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3.3. FULACHT FIADH IN BOFEENAUN TOWNLAND, LOUGH MORE, CO. MAYO

Conor McDermott

INTRODUCTION

The site is located at the lake edge on recently exposed lake bed peat 20m from the former shore of Lough More (Plate 13). This peat is now approximately 1m below the level of the original bank of the lake. Beyond the site the bed of the current lake slopes quite steeply to a depth in excess of 1.5m. The remains of a second fulacht fiadh (MA-BN0003) occur on the modern lake edge 75m to the southwest of the site described here. A crannóg, also investigated by the Unit, is situated 127m to the west-southwest (Map 16, Section 3.1). Low glacially deposited gravel hills run northeast-southwest along both sides of the lake defining part of the Glen Nephin valley in which the fulacht fiadh is located (Fig. 1). The valley floor between the base of the hills and the lake edge is covered in peat. Turf cutting has altered this peat and in places to the north of the site the lake edge was less defined.

A preliminary investigation of the site was undertaken during May 1992. At that time a mound of burnt stone was exposed and some of it had been eroded into the lake. The mound was deepest at the erosion face and it appeared that a third of the mound had already been destroyed. There were four roundwoods exposed on the western lake side of the mound and these were taken to represent the trough area.

At the time of excavation in October 1992 the trough area was flooded and the exposed wood had deteriorated. The mound could be reasonably well defined underneath stones disturbed by the lake but was continuing to erode into the lake on the western side. Around the sides of the mound there were



Figure 1. In the foreground the fulacht fiadh can be seen on the lakeshore while the hills flanking the lake are in the background .

intermittent spreads of stone which had eroded out. This gave maximum surviving dimensions of 11.5m by 6m. It was decided to excavate a strip along the northern portion of the mound along the lake edge and through the trough (Figs 2 & 3). A cutting 5m long parallel to the lake shore was opened which extended into the mound to a maximum of 1.5m.

THE TROUGH

The trough was constructed in a depression in the peat which had been excavated out to a depth of at least 30cm. The depth may have been even greater since it appears the weight of the mound compressed the peat during and after its build up. The depression measured 1.1m along its intact side and 80cm along the truncated side and was just large enough to accommodate the trough. The base of the depression was lined with a layer of leaves, twigs and other plant material up to 1cm thick. The leaves have been identified as bog myrtle (*Myrica gale* L.). Over this a layer of moss 1-2cm in thickness had been laid. Both of these layers ran under the sides of the trough.

The trough measured 1.05m wide at the base and the maximum surviving length on the truncated side was 80cm. At the northern end the intact side was 50cm high. However, as the upper timbers were damaged it may have been slightly higher. Were this damage caused by the timbers being exposed from the time of construction, it would indicate that the lower part of the trough was protected by peat and capable of holding water up to this level (Fig. 2; Plate 6).



Figure 2. The surviving eastern end of the trough and remains of the northern side. The lake is dammed to prevent flooding.

