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A summary of investigations by the Lisheen Archaeological Project

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Introduction

The Lisheen Archaeological Project was carried out between 1992 and 1998 in Derryville Bog, County Tipperary, Ireland (see Figure 1), in advance of the construction of a lead and zinc mine by Minorco Lisheen Ltd. The work progressed from being the heritage component of an Environmental Impact Statement through wetlands survey to reach fruition as an integrated research project carried out under the management of Margaret Gowen & Co Ltd., and funded in full by Minorco Lisheen. The multi-disciplinary nature of the project allowed for a series of aspects of Derryville Bog to be examined on two levels.

Firstly, the specialist studies such as palynology (Prof. Chris Caseldine and Dr. Jackie Hatton), testate amoebae (Dr. Ben Gearey), palaeohydrology and peat morphology (Prof. Wil Casparie), coleoptera (Eileen Reilly) and wood analysis (Dr. Ingelise Stuijts), were carried out as stand alone elements of the project, with analysis being conducted in Ireland, England and the Netherlands.

Secondly, regular communication between the specialists and the excavation directors (Sarah Cross, Cara Murray, Paul Stevens and John Ó Néill) meant that the various strands, as represented by the archaeology and the specialist studies, could be knitted together to compare and contrast each set of results. The integration achieved by the project allowed each aspect to inform and guide the overall direction.

In all, some 100-plus archaeological sites were investigated at the site of the proposed Lisheen Mine, close to the tri-county (Tipperary, Laois, Kilkenny) border. This included 66 wetland structures dating from the Early Bronze Age to the Early Christian Period. The data obtained in the course of these campaigns is still being analysed, such is the wealth of information recovered from the area.

The study area incorporated a "peninsula" of *Bord na Móna*-worked raised peat bog, called Darryville Bogg, which forms part of the southern extent of the Littleton raised bog complex. The bog began in two basins separated by a glacial ridge, and extended out into Derryfadda to the east, Killoran to the west, and Cooleeny to the south-west. Both raised bog and fen were present during most of the period of bog development. The main area of construction of the Lisheen Mine lay to the west of the bog and out towards Carrick Hill, some 3km to the west. Thus the study area of the project lay across these two areas of wetlands (within Derryville Bog) and drylands (around the bog and up to 3km to the west of the bog).

Given the scale of the project, it is difficult to produce a concise summary of the results, so this paper mainly outlines the structures and sites by type along with their dates. More detailed information on individual sites is included in the 1996, 1997, and forthcoming 1998 *Excavations Bulletins* (see bibliography). This paper assembles those entries into an outline chronological sequence for the study area. Three papers on the results were presented at the World Wetland Archaeology Conference in Dublin in September 1998 and will appear in the conference proceedings (Casparie, *forthcoming*; Caseldine, *forthcoming*; Cross, Murray, Ó Néill and Stevens, *forthcoming*).



The Chronological Framework

The chronological framework for the project results has been constructed from a number of sources. The primary data, in the form of radiocarbon and dendrochronology dates from excavated sites, has been used alongside independent dating of peat and pollen sequences. The integration of these series provided controls for the dating of individual sites, particularly when a specific archaeological or environmental episode could be dated by dendrochronology and that date could be extrapolated across the whole bog. Dates were obtained from the radiocarbon laboratories in Miami, Belfast and Groningen, while the dendrochronology dates were also obtained in Belfast.

Dates quoted here are from the following radiocarbon laboratories: Beta Analytic, miami (prefixed Beta), Queen's University, Belfast (prefix UB) and Groningen (prefix GrN). For reference purposes, all dates are assigned a lab code and serial number (e.g. Beta-102752). Radiocarbon dates are obtained by measuring the surviving amount of carbon 14 isotope in organic matter, which decays at a known rate. The dates quoted here have been calibrated against a real time curve, giving an estimated date in calendar years, within a statistical probability of 2 or 96%. These dates are referred to as calibrated dates, and are the type quoted in this paper.

Dendrochronology dates (prefixed Q.) are obtained by identifying the possible date of the last year ring present on oak timbers, against a master chronology.

In total, 140 dates were obtained from sites of archaeological or environmental significance. The sequence of 31 environmental dates begins in 6080 BC after the start of peat development and includes 7th century AD dates for the surviving surface levels (see Casparie, *forthcoming*). Dendrochronology dates, from 3368 BC to 161 BC, helped to place various expansions of oak woods into the wetland margins. Coupled with the series of dates from the pollen cores, they have provided a sequential picture of the dry land flora and woodland cover from the end of the 3rd millennium BC onwards (see Caseldine, *forthcoming*). A summary chart of the dates and other events is included as Figure 2.

Overall, the dates obtained for the causeways, trackways and platforms in Derryville Bog do not fit neatly into the existing wider national pattern in that they fall more substantially into the first millennium BC (see Figure 3). The dryland dating sequence shows a certain amount of continuity from around the mid-second millennium BC to after AD 1000 with the only major gap in the early 1st millennium BC (Figure 4). The chronological boundaries which were used mostly followed the conventional approach (e.g. Brindley 1995, 5; Cooney and Grogan 1994). Two interregna were inserted, with a Final Neolithic/Copper Age being inserted between 2800 BC and 2350 BC, preceding the beginning of the Bronze Age. The second period was inserted across the Bronze Age/Iron Age transition, which is a problematic period of Irish prehistory (Raftery 1994, 35).

However, the distribution of dates after 800 BC is unique, in that there is a range of dates between 750 BC and 450 BC. Many structures were built during this period, including the 7m wide causeway Cooleeny 31. The dating sequence from the period between 650 BC and 450 BC allowed the end of the Late Bronze Age (1200-650 BC) to be studied in some detail. This period saw a recognisable change in the marks left by axes on felled timbers. This appears to correlate with a change from bronze to iron axes. The change first appears on sites constructed around c. 600 BC or slightly earlier.

Site Types

Within each chronological period below, the sites are loosely grouped by type. Wetland structures were mainly identified as causeways, trackways or platforms on the basis of function, as identified during excavation:

Causeways: structures crossing from one side of the bog to another.

Trackways: structures accessing rather than crossing the bog (e.g. within the fen margins or across localised features of the bog surface).

Platforms: isolated dry areas constructed on the bog surface. In Derryville Bog, these were generally less than 10m across.

This very loose classification can be infinitely subdivided on the basis of construction materials and elements, but for the purposes of this paper they are grouped by their perceived function.

