The Environmental Context and Function of Burnt-Mounds: New Studies of Irish *Fulachtaí Fiadh*

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SUPPLEMENTARY MATERIAL

METHODS

Plant macrofossil and macroscopic charcoal

For plant macrofossil analysis samples of 125 ml were disaggregated in warm water and washed through a nest of sieves ranging from 150–500 μm size. The residues were scanned using a Leica MZ6 stereomicroscope and identification was aided by modern reference collections and the seed atlas of Beijerinck (1947), Katz *et al.* (1965), and Cappers *et al.* (2006). Plant taxonomic nomenclature follow Stace (1997). Charcoal and wood identification involved the examination of the transverse, radial, and tangential sections, at up to ×600 magnification using a Leica DMLM microscope. Identification was assisted by the descriptions of Hather (2000) and a modern reference collection at Durham. Moss identifications were made by examining branch and stem leaves at up to ×600 magnification and identification was assisted using the descriptions of Smith (1978) and Watson (1981). At Ballygawley bulk samples were sub-sampled at volumes of 1 litre, measured using the displacement method. Samples were then washed through a stack of sieves with 0.01 m and 250 μm meshes. The remains were sorted and identified using a binocular microscope at magnification of ×10, and ×40 where greater magnification was needed for identification. Identifications were confirmed using modern reference material and seed atlases including Berggren (1969), Cappers *et al.* (2006) and Schoch *et al.* (1988). For macroscopic charcoal analyses a maximum of 50 charcoal fragments were randomly selected from each sample based on their size and therefore suitability for identification. The charcoal was broken or fractured to view three sectional surfaces (transverse (TS), tangential (TLS), and radial (RLS)) necessary for microscopic wood identification. The charcoal fragments were then mounted onto a slide and examined using an incident light microscope at magnifications of ×100, ×200 and ×400, where applicable. The procedure for wood analysis involved taking samples one cell thick was taken with a razor blade from the transverse, radial and tangential planes of the wood. Thin section analysis was completed using a compound Nikon microscope of magnifications of X100, ×200 and ×400. Charcoal and wood identifications were made using wood keys by Schweingruber (1978) and Wheeler *et al.* (1989). Due to the different taxonomic resolution of the palaeocological data and lack of common name for some data scientific names are used with English common names in the first instance only.

Pollen and spores

Standard preparation procedures were used on 0.5 ml of sediment from either close (0.01 m) spacing from a column or monolith or in some cases from an intact block of sediment. Standard processing methods were used (Moore *et al.* 1991) including hydrofluoric acid digestion and acetolysis. Samples were sieved (180 μm and 8 μm) and mounted in silicone oil. Identification was at ×600 magnification and ×1000 magnification for critical features. The University of

Exeter's pollen reference collection and subsequently the Palaeoenvironmental Laboratory University of Southampton (PLUS) collection were used for critical identifications. The pollen types recognised generally follow Bennett (1994) and plant taxonomy follows Stace (1997), however, critical types were taken as far as taxonomically possible using both reference slides restricted keys referenced when appropriate in the results section. A pollen sum of 500 total land pollen (TLP) grains excluding aquatic types and spores was initially used but in several cases this was increased to over 1000 TLP due to a) high *Alnus* (alder) or occasionally *Pinus* (pine) values, and b) a desire to encounter rare pollen types with a low frequency which might be of importance in site interpretation. The monoliths used for sampling were taken from the excavations of the mound, trough or sediments adjacent to the mound or trough. All the sites are unusually small (<10 m) and within woodland and therefore would only be expected to provide a strong representation (>80%) of the local vegetation in patchy, largely wooded, landscapes (Jacobsen & Bradshaw 1980; Sugita 1994). A recent modeling approach has supported a 'relevant source area of pollen' (RSAP *sensu* Sugita 1994) for small sites (25–250 m in diameter) of between 1000–3000 m and for sites at the smaller end of this range the RSAP is likely to be under 2000 m (Hellman *et al.* 2009). The sites can be regarded as comparable with forest hollows or wind-gaps (Calcote 1998) rather than raised mires or lakes with the implication that 40%–50% of the pollen comes from plants within 50–100 m of the site.