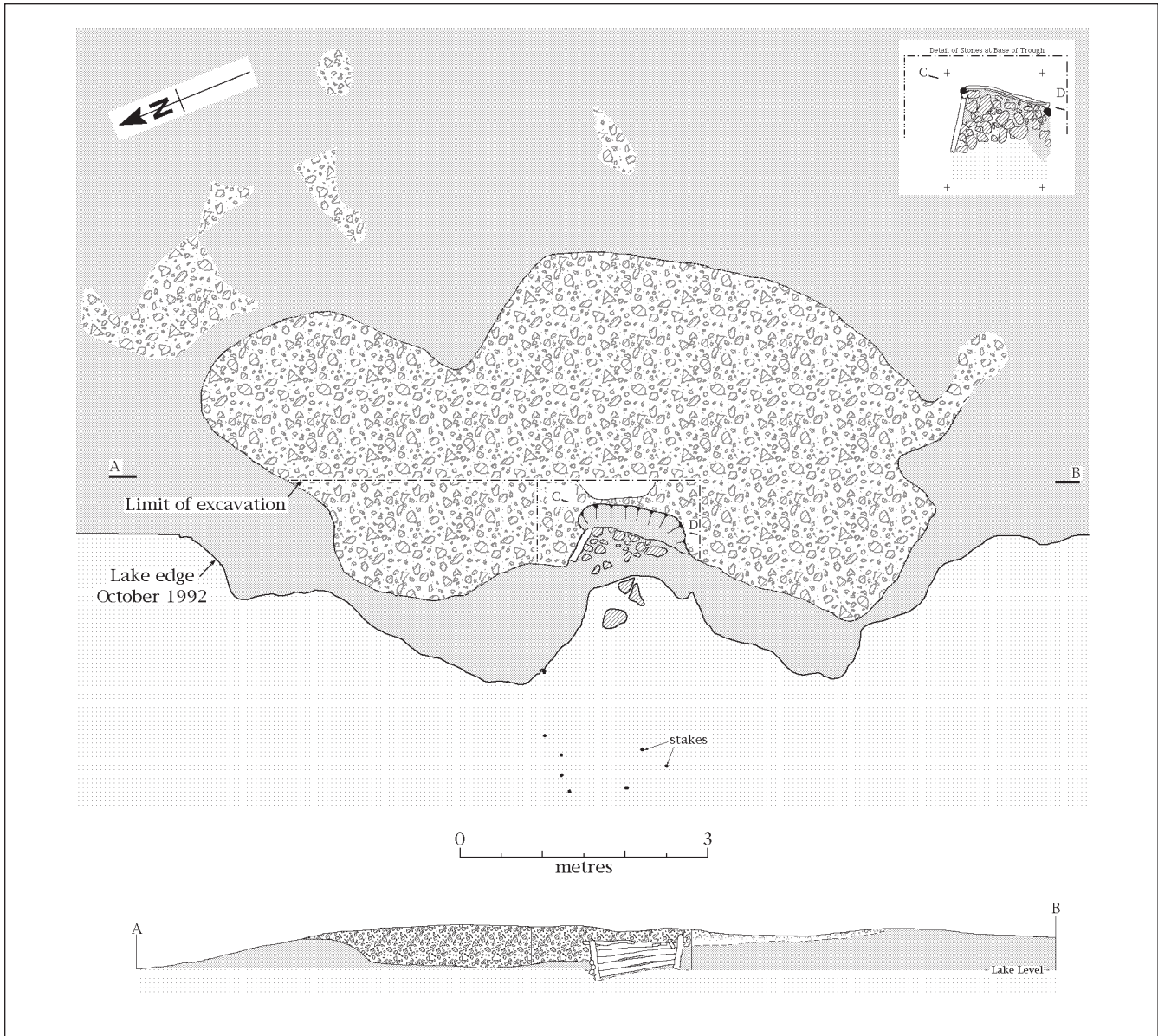


Figure 3. Plan and section of Fulacht Fiadh.

The sides of the trough were constructed of roundwoods averaging 6cm in diameter set horizontally one on top of the other. These were held in place by two internal upright corner posts 8cm and 9cm in diameter respectively (Fig. 4). These posts had been driven into the peat to a depth of 51 and 48cm. Small amounts of moss were found between some of the lower timbers. This appears to have been used as caulking to close small gaps. Between the intact eastern side of the trough and the peat two irregularly placed posts and some roundwoods were uncovered when the structure was dismantled. These appear to have held the side in place until back filling or mound deposition filled the gap between.

The weight of the mound and peat caused

the intact eastern wall of the trough and the corner posts to lean inwards slightly. In addition the absence of the remaining walls allowed the corner posts to splay outwards between 8 and 10 degrees away from this wall (Fig. 4). The northeastern corner of the trough had also subsided being 15cm lower than the southeastern corner. Details of each timber from the trough are given in Appendix 1.

There was a concentration of sand at the base of the trough which appears to have resulted from the exfoliation of heated sandstone rocks on contact with the water. Above this there were a number of large intact stones which were taken to represent the last use of the site (Fig. 5). Some of these were cracked and one example in particular was in pieces but had not fallen apart which

