

Scotland's Clava Cairns and the Midsummer Full Moon

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Abstract

The Clava cairns of the Central Highlands of Scotland constitute a megalithic group, constructed during the Early Bronze Age (c.2300-1500 BCE), but were reused during the late Bronze Age and Iron Age periods as burial monuments. Their original purpose is therefore unclear. They consist of a cairn generally surrounded by a free-standing stone circle, where the circle-stones and peristalith-orthostats taper to being tallest in the southwest. Some passage-graves have been recognised as being orientated on midwinter sunset, but previous scholars have suggested that the group as a whole is orientated on moonset for the minor and major extremes. Although this appears to be a culturally distinct group, there are some similarities with Recumbent Stone Circles in nearby Aberdeenshire, Maes Howe in Orkney and Wedge-tombs in southwest Ireland, plus Stonehenge in Wessex.

The low midsummer full moon during major lunar limit years is a recurring phenomenon at these latitudes, whereby the full moon can be seen to skim along the top of the horizon, during the brief summer's night. This is in evidence at Callanish Stone Circle. The large group of cairns at Clava near Inverness is not only the most researched, but it seems to be distinctive for its midwinter sunset orientation. The midsummer full Moon cannot be seen for several days at peak fullness, casting the entire valley into darkness, while everywhere else is in light. This research set out to test to what degree the midsummer full Moon would be perceived on the southerly horizon, during major lunar limit years for the whole Clava region, in order to ascertain whether Clava's darkness was normal for these latitudes and in this district.

Survey methodology is explored and surveys were conducted along six rivers in the region, selected for the presence of Clava cairns and one river without, in order to understand why they did not occur there. Hilltop and coastal cairns were excluded, as they were likely to view a midsummer full Moon rise and set normally. Because seven different varieties of lunar phenomena were met with along water-routes, it is suggested that these constituted the kinds of experiences ancient travellers would have encountered and that cairns were deliberately located to take advantage of the dramatic visual effects. Cairns tend to cluster at significant locations along rivers, suggesting old pilgrimage pathways and trading routes, which later developed into the regions towns: this was both practical (the need to cross fords and tributaries) and spiritual (a place to view the Moon meeting the earth).

The research compares areas where the moon was visible or invisible, whether the location was in light or in darkness at midsummer full Moon; for cairn sites and non-cairn sites. It concludes that seasonal differences were significant and cairns tended to be built in places where people would benefit from viewing the midsummer full Moon. Contrasting cairn styles were considered with respect to their utilisation of seasonal light and dark, inclusivity and exclusivity, summer and winter use, or solar and lunar emphasis. Both styles appear scattered throughout the region and the research concluded that both styles catered to different festivities. Some cairn pairing is in evidence and it is suggested that while this might be due to chance, or the preferences of an individual family group, it could also hint at the possibility of centrally orchestrated planning. The builder's choice of Clava, as an area of exceptional midsummer full Moon darkness, appears to validate the primary research question about why this group is unique; utilising as it does midwinter sun to light the dark passage-graves and hill shadow to darken the normally light ring-cairn.

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Statement of Originality



Master's Degrees by Examination and Dissertation

Declaration Form

1. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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Date 24th March 2017

2. This dissertation is being submitted in partial fulfilment of the requirements for the degree of Masters of Art in Cultural Astronomy and Astrology

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3. This dissertation is the result of my own independent work/investigation, except where otherwise stated.

Other sources are acknowledged by footnotes giving explicit references.

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I am satisfied that this work is the result of the student's own efforts.

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Abbreviations

ESR Equinoctial Sun Rise	GPS - Global Positioning System
HER - Highland Environment Record,	HES - Historic Environment Scotland
HHER - Highland Historical Environment Record	
MLL - Major Lunar Limit	mll - minor lunar limit
MSSR - Midsummer Sun Rise	MSSS - Midsummer Sun Set
MWSR - Midwinter Sun Rise	MWSS - Midwinter Sun Set
NmMS - Northern minor Moon Set	NmMR -Northern minor Moon Rise
RCHAMS - Royal Commission for the Historic and Ancient Monuments of Scotland	
RSC - Recumbent Stone Circle	SMMR - Southern Major Moon Rise
SMMR - Southern Major Moon Rise	SMMS - Southern Major Moon Set
SmMR - Southern minor Moon Rise	SmMS - Southern minor Moon Set

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1. Introduction

Clava cairns are a concise architectural group of the Early Bronze Age (approximately 2300 to 1500 BCE). They are a relatively late flowering of the megalithic tradition along Europe's western seaboard and are only found in the Central Highlands of Scotland, see Richard Bradley's 'distribution': (figure 1.1).¹ Clava cairns consist of a central chamber or area, surrounded by the cairn (with or without a passage), frequently surrounded by a platform and a free-standing stone circle, (figures 1.2, 1.3 and 1.4). Their defining feature is a 'southwest orientation', as described by Stuart Piggott (1910-1996), Bradley, Audrey Shore Henshall and Clive Ruggles: passages align southwest, plus both their circle-stones and kerb-orthostats taper from lowest in the northeast to highest in the southwest (figure 1.2).²

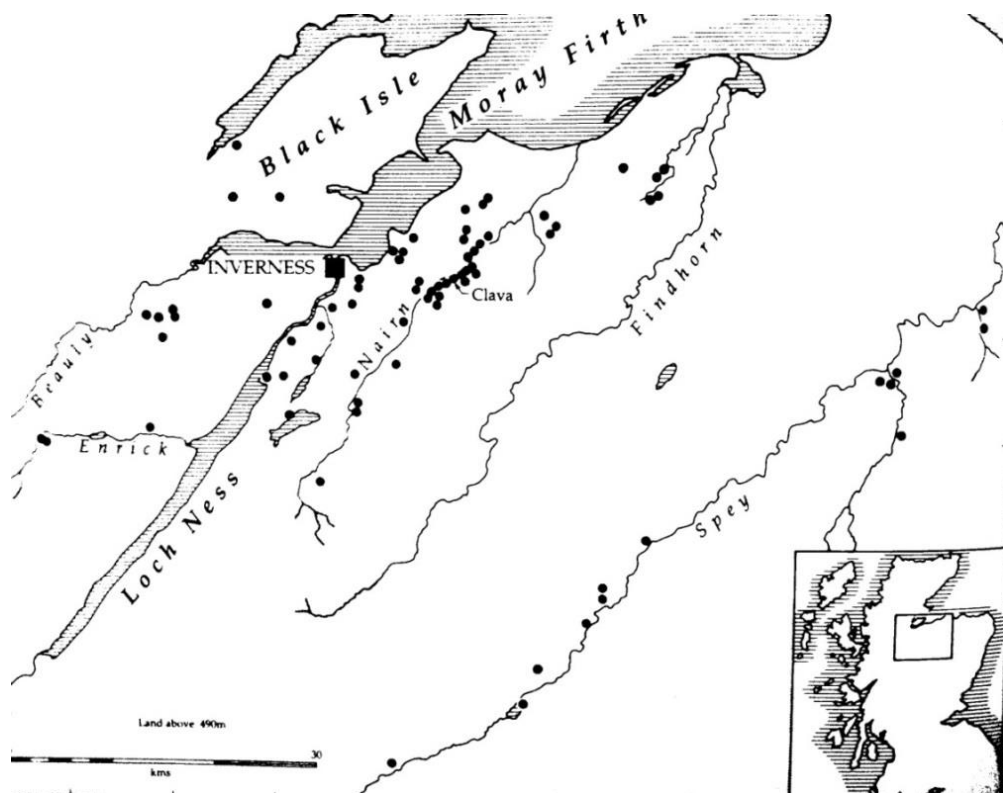


Figure 1.1 Bradley's Clava Cairn distribution, the area of Scotland is inset in the lower right corner.

¹ Richard Bradley, *The Good Stones a new investigation of the Clava Cairns* (Edinburgh: Society of Antiquaries of Scotland Monograph Series Number 17, 2000), [Hereafter, Bradley, Good Stones], p.2.

² Stuart Piggott, *Scotland before History* (Edinburgh: Edinburgh University Press, 1982), [Hereafter Piggott Scotland], p. 129; Bradley, Good Stones, pp.122-126; Audrey Shore Henshall, *The Chambered Tombs of Scotland Vol. 2* (Aberdeen: Edinburgh University Press, 1972), [Hereafter Henshall, CT, Vol. 2], p. 271; Clive Ruggles, *Astronomy in Prehistoric Britain and Ireland* (New Haven and London: Yale University Press, 1999), [Hereafter Ruggles, Prehistoric], p.130.