Other wetland structures included extensive linear post arrangements (stake rows) that, generally, marked off extremely hazardous wet areas of the bog surface. In a number of locations unassociated deposits of worked wood were also found, indicating further human activity on the site.

A large number of *fulachta fiadh*, or Bronze Age cooking sites, were also identified in the bog and on the surrounding drylands. A number of these had well-preserved wood-lined troughs.

A small number of settlement sites and burial sites were also identified. As is the case with the wetland material, only the briefest of summaries can be given. A number of Middle Bronze Age house sites were identified at Killoran 8, an Iron Age house at Killoran 16, and Early Medieval hut sites at Killoran 8 and Killoran 66.

Two cemeteries of cremated human remains were also excavated, both dating to the Bronze Age (Killoran 10 and Killoran 6), along with some isolated burials. It is hoped that some of these may be published in more detail in this journal at a future date.

Neolithic (4300-2800 BC)

The general scarcity of Neolithic dates in wetland areas has been noted elsewhere (e.g. Raftery 1996), although in Derryville Bog it may also be a product of the constraints on the research, as it was not safe to prospect in 4-5m deep peats. The small number of dates did not allow for an examination of the 2350 BC boundary between the Neolithic and the Early Bronze Age in Ireland.

The earliest archaeological dates produced from the bog were 3339-2924 BC (UB-4082) and 3020-2613 BC (UB-4097). These were obtained from two cleft timbers recovered from the north-eastern side of the bog. The latter timber was located in 0.2m of peaty, silty clay with some charcoal flecks, filling shallow hollows in the glacial till. The charcoal flecks may relate to an otherwise unidentified episode of land clearance in the vicinity in the Neolithic.

An earlier dendrochronology date of 3368 BC + 9yrs (Q9540) was also obtained from peat deposits which were heavily disturbed by a bog burst in 2200 BC. A small number of sherds of pottery from the same area were tentatively identified as Neolithic by Helen Roche. (These are listed as: Derryfadda 218; Vessel 1: One fragment (96E202:218:3) consisting of hurt, slightly crumbly fabric with a low to moderate grit content. Large cavities are present on both surfaces. Colour: Brown exterior and interior surfaces with black core. Thickness: 10.7mm, and, 96E202:218:1. One sherd, too wet and fragile to be examined before conservation (from Roche 1998.)



Final Neolithic/Copper Age (2800-2350 BC)

A small number of sherds of pottery with possible Beaker affinities (Roche 1998) were uncovered from an area beyond the western limits of the bog (Killoran 15). No other evidence was identified at the findspot. One *fulacht fiadh* (Killoran 17), produced a date of 2585-2195 BC (Beta-117547).

Early Bronze Age (2350-1700 BC)

The typical Bronze Age structures, in Derryville Bog, *fulachta fiadh*, platforms and trackways, begin to appear in the Early Bronze Age. The small number of Early Bronze Age dates, like the Neolithic, may reflect the constraints mentioned above, but this, too, is a visible trend on a national level.

Five sites could be dated within the 2350-1700 BC range including two trackways, at least one of the *fulachta fiadh*, a platform and an area of burning. The pollen evidence from this period showed small drops in tree pollen, suggesting clearance of trees in the surrounding dry land, which at this time was still heavily afforested. The presence of the beetle *Prostomis Mandibularis*, in wood from the Middle Bronze Age track Cooleeny 23, implies that primary woodland was still present in the area at this later date.

Trackways: Two short trackways were built in this period, Derryfadda 207, dated to 2205-1795 BC (Beta-102757), and Derryfadda 204, dating to 2120-1755 BC (Beta-102764). These structures were located in the south-eastern corner of the bog.

Platforms: In the south-east of the bog, there was a badly degraded wooden platform, Derryfadda 218, constructed on the fen margin dated to 2290-1935 BC (Beta-102759). A number of sherds of coarse undecorated pottery were found associated with the platform, but these may be earlier as mentioned above.

Fulachta Fiadh: The *fulacht fiadh*, Killoran 304, was dated to this period, although a number of other sites such as Killoran 316 may also be of similar date (2138-1935 BC, UB-4186). The low volume of firing debris suggested that this *fulacht fiadh* was not in use for a long period of time.

Miscellaneous: A deposit of charcoal underneath Killoran 18 was dated 2133-1548 BC (UB-4095). This burning could have represented scrub clearance by burning in that area or may have been an informal hearth.

Middle Bronze Age (1700-1200 BC)

The earliest causeway, substantial settlement and burials in the study area date to the Middle Bronze Age. Much of this appears to relate to a prolonged episode of settlement in the 16th and 15th centuries BC. During this period the first evidence of trough-linings appear on *fulachta fiadh*. The beginning of the Middle Bronze Age was marked in the pollen record by significant clearance, notably of elm and ash, which continued with increased severity up to c. 1250 BC. This was also largely borne out by the archaeological record. The activity on the bog was largely a continuum from the Early Bronze Age but with an increased size and scale.

Causeways: During the Middle Bronze Age, the first attempt was made to build a structure from one side of the bog to the other with the construction of Killoran 18. During the course of the project it was decided to designate these type of sites as causeways since they linked one area of dryland to another. The only other attempt to bridge the whole bog was around 600 BC when Cooleeny 31 was built.