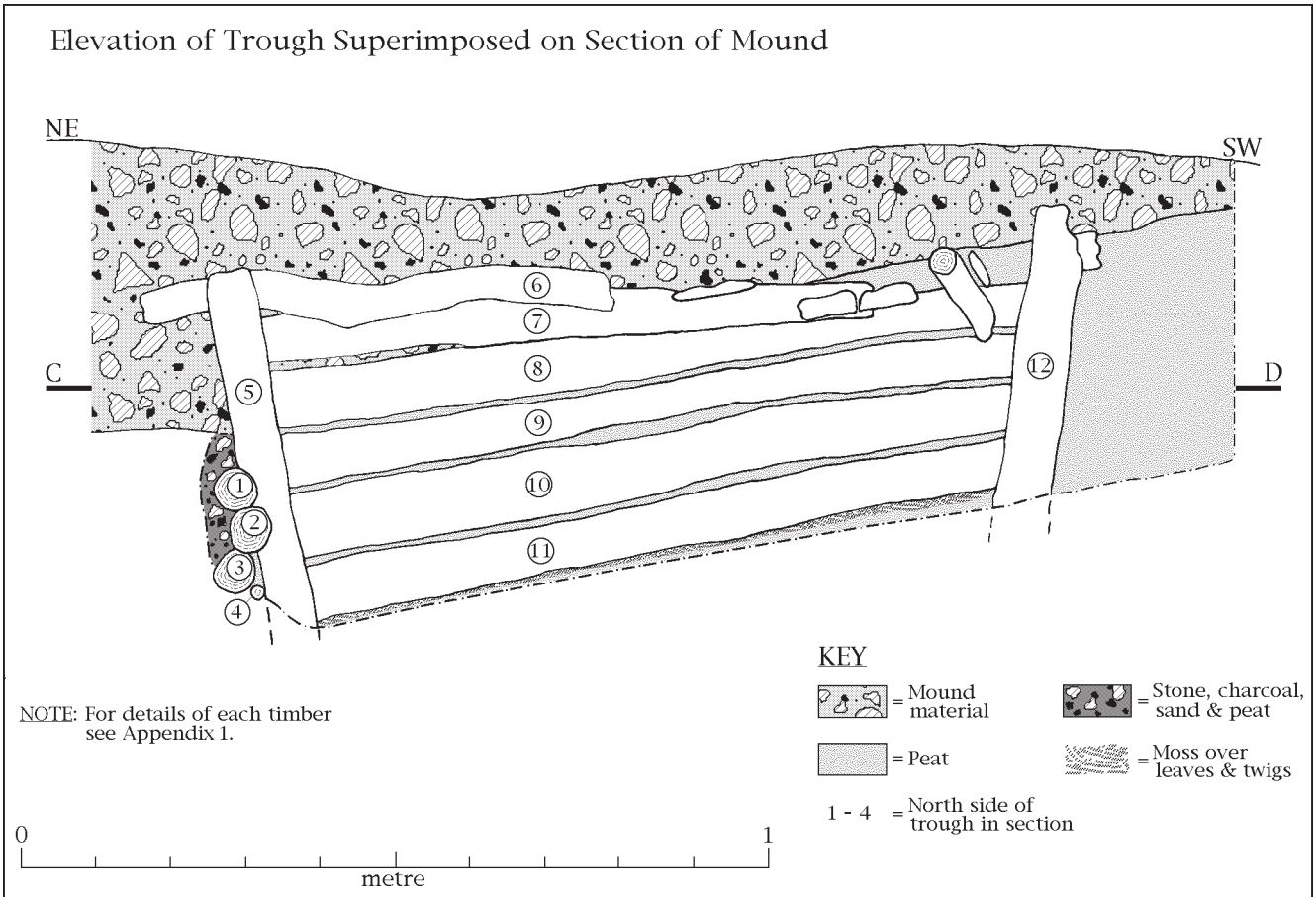


Figure 4. Detailed drawing of eastern end of trough.

showed it had not been moved after it had been plunged into the water (Fig 6). The remainder of the trough was filled with fire cracked stones, fragments of wood, both charred and uncharred, and charcoal. These upper deposits were extensively water washed by the erosion of the site and no clear patterning could be distinguished. There were also some larger stones in the upper disturbed trough fill (which may have been brought to the site to be heated) which slumped into this area as the site eroded.



Figure 5. The trough fill showing burnt stone which had slumped into the trough. Below are larger stones which represent the last use of the site.

THE MOUND

The original mound is kidney shaped and measures 7.5m by at least 4.5m when the out-wash is discounted. It was truncated slightly along the lake edge. The greatest excavated depth of the mound was parallel to the lake edge where it measured 52cm (Fig. 7). While there was no clear evidence for



Figure 6. A large heat cracked stone from the base of the trough which shows the process of reduction.

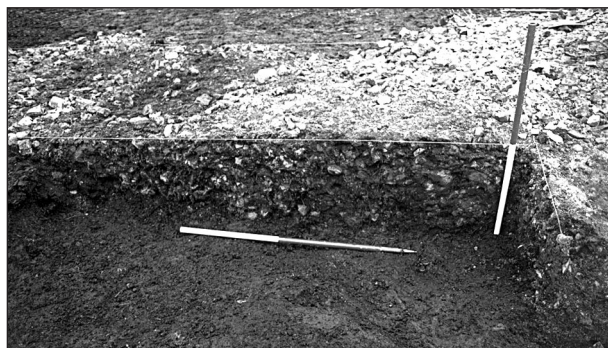


Figure 7. The excavated northwestern part of the mound prior to the excavation of the trough area to the right.

a hearth, there was an area rich in charcoal and sand on the surface of the mound to the east of the trough. There was no peat over the mound at the time of excavation but disturbed peaty deposits were found in the trough area.

Most of the stones within the mound were small and angular measuring between 2 and 10 cm across. Sandstones, conglomerates, rounded limestones and occasional pieces of quartz were recorded. The rounded limestone appears to have been contained within the conglomerates and to have fractured from them during use on site.