Figure 1.2 Balnuaran of Clava Northeast passage-grave, looking west. The cairn material hides the chamber. Both the circle and kerb orthostats are smallest in the northeast (right), tapering in height towards the tallest southwest orthostat (marked). The passage is aligned southwest. Originally the cairn was taller having a corbelled beehive-type roof. Photograph Estaroth 26/03/15

The generic name Clava derives from several Clava-valley cairns, of which Balnuaran of Clava (henceforth Balnuaran) are the most researched. Nairn valley's eleven cairns, including Balnuaran's five, constitute a multi-cairn cluster, referred to, in this dissertation, as Clava-valley, whereas Clava region indicates their Highland distribution. Stuart Needham described their location as 'pivotal' in controlling early bronze trade routes.³ There are two cairn types: passage-graves such as Balnuaran Northeast and ring-cairns such as Balnuaran Central (figures 1.3 and 1.4).



Figure 1.3 Balnuaran of Clava Northeast passage-grave, from above, looking north. The cairn material almost hides the chamber and the passage is aligned southwest on midwinter sunset. Photograph John Knowles of the West Lothian Archaeology Group.

³ Stuart Needham, 'Migdale-Marnoch: Sunburst of Scottish metallurgy', in *Scotland in Ancient Europe: The Neolithic and Early Bronze Age of Scotland in their European Context* ed. by Ian A.G. Shepherd and Gordon J. Barclay (Edinburgh: Society of Antiquaries of Scotland, 2004), [Hereafter Needham, Sunburst], p. 241.



Figure 1.4 Balnuaran of Clava Central ring-cairn's inner area, looking southwest. There is no passage or roof. The central area is as initially designed, although it was later infilled by the cairn builders. The tallest circle orthostat is to the southwest. Balnuaran of Clava Southwest passage-grave, with its own stone circle is visible top left. Photograph Estaroth 27/08/16

Several scholars argued that Clava cairns exhibit a sky-connection and Ruggles recommended them for research as sites are 'demonstrably similar'.⁴ They epitomise a realisation of Neolithic sky-expertise; Euan Mackie discussed 'midwinter sunset' aligning with Balnuaran's passages, while Bradley explored 'sunset orientation' shared with Maes Howe, Durrington Walls and Stonehenge.⁵ Similarities exist with 'Knocknarea' in Ireland, described by Bradley and also with 'Callanish' explored by Gerald Hawkins (1928-2003), Vincent Malmström and Henry Boyle Somerville (1863-1936).⁶ Midsummer and midwinter solstices are when the sun

⁴Clive Ruggles, 'Megalithic Astronomical Sightlines: Current reassessment and Future Directions' in *Archaeoastronomy in the Old World* ed. by D. C. Heggie, pp. 83-105 (Cambridge, Cambridge University Press, 1982), [Hereafter Ruggles, *Megalithic Sightlines*], p. 99.

⁵ Euan W. MacKie, *Scotland an Archaeological Guide from earliest times to the twelfth century AD* (London: Faber & Faber Ltd., 1975), [Hereafter MacKie *Scotland Guide*], p. 206; Richard Bradley, 'The dark side of the sky: the orientations of earlier prehistoric monuments in Britain and Ireland', in *The Archaeology of Darkness* ed. by Marion Dowd and Robert Hensey (Oxford: Oxbow books, 2016), [Hereafter Bradley, *Dark*], p.56.

⁶ Richard Bradley. *The Significance of Monument: On the shaping of human experience in Neolithic and Bronze Age Europe* (London & New York: Routledge, 1998), [Hereafter Bradley, *Significance*], p.112; Gerald S. Hawkins, 'Callanish, A Scottish Stonehenge' *Science New Series*, Vol. 147, No. 3654 (8 Jan., 1965), 127-130, [Hereafter Hawkins, *Callanish*], p.129; Vincent H. Malmström, HN 03755 'The Callanish Connection.' 2010.

<http://www.dartmouth.edu/~izapa/The%20Callanish%20Connection.pdf> , [Accessed 16 September 2015] [Hereafter Malmström, *Callanish Connection*]; Henry Boyle Somerville, 'Prehistoric Monuments in the outer Hebrides, and their Astronomical Significance', *The Journal of the Royal Anthropological Institute of Great Britain and Ireland* Vol. 42, (Jan. - Jun. 1912), 23-52, [Hereafter Somerville, *Outer Hebrides*], p. 32.

appears to standstill on the horizon, reversing direction. The moon also appears to reverse direction, as part of its nodal cycle, after reaching the most southerly or northerly extreme horizontal position known as major lunar limit (henceforth MLL), the other extreme being its least southerly or northerly position; minor lunar limit (henceforth mll). Where Clava passages and/or orthostats align with these southwestern positions they have 'lunar-orientation', as described by Ruggles, Aubrey Burl, plus Alexander (1894-1985) and A.S. Thom.⁷

While the majority of Clava cairns are apparently lunar-orientated, scholars have focussed almost exclusively on 'midwinter sunset' at Balnuaran, Burl described solar-orientations at Balnuaran, but sol/lunar-orientations elsewhere.⁸ Balnuaran's potential lunar-orientations have been overlooked. The author's 2015 preliminary survey found Balnuaran Central had mll orientations, but not MLL, despite a horizon feature that coincided with MLL moonset, which required explanation. Ruggles argued that MLL 'midsummer full moon' was the focus at other Clava cairns, while Balnuaran was 'exceptional'.⁹ Therefore this dissertation addresses that uniqueness, exploring it from a lunar perspective. It asks whether the midsummer full moon appeared differently at Balnuaran, on MLL years, earmarking Clava-valley as particularly sacred, compared with neighbouring river valleys. Potentially varied uses of contrasting cairn-types are also considered.

Other Scottish monuments exhibit interesting lunar phenomena. The MLL full moon nearest midsummer travels along the southerly horizon at Callanish, (hereafter 'Calanais') described as 'skimming' by James Cornell, Gerald and Margaret Ponting.¹⁰ Personal experience confirms it is dramatic. Gerald Hawkins' diagram

⁷ Ruggles, *Prehistoric*, p. 130; Aubrey Burl, 'Dating the British Stone Circles: A provisional chronology for the geometrical designs of the megalithic sites is based on evidence from architecture, carbon-14, and artefacts.' *American Scientist* Vol. 61, No. 2 (March-April 1973), 167-174. Sigma Xi, The Scientific Research Society, [Hereafter Burl, *Dating*], p.165; Alexander Thom and Archibald Strang Thom, *Megalithic Remains in Britain and Brittany* (Oxford: Clarendon Press 1978), p. 130: MacKie, *Scotland Guide*, p.206.

⁸ Aubrey Burl, *A guide to the Stone Circles of Britain, Ireland and Brittany* (New Haven and London, Yale University Press, 1995), [Hereafter Burl, *Guide*], p. 129.

⁹ Ruggles, *Prehistoric*, p. 246.

¹⁰ <https://www.historicenvironment.scot/visit-a-place/places/calanais-standing-stones> [Accessed 15 February 2017]; James Cornell, *The first star-gazers and introduction to the origins of astronomy*. (London: Athlone Press, 1981), [Hereafter Cornell, *First star-gazers*], p.78; Gerald Ponting, *Callanish and other megalithic sites of the outer Hebrides* (Glastonbury: Wooden Books Ltd., 2007) [2002], p. 42; Gerald and Margaret Ponting, *Clach an Tursa, Carloway Isle of Lewis* (Stornoway: Ponting, July 1981), p. 4.

illustrates lunar skimming (figure 1.5).¹¹ This research explored whether skimming occurs along cairn and river horizons in the Clava region. The aim was to systematically explore landscapes and skylscapes of the region's southwest/northeast-orientated rivers, (potential Clava cairn locations), to compare with Balnuaran, much as Lionel Sims considered various 'local landscape' locations for Silbury Hill, to argue the rationale for its actual placement vis-à-vis the avenues.¹² Fieldwork consisted in measuring southerly horizons, along rivers and at cairns between standard moonrise and moonset azimuths.

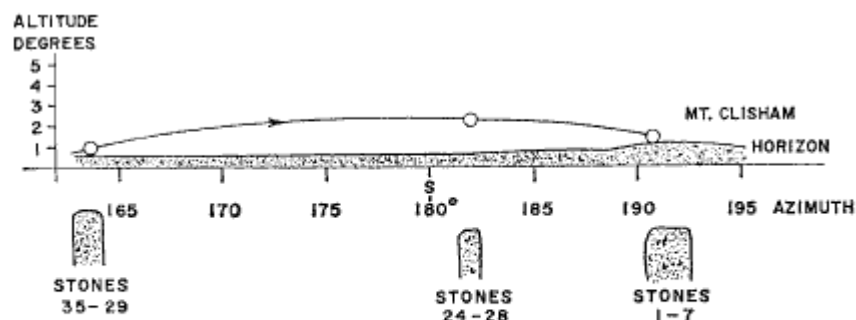


Fig. 4. The apparent path of the full moon at Callanish at midsummer computed for about 1500 B.C.