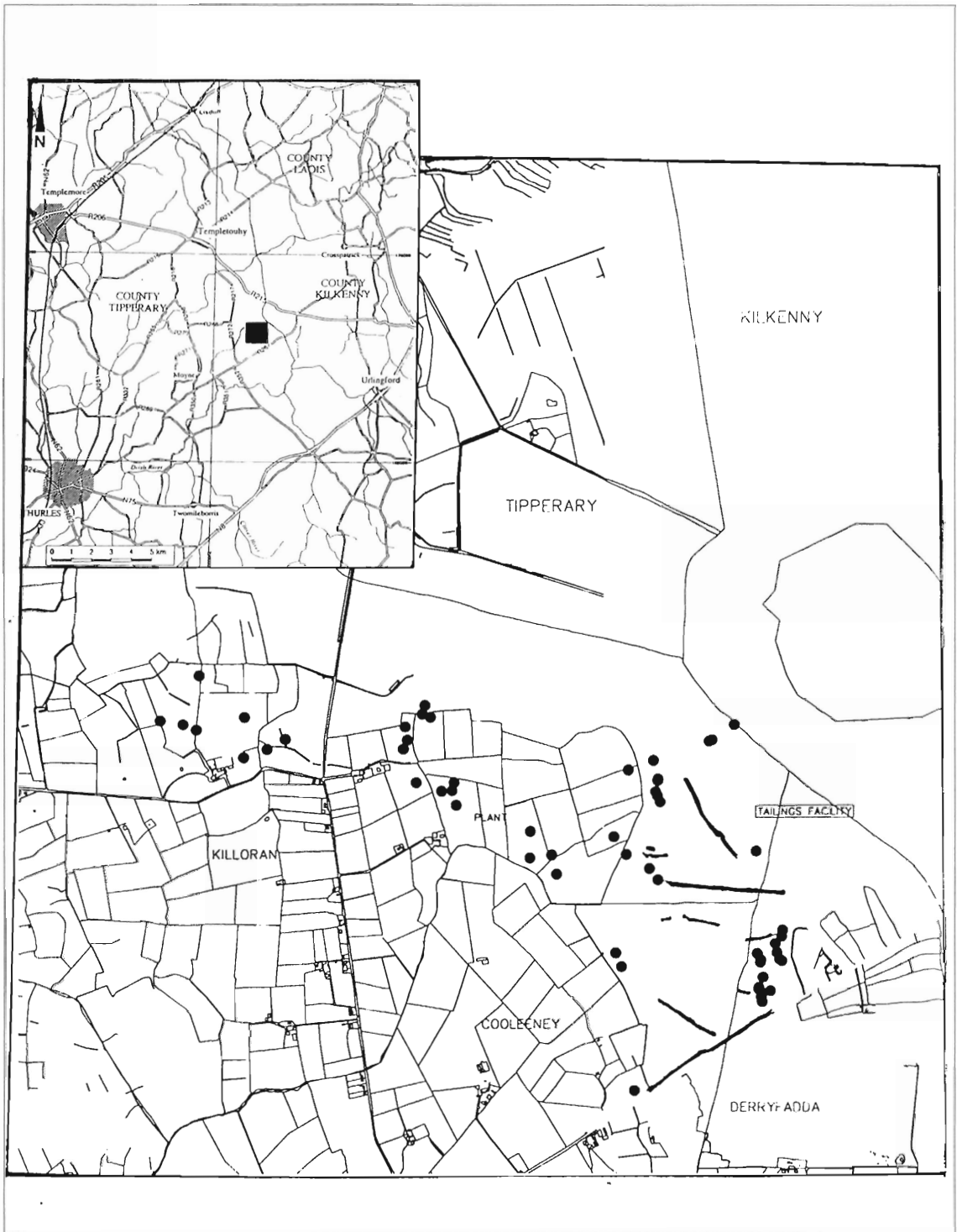


Figure 1. Map showing the location of the Lisheen Mine, the townlands and sites.

Dates of Lisheen Wetland Structures and Conventional Chronological Periods with metalwork subdivisions, bog bursts, pollen zones and changes in woodworking.

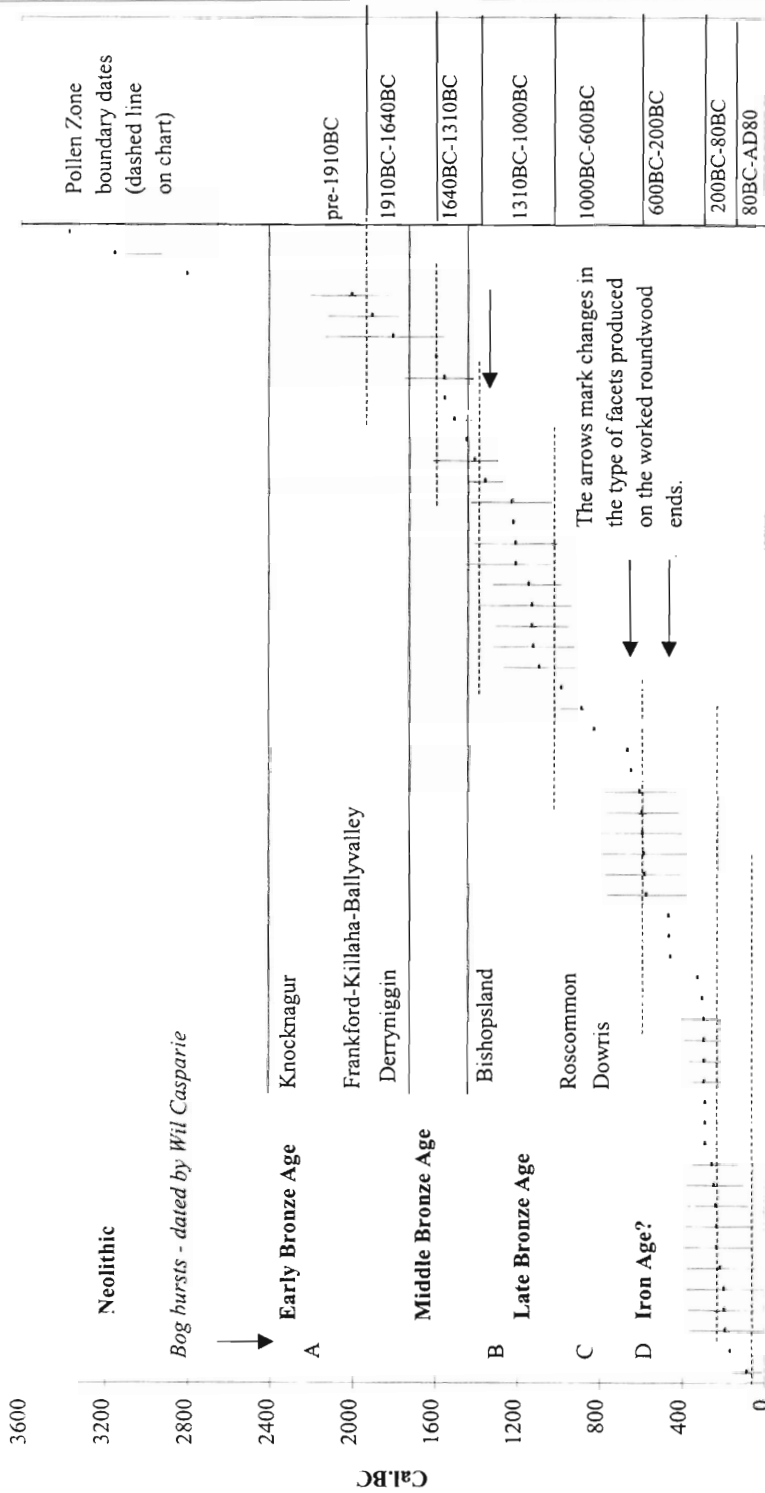


Figure 2. Dates of Lisheen Wetland structures and Conventional Chronological Periods with metal subdivisions, bog bursts, pollen zones and changes in woodworking.

