be recorded and subjected to dendrochronological analysis (carried out by AOC Archaeology). This work was undertaken as part of the contract for Underwater Archaeology Services (HS/C/2804).

Acknowledgements

This investigation was commissioned by Historic Environment Scotland, and the assistance provided by Phil Robertson is gratefully acknowledged.

WA Coastal & Marine would also like to thank the following people and organisations for the very kind welcome and enthusiastic help (alphabetical order):

- *Camille Dressler and Brian Greene;*
- *Owen and Laraine Wyn-Jones (Eigg Adventures);*
- *Marie, Colin and Greg Carr;*
- *Dean Wiggin;*
- *George Brown from the Highland Council Diving Unit; and*
- *The residents of the isle of Eigg.*

The report was researched and compiled by Isger Vico Sommer and John McCarthy with contributions from Dr Andrew Bicket, Ben Saunders with radiocarbon dating calibration by Dr Alistair Barclay. John McCarthy managed the project on behalf of WA Coastal & Marine.

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1 ASSESSMENT BACKGROUND

- 1.1.1 The wreck at Galmisdale was first reported in the Spring of 2001. The site was seen at extreme low tides and is a clinker built vessel of about 12.2 metres of unknown date. After recording and recovery of loose timbers the site was sandbagged in 2002 (Birch 2002). In recent years reports have been received of further timbers from the site being washed up on the shore close to Galmisdale Bay.
- 1.1.2 The Galmisdale wreck's location is adjacent to Galmisdale Pier on the south east side of the Isle of Eigg, Highlands, Scotland. The wreck is visible from the shore at low tides and becomes fully exposed at spring low tides.
- 1.1.3 After visual monitoring of the site carried out in 2014 and 2015 (full details below) WA Coastal & Marine was commissioned by Historic Environment Scotland under the auspices of the Underwater Archaeology Services contract in January/February of 2016 to retrieve all timbers related to the Galmisdale bay wreck, provide a dendrochronological analysis of those timbers, inspect the current condition of the wreck and enhance the *in situ* protection with further sandbag deployment.

2 OBJECTIVES

2.1 Aims and objectives

- 2.1.1 This work was commissioned in line with objectives defined in *The Marine Historic Environment Strategy for the Protection, Management and Promotion of Marine Heritage 2012-15* (Historic Scotland 2012).
- 2.1.2 The aim of the project was to:
- *Collect, survey, record all timbers thought to derive from the Galmisdale wreck;*
 - *Provide a dendrochronological analysis of the timbers with the help of Dr Anne Crone of AOC Archaeology;*
 - *Conduct a visual inspection of the current state of the wreck supported through photographic record;*
 - *Reinforce existing conservation methods through the deployment of additional sandbags.*
- 2.1.3 WA Coastal & Marine was also asked to liaise with the residents of Eigg, including Camille Dressler, in whose care the recovered timbers were held, to facilitate the programme of works.



3 METHODOLOGY

3.1 Snorkelling and sandbag placement

- 3.1.1 Empty sand bags were brought to Eigg and filled by the WA team using beach sand from Galmisdale Bay with the assistance of local resident Camille Dressler on the day of arrival in preparation for deployment on the site. A fibreglass kayak was provided to facilitate transport of the sandbags by local business Eigg Adventures. Sandbags were placed in this kayak and towed by the snorkelers to the location of the wreck site. These sandbags were not placed due to adverse conditions during fieldwork.
- 3.1.2 For inspection of the wreck a waterproof GPS was used to locate the site. For in-water photography a Sony RX100 digital camera was used with a waterproof housing and fish eye lens. However at the time of survey through-water visibility was found to be too poor for in-water record photography.

3.2 Timber recovery and transfer

- 3.2.1 Recovery of timbers was undertaken using long wheel base vans mobilised from Edinburgh to Inverness and Eigg. Prior to loading timbers were assigned unique identifying 'T' numbers and were transported after careful packing with bubblewrap and saran wrap with the heaviest and most well preserved frames placed on their sides and overlaid with the more fragile strakes.

3.3 Timber recording

- 3.3.1 The retrieved timbers were recorded using proforma timber recording sheets and also using photography and photogrammetry. Photogrammetric recording involved placement of groups of three or four timbers with scales on mats at the Eigg Village Hall and approximately 40 images being taken of each group from all angles. Each group was then flipped to expose the opposite side and recorded in the same manner. After the completion of fieldwork, image datasets were processed into 3D models using Agisoft Photoscan and orthomosaics were then generated.

4 REVIEW OF EXISTING DATA AND PREVIOUS SITE INVESTIGATIONS

4.1 Previous site investigations

- 4.1.1 The Galmisdale Bay wreck was first reported to the Royal Commission for the Ancient and Historic Monuments of Scotland (RCAHMS) in 2001 by local fishermen. Initial accounts of the wreck site indicated that it was the remains of a wooden clinker-built vessel which became visible due to the shifting sands of the bay (Canmore ID: 213713). Local accounts suggest that the vessel may have been previously seen in the 1960s.
- 4.1.2 A preliminary inspection was conducted by RCAHMS personnel in October 2001. The location of the site was confirmed and a walkover was conducted at low spring tide with approximately 0.3m of water over the site. Following the RCAHMS site visit, professional archaeologists Martin Wildgoose and Steven Birch together with divers from the Highland Council investigated the wreck on behalf of the Highland Council Road and Transport Department in advance of construction of the pier development in Galmisdale Bay. The investigation confirmed the presence of a well-preserved wooden clinker-built vessel. All exposed timbers were recorded and a site plan was prepared.
- 4.1.3 The wreck was revisited by divers in 2002 when they sandbagged the remains and placed marker buoys around it for *in situ* protection. It was noticed that since 2001 a significant

area of the wreck had been uncovered due to shifting sands, but unfortunately due to time constraints it was not possible to record the newly exposed portion of the wreck. A brief report by Birch (2002) included a plan of the wreck, but research at this time did not provide a definitive date or identification for the vessel. As part of this work a number of loose timbers were recovered and subsequently stored at the offices of the Highland Council dive team. Subsequent to the production of the 2002 report a radio-carbon date was obtained for one of the recovered strakes although this was not published at the time. This dating evidence is discussed further below.