Entomological analysis

The procedure used for the isolation of invertebrate remains followed a standard paraffin flotation technique as described by Kenward *et al.* (1980). Samples for insects were washed over a 300 μm sieve and the residues mixed well with paraffin. Following addition of cold water, the resultant mixture was decanted and washed with hot water and detergent. The flots were sorted for insect remains were stored in denatured ethanol, and identified with the aid of the collections housed in the Royal Albert Museum, Exeter with reference to the work of Joy (1932) and standard entomological keys. Taxonomy largely follows that of Kloet and Hincks (1977) and Lucht (1987). Dipterous (fly) remains have proved relatively sparse within the samples but have included occasional puparia of the family Calliphoridae (blow flies) and Heleomyzidae, and head capsules of the family Bibionidae (fever flies). Calliphoridae are characteristic carrion taxa whilst the other two families are characteristic of more general decaying organic matter, often of plant origin. The Ballygawley samples were prepared using the same procedures and the insect remains were identified by comparison with specimens in the Gorham and Girling collections at the University of Birmingham. To aid interpretation, where applicable, the taxa have been assigned ecological groups modified by the author based after those of Whitehouse (2006) and Olsson and Lemdahl (2008) which modified and enhanced categories first proposed by Kenward (1978) and Robinson (1981; 1993).

Multi-element analysis and radiocarbon dating

Up to 22 elements were analysed using inductively coupled plasma mass spectroscopy (ICP-MS). Samples of approximately l25 g were using a Thermo Elemental Xseries ICP-MS. The sediment was subjected to a HF/HNO_3 digest. However, with some samples (e.g. Coonagh West) problems were encountered due to the highly organic nature of the sediments and in order to overcome any non-digestion the results are also expressed as a ratio to Ti as it has a constant and relatively high concentration in all the samples. All the sites have been radiocarbon dated by the excavating team and the reader is referred to the original reports for details of the methodologies employed although where relevant details are given in the analysis and discussion. Dates are given calibrated to cal BC/AD using Calib v5 (Stuiver *et al.* 1998).

BIBLIOGRAPHY

Alloway, B.J. 1990. *Heavy Metals in Soils.* New York: John Wiley

Beijerinck, W. 1947. *Zadenatlas der nederlandsche flora, Ten behoeve van de botanie, palaeontologie, bodemcultuur en warenkennis.* Wageningen: Veenmann & zonnen

Berggren, G. 1969. Atlas of Seeds and Small Fruites of Northwest European Plant Species and Morphological Descriptions. Stockholm: Natural Science Research Council

Calcote, R. 1998. Identifying forest stand types using pollen from forest hollows. *Holocene* 8, 423–32

Cappers, R.T.J, Bekker, R.M & Jans, J.E.A. 2006. *Digitale zadenatlas van nederlands*, Groningen: Barkhuis

Hather, J.G, 2000. *The Identification of the Northern European Woods: a guide for archaeologists and conservators.* London: Architype

Hellman, S., Gaillard, M.-J., Bumting, J.M. & Mazier, F. 2009. Estimating the relevant source area of pollen in the past cultural landscapes of southern Sweden – a forward modelling approach. *Review of Palaeobotany and Palynology* 153, 259–71

Jacobsen, G.L. & Bradshaw, R.H.W. 1980. The selection of sites for palaeovegetational study. *Quaternary Research* 16, 80–96

Joy N.H. 1932 . *A Practical Handbook of British Beetles*. London: Witherby

Katz, N.J., Katz, S.V. & Kipiani, M.G. 1965. *Atlas and Keys of Fruits and Seeds Occurring in the Quaternary Deposits of the USSR,* Moscow

Kenward, H.K. 1978. *The Analysis of Archaeological Insect Assemblages: a New Approach*. Archaeology of York 19, 1–68. London: Council for British Archaeology

Kenward, H.K., Hall, A.R. & Jones, A.K.G. 1980. A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits. *Science and Archaeology* 22, 3–15

Kloet, G.S. & Hincks, W.D. 1977. *A Checklist of British Insects Part 3: Coleoptera and Strepsiptera* (revised by R.D. Pope). Chicago: Handbooks for the identification of British Insects 11

Lucht, W. 1987. *Die Käfer Mitteleuropas Catalogue.* Krefeld: Geocke & Evers

McGrath, S.P. & Zhao, F.J. 2006. *Ambient Background Metal Concentrations for Soils in England and Wales*. Bristol: Environment Agency Science Report: SC050054/SR SCHO1106BLPV

Olsson, F. & Lemdahl, G. 2009. A continuous Holocene beetle record from the site Stavsåkra, southern Sweden: implications for the last 10 600 years of forest and land use history. *Journal of Quaternary Science* 24, 612–26

Paterson, E. Towers, W., Bacon, J.R. & Jones, M. nd. *Background Levels of Contaminants in Scottish Soils Report Commissioned by the Scottish Environment Protection Agency*. Aberdeen: Macaulay Institute

Salomons, W. & Forstner, U. 1984. *Metals in the Hydrocycle.* Berlin: Springer

Schoch, W.H., Pawlick, B. & Schweingruber, F.H. 1988. *Botanical Macro-remains.* Stuttgart: Paul Haupt