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Figure 1.5. Gerald Hawkins' diagram of Calanais. The midsummer full moon never reaches above 2 degrees altitude.

The dissertation is divided as follows: The Central Highlands environmental/cultural context and prehistoric timescale is explored, alongside a discussion of archaeological scholarly debates in chapter two. Archaeoastronomy is introduced in chapter three, specifically its deliberations concerning lunar limits. Research methodology is outlined in chapter four, explaining selection of cairns and southwest/northeast orientated rivers. Measurement techniques, reflexivity and the phenomenological approach are discussed. Chapter five explores individual rivers and cairns in their context. Chapter six presents a discussion and interpretation of fieldwork data and chapter seven provides an amalgamated conclusion.

¹¹ Hawkins, Callanish, p.130.

¹² Lionel Duke Sims, 'Entering, and Returning From, the Underworld: Reconstituting Silbury Hill by Combining a Quantified Landscape Phenomenology with Archaeoastronomy', *The Journal of the Royal Anthropological Institute* Vol. 15, No.2 (2009), 386–408, Royal Anthropological Institute of Great Britain and Ireland, [Hereafter Sims Underworld], p.389.

2. Historical context: The archaeology of Clava cairns

This chapter considers prehistory of the central Scottish highlands: providing geographical and cultural context for Clava cairns, which are defined and explored from antiquarian interest to archaeological excavations. The timescale of usage from the Early Bronze Age (henceforth EBA) to modern times is discussed.

2. 1. The Mountains, Glens and Straths: prehistory in the wider region.

According to Alan McKirdy the Highlands were created during the 'Ordovician Period': a crunch combination with England about 443-495 million years ago and the Clava region is largely granite and moine of 'Devonian origin (354-417 million years ago)'.¹³ The mountains were 'deeply scarred' by severe ice-age erosion creating the distinctive northeast/southwest orientation of river valleys, steep-sided V-shaped glens and flat-bottomed U-shaped straths: McKirdy's map (figure 2.1.1).¹⁴



Figure 2.1.1 McKirdy's Ice flow. Great Britain and Ireland covered in Ice. Blue arrows indicate the direction of glaciers; our region is demarcated by the red square, ice flow is to the northeast.

¹³ Alan McKirdy. *Set in Stone the Geology and Landscapes of Scotland* (Edinburgh: Birlinn Ltd., 2015), [Hereafter McKirdy, *Set in stone*], pp.15.16.

¹⁴ McKirdy, *Set in Stone*, pp.36.68.

McKirdy explained that post ice-sheet ('11,700 years ago') juniper, birch, alder, pine and oak appeared, and Creag nan Uamh cave at Inchnadamph (Northwest Scotland) provided evidence of 'brown bear, arctic fox, northern lynx, wolf' plus many current predators.¹⁵ Rick Schulting and Michael Richard provided radio-carbon dates for Creag nan Uamh between '3640-2940 BCE' (all radio-carbon dates labelled BCE are calibrated).¹⁶ Similar animals inhabited Clava territory. Ian Grimble's chambered cairn 'distribution' shows mostly Orkney-Cromarty-Hebridean cairns (hereafter OCH) indicating that Clava cairns arose within an established Neolithic landscape with significant water transport (figure 2.1.2).¹⁷ Loch Ness cuts across northern Scotland creating a water-link between Clava and Kilmartin Glen in the southwest.

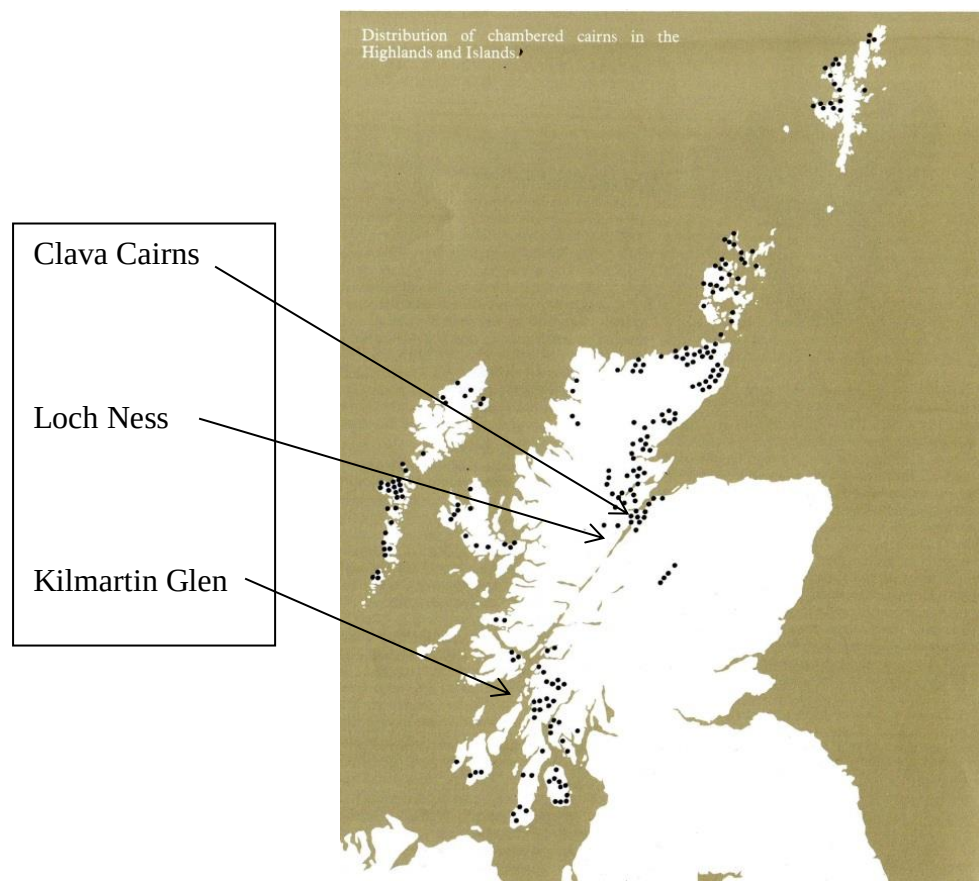


Figure 2.1.2 Ian Grimble's map of Chambered cairn distribution in the Highland and Islands of Scotland.

¹⁵ McKirdy, *Set in Stone*, pp. 67. 71.

¹⁶ Rick J. Schulting and Michael P. Richards, 'The wet, the wild and the domesticated: the Mesolithic–Neolithic transition on the west coast of Scotland' *European Journal of Archaeology*, Vol. 5, No. 2 (01 August 2002), 147-189, [Hereafter Schulting and Richards, *Wet - wild*], p.164.

¹⁷ Ian Grimble, *Highland Man* (Inverness: Highlands and Islands Development Board, 1980), [Hereafter Grimble, *Highland Man*], p.16.

Schulting and Richards' palaeodietary analysis of Mesolithic/Neolithic bone fragments/charcoal (dates ranged between c.4300-c.2600. BCE) concluded that plant and animal domestication occurred within 'a few generations at most' and protein was 'from domestic animals', an agro-pastoralist economy.¹⁸ Clava cairn builders were agro-pastoralists although Gordon Barclay found 'no direct evidence for transhumance' in Scotland.¹⁹

2. 2. The Clava Cairns

Based on Bradley and Henshall's estimates Clava cairns number about fifty-five: (figure 2.2.1).²⁰