- 4.1.4 Although it was not possible to be certain of the vessel type at the time of the 2002 survey, Birch noted that if the vessel post-dated 1745, the form of the construction is unlikely to have been of the Highland Galley type as these vessels were outlawed and destroyed after the 1745 rebellion. Instead it is suggested that the vessel may represent an example of the *iubhrach* type, two masted vessels with a'fore and aft' rig supplemented with a square sail on the fore-mast for running before the wind (Birch 2002, 17).
- 4.1.5 There are few records of vessels lost in this area but one possible identification that has been highlighted by locals and discussed by Birch is that the remains may be the *Dubh Ghleannach*, a boat built for Alexander MacDonald of Glenaladale which is thought to have sunk in Galmisdale Bay in 1817. If this identification proved to be correct, the wreck would have a particular interest through its association with a contemporary poem describing the *Dubh Ghleannach* (Birch 2002, 6-7).
- 4.1.6 No further work on the site occurred for over a decade. In 2014 WA Coastal and Marine undertook a visual diver inspection of the site (Wessex Archaeology 2014) on behalf of Historic Scotland (HS - the forerunner of Historic Environment Scotland). The site was relocated and an exact position at 148497E, 783888N [BNG] using a GPS was recorded. After visual prospection it was concluded that the *in situ* preservation plan had been broadly successful with the site mainly still covered by sandbags. However it was also noted that erosion was increasingly becoming a problem and that some parts of the wreck were starting to become exposed. In March of 2015 WA Coastal & Marine was contacted by local historian Camille Dressler who reported that spring storms had resulted in the washing up of three strakes which had been recovered and stored in a waterlogged trench in her garden (**Plate 1**). In the summer of 2015 WA Coastal and Marine returned to the site as part of the Samphire project (Wessex Archaeology 2016) and undertook another visual inspection of the site. This work established that more of the sandbags had decayed exposing the edge of the wreck. A photographic record of the newly recovered strakes was also made although the timbers were not removed from the island. As part of the dive survey some underwater photogrammetric recording was undertaken of the exposed timbers at the north-eastern end of the site. An orthomosaic of an area approximately 4 m by 2 m was produced and overlaid on the original 2002 plan. The results have been included in **Plate 2**. This work demonstrated that, in this area at least, there has been minimal loss of timbers between 2002 and 2015 although some of the timbers may have degraded.
- 4.1.7 Further storms over the autumn and winter of 2015 resulted in more timbers washing ashore where they were recovered by locals and stored in a rock pool near the pier. (**Plate 3**). WA Coastal & Marine was then commissioned by Historic Environment Scotland to recover these timbers and conduct a monitoring visit to the site.



5 SITE DESCRIPTION AND INTERPRETATION

5.1 Site Location

WA Site Position

Easting	148497
Northing	783888
British National Grid	

5.2 Retrieval of timbers

5.2.1 WA Coastal & Marine staff collected twelve timbers from the Highland Council offices in Inverness on the 25th of January 2016 and conducted an initial timber recording using standard timber sheets, having numbered and labelled the individual timbers. These timbers included six planks, five frames and one timber of unknown use. The exact provenance of these timbers was unclear. Although some of these timbers were recovered 'immediately inshore from the wreck' and one frame was recorded 'in the garden of a local inhabitant' at the time of the original survey work (Birch 2002, 15) it is unknown whether any of the timbers in Inverness had come directly from the wreck site. This left open the possibility that at least some of them could have come from another vessel. After recovery from Eigg they had been transported to Inverness by the Highland Council Diving Unit where they were deposited behind the unit's office wrapped in plastic sandbag material and covered with tarpaulins. While this was a suitable temporary solution, the extended period the timbers remained in these storage conditions (over a decade) meant that their current condition is not optimal, with evident damage caused by repeated drying out/dampening events. This is most obvious in the cracked and opened grain, particularly in the case of the frames and some construction details have been lost. After recovery at Inverness by the WA Coastal & Marine team the timbers were brought directly to Eigg.

1.1.1 A further recovered six timbers were subsequently collected on the island of Eigg on the 27th of January 2016. These had all been found by local residents in and around Galmisdale Bay. All of them had been recovered on the north-east side of the new pier near a culvert running underneath the pier. Three timbers had been recovered in 2014 by Camille Dressler (T 16-18) and stored in a waterlogged trench in her own garden while the other three (T 13-15) were found by local resident Dean Wiggin in 2015 and had been stored fully submerged in a freshwater rock pool near the pier. The timbers were made up of two frames and a total of four strakes. As they were kept either submerged or in damp storage after recovery these are in a better state of conservation than the timbers recovered from Inverness. As with the timbers recovered in 2001/2002 it was not considered to be certain that these timbers had come from the Galmisdale wreck.

5.2.2 Upon the completion of fieldwork on Eigg the full assemblage of timbers were transferred to AOC Archaeology Group in Loanhead, Midlothian on the 3rd of February for dendrochronological dating and species ID. The timbers remain in storage at an AOC warehouse pending a decision on their retention.

5.3 Recording of retrieved timbers

5.3.1 All recovered timbers were reunited on Eigg and were photographed at the Eigg community hall in order to generate detailed scaled orthomosaics. All images were taken using a Canon 550D with tripod and remote trigger to avoid image blur. Timbers were recorded in batches of three or four with recording of both sides (**Plate 4**). The resulting photographic datasets were processed into 3D models using Agisoft Photoscan and

orthomosaics were produced from textured meshes. In addition all timbers have been recorded with pro-forma timber recording sheets in order to capture details that might not be apparent in the outputs from the photogrammetric recording process. Each timber has been assigned a unique number from T1 to T18. Two orthomosaics have been produced; one showing all strakes recovered (**Plate 5**) and one showing all frames (**Plate 6**). A table detailing all measurements and information has been created from the timber recording sheets and digitized information (**Appendix 1**)

5.4 Current condition of the wreck

- 5.4.1 At the same time as the timber recovery at Eigg, attempts were made to carry out an inspection of the wreck site itself through snorkel survey and to place additional sandbags around the exposed areas. Upon arrival on the 27th of January team members prepared 20 sandbags to be deployed once the wreck had been located and inspected. A kayak was provided by local residents Owen and Laraine Wyn-Jones of Eigg Adventures and a snorkel survey and sandbag placement was first attempted on 28th of January 2016 at 10:00 and 14:45. However both attempts were called off due to worsening weather conditions attributed to the first of a series of storms which took place during fieldwork deployment. Poor weather, short daylight hours and unfavourable tidal conditions meant that only a few windows of opportunity for further survey presented themselves over the following days. On the 31st of January another attempt was made to locate the wreck at both high and low tide (12:30 and 16:30). However very low through-water visibility was encountered, resulting from the poor weather, and the wreck could not be located visually. On the morning of the 3rd of February a final snorkel attempt was undertaken. With the use of a GPS the team were able to locate the site despite low visibility. A photographic survey was attempted but the conditions did not allow for photography or sandbag placement. Although it proved impossible to get a clear view of the entire site it was possible on this occasion to confirm that at least some of the sandbags over the site remained intact.
- 5.4.2 Through discussions with Camille Dressler it was decided that local residents would visit the site at the next low spring tide when the site was expected to be fully exposed and attempt a photographic survey which would allow for some assessment of the current condition of the wreck. Photographs of the wreck taken by local resident Greg Carr on the 10th of March 2016 were subsequently provided to the WA Coastal & Marine team and show that most of the wreck is still intact with some further evidence of exposed timber at the stem and stern and of edges of at least one in-situ strake between them (**Plates 7-9**). Currently the bow and stern seem to be partially covered by sandbags. Some parts of the bow and stern however are exposed posing a risk to the conservation of the vessel in the future. Amidships the wreck remains largely covered with sand as it was at the time of the 2002 survey.
- 5.4.3 At the request of residents, WA Coastal & Marine has provided sandbags to allow them to undertake further sandbagging themselves at the next low spring tide.