Within the mound there was no clear stratigraphy, differentiation in charcoal, stone density or sorting of stones by size. However, much of the mound had been penetrated by rootlets and three thin layers of slightly higher root density were discernible in the northern excavated section. This indicates that there was a minimum of three periods during its build-up in the course of which the mound was at least partially covered by vegetation. Although it was not possible to say whether these plants were sub-aquatic or dryland it does show that the mound was abandoned periodically.

The charcoal and charred wood examined from the mound and trough area was ash (*Fraxinus excelsior* L.), willow (*Salix* sp.), alder/hazel (*Alnus/Corylus*), hazel and birch (*Betula* sp.).

THE STAKES

There was an irregular arc of stakes in the submerged lake bed just beyond the site. This arc starts 2.3m from the intact side of the trough and runs 3.4m into the lake on the southern side. While it was not possible to study these posts in detail, their arrangement in relation to the trough and their proximity to the likely lake end of the trough just over 1m away suggest they are related to the structure (Fig. 3). A single stake near the lake edge was sampled and identified as holly (*Ilex aquifolium* L.).

No finds or faunal remains were recorded during the excavation. A sample of the wood from the trough was sent to the Centre for Isotope Analysis, Biologisch-Archaeologisch Instituut of Groningen for radiocarbon determination. A date of 2900 ± 40 BP (calibrated range at two sigma: 1290-939 BC) was returned.

DISCUSSION

The number of known fulachta fiadh in Co. Mayo has risen dramatically in recent years from just two in 1986 (Buckley & Lawless 1987, 33) to over two hundred and forty known or possible sites in the Sites and Monuments Record of County Mayo published in 1991. This increase is due almost entirely to the work of local archaeologists and the total is increasing as their work continues. The characteristics of these sites are the same as those used to classify sites from other parts of the country. These include a mound of fire cracked stones often in a kidney shape, proximity to water, presence of a trough of wood, clay or stone and evidence for a hearth (Brindley & Lanting 1989/90, 25). In addition, the close proximity of a second, intervisible, fulacht on the same lake shore can also be taken as a feature of their siting (Ó Drisceoil 1991, 3).

There was no evidence for a constructed hearth or for clear ash deposits in the excavated portion of the Bofeenaun site. The lake had eroded the western portion of the site and it is likely that any hearth structure present would have been in this area since the mound arcs around the eastern side of the trough. Insubstantial amounts of charred wood in the trough fill and charcoal on the surface of the mound east of the trough seem to represent discarded material.

Some elements present at this site are paralleled elsewhere. Roundwood troughs are not the most commonly recorded in fulachta fiadh but there are excavated examples from Ballyvourney 1, Co. Cork (O'Kelly 1954) and Ballycroghan (Hodges 1955). At Ballyvourney the trough was constructed of roundwoods on three sides without a wooden base and moss had been used between the timbers. Here as at Bofeenaun the corner posts were also stout and long, driven to a depth of up to 57.5cm. Experimentation showed that this was necessary to stop the sides of the trough being pressed inwards as the surrounding peat was trampled during use of the site (O'Kelly 1954, 108).

The Bofeenaun trough was constructed so that it would fill naturally with ground water coming from the surrounding peat. In addition the proximity to the lake would have enabled fresh clean water to be used if the water in the trough was stag-

nant or if dryer conditions lowered the water table in the peat.

The average dimensions of troughs in Ireland are 90cm wide, 1.9m in length and 90cm in depth (Buckley 1990, 170). Taking these dimensions into account it would appear at Bofeenaun that the trough wall measuring 1.1m represents the shorter end and that the long side of the trough extended into what is now the lake. Calculating the length of the trough using the average ratio of length to breadth, given above, results in trough length of up to 2.3m. Taking these figures, and with the depth at 50cm, we arrive at a maximum volume of approximately 1,265 litres (278 gallons) which compares with an average volume when full of 1,539 litres (338 gallons).

The overall evidence for wood working at the site was limited. There were a small number of worked ends which retained good quality wood-working evidence. No complete tool impressions (jam curves) were recorded so only general statements can be made regarding the tools used. The two main species used in the construction of the trough were ash and hazel with a single piece of mountain ash used as an upright post (*Sorbus aucuparia* L.). These pieces showed relatively narrow, often concave toolmarks. The partial tool impressions also indicated the tools used had markedly curved cutting edges. O'Sullivan (1991) has shown

that such toolmarks are consistent with the tools available during the date range of this site. However, it is not possible to distinguish between the use of palstaves or early socketed axes based on toolmarks, particularly from such a small sample (O'Sullivan, pers. comm.). There is evidence for the use of more than one tool at the site. Timber number 11, of mountain ash, shows clear tool signatures (Figs. 8). These are the marks left by a flawed or nicked tool blade on the cut surfaces. The other worked ends had smooth facets indicating the use of a different tool. This suggests that the wood brought to the site was cut from different species with different tools and perhaps by different individuals.