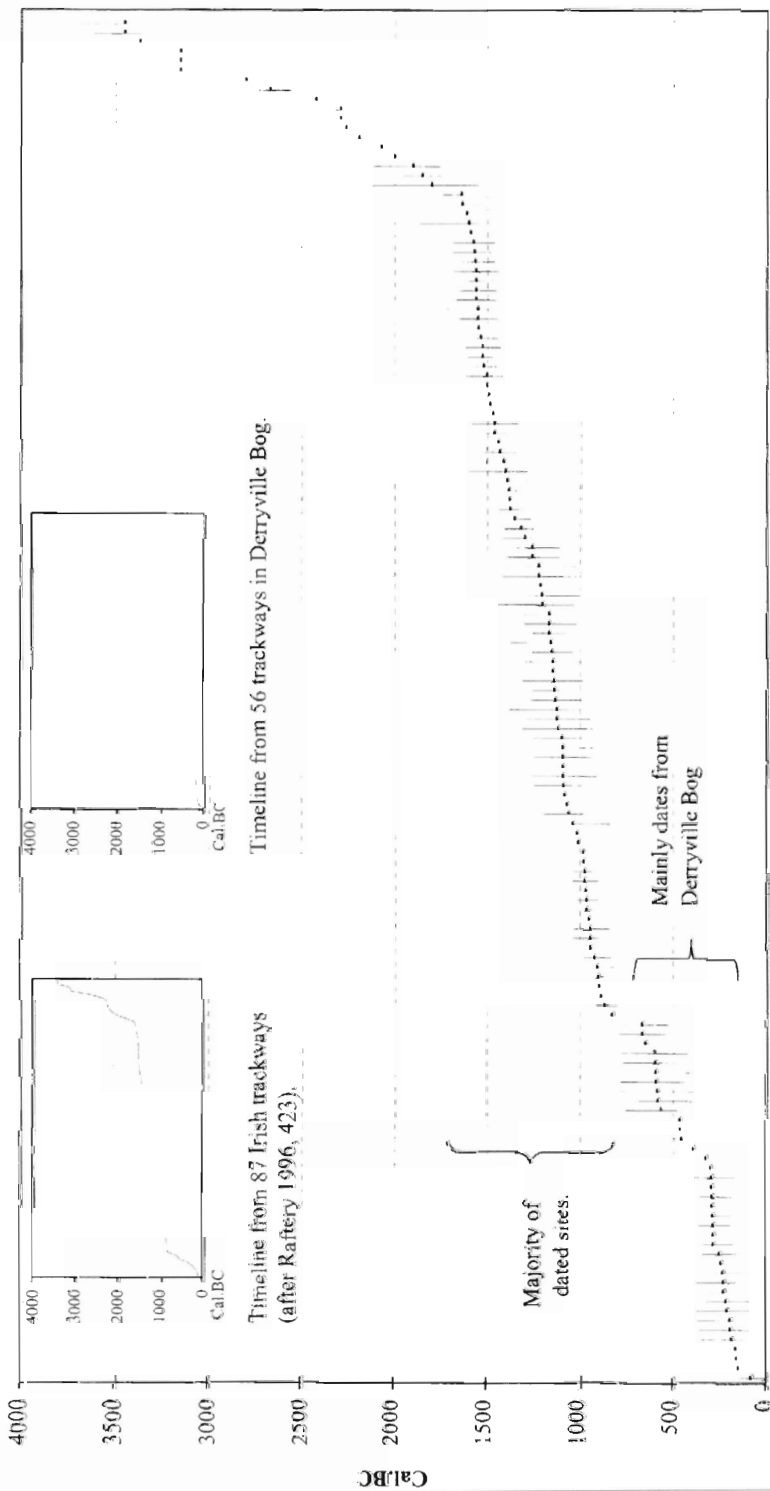


Figure 3. Range of Dates from Trackways and Causeways in Ireland.