5.5 Outreach

- 5.5.1 At the request of the local school, WA Coastal & Marine was able to give a presentation during the fieldwork deployment to the four children attending the local school (**Plate 10**) on shipwrecks and the work happening at Galmisdale.
- 5.5.2 On the same day a visit was made to the local history archives held at the school and a photograph was found in the archives by Camille Dressler which shows the concretion that was retrieved by a local carpenter from the Galmisdale wreck in 2001 (**Plate 11**).

Subsequent analysis of this concretion by the RCAHMS and the National Museum of Scotland suggested that it might be an iron axe (Birch 2002, 3). Correspondence with David Caldwell, formerly of the National Museum, established that the iron axe was found to be highly corroded and unsuitable for further analysis. Its current location is unknown (pers. comm. Caldwell 05/02/2016).

5.6 Timber analysis

5.6.1 A total of 18 timbers were collected. These included 12 stored in Inverness that were collected from near the site in 2002 (T-1-12), three found in Galmisdale Bay in 2014 and stored in Camille Dressler's house (T 16-18) and a further three found in Galmisdale Bay by Dean Wiggin in 2015 and stored in a pond near the harbour (T 13-15). One of the timbers recovered at Inverness (T7) have broken in two and has been recorded as T-7A and T-7B. In total there are 10 strakes and six frames, one possible floor timber (T-3) and one unidentified structural timber (T-5).

5.6.2 Inspection of the full assemblage of recovered timbers strongly supports the theory that they are all derived from the wreck at Galmisdale. The frames and strakes recovered match the general dimensions of those recorded *in situ* in 2002, with strakes approximately 3-4 cm thick and 20 cm wide and frames with a width of approximately 10-15 cm and 18 cm deep. The timbers are all derived from a clinker built vessel and show evidence of similar fastenings, traces of tarring and caulking and are of the same wood-types. None of the timbers show traces of damage by marine organisms although some damage of this type was noted during the 2002 survey (Birch 2002, 9).

Frames

5.6.3 Wood analysis of two frames by AOC demonstrated that they were not oak as previously thought but were fast-grown ash (*Fraxinus excelsior*).

5.6.4 The frames vary in preservation but all show clear signs of joggles. The curvature also varies with T-6 and T-15 showing the greatest degree of curvature. The bilge had a round chine with around nine strakes up until the turn of the bilge, as noted by Birch (2002, 9) and the vessel appears to have had quite a wide midsection. The frames have double or triple fastenings where the planks would have been fastened to the frames. All frames are joggled indicating a clinker built vessel.

5.6.5

Strakes

5.6.6 Wood analysis of the strakes carried out by AOC showed that they were oak. The 2002 survey was unable to establish whether the strakes were radially split (Birch 2002, 19) but analysis by AOC has demonstrated that they were all rift-sawn.

5.6.7 The strakes have a width of around 240 mm and a length between 1 and 3.12 m. The thickness of the planks is around 30 mm. The planks were joined using plain vertical scarph joints which seem to have been reinforced through a range of very small fastenings (**Plate 12**) as can be seen on the scarph joints on timbers number T17 and T18. Further tool marks suggest the surface was at least partially cut using an adze, most apparent on T18 (**Plate 13**). This might be an indication that the planks might have been worked with the adze to compress the timber giving it more strength. Along the edges of the planks there are paired fastening holes that would have been used to fasten overlapping planks with each other, a distinctive indicator of clinker built vessels. Planks number T 16 and T18 have a horizontal hooked scarf.

- 5.6.8 A square hole of 70 by 110 mm is found on one of the planks which might be related to the bilge pump (**Plate 14**).
- 5.6.9 It was noted that some of the strakes exhibited a distinct curvature in one direction and in some cases a slight longitudinal twist. One strake (T-7) had a distinct twisted and is therefore considered likely to be from near the bilge at the raked stern or stem of the vessel.

Fastenings

- 5.6.10 There are two types of fastening evident on the timbers. Single metal fastenings of around 6 mm square are holding strakes together and are spaced around 50 to 30 mm apart. An indent observed in some of the strakes by a square or rhombic rove of between 20 and 40 squared mm is an indicator of the fastenings being metal bolts or nails clenched over roves or washers. These fastenings are related to the clinker build of the ship which allowed the planks to overlap each other creating a flexible hull capable of withstanding tougher sea conditions than frame first constructed vessels (McGrail 2004; pp.149–153). The iron fastenings connecting the strakes to the frames on the other hand are slightly larger, around 8 and 10 mm squared and are mostly paired to give the strakes more stability. The twinned fastenings are spaced between 200 and 400 mm from each other indicate that the frames were placed closer together at different points of the vessel.
- 5.6.11 Treenails have been found on T-3 (3 in total) and T-10 (2 in total), both with a diameter of around 20 mm (**Plate 15**). On T-3 the treenails were most likely used to fasten what could be a floor timber to the keelson. Although previous analysis of timbers from this site has mentioned treenails at the end of the frames, these were not observed during recording. This may be due to the degradation of the timbers.

Caulking

- 5.6.12 Both the planks and some frames have a cream or white caulking residue on them but an organic residue analysis would be required to determine the precise nature of the substance. Caulking material of similar colour has been found on a range of ships in UK waters such as the *Mary Rose* and the *Gresham Ship* (Auer et al. 2007; p.222–241). The strakes also appear to show blackening which may demonstrate tarring of the vessel.