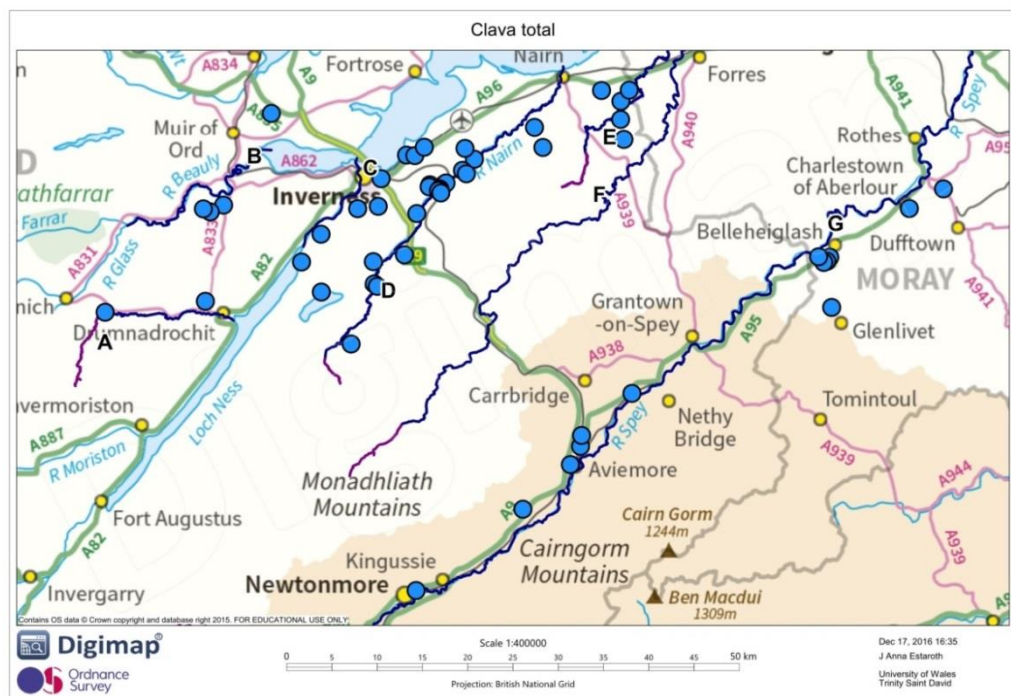


Figure 2.2.1 Clava Cairns in the region. Rivers are designated blue and their upper reaches in purple. A Enrick, B Beaul, C Ness, D Nairn, E Muckleburn, F Findhorn and G Spey. There are currently fifty-five recognised Clava cairns (seven at Clava) of which twenty-five were included in the survey. Scale reads 1:4000000 50km.

Figure 2.2.2 shows fifty-seven non-clava cairns, plus several indeterminate standing stones. Non-clava cairns range from Neolithic to Bronze Age; radiocarbon

¹⁸ Schulting and Richards, *Wet - wild*, pp.177, 159.

¹⁹ Gordon J. Barclay, *Farmers, Temples and Tombs Scotland in the Neolithic and Early Bronze Age* (Edinburgh: Canongate Books, 1998), [Hereafter Barclay *Farmers*], p. 26.

²⁰ Bradley, *Good Stones*, p.172; Henshall, *CT. Vol. 2*, pp.358-402.

dating is largely unavailable. George Eogan suggested Scotland has about 'six hundred' passage-graves, numerically similar to Irish 'passage-tombs'.²¹ Later residents built near Clava sites and Clava builders constructed near earlier OCH cairns. In a mountainous region agro-pastoral land was precious. Robert Lenfert gave Crannog dates ranging from early Neolithic 'Eilean Domhnuill' on the Western Isles to the sixteenth century CE 'near Fort William'.²²

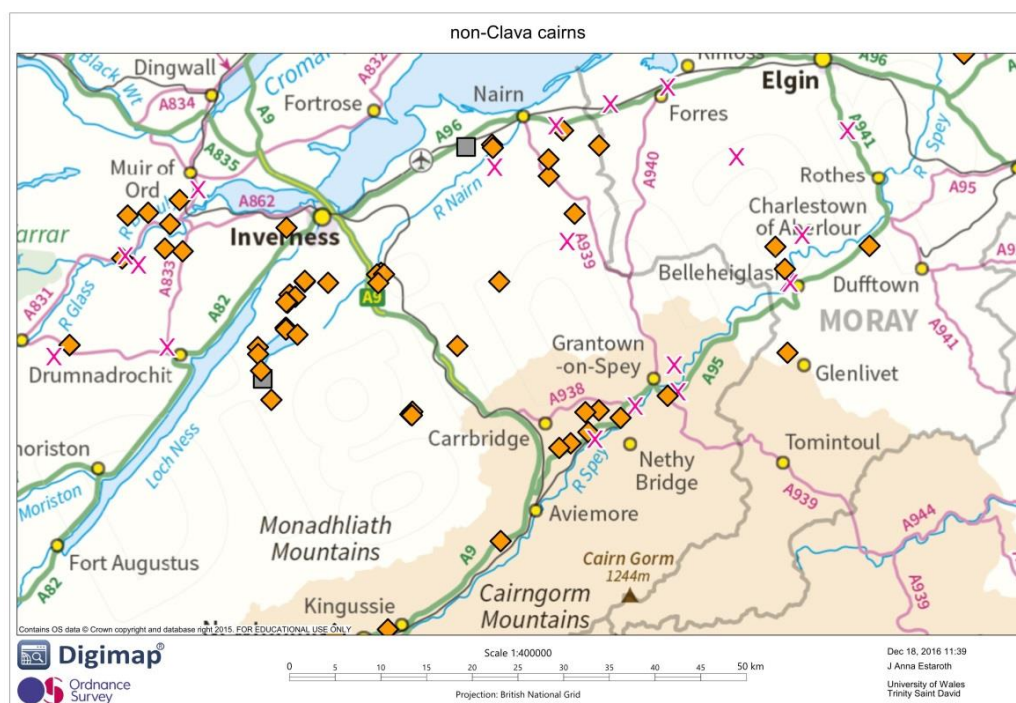


Figure 2.2.2 Non-Clava cairns in the same region (yellow diamonds). There are a few more cairns further south but this provides a comparative landscape. Non-Clava cairns range in date from the Neolithic to late Bronze Age, almost no radiocarbon dates exist. The two grey squares are crannogs, which might be later or earlier. The crosses are single standing stones, a few of which are Pictish symbol stones, but many are probably all that remains of a Clava cairn. This gives an impression, but is not an exclusive diagram. Scale reads 1:4000000 50km.

Gordon Childe (1892-1957) described Clava cairns as having approximately circular chambers, with rounded boulders supporting 'corbelled masonry' with a round cairn 'defined by a peristalith of similar boulders surrounded by a ring of free-

²¹ George Eogan,, 'Scottish and Irish Passage Tombs: Some comparisons and contrasts', in *Vessels for the Ancestors Essays on the Neolithic in Britain and Ireland in honour of Audrey Henshall* ed. by Niall Sharples and Alison Sheridan (Oxford: Edinburgh University Press, 1992), pp.120.121.

²² Robert Lenfert, Crannogs - Timber and stone riddles wrapped in water.
<http://www.heritagedaily.com/2013/08/crannogs-timber-and-stone-riddles-wrapped-in-water/98753>,
 [Accessed 18 December 2016].

standing uprights'.²³ Childe noted two styles, passage-graves and ring-cairns, distributed throughout the Clava region, with the presence of 'cup-marks'.²⁴ Henshall defined Clava passage-graves as 'circular dry-built chambers with corbelled roofs under round cairns'.²⁵ George (1802-1878) and Peter Anderson recorded heights of 'fifteen feet' (4.5m) in 1851, although Bradley estimated 'six metres' for the original.²⁶ Balnuaran Northeast is a good example of a passage-grave: Canmore provided an aerial view and James Fraser created an excellent ground plan: (figures 2.2.3 and 2.2.4).²⁷ It is notable that Christian MacLagan recorded 'several pillar stones fell' in 'august 1871-1872' and smaller stones stolen to 'build walls for the new road'; such depredation and antiquarian loses also occurred at other Clava sites.²⁸



Figure 2.2.3 Canmore's photograph of Balnuaran of Clava North East passage-grave, showing chamber, passage, platform and the north-east part of the stone circle.

²³ Vere Gordon Childe, *Scotland Before the Scots being the Rhind Lectures for 1944* (London: Methuen & Co. Ltd., 1946), [Hereafter Childe, Scotland], p.97.

²⁴ Childe, Scotland, p.97.

²⁵ Henshall, CT, Vol. 2], p. 270.

²⁶ George Anderson and Peter Anderson, *Guide to the Highland and Islands of Scotland, Including Orkney and Zetland, description of their scenery, statistics, antiquities and natural history with numerous historical notes and a complete map* 3rd edn (Edinburgh: G. Parker, 1851), [Hereafter Anderson and Anderson, 1851 Guide], p. 370; Bradley, Good Stones, p. 47.

²⁷ Canmore <http://canmore.org.uk/file/image/335883> [Accessed 20 July 2016] ; James Fraser, 'Descriptive Notes of the Stone Circles of Strathnairn and Neighbourhood of Inverness' *Proceedings of the Society of Antiquaries Scotland* Vol. 18, (1884), 328-362, [Hereafter Fraser, Strathnairn], p.342.