Schweingruber, F.H. 1978. *Microscopic Wood Anatomy. Structural Variability of Stems and Twigs in Recent and Subfossil Woods from Central Europe.* Birmensdorf: Swiss Federal Institute for Forestry Research

Smith A.J.E. 1978. The Moss Flora of Britain and Ireland. Cambridge: Cambridge University Press

Stace, C, 1997. *New Flora of the British Isles* (2nd edn). Cambridge: Cambridge University Press

Sugita, S. 1994. Pollen representation of vegetation in quaternary sediments: theory and method in patchy vegetation. *Journal of Ecology* 82, 881–97

Watson E.V. 1981. British Mosses and Liverworts (3 edn). Cambridge: Cambridge University Press

Wheeler, E., Baas, P. & Gasson, P.E. (eds). 1989. IAWA List of Microscopic Features for Hardwood Identification. IAWA Bulletin 10: 3, 219–332

Whitehouse, N.J. 2006. The Holocene British and Irish ancient forest beetle fauna: implications for forest history, biodiversity and faunal colonisation. *Quaternary Science Reviews* 25, 1755–89

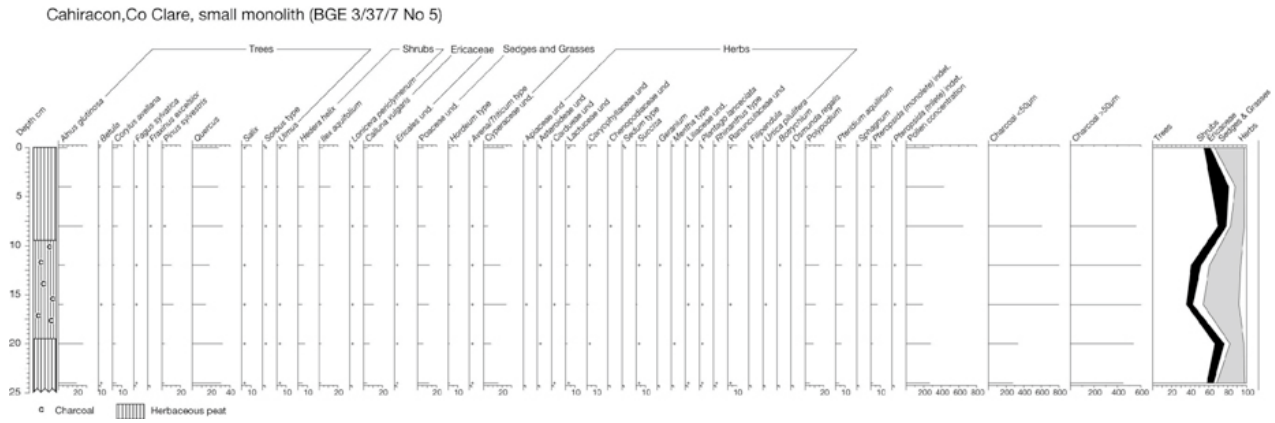

Figure S1. Cahiracon monolith 5 pollen diagram

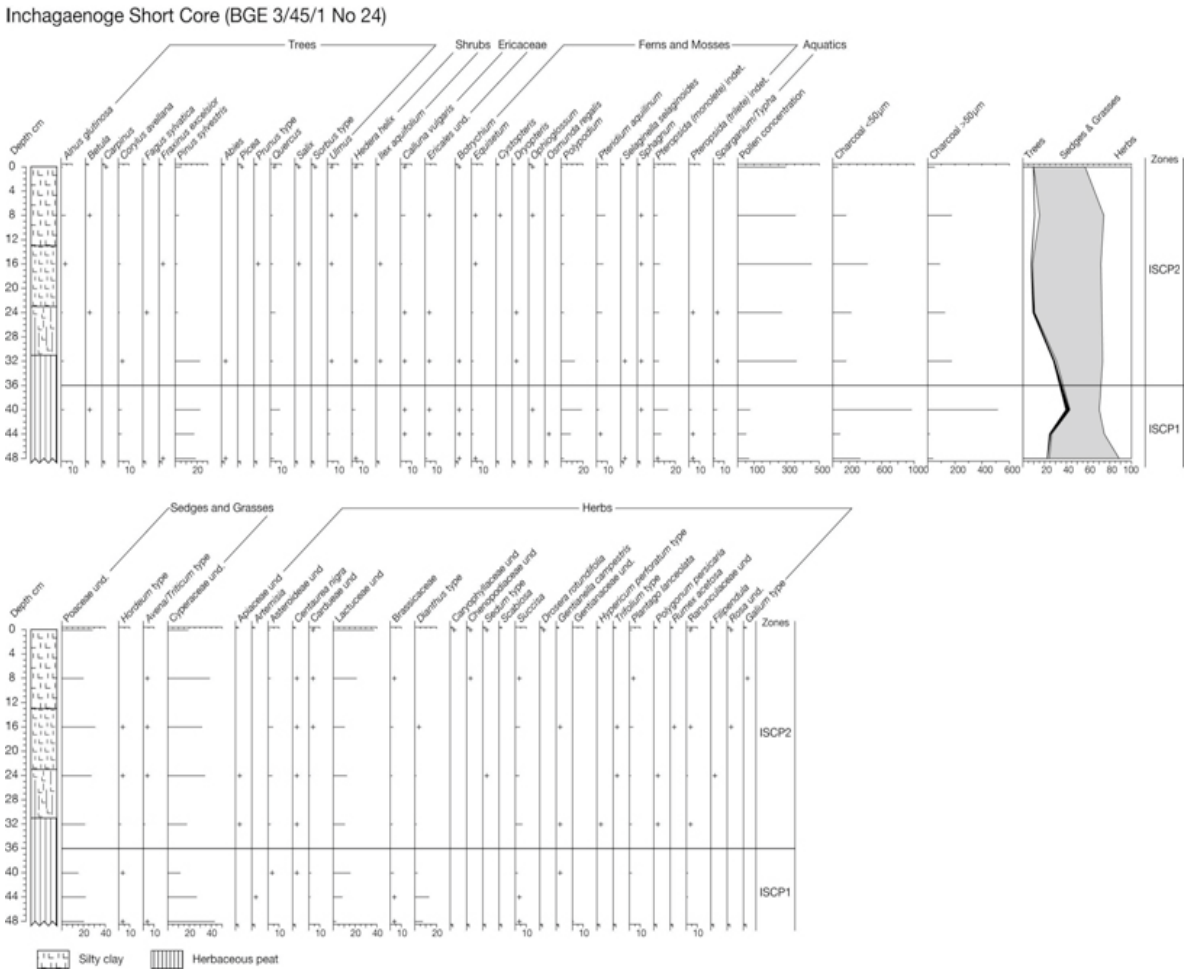

Figure S2. Inchagreenoge short core (3/45/1) pollen diagram

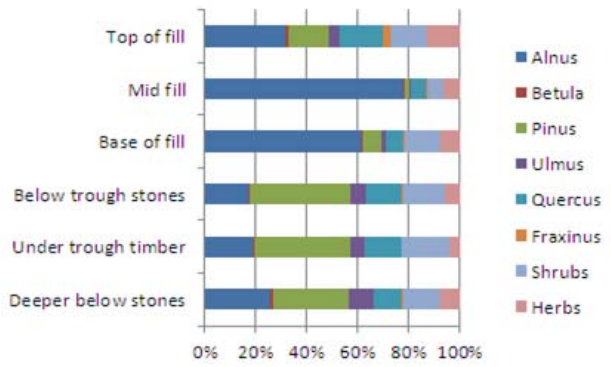

Figure S3. Coonagh West pollen analysis of trough samples.

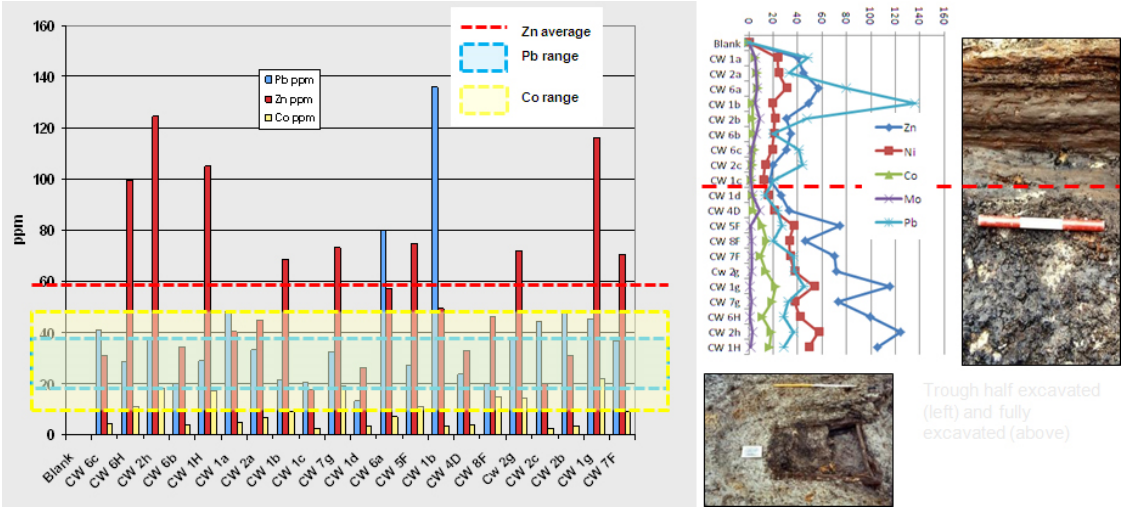

Figure S4. ICP-MS multi-element analysis of Coonagh West trough.