5.7 Dendrochronological and radiocarbon dating

- 5.7.1 A dendrochronological analysis of five strakes (T-11, T-12, T-16, T-17, and T-18) has been conducted by Dr Anne Crone from AOC Archaeology in Edinburgh and is attached as **Appendix 2**. Two of the strakes subjected to dendrochronological analysis are from the assemblage recovered from Eigg in 2001/2002, the rest being from the group recovered in 2014. The frames were found to be ash and proved unsuitable for dendrochronological dating.
- 5.7.2 The dendrochronological analysis of strakes has produced a 188 year chronology which has been dated to AD 1557 – 1744. Allowing for missing tree-rings this provides a *terminus post quem* date of AD 1754 and accounting for missing heartwood and sapwood an estimated felling date somewhere in the late 18th century. The sequence has strong geographical correlations with known sequences in the Boston area or East Massachusetts.
- 5.7.3 Following the completion of fieldwork it was established through correspondence with staff of the National Museum that radiocarbon dating analysis had been conducted by the museum on a strake that was recovered from Eigg in 2001.

- 5.7.4 The original radiocarbon dating assay on the strake (215 ± 35 BP) was recalibrated by WA Coastal & Marine in early 2016 using OxCal v4.2.3 (2013) (Bronk Ramsey 2009) and the IntCal13 atmospheric curve (Reimier et al. 2013) to provide a full chronometric baseline of existing dating assays on wreck material. The resulting calibrated date (reported to 2σ , 95.4% probability) plots on a notable plateau producing 3 probable age ranges for the sample (**Appendix 3**):
- 1639AD (32.1%) 1692AD
 - 1728AD (46.8%) 1811AD
 - 1922AD (16.5%) ...
- 5.7.5 The most probable date for the felling of the timber that produced the strake is AD 1728 – 1811 (46.8% probability). Judged within the context of the dendrochronological analysis, i.e. a felling date after AD 1754, and with several caveats; including that the dated techniques have not been applied to the same sample; that there may be different phases of construction/repair; and, that the timbers may not derive trees felled at one period, the radiocarbon dating results are consistent with the dendrochronology. Bearing these caveats in mind, the radiocarbon dates would appear to confirm a late 18th century date for elements of the wreck.
- 5.7.6 It has not been possible to identify with certainty or to locate the strake used in the radiocarbon analysis although it is possible that it may be one of those recovered at Inverness.

6 INTERPRETATION

6.1 Analysis

- 6.1.1 Analysis of the recovered timbers has for the most part confirmed the conclusions of the 2002 report (Birch 2002). The principal contribution to the analysis of the wreck at Galmisdale made by the work carried out in 2015/2016 is to establish the approximate date of the vessel as late 18th century. This new knowledge is valuable as it narrows the possibilities of vessel type and identification. However the results do not rule out Birch's suggestion that this vessel may be the *Dubh Ghleannach*, a vessel of unknown type reported lost off Kildonnan Point in 1817.
- 6.1.2 The narrowing of the possible dates for the wreck allows a more focussed consideration of parallels for similar vessels of similar date. Although there are very few examples of vessels of this period from the west coast of Scotland, McWhannel (2003, 410) notes that in the 17th century 'It is likely that small craft in the northern clinker tradition, adapted to suit local conditions, were constructed all around the Scottish coasts'. McWhannel also discusses an historical account dating to 1695 of the building of a vessel of similar size (around 12 m in length) built for Campbell of Breadalbane. This vessel had 12 oars and McWhannel (2003, 415) suggests that although it was a contemporary of the Highland Galley, this example may have been a 'work-boat'. However, as noted by Birch (2002, 17) there is thought to have been a major break in boat-building traditions after 1745 when the use of Highland Gallies or birlinns was outlawed and existing vessels destroyed. The dating evidence presented above suggests a late 18th century construction date for this vessel and it is therefore likely that it represents a later type but still perhaps within the tradition of pre-1745 west coast boat-building. The Galmisdale wreck may also have similarities with later vessel types like the Orkney yole and Ness sgoth, although many of these are typically smaller than the reported 12 m metre length of the wreck at

Galmisdale. For example the Ness sgoth had a typical length of 30-31 feet (McKee 1983, 179).

- 6.1.3 One interesting possible near-contemporary parallel for this vessel is the *Lady Guilford*, a sailing galley commissioned in 1819 by the Marquess of Bute and built by the Scottish boat-builder Lachlan McLean. This vessel was a three-masted, lugger-rigged vessel with 12 oars and seems to have fulfilled a similar function to the *Dubh Ghleannach* as something of a pleasure boat and status symbol for the Marquess. Remarkably this vessel stayed in use with minor alterations up to the 1930s and has been preserved intact in the collections of the Scottish Maritime Museum as possibly the oldest surviving example of a Scottish-built vessel.¹ Interesting features of this vessel include large rectangular oar locks cut into the gunwales, a possible parallel for the rectangular hole cut into timber T-10 (alternatively this may be related to a bilge pump).

6.2 Identity of the vessel

- 6.2.1 A number of possible identifications for this vessel have been discussed in the 2002 study. Birch (2002, 20-21) highlights the fact that the vessel appears to be of better than average quality and the fact that it was built of oak and ash rather than pine seems to support this. The use of imported oak for the planks is another indicator of a vessel of high status or importance.
- 6.2.2 The dating evidence presented above does seem to lend weight to the possible identification of this wreck with the *Dubh Ghleannach* (Birch 2002, 6-7). However as there is little other information available on the construction of the *Dubh Ghleannach* this identification remains speculative. One additional piece of information on the *Dubh Ghleannach* was provided by Camille Dressler who reported that Iain Campbell, one of the indigenous islanders remembered an oral tradition that the vessel had sunk when a plank was dislodged by the cattle, just as the boat was about to round the point of Kildonan. This tradition is borne out by contemporary accounts such as *The Scots Magazine*, which states that 'Dr Donald McAskill of the island of Eigg, who was unfortunately drowned off that island. He was proceeding from Airsaig (sic) to Eigg, in a boat, along with the Rev. Mr Fraser, minister of the Small Isles, when, by the starting of a plank, the boat instantly sunk, and he and Mr Fraser, with two men, perished (Volume 80, 499). A further, earlier reference to the *Dubh Ghleannach* has been identified. MacDougall (1922, 462) states that one Hugh MacEachan 'had the distinction of being at one time Captain of Alexander MacDonald of Glenaladale's pleasure boat "Dubh Ghleannach". However no sources giving any further detail of the construction of the vessel have been identified.
- 6.2.3 Another possibility is that the vessel is the *Mary*, a Smack that ran ashore at the beginning of February 1864, referenced in a newspaper article from the *Inverness Advertiser* (1864; 2F) and recorded in the National Inventory (Canmore ID 213344). The *Mary* of Inverness was carrying a cargo of meal from Peterhead to the West coast when it ran aground in the Sound of Eigg where it wrecked. Considering the dating of the imported oak planks this identification also remains a possibility. All other vessels recorded as lost in the vicinity of Eigg in the National Inventory are too late in date to correspond to this wreck.
- 6.2.4 The First Statistical Account of Scotland describes the harbour at Eigg in the period 1791-99:

¹ <https://scottishmaritimemuseum.org/collections> *Lady Guilford* factsheet Accessed 30/03/2016

'The sound between this island (Eilean Chaisteal) and Eigg makes a tolerable harbour for a few vessels not exceeding 70 tons. It has not real depth of water and consequently, with spring tides, such vessels are apt to take the ground, the consequence of which in severe weather, might be dangerous... Within this harbour a pier has been built by the inhabitants for the security of fishing boats and small vessels but on a plan not sufficiently extensive for accommodating vessels of the above mentioned size; besides that it has been neglected for some time, and become in a manner ruinous.' (Small Isles, County of Inverness 1791-99, 277).

- 6.2.5 Leslie's Thomas' map of Eigg from 1824 also shows a pier close to the location of the current old pier.

6.3 American Timber Trade

- 6.3.1 The dendrochronological assessment the oak strakes has established that they are imported timbers of white oak from near Boston in North America. There have been very few examples of American white oak analysed by dendrochronologists in the UK. Examples have been identified in a few buildings in England as well as in two assemblages of ships timbers in Dublin (see **Appendix 2** for full details). However it is known that Scottish woodlands were coming under increasing pressure towards the late 18th century (Rixson 1998; 104-7). The increase in the timber trade, predominantly of pine and oak, between Britain and the North American colonies during the late 17th and early 18th centuries was partly driven by uncertainties of the Baltic trade routes (Hutchison 2012). Particularly in the case of good mast pine timber, Britain was dependent on imports and with the high potential for a blockade of the Baltic by Dutch and French forces, the British were encouraged to look elsewhere for their source of timber, despite the higher transportation costs (Lower 1973). At the same time 'white oak, the most common shipbuilding timber in England, was available in abundance in the colonies during the eighteenth century' (VanHorn 2004, 14). As outlined in **Appendix 2**, white oak was being imported into the UK in the mid-18th century; an advert in the Boston Gazette in February 1751 describes a cargo of white oak timber destined for Scotland or Ireland. However timber did not make up a significant proportion of cross-Atlantic trade until the 1760s (Truxes 1988, 219-20).
- 6.3.2 One possible although unlikely alternative is that the vessel was built abroad. A parallel for this exists with the contemporary Shetland Yole, where the timbers for vessels were cut in Norway and shipped to Scotland for assembly (Greenhill 1997, 26). It is possible therefore, although unlikely that this vessel might have been shipped in this way from the United States.

7 SUGGESTED FUTURE WORKS

- 7.1.1 In archaeological terms this vessel has an interest as a rare example of Highland vernacular boatbuilding in a period for which there are few physical survivals of this type.
- 7.1.2 It is recommended that the wreck remains are further protected through sandbagging. Further archaeological investigation could also provide valuable information about shape, construction details and methods of the vessel and may provide enough information to determine a clearer ship typology. Due to the completion of both radiocarbon-dating, dendrochronological analysis and 3D survey of the recovered timbers it is considered that there is little more information to be gained from further analysis although consideration of



opportunities for long term preservation of the recovered timber assemblage is recommended.

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Wreck location

Figure 1



Plate 1: A photograph of the storage location of timbers T16, T17 and T18 near Lagg. This image shows WA archaeologist Andrew Roberts speaking to Camille Dressler, in whose garden the timbers were stored, during fieldwork for the SAMPHIRE project in the summer of 2015 (photograph Jonathan Benjamin)

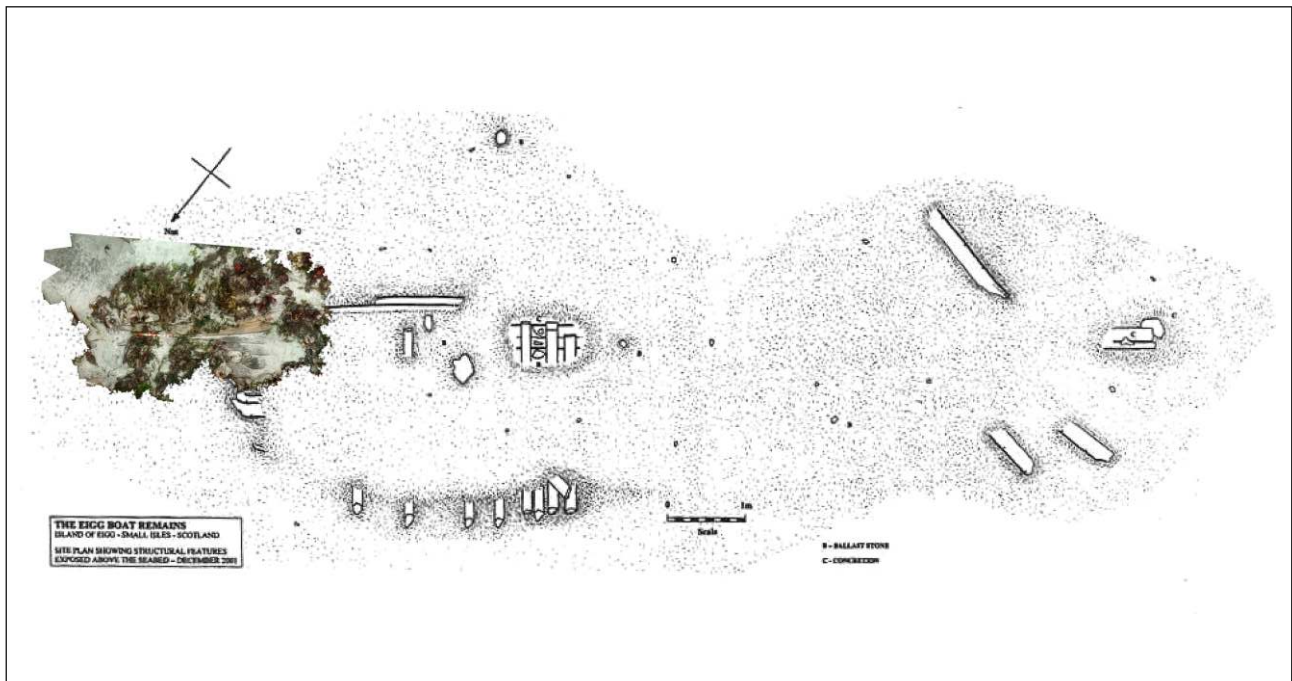


Plate 2: Photogrammetric survey of exposed areas seen in the summer of 2015 overlaid onto the 2002 survey (after Birch 2002)