The moss used in the base of the trough seems to have been intended as a form of water filter allowing the water to percolate through to fill the trough while excluding peat sediment. The lower layer of fine leaves and twigs of bog myrtle would also have served this function. At Ballyvourney I leaves and twigs were also recorded in the base of the trough but were not stratified and were interpreted as having accumulated in the trough after it was abandoned (O'Kelly 1954, 109). Bog myrtle is a fragrant shrub which was used in Yorkshire to flavour 'gale beer' (Bean 1973, 760) and could have had the additional effect of flavouring the boiling water in the trough. However, bog myrtle is one of the few small woody plants that would have occurred naturally in the peaty soil conditions around the site and its placement below the moss may suggest it was not deliberately selected for this purpose. The use of these leaves in the construction does not indicate the season of construction or use of the site since bog myrtle is an evergreen plant. However, another site in Co. Mayo in Turlough Parish has burnt hazel nuts amongst the stones and charcoal (Buckley & Lawless 1987, 33) showing use of the site at least during the later part of the year. The possibility that the Bofeenaun site was used seasonally is discussed below.

The environment around Lough More during this period was suitable for the immediately local growth of the wood burnt to heat the stones and used in the construction. Ash, which made up 60% of the identified fuel, grows best in base rich damp soils and less favourably in sandy soils (Mitchell 1974, 380). The basal limestone geology of the surrounding area is covered by sandstone rich glacial deposits. The peats filling the valley bottom, which would have restricted tree growth, and the glacial deposits which they overlay would be thinnest along the sides of the rivers leading to and from Lough More. These damp conditions and the influence of alkaline ground water which had been



Figure 8. Timber number 11 from the trough with tool signatures visible on the worked end.

in contact with the underlying limestone would have created conditions where ash could grow avoiding the acidic peat and sandier material below. To a lesser extent ash could also have grown on the sides of the surrounding gravel ridges, where the peats are very thin. Here damp conditions and perhaps shelter from the prevailing southerly and westerly winds are available.

The second largest fuel source was willow. This made up 30% of the identified fuel species. The willow family is native to environments similar to those found around Lough More. It prefers damp soils and is common along river banks (Webb 1953, 154-156). The remaining species of alder/hazel, hazel and birch made up 10% of identified species. These species would also have grown naturally in areas such as this.

The stone recorded in the mound is the same as the mainly sandstone and conglomerate glacially deposited ridges running parallel to the lake on both sides. There was no discernible evidence for the selection of particular rock type and the proportions compare well with the natural deposits. The underlying limestone bedrock would not have been sought out as it can turn to lime when exposed to extreme heat for long periods or become calcium hydroxide when put into water (Lawless 1990, 8; O'Kelly 1954, 145). Its life span for repeated firings before it breaks down is almost the same as that of sandstone and less than that of agglomerate (Buckley 1990, 171). There are quarry scoops of unknown date dug into the adjacent hills above the peat line. One of these sites (BN 0006, see Map 16 Section 3.1) is directly above the site a short distance over the crest of the hill and it is possible that these may be stone extraction sites for use in the fulacht fiadh.

The larger stones found toward the base of the trough and the disturbed upper examples measured on average 20cm in diameter and were rounded to semi-rounded in shape. This may be taken as the starting size of stones which were heated and immersed in water in the trough to boil it. Experiments have shown that the stone types recorded at this site would have had an average life span of five to ten fire heatings and coolings. (Buckley 1990, 171). This involves placing the stones in a fire for a minimum of one hour and then placing them in the water filled trough. This method can boil up to 100 gallons of water in 20 minutes (Ó Drisceoil 1991, 5). One stone found near the base of the trough was cracked and starting to fall apart and appears to represent the last stages of this process (Fig. 6).

The function of the arc of stakes is difficult to determine. It has been suggested above that its

proximity to the trough and possible arrangement around its former extent show it is part of the site. These may represent the supports for an above ground structure such as a wind break or perhaps the only surviving remains of a breakwater intended to stop the lake encroaching on the site.

At the time of excavation it was noted that the lake level was sufficiently high to have prevented the use of the fulacht fiadh. The eroding mound, semi-submerged trough and completely submerged outer stake arrangement appear to support this. The trough was not watertight and appears to have been set quite deeply into the ground to allow it to fill with ground water. This would indicate that during the period of its use the water level was up to 20cm lower. A rise in lake level halted peat growth, as evidenced by the complete lack of any peat covering the mound, and would have led to the abandonment of the site. The absence of a peat cover also suggests that the site was generally submerged by the waters of the lake until recent drainage exposed the peats.