TABLE S1: PLANT MACROFOSSILS FROM KILLESCRAGH (A024/22 AND A024/23)

Site		*A024/22*							*A024/23*		
Feature		*3*	*3*	*4*	*8*	*22*	*22*	*38*	*52*	*18*	*19*
Sample		*4*	*6*	*2*	*10*	*78*	*84*	*82*	*28*	*101*	*124*
Volume (ml)		*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*
Matrix (Relative abundance)											
Buds		-	1	1	-	-	-	1	1	-	1
Bud scales		-	1	3	1	3	1	2	1	3	3
Charcoal		2	-	2	4	3	1	3	3	1	2
Gravel		-	-	1	2	-	1	2	2	-	1
Insects		2	-	1	1	3	1	2	3	2	2
Monocot stems		1	3	2	2	1	1	-	2	-	-
Rootlets		3	5	-	5	-	5	-	-	-	-
Wood fragments		1	2	5	5	5	5	5	4	4	5
Plant macrofossils (Total counts)											
(c) *Hordeum* sp (Barley)	charred grain	-	-	-	1	-	-	-	-	-	-
(q) *Hippuris vulgaris* (Mare's tail)	fruit	6	-	-	-	-	-	-	-	-	-
(q) *Ranunculus* subgenus *Batrachium* sp(p) (Crowfoot)	achene	1	-	1	-	-	-	-	1	-	-
(r) *Persicaria maculosa* (Redshank)	nutlet	-	-	-	-	-	-	1	-	-	-
(r) *Sonchus asper* (Prickly sow-thistle)	achene	-	-	-	1	-	-	-	-	-	-
(t) *Alnus* sp (Alder)	wood fragment	-	1	-	-	-	-	1	-	-	-
(t) *Alnus glutinosa* (Alder)	fruit	-	-	-	-	1	3	2	4	5	-
(t) *Alnus glutinosa* (Alder)	female cone	-	-	-	-	-	-	3	-	-	1
(t) *Betula/Alnus/Corylus* sp (Birch/alder/hazel)	wood fragment	-	-	1	-	-	-	-	-	-	-
(t) *Betula/Alnus* sp (Birch/alder)	wood fragment	-	-	1	-	-	-	-	-	-	-
(t) *Betula* sp (Birch)	charcoal fragment	-	-	-	-	-	-	-	1	-	-
(t) *Betula pendula* (Silver birch)	fruit	-	-	-	-	-	-	-	1	-	-
(t) *Betula pubescens* (Downy birch)	fruit	-	-	-	-	-	-	-	-	-	2
(t) *Betula pendula/pubescens* (Silver/downy birch)	fruit	-	-	-	-	1	1	2	2	9	3
(t) *Corylus avellana* (Hazel)	nut fragment	-	-	3	-	1	-	1	1	5	2
(t) *Corylus avellana* (Hazel)	charcoal fragment	-	-	1	1	-	-	-	2	-	1
(t) *Corylus avellana* (Hazel)	wood fragment	-	-	-	-	-	-	1	-	-	1
(t) *Eurynchium striatum* (Moss)	branch	-	-	-	-	4	-	-	3	3	1
(t) *Fraxinus excelsior* (Ash)	charcoal fragment	-	-	1	1	-	-	-	-	-	-
(t) *Fraxinus excelsior* (Ash)	wood fragment	-	-	-	-	-	1	-	-	-	-