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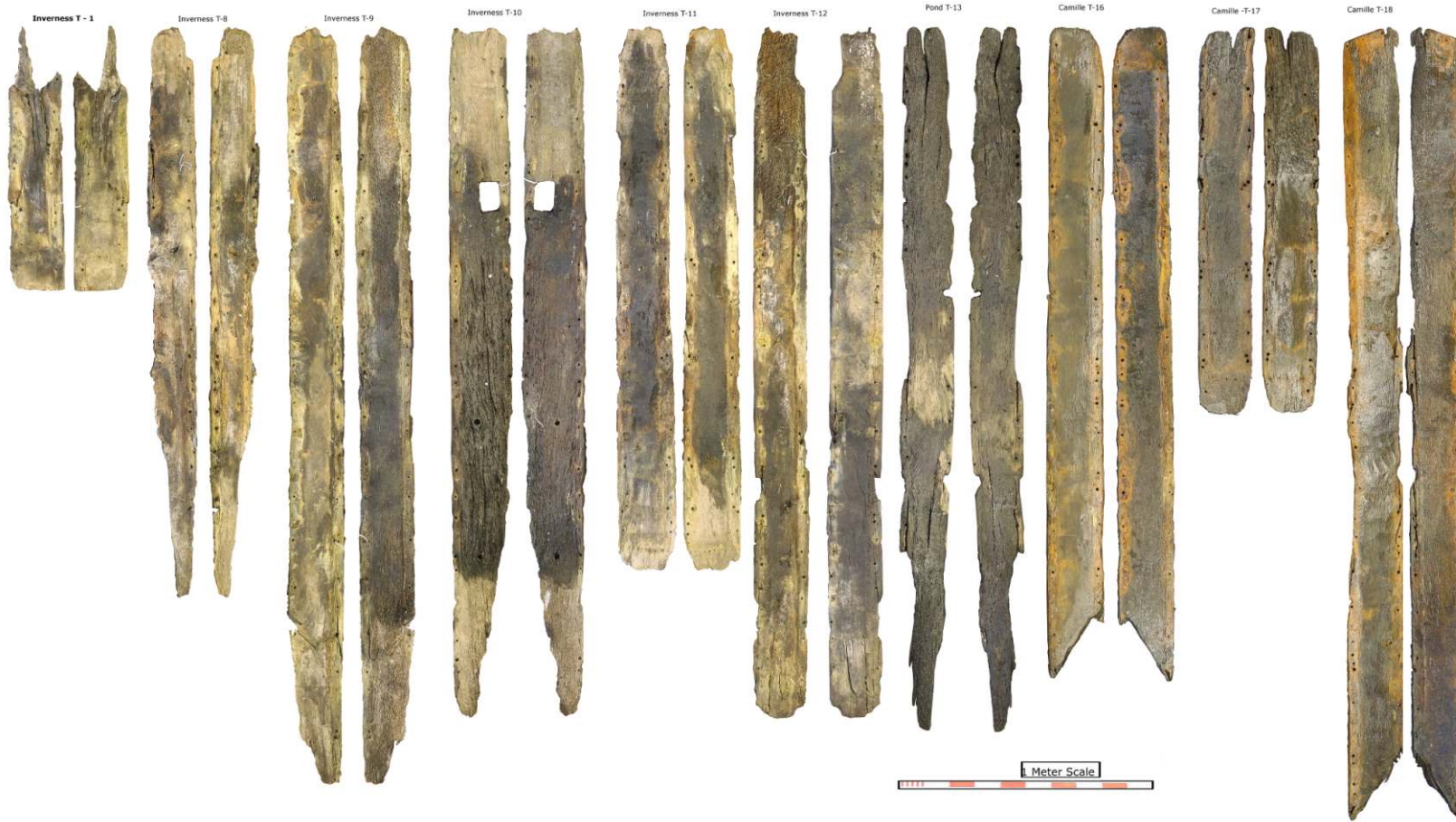


Plate 3: The freshwater rock pool where timbers T13, T14 and T15 were stored, near the old pier



Plate 4: The photogrammetric survey of the Galmisdale timbers in the Eigg community Hall

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Plate 7: Exposed bow and stern visible at spring low tide in March 2016 facing west (Copyright Greg Carr 2015)



Plate 8: Exposed bow and stern visible at spring low tide in March 2016 facing north (Copyright Greg Carr 2015)



Plate 9: Exposed timber visible at low spring tide in March 2016 (copyright Greg Carr 2015)


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Plate 10: John McCarthy giving presentation on the Eigg timbers and maritime archaeology at Eigg Primary School



Plate 11: Concretion of what is thought to have been an iron axe found on the Galmisdale wreck, photographed around 2001 (copyright Camille Dressler 2015)


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Plate 12: An example of small fastenings visible on the scarph joints (T-16)



Plate 13: Traces of adze marks on T-18



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Plate 14: Square hole found on one of the strakes (T-10) which may be associated with a bilge pump



Plate 15: Treenails visible on a possible floor timber (T-3)

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APPENDICES

Appendix 1: Table of timber measurements

Timber number	Type	Length (m)	Width (m)	Depth (m)	Fastenings	Treenails	Scarfs/Joint	Caulking	Other
T-1	Strake	1.03	0.21	0.03	Metal paired and single		Scarf	Yes	
T-2	Frame	1.97	0.19	0.14	Metal paired fastenings		Possible Butt/ Scarf Joint	Yes	Joggled
T-3	Floor timber (?)	0.86	0.14	0.09		Yes			
T-4	Frame	2.06	0.2	0.12	Metal paired fastenings		Possible Butt/Scarf Joint	Yes	Joggled
T-5		1.86	0.11	0.1	Metal (1 at Flat Scarph joint)		Flat Scarf joint		
T-6	Frame	2.47	0.14	0.12	Metal paired fastenings			Yes	Joggled
T-7 A	Frame	1.4	0.11	0.12	Metal paired fastenings				
T-7 B	Frame	0.5	0.1	0.12	Metal paired fastenings				Deteriorated
T-8	Strake	2.23	0.19	0.03	Metal paired and single			Yes	Curved
T-9	Strake	2.98	0.22	0.03	Metal paired and single			Yes	
T-10	Strake	2.71	0.24	0.03	Metal paired and single	Yes		Yes	Square opening
T-11	Strake	2.14	0.23	0.03	Metal paired and single		Scarf	Yes	
T-12	Strake	2.72	0.21	0.03	Metal paired and single		Scarf	Yes	
T-13	Strake	2.76	0.21	0.03	Metal paired and single				
T-14	Frame	1.96	0.13	0.12	Metal paired fastenings		Possible Butt/Scarf Joint	Yes	Joggled/ saw marks
T-15	Frame	2.2	0.14	0.12	Metal paired fastenings		Possible Butt/Scarf Joint	Yes	Joggled
T-16	Strake	2.56	0.22	0.03	Metal paired fastenings		Vertical and Horizontal Scarf	Yes	
T-17	Strake	1.52	0.21	0.03	Metal paired fastenings		Scarf	Yes	
T-18	Strake	3.12	0.21	0.03	Metal paired fastenings		Vertical and Horizontal Scarf	Yes	Adze marks