²⁸ Christian MacLagan, *The Hill-Forts, Stone Circles and other Structural Remains of Scotland* (Edinburgh: Edmonton & Douglas, 1875) [Hereafter MacLagan, Hill-forts], p. 75.

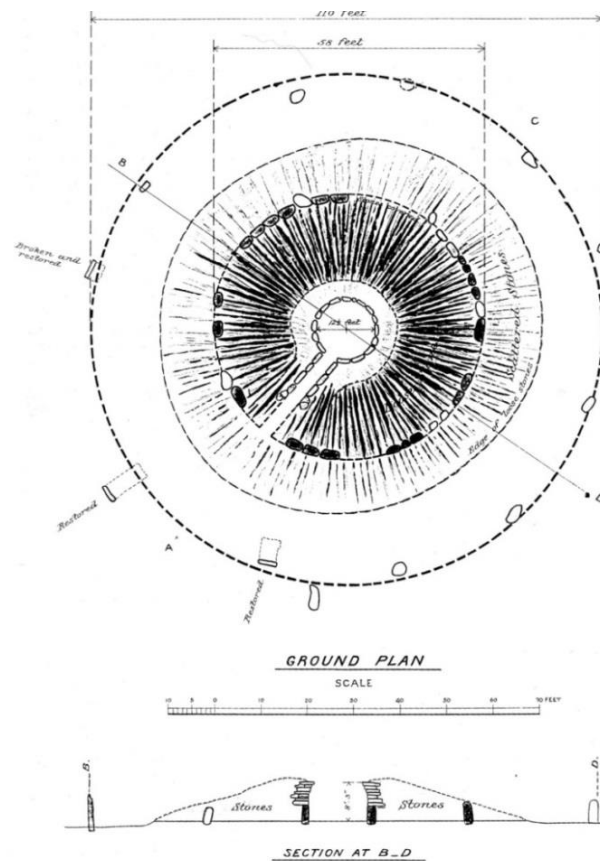


Figure 2.2.4. James Fraser's ground plan of Balnuaran Northeast, indicating the central chamber, the cairn material, surrounded by the peristalith (darker stones), the platform and final encirclement by the stone circle. He also noted stones restored in the nineteenth century.

Bradley explained monument comes from the Latin '*monere* to remind' therefore megalithic monuments are large stone reminders.²⁹ Cairn is a Scottish term meaning heap of stones: applying to way-markers, field-clearance or burial monuments. Bradley described Clava cairns as 'mortuary monuments', although Henshall noted the 'complete lack of grave goods'.³⁰ Childe and Angus Graham stated they were named after the 'best-preserved monuments' at Balnuaran.³¹

²⁹ Richard Bradley, 'The land, the sky and the Scottish stone circle', in *Monuments and landscape in Atlantic Europe: perceptions and society during the Neolithic and Early Bronze Age* ed. by Chris Scarre, pp. 122-138 (London and New York: Routledge, 2002), [Hereafter Bradley, Scottish Stone circle], p.122.

³⁰ Richard Bradley, 'Making Strange: Monuments and the Creation of the Earlier Prehistoric Landscape', in *Prehistoric and Roman Landscape History after Hoskins Volume I* ed. by Andrew Fleming and Richard Hingley, series ed. Christopher Dyer, pp. 33-42 (Macclesfield: Windgather Press, 2007), p.38; Audrey Shore Henshall, *The Chambered Tombs of Scotland Vol 1* (Aberdeen: Edinburgh University Press, 1963), [Hereafter Henshall, CT, Vol. 1], p. 30.

³¹ Childe and Graham, Royal Commission for the Ancient and Historical Monuments of Scotland (RCAHMS) *MS 36 Emergency Survey Sire Descriptions Inverness-shire 1943*, Vere Gordon Childe (commissioner) and Angus Graham (Secretary), <http://canmore-pdf.rcahms.gov.uk/wp/00/WP000789.pdf>, [Accessed on 11 December 2016], [Hereafter Childe and Graham RCAHMS], p.40.

Monuments are often associated with enchantment and James MacPherson said Clava Cairns meant 'Good Stones' or fairy stones.³² Local people thought cairns inhabited by the *Sith* (pronounced Shee) or Scottish faerie, who were feared. Alexander Macgregor (1806-1881) explained referring to faeries as 'good neighbours' was to placate them.³³ A tradition of Clava cairns as faerie-mounds may have helped preserve them, with multiple tales of bad luck if stones were removed. However Balnuaran was neglected in the early twentieth century as George Browne (1833-1930) said it was 'so overgrown with every prickly and scratchy growth', that it was impossible to count the stones.³⁴

Henshall, documenting passage-graves and ring-cairns, produced evidence of human 'remains', noting that southwest orientation was common in 'Scotland, Brittany and Iberia', without giving details of Iberian-Britannic similarities.³⁵ This southwest focus occurs at Stonehenge; Sims stated both the Trilithons and the bluestones are 'stepped in height towards the southwest.'³⁶ In addition Bradley said Clava circle-orthostats were 'apparently "paired" with individual kerbstones,' matched by colour, shape, markings or substance.³⁷

Henshall noted their 'predominantly riverine' distribution.³⁸ Extant cairns are almost all near rivers, the Clava-valley has eleven with passages aligned alongside the river, just as Fabio Silva said Portuguese cairns were 'parallel to the river'.³⁹ Some hilltop-cairns lie between the Nairn and Loch Ness, although few coastal cairns survive; most were destroyed through river-flow alterations over millennia or when coastal towns were built, Fraser noted two cairns 'entirely removed' at

³² James MacPherson, 'Glossary of some place names' *The Hub of the Highlands* Inverness Field Club (Edinburgh: Mercer Press, 1975) p.371.

³³ Alexander MacGregor, *Highland Superstitions: the druids, fairies, witchcraft, second-sight, Hallowe'en, Sacred wells and lochs, with several curious instances of Highland customs and beliefs* Fifth edition (Stirling: Eneas MacKay, 1937), p. 24, [Hereafter MacGregor, *Highland Superstitions*].

³⁴ George Forrest Browne, *On some antiquities in the neighbourhood of Dunect House, Aberdeenshire [With plates]* (Cambridge: for the Cambridge Press, 1921), [Hereafter Browne, *Antiquities*], p.98.

³⁵ Henshall, CT, Vol. 1, pp. 14. 368; Henshall, CT, Vol. 2, p. 271.

³⁶ Lionel Sims, 'The 'solarization' of the moon: Manipulated knowledge at Stonehenge' *Cambridge Archaeological Journal* Vol.16, No. 2 (Jun. 2006), 191-207, [Hereafter Sims, *Solarisation*], p.195.

³⁷ Bradley *Scottish stone circle*, p.128.

³⁸ Henshall, CT, Vol. 1, p. 17.

³⁹ Fabio Silva, "'A Tomb with a View": New Methods for bridging the gap between land and sky in megalithic archaeology', *Advances in Archaeological Practice* Vol. 2, No. 1 (2014), 24-37, [Hereafter Silva, *Tomb*], p.25.

Flemington.⁴⁰ The coast remains popular, having sea access and reasonably flat ground for crops and travel. In hilly landscapes ease of travel is important; until recently hills were barriers and rivers required fording. Rivers and coasts functioned as highways for maritime people. Thom suggested that early navigation required 'tidal knowledge, leading to understanding lunar phases'.⁴¹ Figure 2.2.5 shows existing hilltop Bronze Age hut circles and field systems, but Clava cairn users probably lived nearby.

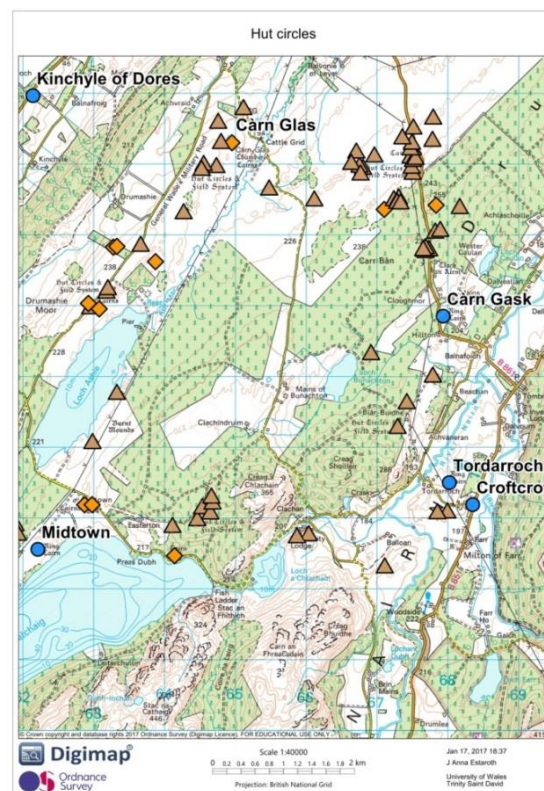


Figure 2.2.5 Hilltop Bronze Age hut circles. Clava cairns are labelled (blue circles) and their environment with many non Clava cairns (yellow diamonds) and many hut circles (brown triangles) which are close to Bronze Age field systems. These occur on hills above Clava cairns, although of later date, they indicate good areas to live. Scale reads 1:40000, 2km.