Site		*A024/22*							*A024/23*		
Feature		*3*	*3*	*4*	*8*	*22*	*22*	*38*	*52*	*18*	*19*
Sample		*4*	*6*	*2*	*10*	*78*	*84*	*82*	*28*	*101*	*124*
Volume (ml)		*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*
(t) *Ilex aquifolium* (Holly)	fruitstone	-	-	-	-	1	-	-	-	-	-
(t) *Pinus* sp (Pine)	wood fragment	-	-	-	3	-	-	-	-	-	-
(t) *Prunus domestica /spinosa* (Plum/sloe)	wood fragment	-	-	1	-	-	-	-	-	-	-
(t) *Prunus padus* (Bird cherry)	fruitstone fragment	-	-	-	-	-	3	-	-	-	-
(t) *Rubus fruticosus* agg. (Bramble)	fruitstone	-	1	-	-	-	1	-	-	1	2
(t) *Rubus idaeus* (Raspberry)	fruitstone	-	-	-	-	-	1	-	-	-	-
(t) *Sorbus* sp (Whitebeams)	fruitstone fragment	-	-	-	-	1	-	-	-	-	-
(t) *Taxus baccata* (Yew)	fruitstone	-	-	-	1	-	1	-	1	-	5
(t) *Taxus baccata* (Yew)	fruitstone fragment	-	-	-	-	-	-	-	-	2	17
(t) *Thuidium tamariscinum* (Moss)	branch	-	-	-	-	10	-	-	7	33	-
(t) *Ulmus* sp (Elm)	charcoal fragment	-	-	-	1	-	-	-	-	-	-
(w) *Ajuga reptans* (Bugle)	seed	-	-	-	-	-	-	3	-	-	-
(w) *Alisma* cf. *plantago aquatica* (Water plantain)	fruit	-	2	-	-	-	-	-	-	-	-
(w) *Calliergon giganteum* (Moss)	branch	26	-	-	-	-	-	-	-	-	-
(w) *Caltha palustris* (Marsh-marigold)	seed	5	-	-	2	-	-	-	-	-	-
(w) *Carex* cf. *paniculata* (Greater tussock-sedge)	biconvex nutlet	-	6	-	2	-	-	-	-	-	-
(w) *Filipendula ulmaria* (Meadowsweet)	achene	-	-	-	-	1	-	-	-	-	-
(w) *Hydrocotyle vulgaris* (Marsh pennywort)	fruit	-	-	2	-	-	-	-	-	-	-
(w) *Mentha* cf. *aquatica* (Aquatic mint)	seed	2	-	-	1	-	-	-	-	-	-
(w) *Menyanthes trifoliata* (Bogbean)	seed	-	1	-	1	1	-	-	1	-	-
(w) *Neckera crispa* (Moss)	branch	-	-	-	-	33	1	4	6	5	4
(w) *Ranunculus flammula* (Lesser spearwort)	achene	11	9	-	7	-	-	4	-	-	-
(w) *Rorippa nasturtium-aquaticum* (Water-cress)	seed	-	9	-	-	-	-	-	-	-	-
(w) *Sparganium erectum* (Branched bur-reed)	fruitstone	-	1	-	1	-	-	-	-	-	-
(w) *Sparganium erectum* (Branched bur-reed)	fruitstone fragment	-	8	-	-	-	-	-	-	-	-
(w) Valerianaceae sp(p) (Valerian family)	achene	2	-	-	-	-	-	-	-	-	-
(x) *Carex* sp(p) (Sedges)	biconvex nutlet	2	-	-	1	-	2	3	2	-	-
(x) *Carex* sp(p) (Sedges)	trigonous nutlet	22	2	7	4	-	5	-	4	-	-
(x) *Carex* sp(p) (Sedges)	utricle	5	-	-	-	-	-	-	-	-	-
(x) *Cenococcum geophilum* (Soil fungus)	sclerotia	-	-	-	8	-	15	3	-	1	-
(x) *Cerastium* sp (Mouse-ear)	seed	-	-	-	-	-	-	1	-	-	-
(x) *Cirsium* sp (Thistle)	achene	-	-	-	1	-	-	-	-	-	-

Site		*A024/22*							*A024/23*		
Feature		*3*	*3*	*4*	*8*	*22*	*22*	*38*	*52*	*18*	*19*
Sample		*4*	*6*	*2*	*10*	*78*	*84*	*82*	*28*	*101*	*124*
Volume (ml)		*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*	*125*
(x) *Hypericum* sp (St. John's-wort)	seed	-	-	-	-	-	1	-	-	-	-
(x) *Juncus articulatus* type (Rushes)	seed	102	94	9	52	-	-	-	-	-	-
(x) *Juncus effusus* type (Rushes)	seed	-	-	-	-	-	1	-	-	-	-
(x) *Juncus* sp(p) (Rushes)	seed	-	-	-	9	1	-	-	-	-	-
(x) Musci sp(p) (Indeterminate mosses)	branch	2	6	-	6	7	-	2	6	-	-
(x) Poaceae sp(p) (Grass family)	caryopsis	2	-	-	2	-	-	-	-	-	-
(x) *Potentilla* sp (Cinquefoils)	achene	-	5	-	-	-	4	-	-	-	-
(x) *Prunella vulgaris* (Selfheal)	seed	-	-	-	5	-	-	-	1	-	-
(x) Pteridophyta (Ferns)	sporangium	-	-	1	-	-	-	1	-	31	-
(x) *Ranunculus* subgenus *Ranunculus* sp(p) (Buttercups)	achene	-	-	-	5	-	14	2	-	1	-
(x) *Rumex* sp (Dock)	nutlet	-	-	-	1	-	-	-	-	-	-
(x) *Urtica dioica* (Nettle)	achene	1	-	-	-	-	-	-	-	-	-
(x) *Viola* sp (Violet)	seed	-	-	1	1	1	-	-	-	-	-
(x) *Viola* sp (Violet)	seed fragment	-	3	1	1	-	7	2	2	-	-

(c: cultivated plant; q: aquatic; r: ruderal; t: trees/shrubs and woodland taxa; w: wetland/damp ground; x: wide niche)
Relative abundance is based on a scale from 1 (lowest) to 5 (highest).