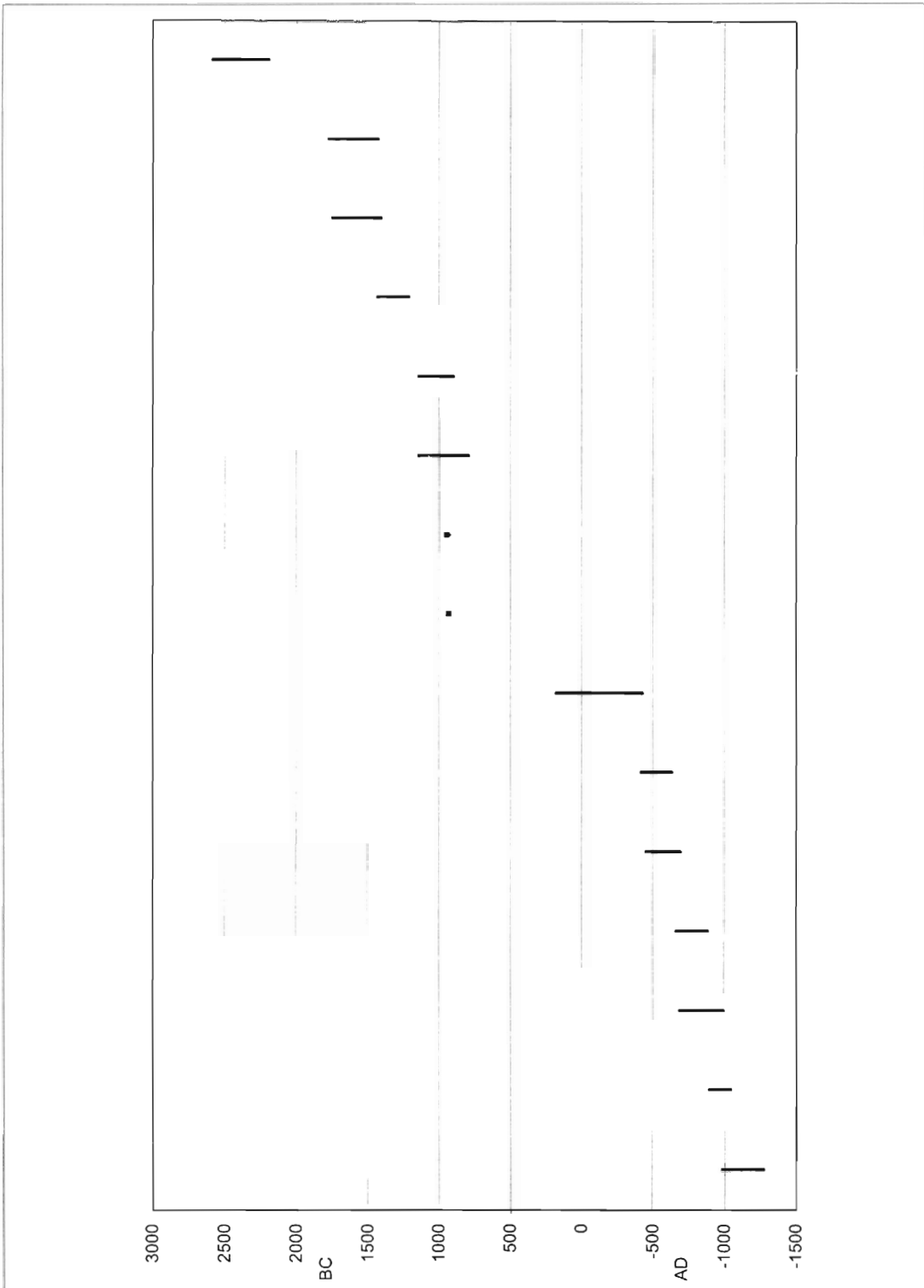


Figure 4. Dryland Dates obtained from sites around Derrynville Bog.



Figure 5. View of the causeway, Killoran 18.

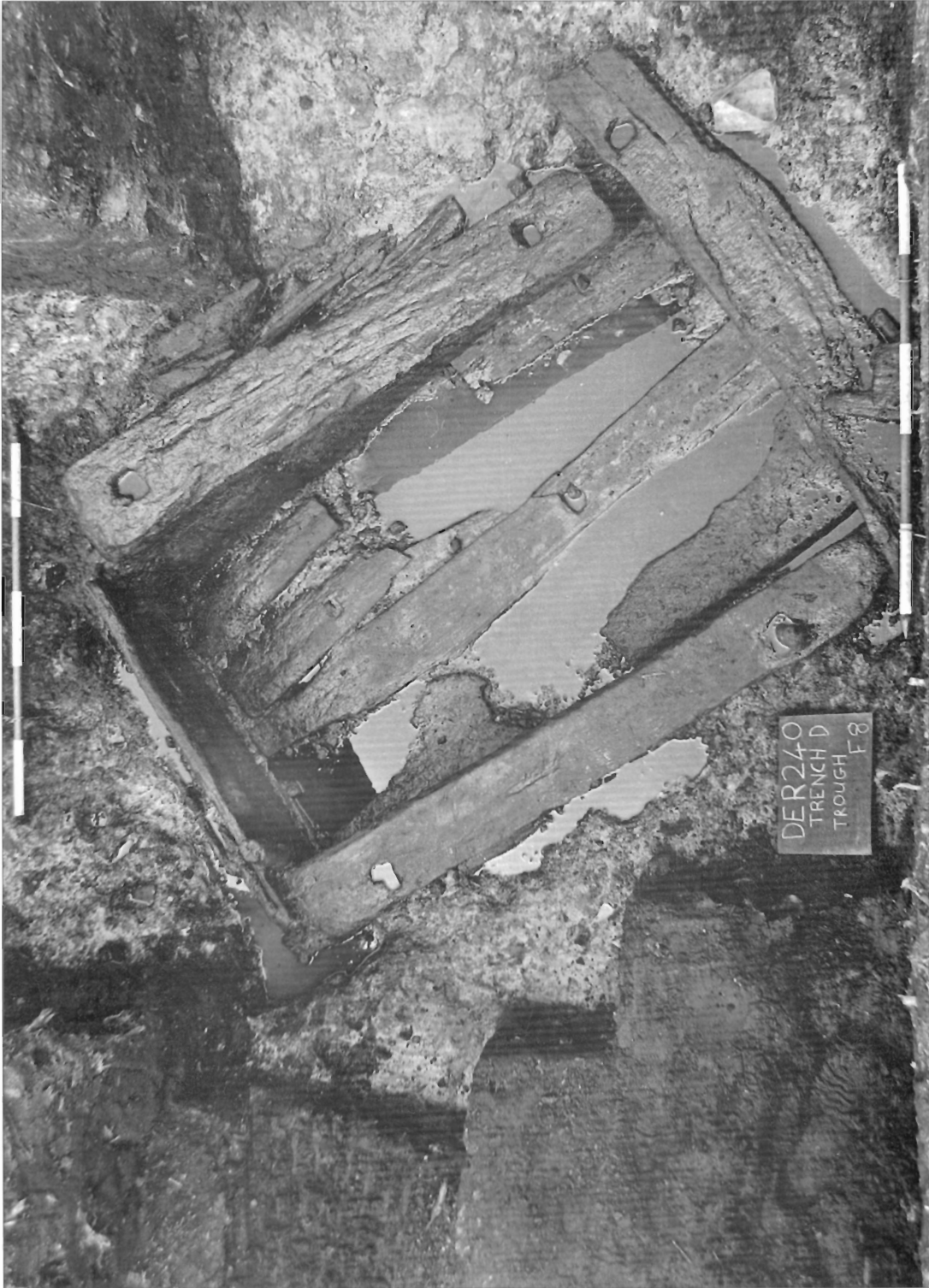


Figure 6. View of the trough of the fulacht fiadh, Killoran 240.



Figure 7. Ground plan of House A, Killoran 8.



Figure 8. The wicker lined trough of Killoran 253.



Figure 9. The causeway, Cooleeny 31.