It is also possible that the site was used on a seasonal basis. The close proximity of the site to the lake edge would have rendered it susceptible to flooding by small rises in lake level such as are common in mountain lakes during the winter months. O'Kelly suggested that Site I at Killeens, Co. Cork may only have been used during summer months "for in wintertime, the valley floor becomes a morass, thus rendering the operation of the cooking-place very uncomfortable indeed" (1952, 132). More recently, sites at Mooghaun Lough, Magh Adhair and Knocknalappa, Co. Clare have been recorded on seasonally fluctuating lake shores and turloughs. These sites are frequently submerged in winter and similar lake levels in the prehistoric period would have left them accessible only during spring and summer (O'Sullivan & Condit 1995, 8). Fulachta fiadh are always constructed near water or, as at the Bofeenaun example, located in low lying wet conditions so that the trough is filled by ground water. It is likely that many of these ground water supplied sites could only have functioned seasonally. This suggests that either alternative sites were used during the wetter months or that the activities which caused these sites to be constructed were restricted to the spring-to-summer period.

Due to the general lack of stratigraphy at the site and the absence of peat cover it is not possible to say how long the site was in use. Some recently redated sites have produced two dates which show quite a long period of use. Drombeg and Killeens I Co. Cork each have dates almost three hundred years apart (Brindley *et al.* 1989/90, 26). The Drombeg dates come from beneath the mound

and in the trough fill. The Killeens dates, however, are both from planks in the trough. When excavating at Killeens I O'Kelly recorded these planks as coming definitely from no more than two trees with up to 130 rings (1954, 130) and so the 'old wood effect' (Warner 1990) alone cannot be responsible for this 300 year range. The two sigma standard deviation range of radiocarbon dates appear to be too wide to accurately record duration of activity at these sites. Some areas have such high densities of these sites that it is difficult to imagine all of them in use simultaneously. If individual sites were used for even 100 years this would not be detectable in radiocarbon determinations.

Analysis of the build up of mound material and the frequency of use seem more likely to indicate the life span of a site. O'Kelly calculated the number of phases of uses of the Killeens I site based on mound volume. He suggested that the local shaly red sandstone rock would not survive more than two firings and arrived at an approximate total of 395 boiling episodes (*ibid.*, 131; 132). Studies of five other unexcavated sites have produced estimates of 67 to 340 phases and with an average of *c.*250 (O'Sullivan & Condit 1995, 8). The Bofeenaun example was badly eroded and accurate estimate of its original mound volume was not possible. However, taking the known dimensions and geology into account and comparing it with these other site estimates it seems likely the Bofeenaun site was used on no more than 150 occasions

The function of fulachta fiadh has been the subject of debate with uses such as cooking, bathing and industrial functions having been suggested (eg. Ó Drisceoil 1988). Brindley and Lanting have stated that these sites "have no connection with descriptions in Early Historic and later texts to practices involving cooking with stones" and that "there is no evidence...that fulachta fiadh are primarily cooking sites" (1990, 56). Since then a site near Carron, Co. Clare has produced bones and teeth of red deer and domesticated cattle (Ó Drisceoil 1991, 6). The overall picture of these sites that has emerged is of cooking places and they may have had a second or secondary function as bathing places, exploiting the opportunity presented by a large quantity of hot water (*ibid.*, 5).

DATING

The possible date range of the Bofeenaun site centres on the early twelfth century BC. There is some other evidence of prehistoric activity in the general area around the site. Lawless has identified a ringbarrow 20m in diameter on the plateau of a gravel ridge 187m southeast of Lough More (Lawless

1992, 29) and a possible long barrow 4m long to the south (*ibid.*, 30). Two of the other fulachta fiadh found recently in Co. Mayo have also been dated. The sites are part of a concentration of over 120 fulacht fiadh in the parish of Turlough near Castlebar. These sites in Cashel Upper and Lack West townlands dated to 3310±40BP (Gr N 15494) and 2780±50BP (Gr N 15495) respectively (Buckley & Lawless 1988, 23).

It has recently been argued that the general dating of fulachta fiadh should be limited to a period between *c.* 3800 BP and 2500 BP and that sites outside this range should be termed burnt mounds (Brindley & Lanting 1990, 56). Fulachta fiadh are defined as having firm evidence of a trough, water source, heat fractured stones and evidence of a hearth (Brindley *et al.* 1989/90, 25). The Bofeenaun site fits this model well in terms of both chronology and typology. There is, however, evidence from a number of sites to suggest that the proposed later end of the date range may be too rigid.