TABLE S2: PLANT MACROFOSSILS FROM CARAUNMORE (A024/17) AND COONAGH WEST (A005/2021)

Site		*Caraunmore*	*Coonagh West*				
Feature		*27*	*72*	*72*	*74*	*74*	*-*
Column		*-*	*1*	*1*	*3*	*3*	*2*
Section		*-*	*3*	*3*	*5*	*5*	*2*
Sample		*43*	*0-10*	*50-60*	*0-10*	*30-40*	*30-45*
Volume (ml)		*300*	*200*	*200*	*200*	*100*	*200*
Matrix (Relative abundance)							
Buds		3	3	3	4	4	2
Bud scales		3	3	3	4	4	1
Charcoal		4	-	1	1	-	-
Gravel		5	-	-	-	-	-
Insects		-	2	2	1	2	1
Sand		5	-	-	-	-	-
Wood fragments		5	4	5	4	4	4
Plant macrofossils (Total counts)							
(h) *Rumex acetosella* (Sheep's sorrel)	nutlet	-	-	-	-	1	-
(q) *Callitriche* sp (Water star-wort)	fruit	-	3	1	2	3	-
(q) *Ranunculus* subgenus *Batrachium* sp (Crowfoot)	achene	-	1	-	-	1	-
(r) *Sonchus asper* (Prickly sow-thistle)	achene	3	-	-	-	-	-
(t) *Alnus* sp (Alder)	charcoal fragment	6	-	-	-	-	-
(t) *Alnus* sp (Alder)	wood fragment	-	-	1	-	-	-
(t) *Alnus glutinosa* (Alder)	fruit	11	34	14	12	7	-
(t) *Alnus glutinosa* (Alder)	female cone	5	12	15	31	2	-
(t) *Betula pendula/pubescens* (Silver/downy birch)	bract fragment	1	-	-	-	-	-
(t) *Betula pendula/pubescens* (Silver/downy birch)	fruit	16	-	-	-	-	-
(t) *Corylus avellana* (Hazel)	nut fragment	-	-	6	-	-	-
(t) *Corylus avellana* (Hazel)	charcoal fragment	23	-	-	1	-	-
(t) *Corylus avellana* (Hazel)	wood fragment	1	-	-	-	-	-
(t) *Crataegus monogyna* (Hawthorn)	fruitstone	-	-	-	1	-	-
(t) *Fraxinus excelsior* (Ash)	wood fragment	1	-	-	-	-	-
(t) *Ilex aquifolium* (Holly)	fruitstone	3	-	2	3	4	-
(t) *Oxalis acetosella* (Wood-sorrel)	seed	-	-	-	-	1	-
(t) *Prunus domestica /spinosa* (Plum/sloe)	charcoal fragment	1	-	-	-	-	-
(t) *Prunus spinosa* (Sloe)	fruitstone	-	-	-	-	2	-
(t) *Prunus* sp (Cherry)	fruitstone fragment	11	-	-	-	-	-
(t) *Quercus* sp (Oak)	bud	-	4	2	6	27	3
(t) *Quercus* sp (Oak)	charcoal fragment	-	-	-	1	-	-
(t) *Quercus* sp (Oak)	cupule fragment	-	1	2	6	1	1
(t) *Quercus* sp (Oak)	wood fragment	1	-	1	-	-	2