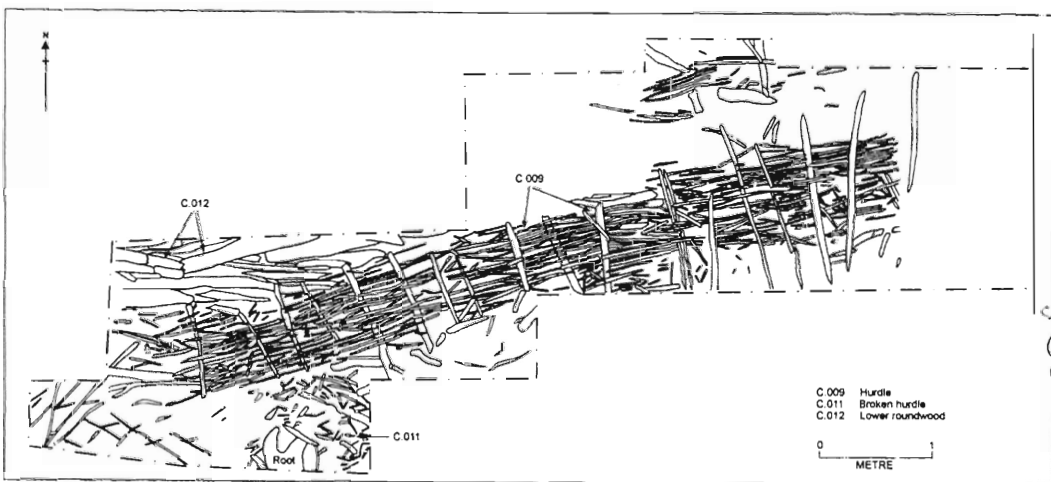


Figure 10. One of the hurdles from Killoran 75.

There were a number of phases of construction of Killoran 18. Phase 1 consisted of a double stake row and brushwood track. Dates of 1745-1405 BC (Beta-102752) and 1405-1000 BC (Beta-102750) were obtained for this phase. These cannot be reconciled and one of the two (probably the later date) should be considered as anomalous. Phase 2 consisted of a stone and wood causeway. It was dated to after 1524-1543 BC (Q9470) and 1605-1410 BC (Beta-102751). The last year rings on timbers used to repair the causeway grew in 1440 BC (Q9349) and 1542 BC (Q9349). The condition of the some of the timbers from Phase 2 suggested that the structure was repaired after 20-40 years.

Further features, which appear to be associated with the causeway, included an area of burning and a narrow wooden trackway (Killoran 305, described below). The area of in situ burning was located close to the stone-paved eastern terminus of the causeway and dated to 1620-1410 BC (UB-4083).

Trackways: Two single plank trackways were built across raised bog in the south-east of the study area, in the late 17th and late 16th centuries BC. Derryfadda 23, the shorter of the two, was dated to 1581-1599 BC (Q9370). Cooleeny 22 was much longer and lay further north than Derryfadda, and was dated to between 1526-1508 BC (Q9547, Q9549). A short trackway (Killoran 241) was also constructed during the use of a *fulacht fiadh* (Killoran 240), some twenty years before an oak collapsed on to the upper surface 1538-1556 BC (Q9542). This trackway began as a narrow line of longitudinally laid branches, and was later widened when transverse elements were added. The trackway, Killoran 305, was located close to the western terminus of the causeway, Killoran 18, and was dated to 1510-1310 BC (UB-4187) and 1436-1264 BC (UB-4188). Damage to the blade of the axe used to fell timbers on this structure left a recognisable pattern, which was also visible on timbers from Killoran 18, indicating that the two sites are contemporary.

A further trackway, Killoran 230 was dated to 1500-1195 BC (Beta-111368). The latest trackway dating to this period, Killoran 235, was a short irregular structure located within marginal woodland. This dated to just before 1221-1203 BC (Q9541).

Platforms: A small platform, Killoran 237, was located in a small outlet channel directly over the alluvium and was dated to 1685-1400 BC (Beta-111370). A yew spear shaft was identified amongst the timbers used in the construction of the platform.

Fulachta Fiadh: The first evidence for *fulachta fiadh* with lined troughs appears in Derryville Bog in the Middle Bronze Age. The largest example excavated in the study area was Killoran 240, which had a rectangular, plank-lined trough, which had been re-lined on at least one occasion. A trackway (Killoran 241) built to access the site was in use around 1538-1556 BC (Q9542). Stones which survived in the trough, from the last use of the site, suggest that the site was used up to 4,000 times.

A small mound of burnt stone and charcoal (Killoran 316) was identified to the south of Killoran 240. No features such as a trough were found associated with this site. While this precludes the site being classed as a *fulacht fiadh* (see Brindley et al, etc), they may be related in function to the contemporary Scandian skärvtenshöggar. Its stratigraphic position suggests that it dates to this period also.

Further west, on the dryland, Killoran 5, dated 1750-1410 BC (Beta-117545), was located on the western slope of a glacial ridge in the centre of the Killoran dryland.

A later site, Killoran 265, located on the glacial till to the west of the channel had a large carved oak trough, and was dated to 1425-1120 BC (Beta-111377). The composition of the burnt material contained a high percentage of limestone, unlike the other *fulachta fiadh* in the area where sandstone predominated. This site was re-used around 600 times.

Miscellaneous: To the north was a deposit of archaeological wood, Killoran 229, consisting of a scatter of worked roundwoods lying within the discharge channel and overlying the alluvium. It was dated to 1385-930 BC (Beta-102747).

A number of archaeological wood deposits, Derryfadda 15, Killoran 41, Killoran 56, Killoran 57 and the burnt mound Killoran 316 have also been dated to this period, on the basis of their stratigraphic positions within the peat.

Beyond the western margins of Derryville bog, located on a dry plateau, a very large flat cremation cemetery dating to 1435-1215 BC (Beta-117546) was revealed. This site contained over 28 unmarked, simple individual cremation pits.

Also dating to this period was the unenclosed settlement at Killoran 8 (1775-1430 BC, Beta-117553), where two complete roundhouses were excavated. These had diameters of 8m and 9m and survived as circular wall slots with internal postholes. The remains of a third structure and other features were also identified on the site.

Late Bronze Age (1200-650 BC)

Most of the main site types, trackways, *fulachta fiadh* and platforms all continue in use into this period. The first stake row was also laid across the edge of a hazardous area of bog. There is continuing evidence for burials and *fulachta fiadh* on the surrounding dryland.

The pollen suggests a lull in clearance from 1310-1000 BC followed by a serious attack on the woodland in the period between 1000 and 600 BC. This does not appear to be reflected in the dates for the construction of sites, which cluster more around a bog burst, dating to 1250 BC when the hydrology of the bog was severely altered.