Appendix 2: Dendrochronology Report

Galmisdale Bay, Eigg boat wreck Dendrochronological analysis

*Anne Crone
Mar 2016*



ARCHAEOLOGY

HERITAGE

CONSERVATION

GALMISDALE BAY, EIGG BOAT WRECK

Assessment

A total of 11 strakes and seven frames from the boat wreck in Galmisdale Bay, Eigg were assessed for their dendrochronological potential. They were all thought to be oak (*Quercus* sp.), some with suitably long ring-patterns, and two frames and five strakes were subsequently selected for analysis.

Methodology

Slices, approximately 70 mm wide were taken at positions on the timbers indicated during in the assessment report. The surfaces of the samples were pared using a razor blade to produce a glassy surface into which powdered chalk was rubbed, highlighting the ring-pattern (Illus 1). The tree-ring sequences were measured on a Heidenhain measuring table, under a low-power microscope, linked to a P.C. Data capture, analysis and plotting were undertaken using the 'Dendro' suite of programs (Tyers 1999). The program produces t-values as a measure of the degree of correlation between sequences, and as a general rule of thumb values above 3.5 are considered to be significant. Visual cross-matching of the graphed tree-ring width sequences was undertaken to verify any statistical positions of match. Cross-matching proceeded in a stepwise fashion, using the strongest internally replicated group to form the kernel of a site chronology first and then comparing that chronology with the remaining unmatched sequences to find further acceptable statistical and visual matches.

Results

Firstly, the two frames are not oak. Full exposure of their cross-sections made it clear that they are both ash (*Fraxinus excelsior*). They were both fast-grown; T2 had 69 surviving rings and T15 had 42 surviving rings. No further work was carried out on the frames.

The results for the strakes, all of which are oak, are shown in Table 1. They were probably all rift-sawn from the log and consequently the ring-pattern lies at varying angles to the sides of the strake (Illus 1). In the case of T11 the rays across the innermost rings lay almost at right angles to the sides and so it was not possible to measure the growth-pattern in a single sequence. There are almost certainly errors in the inner rings of this sequence and consequently, only the outermost 103 rings were used in the analysis.

There were strong correlations between all five measured sequences and consequently a master chronology, EIGGx5 was constructed, 188 years in length (Illus 2). The master chronology was then compared against a dataset that included British, European and American oak tree-ring data. The only significant correlations were with American East Coast assemblages, and with the few known assemblages of American provenance in the UK (Table 3). These correlations date EIGGx5 to AD 1557 – 1744.

Interpretation

The locations of the American chronologies that provide the strongest correlations with the Eigg chronology suggest that the source of the timber is likely to be either the Boston area or eastern

Massachusetts (Dan Miles pers comm). The American provenance means that the oak is likely to be American white oak (*Quercus alba*) which is indistinguishable in most respects from the European pedunculate oak (*Quercus robur*), although it has different structural qualities (Michaux 1853).

Felling date

The calendar date of the outermost ring of the master chronology has been established as AD 1744 but this provides at most a *terminus post quem* for the felling of the timber because all the timbers have been fully squared and an unknown number of heartwood and sapwood rings have been trimmed off. Synchronicity between the outermost growth rings on fully squared timbers can sometimes help in gauging how many rings have been lost, because it usually means that the timbers have been trimmed close to the heartwood/sapwood boundary and therefore a rough felling estimate can be applied (cf Crone 2008, 10). However, there is no synchronicity in the outermost rings of the boat strakes (Illus 2); there are some 28 years between the outer ring of T16 and T17 (Table 2).

The problem of estimating missing rings for American white oak is further compounded by the lack of any accurate sapwood estimates for this species which might allow us to add a minimum number of sapwood rings to the date of the outermost ring, as can be done routinely in Europe (Miles *et al* 2005). Field observation suggests that the number of sapwood rings is broadly similar to that of English oak (Dan Miles pers comm). A sapwood estimate of 10- 46 rings is used throughout the UK (EH 1998, 11) and the application of this figure would give a *terminus post quem* date of AD 1754. Allowing for an unknown number of missing heartwood rings the most precise statement that can be made about the date of felling is that it was probably sometime in the last decades of the 18th century.

Context

There is surprisingly little of substance written about the timber trade between England and America in the 18th century; the bulk of the timber trade was with the Canadian colonies, particularly after the War of Independence in 1783 (Lower 1973, 10). Nonetheless, white oak was being imported into the UK in the mid-18th century; an advert in the Boston Gazette in February 1751 describes a cargo of white oak timber destined for Scotland or Ireland (Illus 3), while there are archival records referring to a cargo of American oak plank at Deptford in 1768 (ADM106/1164/66, 75, 82 & 87 – UK National Archives). A review of the trade between Ireland and the American colonies provides some insights (Truxes 1988). Timber was not a significant part of this trade until the 1760s possibly because the colonies were struggling to meet their own domestic demands (ibid 219-20). The costs of shipping timber across the Atlantic may have also made it prohibitively expensive; the archival records of 1768 reveal that the merchant could not sell his timber at the price he had hoped for.

Oak of American origin in the UK has only begun to be identified by dendrochronology in the last few years. It has been found in a few buildings in England (Ian Tyers & Martin Bridge pers comm), in the Granary at Elie, Fife, as well as in two assemblages of ships timbers in Dublin (Brown 2008; 2009), and now the shipwreck off Galmisdale Pier. As the previous paragraph demonstrates very little research has been undertaken into the early timber trade between America and Britain to provide a context for these assemblages but the growing tree-ring dataset will itself provide insights into the nature of this trade, the type of timber being imported and its final destination.