Bright quartz stone of hilltop-cairns (Carn Gask figure 2.2.5) were easily located by passing traders and herders. Valley floors flood and, while rocky outcrops were used as ritual centres, little evidence of EBA cultivation or homesteads survives, largely obliterated by modern farming, although Meryl Marshall's

⁴⁰ Fraser, Strathnairn, p. 329.

⁴¹ Alexander Thom, *Megalithic Lunar Observatories* (Oxford: Clarendon Press, 1971), [Hereafter Thom Lunar Observatories], p.10.

(NOSAS) report of 'Balblair Woods' described valley-floor living structures, including an integrated chambered cairn.⁴²

Bradley noted monuments were 'altered to conform with changing circumstances' and Balnuaran's cairns were constructed in three stages: after clearing woodland, passage-graves were constructed, aligned on midwinter sunset, as a temporary 'free-standing monument', about fifty years later rubble platforms then blocked the entrance to humans, allowing light-penetration and the monoliths encircled the cairn paired with kerbstones.⁴³ This process changed them from an accessible monument to one where the dead were entombed and the monument converted into open-air space. Bradley linked this process with how tombs 'replaced older houses' which again transformed the 'living into ancestors, connected by solar movement'.⁴⁴ Today passages are open although Piggott found boulders 'deliberately placed' to finally block Corriemoney and MacKie stated the 'passage' was inaccessible.⁴⁵

Passage-graves are man-made caves. Chris Fowler and Cummings considered the acoustic, rock art and low lighting of 'chambered tombs' appropriate for 'altered states of consciousness and trance'.⁴⁶ They are liminal locations, darkness generating an otherworldly connection. Cummings suggested three realms: the living, the upper realm of sky, birds and spirits and the lower realm of 'Underworld Rivers, caves and the dead'.⁴⁷ Passage-graves transect all three realms. Marion Dowd considered late Bronze Age cave-usage concluding that the cave's darkness allowed rituals to be 'veiled in secrecy'.⁴⁸ Post-closure passage-grave forecourts might suit

⁴² Meryl Marshall. NOSAS Report - North Balblair Wood, Beaully
<https://nosasblog.wordpress.com/2015/05/09/lament-for-a-once-magical-place-or-the-agony-of-a-severely-traumatised-pair-of-archaeological-sites/>, [Accessed 07 February 2016].

⁴³ Richard Bradley, *Altering the Earth: The origins of Monuments in Britain and Continental Europe The 1992 Rhind Lectures* (Edinburgh: Society of Antiquities of Scotland Monograph Series No. 8, 1993), p. 93; Bradley, *Scottish stone circle*, pp. 129. 130.

⁴⁴ Bradley. *Scottish Stone circle*, p.130.

⁴⁵ Stuart Piggott, 'Excavations in Passage Graves and Ring-Cairns of the Clava group, 1952-53', *Proceedings of the Society of Antiquaries Scotland*. Vol. 88, (Jan., 1, 1956), 173-207, [Hereafter Piggott Excavations], p. 180; MacKie, *Scotland Guide*, p. 210.

⁴⁶ Chris Fowler and Vicki Cummings, 'Places of transformation: Building Monuments from water and Stone in the Neolithic of the Irish Sea' *The Journal of the Royal Anthropological Institute*, Vol. 9, No. 1, (1st March 2003), 1-20, [Hereafter Fowler and Cummings], pp.8.15.

⁴⁷ Vicki Cummings, *The Anthropology of Hunter-gatherers Key themes for archaeologists* (London & New York: Bloomsbury Academic, 2013, [Hereafter Cummings Hunter-gatherers], p.81.

⁴⁸ Marion Dowd, 'In search of darkness: cave use in late Bronze Age Ireland', in *The Archaeology of Darkness* ed. by Marion Dowd and Robert Hensey, (Oxford: Oxbow books, 2016), p.68.

initiation ceremonies on the darkest night of the year, but lighting the dark centre at midwinter appears intentional. Bronwen Price saw passage-tombs as transitional spaces between earth and sky, 'present and ancestral realms or childhood and adulthood'.⁴⁹

There was much antiquarian interest. Henshall and James Ritchie noted that Kinchyle of Dores (henceforth Kinchyle) was visited in 1760 by Richard Pococke (1704-1765), in 1762 by Thomas Pennant (1726-1798) plus in 1773 by James Boswell (1740-1795) and Dr. Samuel Johnstone (1709-1784).⁵⁰ Boswell describing a 'double circle of stones' included this scathing comment: 'Dr Johnstone justly observed that "to go and see one druidical temple is only to see that it is nothing, for there is neither art nor power in it; and seeing one is quite enough"'.⁵¹ Prompting Richard Hayman's response that standing stones were 'worth the effort of *going to see*'.⁵² MacLagan produced a diagram of Balnuaran (Canmore's image) saying Northeast was 'planted as a garden' and Southwest was 'used as a pig-sty'; Joseph Anderson (1832-1916) also provided an early drawing (figures 2.2.6 and 2.2.7).⁵³

⁴⁹ Bronwen Price, 'Journeying into different realms: travel, pilgrimage and rites of passage at Graig Lwyd', in *Prehistoric Journeys* ed. by Vicki Cummings and Robert Johnston, (Oxford: Oxbow Books, 2007), pp.96-97.

⁵⁰ Audrey Shore Henshall and James Neil Graham Ritchie, *The Chambered Cairns of the Central Highlands: An inventory of the Structures and their Contents* (Bath: Edinburgh University Press, 1988), [Hereafter Henshall and Ritchie, Chambered cairns], p. 9.

⁵¹ James Boswell, *Journal of a Tour of the Hebrides with Samuel Johnson LLD* (London: T. Cadell & W. Davis, Strand, 1813) Sixth edition [1785], p.143.

⁵² Richard Hayman, *Riddles in Stone: Myths, Archaeology and the Ancient Britons* (London: The Hambledon Press, 1997), [Hereafter Hayman, Riddles], p.3.

⁵³ MacLagan, Hill-forts, p.77; <http://canmore.org.uk/collection/1208808>; Joseph Anderson, *Scotland in Pagan Times: The Bronze and Stone Ages The Rhind Lectures in Archaeology 2 for 1882* (Edinburgh: David Douglas, 1886), p.301.

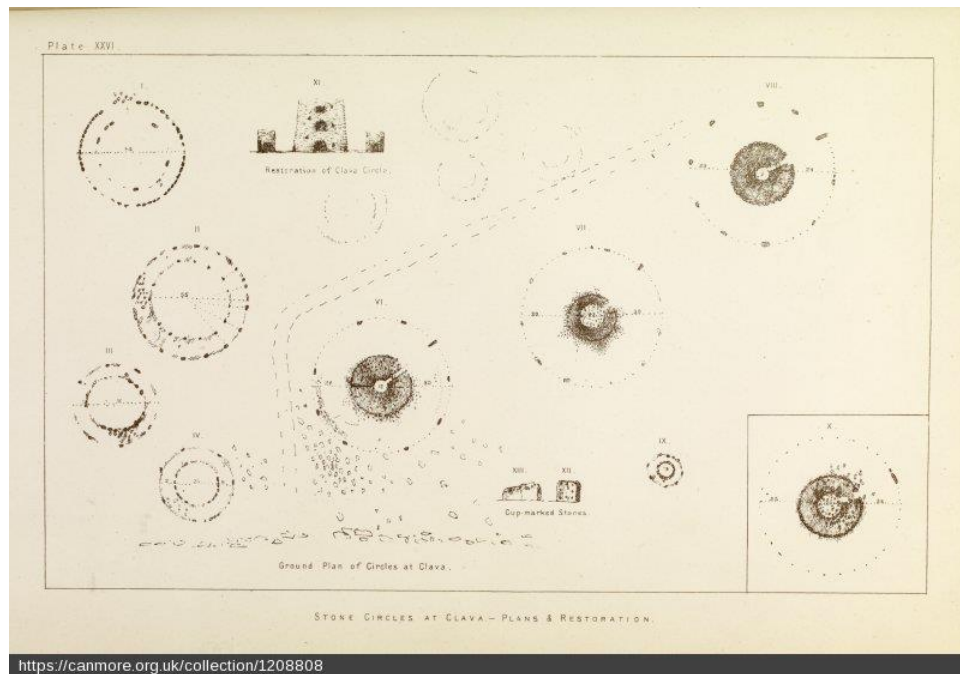


Figure 2.2.6 Canmore's Image of Christian MacLagan's diagram of the three cairn's at Balnuaran, this is a reverse of the modern photograph figure 2.2.6, the top of the page is south, note the added passage in Balnuaran of Clava Central Ring-cairn.