Site		*Caraunmore*		*Coonagh West*			
Feature		*27*	*72*	*72*	*74*	*74*	-
Column		-	*1*	*1*	*3*	*3*	*2*
Section		-	*3*	*3*	*5*	*5*	*2*
Sample		*43*	*0-10*	*50-60*	*0-10*	*30-40*	*30-45*
Volume (ml)		*300*	*200*	*200*	*200*	*100*	*200*
(t) *Rubus fruticosus* agg. (Bramble)	fruitstone	25	2	24	30	13	-
(t) *Rubus idaeus* (Raspberry)	fruitstone	5	-	-	-	-	-
(t) *Rubus* sp (Brambles)	fruitstone fragment	-	9	9	12	4	-
(t) Salicaceae sp (Willow/poplar)	charcoal fragment	2	-	-	-	-	-
(t) *Ulmus* sp (Elm)	charcoal fragment	2	-	-	-	-	-
(t) *Ulmus* sp (Elm)	wood fragment	-	-	-	1	-	-
(w) *Ajuga reptans* (Bugle)	seed	5	-	-	-	-	-
(w) *Filipendula ulmaria* (Meadowsweet)	achene	1	-	-	-	-	-
(w) *Mentha* cf. *aquatica* (Aquatic mint)	seed	-	2	-	-	-	-
(w) *Ranunculus flammula* (Lesser spearwort)	achene	-	-	-	-	26	-
(w) *Ranunculus sceleratus* (Celery-leaved buttercup)	achene	-	4	-	-	1	-
(w) *Schoenoplectus* cf. *tabernaemontani* (Grey club-rush)	nutlet	-	-	-	3	159	-
(x) Apiaceae sp (Carrot family)	fruit	-	-	-	-	1	-
(x) Asteraceae sp (Daisy family)	achene	1	-	-	-	-	-
(x) Brassicaceae sp (Cabbage family)	seed	-	-	-	-	1	-
(x) *Carex* sp (Sedges)	biconvex nutlet	8	1	1	-	6	-
(x) *Carex* sp (Sedges)	trigonous nutlet	6	5	16	2	2	-
(x) *Cenococcum geophilum* (Soil fungus)	sclerotia	1	3	4	-	-	-
(x) *Juncus articulatus* type (Rushes)	seed	2	-	-	-	43	-
(x) *Juncus effusus* type (Rushes)	seed	358	-	-	-	-	-
(x) *Juncus* sp (Rushes)	seed	20	-	-	-	-	-
(x) Musci sp (Indeterminate mosses)	branch	-	-	7	6	1	1
(x) Poaceae sp (Grass family)	caryopsis	5	-	-	-	-	-
(x) *Ranunculus* subgenus *Ranunculus* sp (Buttercups)	achene	23	11	5	7	3	1
(x) Rosaceae sp (Rose family)	thorn	-	-	3	1	-	-
(x) *Rumex* sp (Dock)	nutlet	-	-	-	2	1	-
(x) *Stellaria holostea* (Greater stitchwort)	seed	-	-	-	1	1	-
(x) *Stachys* sp (Woundwort)	nutlet	2	-	-	-	-	-
(x) *Viola* sp (Violet)	seed	7	-	-	1	-	-
(x) *Viola* sp (Violet)	seed fragment	-	1	-	-	-	-

(h: heathland; q: aquatic; r: ruderal; t: trees/shrubs and woodland taxa; w: wetland/damp ground; x: wide niche)
Relative abundance is based on a scale from 1 (lowest) to 5 (highest).

TABLE S3: COLEOPTERA ASSESSMENT OF CAHIRACON, CO. CLARE (BGE 3/37/7 NO. 5)

Depth (cm)	*Vol. processed (litre)*	*Material Assessment*	*Environmental Assessment*
0–10	1	Sparse, v. poor condition	Water dominated fauna (*Hydraena riparia*, *Agabus* sp., *Limnebius truncatellus*) indicates mixed stagnant/flowing regime. One *Aphodius* dung beetle present, some Carabidae of open ground, some Elateridae (*Athous* sp., *Agriotes* sp.) may indicate nearby woodland, supported by a fragment of elytra from the weevil *Polydrusus* sp.
40–50	1	Sparse, poor condition	Fewer water taxa (only *Hydraena riparia*). Weevils (*Polydrusus* sp., *Strophosoma melanogrammum*) indicate woodland proximity with a carabid fauna characteristic of both open (*Pterostichus* sp.) and shaded ground (*Bembidion harpaloides*)

TABLE S4. HEAVY METAL CONCENTRATION RANGES FROM BURNT MOUND SITES AND TYPICAL SOIL VALUES FROM IRISH SOILS

Element	*Coonagh West ppm*	*Inchagreenoge ppm*	*Irish soils mineral median mg/kg*	*N Ireland Soils median mg/kg*	*Maximum bounded range class for Irish Soils mg/kg*	*Typical Range of Soil values[2] mg/kg*
Cr (Chromium)	29.0–114.6	3.5–113.4	48.9	46.5	65–80	1–100
Co (Cobalt)	2.8–22.1	3.8–24.6	5.0–7.5[1]	–	10–12.5	1–40
Cu Copper)	8.0–57.5	25.4–110.5	18.6	7.4	25–30	0–30
Pb Lead)	13.3–79.8	3.1–45.0	24.8	17.9	50–60	10–30
Zn (Zinc)	17.7–124.5	102.9–226.7	72.7	65.4	100–120	10–200 (50 av.), 267 (97 av.)[3], 967(58 av.)[4]

[1] values from the lower Shannon area, [2] from Alloway (1990) and Salomons and Forstner (1984), [3] upper-outlier cutoff and mean from McGrath and Zhao (2006), [4] from Scottish soils in Paterson *et al*. (nd). Note that the conversion from mg/kg to ppm is density dependant for soils but not liquids