Summary

The dendrochronological analysis of timbers from the Galmisdale Bay boat wreck has produced a 188 year chronology which has been dated to AD 1557 – 1744. Allowing for missing tree-rings this provides a *terminus post quem* date of AD 1754 and it was probably felled sometime in the last decades of the 18th century. The timber used to make the strakes had been imported from America, probably from Massachusetts.

Acknowledgements

I would like to thank my colleagues Martin Bridge (UCL), David Brown (QUB), Dan Miles (Oxford Dendrochronology Laboratory) and Ian Tyers (Dendro UK) for their help in dating the timbers from Eigg.

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Table 1: dendrochronological data

Timber	Component	Conv	No rings	Calendar date
T11	strake	D	164*	AD 1629 - 1731
T12	strake	D	166	AD 1560 - 1725
T16	strake	D	131	AD1614 - 1744
T17	strake	D	160	AD 1557 - 1716
T18	strake	D	115	AD 1619 - 1733

* *only outer 103 rings used in analysis (see text)*

Table 2: statistical correlations within EIGGx5

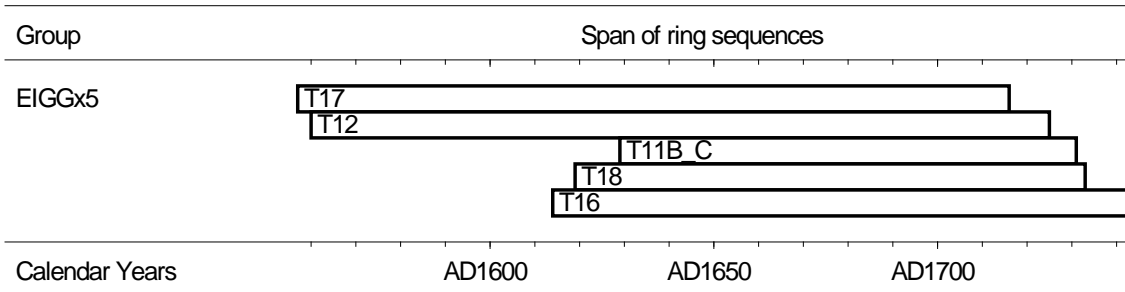
	<i>beg</i>	<i>end</i>	T11B_C	T12	T16	T17	T18
T11B_C	73	175	*				
T12	4	169	-	*			
T16	58	188	5.33	4.68	*		
T17	1	160	-	6.67	3.12	*	
T18	63	177	5.42	3.97	7.04	-	*

Table 3: statistical correlations between EIGGx5 and American chronologies (only correlations over 5.0 are listed here, apart from the Scottish import chronologies). NB: the chronologies shaded in grey are not independent of each other – PHDx1, ALC4x & DWH are included in the large composite chronologies *BOSTON02* and *WACHU*

<i>County or region</i>	<i>Chronology name</i>	<i>Reference</i>	<i>File name</i>	<i>Spanning</i>	<i>t-value</i>
Massachusetts	Robert Pierce Hs, Dorchester – Ph 1	(Miles <i>et al</i> 2002)	PHDx1	1521-1682	7.92
Massachusetts	Mt Wachusets & Boston Area	(Cook and Krusic 2003 <i>unpubl</i>)	WACHU	1363-1997	7.83
Massachusetts	Boston Master Chronology 2002	(Miles <i>et al</i> 2002)	BOSTON02	1454-1769	7.64
Massachusetts	Capen Hs, Dorchester (demolished)	(Miles <i>et al</i> 2005)	ALC4x	1537-1674	7.55
Massachusetts	Deane Winthrop House, Winthrop	(Miles <i>et al</i> 2002)	DWH	1579-1695	7.08
Massachusetts	Peak House, Medfield	(Miles 2010)	PKM	1491-1710	7.06
Massachusetts	SE Massachusetts Master	(Miles <i>et al</i> 2005)	SEMASS3	1609-1796	6.92
Massachusetts	Dwight-Derby House, Medfield	(Miles and Worthington 2007)	DDMx1	1521-1712	6.56
Massachusetts	White Place, Brookline	(Miles and Worthington 2007)	WPB	1533-1682	6.4
Massachusetts	Chestnut Hill Meeting Hs, Millville	(Miles <i>et al</i> 2003)	CHM	1609-1767	6.33
Massachusetts	Lowell Mason House, Medfield	(Miles 2010)	Imm13	1566-1650	6.22
Massachusetts	Haskell House, Beverly	(Miles <i>et al</i> 2005)	BEV	1546-1723	5.46
Dublin, Ireland	Shipwreck – Sir John Rogerson Quay	D Brown QUB data	SJRQD4	1613 - 1760	4.31
Fife, Scotland	Elie Granary, Elie	CM Mills AOC data	EG17_18B	1608 - 1808	4.1



Illus 1: prepared samples, T11, T12, T16, T17 & T18, from top to bottom.

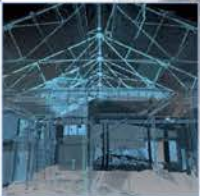


Illus 2: bar diagram showing chronological relationships within EIGGx5

Boston Gazette, page [2], iss. 1615
 Publication Date: February 26, 1751
 Published as: The Boston Gazette, or Weekly Journal
 Location: Boston, Massachusetts
 Headline: [No Headline]
 Article Type: Advertisement

TO be sold, a well proportion'd double Deckt Ship, burthen 167 Tons, new built, with a Cargo ready to put on Board for Scotland or Ireland, consisting of white Oak Barrel Staves, Heading, white Oak, 2 Inch Ship Plank, hewed Square, white Oak Timber, Breast Hooks and Knees, & white Oak Inch Boards, at a reasonable Rate. Inquire of the Printer.

Illus 3: an advert from the Boston Gazette, 1751 advertising oak boards and planks to be shipped to Ireland or Scotland



AOC Archaeology Group, Edgefield Industrial Estate, Edgefield Road, Loanhead EH20 9SY
tel: 0131 440 3593 | fax: 0131 440 3422 | e-mail: edinburgh@aacarchaeology.com

www.aocarchaeology.com



Appendix 3: Radiocarbon Dating Recalibration

OxCal v4.2.3: 2013 Bronk Ramsey (2009); r:5
IntCal13 atmospheric curve (Reimer et al 2013)

GU-5007 R_Date (215,35)
Warning! Date may extend out of range - 215+/-35BP

68.2% probability
1648AD (26.3%) 1679AD
1765AD (29.8%) 1800AD
1940AD (12.1%) ...

95.4% probability
1639AD (32.1%) 1692AD
1728AD (46.8%) 1811AD
1922AD (16.5%) ...