Figure 2.2.7 Joseph Anderson's view of a chambered cairn at Clava, after a drawing by Rev. Dr. J. Joass.

2. 3. The time-scale of Clava Cairn building tradition

The Moray coast was popular for habitation: Bradley found Mesolithic artefacts and workings near Allanfearn and 'Kingsteps Quarry' at the Nairn's river-mouth while Fred Coles' 1903 study estimated 'one hundred and seventy five

prehistoric monuments' in Banff and Moray alone.⁵⁴ Excavations by John Thawley at Newtown of Petty provided radio-carbon dates similar to Balnuran, whereas Derek Simpson at Raigmore discovered a Neolithic wooden structure under the cairn: with multiple-period dates ranging from '4833-3370 BCE' to '2290-1979 BCE'.⁵⁵

Karen Molloy and Michael O'Connell, studying Irish Elm decline, concluded there was a 'peak population' around 5000 BP lasting 'two hundred years', when most monuments were built.⁵⁶ This short period is supported by Scarre who said Galician tombs were built in 'relatively short bursts' within a 'few generations'.⁵⁷ OCH and early Recumbent Stone Circles (hereafter RSC) were possibly constructed during similar Scottish population growth.

Late phase RSC building is contemporaneous with Clava cairns, Ruggles provided '2500-1750 BCE', although Liz Henty noted RSC radio-carbon dates are 'often inaccurate'.⁵⁸ Bradley referred to Clava cairns as 'built during the Chalcolithic period' into the EBA, which suggests that some may be older.⁵⁹ Indeed potsherds from Balnuran SW were 'late Neolithic ware', resembling Skara Brae sherds although Henshall suggested this can indicate adherence to an earlier pottery style.⁶⁰

⁵⁴ Bradley, *Good Stones*, p.203; Fred R. Coles, 'Report of the Stone Circles in North East Scotland (Banffshire and Moray)' *The Proceedings of the Buchan Field Club*, 1903 (Peterhead: P. Stogie, "Buchan Observer" printing works, 1904), [Also printed in *Proceedings of the Society of Antiquaries of Scotland* Vol. 41 (1907), 130-172], [Hereafter Coles, Report], p.6

⁵⁵ Richard Bradley and Margaret Mathews, 'The Clava Ring-cairn at Newton of Petty, Excavations by John Thawley 1975-77' in *The Good Stones a new investigation of the Clava Cairns* ed. by Richard Bradley, pp.131-159 (Edinburgh and Kings Stanley: Society of Antiquaries of Scotland Monograph Series No. 17, 2000), p.158; Derek Simpson, 'Excavation of a kerbed funerary monument at Stoneyfield, Raigmore, Inverness, Highland 1972-3' *Proceedings of the Society of Antiquaries of Scotland* Vol. 126 (1996), 53-86, [Hereafter Derek Simpson, Raigmore], p. 65.

⁵⁶ Karen Molloy and Michael O'Connell, 'The Nature of the Vegetational Changes at about 5000 B.P. with Particular Reference to the Elm Decline: Fresh Evidence from Connemara, Western Ireland' *The New Phytologist* Vol. 107, No. 1 (Sep., 1987), 203-220. Published by: Wiley on behalf of the New Phytologist Trust, p.217.

⁵⁷ Chris, Scarre, 'Rocks of Ages: Tempo and Time in Megalithic Monuments', *European Journal of Archaeology* Vol. 13, No. 2 (01 Aug., 2010), 175-193, pp.177.185.

⁵⁸ Ruggles Prehistoric, p. 91; Liz Henty 'An Examination of the Divide between Archaeoastronomy and Archaeology', in *Skyscapes The Role and Importance of the Sky in Archaeology* ed. by Fabio Silva and Nicholas Campion, (Oxford: Oxbow Books, 2015), [Hereafter Henty, Divide], p.23.

⁵⁹ Richard Bradley, 'After the Great Stone Circles', in *The Use and Reuse of Stone Circles: Fieldwork at Five Scottish Monuments and its Implications* ed. by Richard Bradley and Courtney Nimura, (Oxford and Philadelphia: Oxbow Books, 2016), [Hereafter Bradley Use and reuse of Stone Circles], p, 113.

⁶⁰ Henshall, CT. Vol. 2, p. 182.

Reuse complicates matters, Bradley found Balnuaran South 'intensively re-used' and a Pictish cremation was buried near the central ring-cairn.⁶¹ Simpson found a Romano-British Brooch at Raigmore.⁶² Milton of Clava South became a mediaeval Catholic 'Chapel' with burial ground, probably used until the Reformation.⁶³ Highland Historic Environment Record (HHER) noted a 'post-medieval township' nearby.⁶⁴ Anderson and Anderson found local unbaptised children were 'still buried' at this disused chapel.⁶⁵ Building a chapel from a cairn indicates a continued sense of the sacred and secret burials were common practice. Cosmo Innes (1798-1874) stated ruined chapels were used for secretly burying 'unchristianed children' after interviewing grieving parents.⁶⁶ During excavations at Balnuaran Bradley found modern 'visitor offerings'.⁶⁷ The following table summarises multiuse.⁶⁸

Date	Event	Where
5474-5242 BCE	Radiocarbon no artefacts	Balnuaran NE + Central
2340-2030 BCE	Main construction	Balnuaran enclosure
1100-800 BCE	Extensive reuse	Balnuaran + Clava-valley
653-856 CE	Pictish cremation	Balnuaran Central
c.1100 - 1500? CE	St Brigid's Chapel	Milton of Clava South
1560-1900	Township	Milton of Clava South
1850's	Burials of unbaptised infants	Ruined Chapel
1990's	Deposition of crystals and coins	Balnuaran excavations

Although radio-carbon dates across most Clava sites are unavailable it is reasonable to assume that the bulk of building took place, as Ruggles suggested between '2200-2000 BCE'.⁶⁹ The area may have been inhabited from 4000 BCE, the

⁶¹ Bradley, Good Stones, p.130.

⁶² Derek Simpson, Raigmore, pp. 56.

⁶³ Onsite Historic Environment Scotland information board (previously Historic Scotland).

⁶⁴ <http://her.highland.gov.uk/SingleResult.aspx?uid=MHG25839>, [Accessed on 29 November 2016], website of Highland Historic Environment Record, (HHER, previously HER, previously RCAHMS).

⁶⁵ Anderson and Anderson, 1851 Guide, p. 370.

⁶⁶ Cosmo Innes. 'Notice of a tomb on the hill of Roseisle, Morayshire recently opened; also of the chambered cairns and stone circles of Clava, in Nairnshire', *Proceedings of the Society of Antiquaries Scotland*. Vol. 3 (1857-60), .47-50[Hereafter Innes, Notice], p.48.

⁶⁷ Bradley, Good Stones, p.231.

⁶⁸ Bradley, Good Stones, pp.115.157.120.115.114-119.231; Onsite Historic Environment Scotland information board at Milton of Clava South; Innes, Notice, p.48.

⁶⁹ Ruggles, Prehistoric, p. 14.

periodic use through Pictish into Christian times and its significance for modern Pagans reinforces the site's sacredness.