Although all the samples processed to identify this date range come from sites with evidence for a trough, 5 of the 26 dates cited are from unexcavated sites where it must be assumed the samples come from disturbed or exposed sections and 4 of the sites are dated twice. This could possibly weight the evidence in favour of the suggested range by accepting disturbed samples which fall into it and excluding those that do not.

At Catstown 2, Co. Kilkenny a late date of 1190±60 AD was returned (HAR-1369) (Ryan 1976, 15). Brindley and Lanting (1990, 55) dismiss the date as being from an area of disturbance representing a *terminus ante quem* for the fulacht fiadh and that, despite the stratigraphy, the hearth is a secondary feature (Brindley *et al.* 1989/90, 28). Ryan, however, states that the sample was from a sealed context, interpenetrated with some rootlets, but also dismisses the date on the grounds that an isolated example cannot be cited as evidence for a Medieval survival (1990, 46). Catstown 1, Co. Kilkenny was dated to 490±70 BC (HAR-1379) (Ryan 1976, 15). The sample was from a disturbed pit area on a site with extensive recent disturbance. The excavator, however, takes this as a general confirmation of the dating of fulachta fiadh to the prehistoric period (Ryan 1990, 46). The sample was from a fragment of oak planking apparently disturbed from the wooden lining of the trough. When compared to the proposed range of dates this is the latest accepted example cited (Brindley *et al.* 1989/90, 27; 29).

A site from Peter Street in Waterford, which is stratigraphically dated to the Medieval period, also conforms to the proposed definition (Walsh

1990, 48). Coarhamore, Co. Kerry has also been suggested as dating to the Early Historic period based on parallels for decoration on a spindle whorl from the site (Sheehan 1990, 35). There is also, however, pottery of a prehistoric nature. Three Scottish sites have been dated to between the tenth and the twelfth centuries AD and at least one of them, Auld Taggart 4: Mound 3 there was clear evidence of a trough (Russell-White 1990a, 75; 1990b, 87).

It would appear fulachta fiadh sites generally date to the Irish Bronze Age, as is the case in the Bofeenaun example. However, there are a number of anomalous sites which continue to suggest the possibility of a limited later survival or periodic revival of this simple type of structure.

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REFERENCES

- Bean, W.J. 1973 *Trees and Shrubs Hardy in the British Isles*, Vol. II, eighth edition. John Murray, London.
- Brindley, A.L. & Lanting, J.N. 1989/90 "The dating of fulachta fiadh", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 55-56. Wordwell Ltd.-Academic Publications, Dublin.
- Brindley, A.L., Lanting, J.N. & Mook, W.G. 1989/90 "Radiocarbon Dates from Irish Fulachta Fiadh and Other Burnt Mounds". *J. Irish Archaeol.* 5, 25-33.
- Buckley, V. 1990 "Experiments using a reconstructed fulacht with a variety of rock types: the implication for the petro-morphology of fulacht fiadh", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 170-172. Wordwell Ltd.-Academic Publications, Dublin.
- Buckley, V.M. & Lawless, C. 1987 "Prehistoric Cooking in Co. Mayo", *Cathair na Mart* 7(1), 32-36.
- Buckley, V.M. & Lawless, C. 1988 "Two C14 dates for Fulachta Fiadh at Turlough, near Castlebar-Evidence for the Prehistoric 'Mini Nuclear Winter' in Co. Mayo", *Cathair na Mart* 8(1), 23-25
- Hodges, H.W.M. 1955 "The Excavation of a Group of Cooking-places at Ballycroghan, Co. Down". *Ulster J. Archaeol.* 18, series 3, 17-28.
- Lawless, C. 1990 A Fulacht Fiadh Bronze Age Cooking Experiment at Turlough, Castlebar, *Cathair na Mart* 10(1), 1-10
- Lawless, C. 1992 "Lough More, Bofeenaun, Co. Mayo- Crannóg, Fulachta Fiadh, Deer Traps and Associated Archaeological Sites", *Cathair na Mart* 12(1), 12-31
- Mitchell, A. 1974 *A Field Guide to the Trees of Britain and Northern Europe*. Collins, London.
- Ó Drisceoil, D.A. 1988 "Burnt Mounds: Cooking or Bathing?". *Antiquity* 62, 671-680.