Trackways: A number of trackways were constructed out of different materials in the Late Bronze Age. In the south-east a short stone trackway was built, at Derryfadda 311, dating to 1450-1030 BC (Beta-11375). North of that structure was a stone and timber track, Derryfadda 17; this was dated to 1315-980 BC (Beta-111272). On the western side of Derryville Bog, another stone and timber trackway (Cooleeny 64) was constructed in 1420-1020 BC (Beta-111374). In the north-west, the trackway Killoran 243 (988-970 BC, Q9543) was constructed in a hollow formed by the earlier *fulacht fiadh*, Killoran 240. The timber trackway, Killoran 69 (838-799 BC, UB-4180), also dated to the Late Bronze Age.

Platforms: In the south-east Derryfadda 211 (1265-910 BC, Beta-102753) and Derryfadda 213 (1315-915 BC, Beta-102758) were both in use in this period.

Fulachta Fiadh: A number of the excavated *fulachta fiadh* were dated to this period. On the eastern side of the bog these included Derryfadda 216, dated to 1400-990 BC (Beta-102305), and on the western side, Killoran 253, dating to 1305-940 BC (Beta-111378). Further west, beyond the edge of the bog on the Killoran headland, two more Late Bronze Age *fulachta fiadh*, Killoran 27, dated to 932 BC (Q9698), and Killoran 26, dated to 1145-795 BC (Beta-117549), were identified as having been in use at this time.

Stake rows: The first dated stake row was built during this period, at Derryfadda 209 (990-770 BC, Beta-102749).

Miscellaneous: In the northern part of the bog, a number of pieces of worked wood were recovered at Killoran 20 (1305-940 BC, Beta-111373). On the dryland at the western side of the bog, an isolated cremation pit, Killoran 6, was dated to 1145-900 BC (Beta-117548).

Late Bronze Age/Iron Age Transition (650-460 BC)

By the end of the Bronze Age, *fulachta fiadh* appear to pass out of use. The other main site types continue in use through to the Iron Age. No evidence for dryland activity was identified in this period. As through much of the Bronze Age, the proportion of raised bog gradually increases, encroaching ever further on the fens around the margin of the bog.

The pollen record indicates low levels of human activity between 600 BC to 200 BC. Another bog burst occurred around 600 BC.

Causeways: This period also saw the construction of the short-lived causeway, Cooleeny 31, which crossed the Cooleeny bog system. It was built just before the c. 600 BC bog burst in that area, which destroyed a section of it. Indeed the weight of the causeway may even have precipitated the bog burst. The dated samples from structures in the unexcavated Cooleeny complex of sites, in marginal woodland and raised bog around the western end of Cooleeny 31, suggest that a number of these also fall into the 7th to 5th century BC period.

Trackways: Five trackways were dated to this period. Derryfadda 13, Derryfadda 206 and Killoran 306 all dated to around the time of a bog burst in 600 BC. Two others dated to the period between 600 BC and 450 BC, Derryfadda 210 (515-365 BC, Beta-102740) and Killoran 234 (795-395 BC, Beta-111369).

This distinction was mainly based on a change in the type of axes used on the wood from the structures. The main distinction in the Derryville material seems to take place before around 600 BC. A further, minor, change took place around 450 BC/460 BC. Since the changes that took place were diachronic, they appear to reflect technological changes. In the case of the c. 600 BC change, it may reflect the introduction of iron axes. Comparison of the chronological sets of data, suggest that the samples from 600 BC to the Medieval period were all using a similar material (i.e. iron).

Iron Age (460 BC-450 AD)

Raised bog was the completely dominant environment in the study area by the Iron Age. This period also saw lulls in clearance activity in the pollen record for the area.

Trackways: Two wooden trackways, Derryfadda 215 with a date of 466-448BC (Q9400) and Structure 1 at Killoran 226 dating to 459-441 BC (Q9476), were the earliest Iron Age sites identified. One portion of Derryfadda 13 was dated to 380-100 BC (Beta-102736). The trackway Derryfadda 201, in the south-east marginal woodland, was dated to 390-190 BC (Beta-102738). On the east side of the bog, the trackway Killoran 248 was dated to 394-199 BC (UB-4183). The nearby trackway Killoran 301 was dated to 367-194 BC (UB-4184 and UB-4185). Further north, the trackway Killoran 315 was dated to 405-180 BC (Beta-111371).

In the north-west, the trackway Killoran 75 is dated to 368-190 BC (GrN-21947), 380-4 BC (Beta-102766), 385-50 BC (Beta-102763) and 185 BC – 130 AD (Beta-1027651). These dates taken together suggest a date in the 2nd century BC. The track Killoran 312 was connected to Killoran 75 and so should be considered similar in date. The trackway Killoran 314 was dated to 370-5 BC (Beta-111376). Further south, structure 2 at Killoran 226 was a trackway dated to 170-152 BC years, and 165-8 AD (UB-4181). This structure represents a new episode of activity at the site of Killoran 226 and suggests a persistent use of the same zone.

Another substantial trackway was noted in survey as 95DER169 and dated to 388-207 BC (GrN-21950) but was not excavated.

Most of the sites in this period were constructed in a fairly casual fashion. Most sites did not use pegs to secure the structures and the distinction between trackways and platforms is almost

completely based on the length of the structure. The sites in the western cluster are distinct because they used tightly packed roundwoods and were clearly in use for as much as 20 years. In the east and south-east the structures were less well organised and appear to have been in use for less time.

In the north-west, four structures in this period made use of hurdles. At Killoran 75 the remarkably long hurdle panel appears to have been constructed specifically for the track. At Killoran 312, 314 and 315 the hurdles were probably used expediently to deal with the particularly wet nature of the fen at this time. Woven panels are a widely used and efficient element in landscape management. Hurdles were woven in spring and autumn and could be used for fencing and other types of enclosure and could be moved for different uses (Coles 1987, 151-157). The hurdles found in the bog were most likely to form part of this kind of pattern.

Platforms: A number of timber platforms were constructed in the bog margins during the Iron Age. On the east side of the bog, a number were identified. These were Derryfadda 6, dated to 380-5 BC (Beta-102737), Derryfadda 9, dated to 395-180 BC (Beta-102739) and Derryfadda 214, dated to 309-75 BC (Beta-102741). In the initial survey by IAWU, the sites noted as 95DER100, dated to 351-120 BC (GrN-21820); 95DER141, dated to 368-190 BC (GrN-21949) and 95DER178, dated to 372-194 BC (GrN-21817) were all listed as possible platforms.

Miscellaneous: The scatter of brushwood at Cooleeny 325 was 25cm above Cooleeny 31, which was dated to 790-380 BC (Beta-111367). Since the rate of raised bog growth (approximately 10cm per century) would have been delayed by the bog burst, Cooleeny 325 is likely to have been deposited in the last half of the first millennium. The three worked pieces of roundwood at Derryfadda 208 were dated to 365 BC – AD 5 (Beta-102746).

A post-built house structure was also excavated at Killoran 16, which produced an Iron Age date.

Early Medieval Period (650-1250 AD)

Archaeological activity recommenced following a lull in the archaeological record of the bog for roughly six centuries. Much of the later medieval material was removed (to varying depths), by Bord na Móna industrial milling. The excavated material falls into two clusters, between 6th to 9th century AD and 10th-12th century AD. All of the material occurred in raised bog and has a very different spatial focus to the prehistoric material. This suggests a major cultural or economic change in the use of the bog.

Trackways: A trackway identified in survey 95DER 98 was dated to 1024-1162 AD (GrN-21948), giving the youngest date recorded for the milled bog surface. This was part of a group of 26 trackways clustered around the northern Killoran headland; it incorporated six possibly contemporary stake rows which form a circular boundary reflecting the shape of the Killoran headland. This activity in the early medieval period may have formed part of a much more widespread group of elements across the bog. Most of this level had been removed by milling of the bog surface.

Miscellaneous: A long stake row Killoran 54, dated to 668-884 AD (GrN-21944), consisted of two roughly parallel rows running northwest southeast for c. 406m. Further south Killoran 19 was a second, less substantial stake row dated to 640-890 AD (Beta-102760), measuring c. 100m in length running northwest southeast. A stake row, surveyed outside the study area, 95DER 48 was dated to 672-853 AD (GrN-21823) and ran roughly east-west for a distance of c. 105m, located in the south west. It was highly likely that these three sites were contemporary and marked off dangerous areas of the bog.

The earliest date in this period is derived from a linear ditch at site Killoran 3, dated 415-630 AD (Beta-117555). The site consisted of two large parallel ditches and a cluster of possibly later pits, evidence for Early Christian drainage of the Killoran bog system for agriculture.

Two possible hut sites located in the western bog margin area date to this phase. A possible house site at Killoran 8 dated to 685-985 AD (Beta-117554) was located on the dryland immediately west of the bog. A hut site on Derryville bog Killoran 66 dated 775-887 AD (GrN-21945) is evidence for possible settlement on the raised bog surface.

An unrelated site in the far west of the Killoran dryland Killoran 23 consisted of a pit with fire cracked stone and charcoal, dated to 660-880 AD (Beta-117550). Close to this site was a large backfilled pit at Killoran 16, dated to 890-1040 AD (Beta-117552). The pit was unrelated to the earlier house site and both appeared to relate to isolated activity across the dryland.

A second phase of activity was determined both from the cluster of material in the north west of the bog study area, close to the Killoran headland, and from some of the dryland material. It represented activity in a large area off the north east headland of Killoran townland. Within the dryland material a burnt pit containing charcoal and silt at Killoran 3 was dated 980-1270 AD (Beta-117556). Several other such pits were excavated at Killoran 11, Killoran 15 and two sites at Killoran 16, and all seem to indicate a pattern of sporadic casual use of the dryland in this period.

An Cill Odhráin: At the southern extent of Killoran townland, is an early ecclesiastical settlement within a large circular enclosure (Killoran 31). It is located at the southern end of a glacial ridge 150m in diameter and enclosed on three sides by reclaimed bog and to the east by the Moyne stream. Excavation of a small internal area revealed linear features and iron working evidence, dating to 450-690 AD (Beta-120521). This site is referred to in the townland name Killoran from the Irish 'Cill Odhráin' translated as "the Church of St. Odran" (O'Donovan: 1845, 76). St. Odran is referred to in the Life of St. Columba as one of Columba's first companions at Iona. He died shortly after arriving in 563 AD and the cemetery there bears his name. By Irish tradition St. Odran was the abbot of Meath and founder of a monastery at Latteragh, Co. Tipperary (Farmer 1987, 323). The two traditions almost certainly refer to the same person and it is therefore likely that Killoran 31 was founded before 563 AD.

Conclusion

While the abundance of wetland sites suggests intensive prehistoric settlement, in reality the picture is of quite sporadic use. Since our dating parameters are quite broad (due to the calibrated radiocarbon curve), it can rarely be demonstrated that two apparently contemporary sites were actually in use at the same time.

When this is coupled with a rational distribution of the structures against calendrical time, it seems that there was a regular, if low, presence around Derryville Bog apart from possibly the 17th-15th centuries BC, the 5th-3rd centuries BC and the Early Medieval Period (from 600/700 AD onwards). Indeed these periods saw the greatest attrition of the surviving woodland cover in the vicinity. In the intervening periods the relationship of the palynology to human activity is more obscure. The patterns that could emerge from woodland management or other agriculture practices may blur the distinction between secondary regeneration and deliberate promotion of woodland growth, although this is an issue to be pondered by the palynologists.

The detailed recording of the peat development in Derryville Bog afforded an opportunity to develop an understanding of the positioning of structures within the bog eco-system and their



impact on that eco-system. The parallel study of the contemporary hydrology of the bog provided a concurrent record of that impact, highlighting the wide-scale impact of the bog bursts, which were a characteristic of the history of Derryville Bog.

On a more site-specific level, detailed wood analysis indicated the early and continued practices of woodland management, as well as a direct use record of the woodland resource, which could be set against the woodland history derived from the palynology. One notable contrast was the rarity of elm in structures against a steady, if declining, presence in overall woodland cover. Examination of felling and growth patterns on individual structures also aided the archaeological understanding of a number of sites.

Similarly, study of the insect remains, from peat and wood samples, produced a number of previously unknown species in Ireland. When applied as an independent study it created a further control study of the bog and wooded environment, which increased the sensitivity of the study of individual sites, local peat formations and the contemporary woodland cover.

In conclusion, the detailed examination of the study area has produced a rich body of new evidence for prehistoric and historic settlement in the vicinity of Derryville Bog. This is a stark reminder that the density and complexity of the earlier settlement of much of Ireland is not always apparent in the surviving monuments of any given area.

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