-
- Ó Drisceoil, D.A. 1991 "Fulachta Fiadh: a General Statement". *North Munster Antiq. J.* **33**, 3-6.
- Office of Public Works 1991 *Sites and Monuments Record for Co. Mayo*.
- O'Kelly, M.J. 1954 "Excavations and Experiments in Ancient Irish Cooking-places". *J. Roy. Soc. Antiq. Ireland* **84**, 105-155.
- O'Sullivan, A. 1991 *Prehistoric Woodworking Techniques: the evidence from excavated trackways in the raised bogs in Co. Longford*. Unpublished M.A. Thesis, University College Dublin.
- O'Sullivan, A. & Condit, T. 1995 "Late Bronze Age Settlement and Economy by the Marshlands of the Upper Fergus Estuary". *The Other Clare* **19**, 5-9.
- Russell-White, C. 1990a "The East Rhins of Galloway", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 70-76. Wordwell Ltd.-Academic Publications, Dublin.
- Russell-White, C. 1990b "Synthesis", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 87-91. Wordwell Ltd.-Academic Publications, Dublin.
- Ryan, M. 1990 "Ancient Cooking Places at Catstown, near Hugginstown, Co. Kilkenny", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 40-46. Wordwell Ltd.-Academic Publications, Dublin.
- Ryan, M. 1976 "Fulachta Fiadh at Rathmore Townland, Rathmore", *J. Kerry Archaeol. Hist. Soc.* **9**, 11-16.
- Sheehan, J. 1990 "The excavation of a fulacht fiadh at Coarhamore, Valentia Island, Co. Kerry", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 27-37. Wordwell Ltd.-Academic Publications, Dublin.
- Walsh, C. 1990 "A Medieval Cooking Trough from Peter Street, Waterford", in V. Buckley (ed.) *Burnt Offerings: International Contributions to Burnt Mound Archaeology*, 47-48. Wordwell Ltd.-Academic Publications, Dublin.
- Warner, R.B. 1990 "A Proposed Adjustment for the 'Old-Wood Effect'", in Mook W. & Waterbolk, H. (eds) *Proceedings of the Second Symposium of C14 and Archaeology, Groningen 1987*, 159-172. Pact no. 29 (ESF).
- Webb, D.A. 1953 *An Irish Flora*. Dundalgan Press Ltd., Dundalk.

Appendix 1: Details of wood from Fulacht Fiadh (MA-BN 0002)

	Length (cm)	Max. Diameter (cm)	Species & Rings	Ends	Toolmarks
Timber 1	74+	7.5	Ash, rings not recorded	Damaged	None visible
Timber 2	48+	5.5	Hazel, 35 rings	Chisel point at 60°	None visible
Timber 3	74+	5.3	Alder, 26 rings	Damaged	None visible
Timber 4	42+	3.8	Not identified	Pencil point 26cm long dress on two main opposing planes	Multitple small concave facets. Smooth facet junctions
Timber 5	107 (56 below peat)	8.0	Ash, 45 rings	Chisel point on two adjacent planes 18cm long. Angle of cutting planes 24°. Point broken.	Max. facet width 3.1 cm, max. facet length 3.3cm, max concavity of facets 2.5mm. Average angle of facets 23-30°. Some slightly stepped facet junctions. No signatures present.
Timber 6	75+	4.4	Hazel, 18 rings	In fragments	None visible
Timber 7	90+	6.5	Hazel, 33 rings	Chisel point 40°, damaged	None Visible
Timber 8	126	7.0	Hazel, 39 rings	North end wedge point 20° & 30°, damaged. South end wedge point 30° & 15°, damaged.	None visible
Timber 9	122	7.0	Ash, 49 rings	South end chisel point 38°, 9cm long	Numerous small degraded facets. Smooth facet junctions.
Timber 10	110	6.0	Ash, rings not recorded	North end chisel point 10cm long. South end broken.	Present but too degraded to record accurately
Timber 11	111	7.0	Mountain Ash, 46 rings	North end chisel point 10 cm long, 40°. South end wedge point badly damaged 7cm long, 35° and 20°.	Recorded on northern end. Max. facet width 3.7cm, max. facet length 4.8cm, max. facet concavity 3mm, max. curvature of blade 0.5mm on facet 3.3cm wide. Facet angles 40°, 21°, 35°. Some stepped facet junctions. Clear signatures (Fig. 8)
Timber 12	89 (48 below peat)	9.0	Ash, 49 rings	Chisel point on two adjacent planes 19.5cm long.	Max. facet width 3.9cm, max. facet length 4.2cm. Max facet concavity 4mm Facet angles 16°, 17°, 20°, 23°. Stepped facet junctions. No signatures present.
Timber 13	78	5.5	Birch, 19 rings	One split face	None visible
Timber 14	45	6.0	Alder, 16 rings	No record	None visible
Timber 15	67	5.5	Birch, 36 rings	Broken	None visible
Timber 16	32	6.5	Birch, rings not recorded	Post with chisel 10cm long at point	None visible
Timber 17	31	4.5	Hazel ?	Degraded post in mound	None visible

Notes:

- 1/ No complete tool impressions were present so the figures given above represent the maximum measurements present and the minimum measurements of the tools used.
- 2/ Timbers 13-17 are not visible on plan (Fig. 4). They were uncovered behind the trough and were covered by the mound.