2. 4. Clava Cairns in their cultural environment

Neolithic OCH cairns lie northwest of Clava territory, with Neolithic to EBA RSC monuments east and southwest. From the 'coast', Childe said Orkney was visible, described by Gavin MacGregor as one of the 'richest surviving Neolithic landscapes in Western Europe'.⁷⁰ Nick Card et al stated the Ness of Brodgar temple complex, (discovered by 'chance' in 2003), exhibited 'intense cultural activity between 3000-2800 BC' lying at the boundary between two lochs: one 'salt', one 'freshwater'.⁷¹ The Barnhouse structures were inhabited, Card stated, between 'c.3400 - 3100 BC' when 'Newgrange was under construction' and the Ness of Brodgar predated the earliest phase at Stonehenge 'c.3100' BCE, going 'out of use in 2300 BC'.⁷²

Neil Oliver said Orkney was populated during the 'Mesolithic period' and Skara Brae (c.3100 BCE) had two skeletons buried 'beneath a bed-setting'.⁷³ Maes Howe tomb was similarly built above previous habitation indicating, Oliver suggested, a 'slow evolution from domestic to spiritual', while Bradley put Clava cairns at the heart of a 'domestic landscape'.⁷⁴ According to Gordon Noble, Maes Howe's 'main period of use' was 2800-2200BCE; ending as Clava construction began.⁷⁵ A storm uncovered Skara Brae in 1850, but Sara Reardon suggested 'a catastrophic storm in 2200 BCE drove the villagers away' preserving the village,

⁷⁰ Childe, Scotland, p. 20; Gavin MacGregor, 'Neolithic Pasts, Neolithic Future: The Contemporary Socio-politics of Prehistoric Landscapes', in *The Neolithic in Mainland Scotland* ed. by Kenneth Brophy, Gavin MacGregor and Ian Ralston, (Edinburgh: Edinburgh University Press, 2016), p.30.

⁷¹ Nick Card, Jane Downes, Julie Gibson and Susan Ovenden, 'Bringing a Landscape to Life? Researching and Managing 'The Heart of Neolithic Orkney' World Heritage Site', *World Archaeology*, Vol. 39, No. 3, The Archaeology of World Heritage (Sep., 2007), 417-435, p.425; Nick Card, *The Ness of Brodgar* (Kirkwall: Orkney Media Group Ltd., 2015), [Hereafter Card, Ness of Brodgar], p.3; Nick Card, Jonathan Cluett, Jane Downes, John Gater, John and Susan Ovenden, "'The Heart of Neolithic Orkney' World Heritage Site: building a landscape", in *From Stonehenge to the Baltic Living with cultural diversity in the third millennium BC* ed. by Mats Larsson and Mike Parker-Pearson, (Oxford: BAR International Series 1692, 2007), pp.225.228.

⁷² Card, Ness of Brodgar, pp. 3.30.

⁷³ Neil Oliver *A History of Ancient Britain* (London: Weidenfeld & Nicolson, 2011), [Hereafter Oliver, History], pp.105. 109.109.

⁷⁴ Oliver, History, p.111: Bradley, Scottish stone circle, p.125.

⁷⁵ Gordon Noble, *Neolithic Scotland Timber, Stone, Earth and Fire* (Edinburgh: Edinburgh University Press, 2006), [Hereafter Noble, Neolithic], p.107.

coinciding with Noble's dates for the final uses of Maes Howe and Bradley's for the beginning of building at Balnuaran.⁷⁶

Bradley recognised similarities between Clava, Knocknarea in SE Ireland and Maes Howe; all are surrounded by a bank or circle which suggests that their usage involved a change in inclusivity: (figure 2.4.1).⁷⁷ Access to the passage-chamber was exclusive but post-closure the platform, as far as the stone circle or bank, was open for people to perform rites: Bradley noted cremated bone fragments and 'seashells' deposited on the platform at Balnuaran resembled chamber depositions.⁷⁸ Ireland's Newgrange also had a platform added, during what Robert Hensey referred to as the 'post-Neolithic phase of remodelling' c.2500 BC.⁷⁹

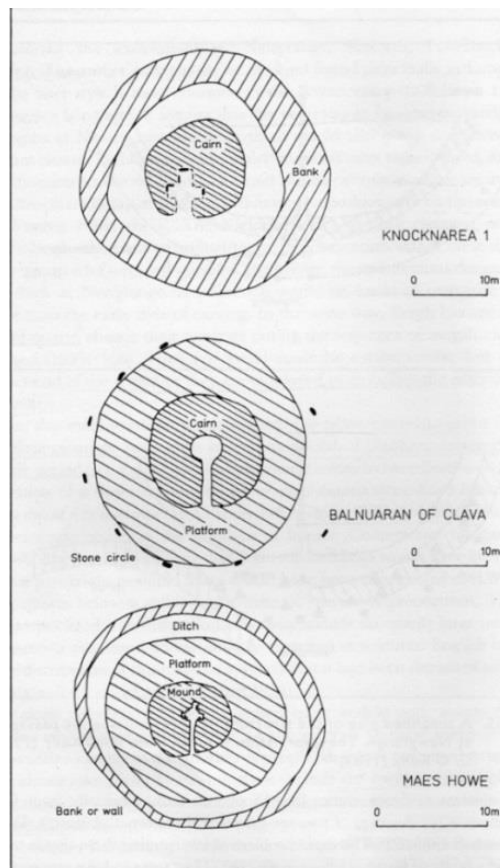


Figure 2.4.1 Bradley's comparison of Knocknarea 1, Balnuaran of Clava and Maes Howe: platforms extend out to the bank at Maes Howe and to the encircling stone circle at Balnuaran of Clava, while Knocknarea is surrounded by the rubble bank.

⁷⁶ Sara Reardon, 'Archaeologists Race Against Sea Change in Orkney', *Science*, New Series, Vol. 334, No. 6059 (25 November 2011), 1054-1055 p.1054; Noble, *Neolithic*, p.107; Bradley, *Good Stones*, pp. 115.116.118.119.120.

⁷⁷ Bradley, *Significance*, p. 112.

⁷⁸ Bradley *Significance*, p. 113.

⁷⁹ Robert Hensey. *First Light The Origins of Newgrange*. *Oxbow Insight in Archaeology* (Oxford: Oxbow Books, 2015), [Hereafter Hensey, *First Light*], p.136.

Henshall thought Clava 'builders came from Ireland,' noting the easy route through Loch Ness (known as the Great Glen) suggesting cairns were orientated southwest to focus on areas of origin.⁸⁰ Although invasion theories are discredited today, trade links via Loch Ness is likely. The earliest British Bronze items were found at sites in northeast Scotland; Oliver described axes 'cast about 2200 BCE' which were 'created with a union of Irish copper and Cornish tin.'⁸¹ William O'Brian described Irish copper being mined 'c2400-2000 BC'.⁸² Kilmartin Glen acted as a gateway connecting Loch Ness, Ireland and Cornwall water-routes: Oliver noted '350 monuments, with axe-heads and cup-marked stones'.⁸³ Needham linked SW Ireland, RSCs and Clava SW orientations to the moon, providing this diagram of copper distribution, which focuses in northeast Scotland (circled): (figure 2.4.2).⁸⁴

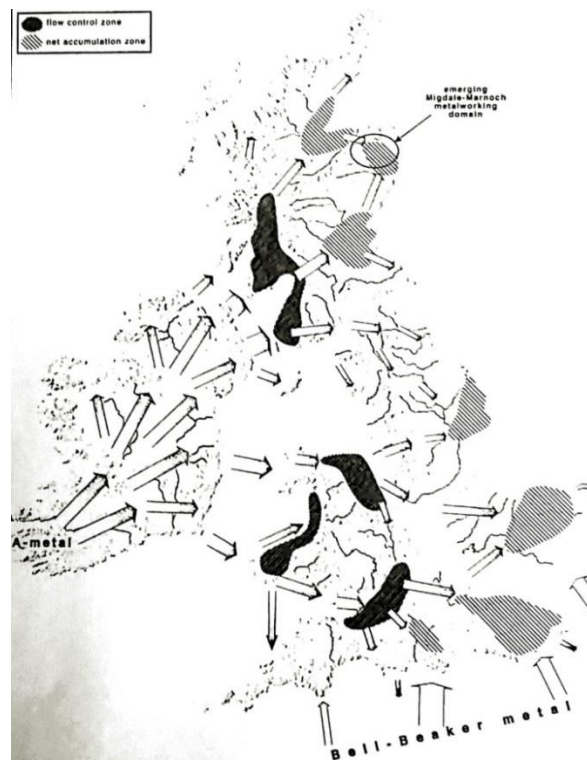


Figure 2.4.2 Stuart Needham's diagram of the flow of metal across Britain and Ireland in the late copper age (approximately 23-22,000 BCE). The dark regions are 'flow control zones', such as Kilmartin Glen in Scotland and the striped areas are 'net accumulation zones', such as Clava and RSC territories. He has circled 'emerging Midgate-Marnoch metal-working domain'.

⁸⁰ Henshall, CT Vol. 2, p. 270.

⁸¹ Oliver, History, p. 156.

⁸² William O'Brian, *Bronze Age Copper Mining in Britain and Ireland* (Princes Risborough: Shire Archaeology Publications, 1996), p. 10.

⁸³ Oliver, History, pp. 157-158.

⁸⁴ Needham, Sunburst, p. 243, 242.

Bradley explored burial practices from Mesolithic to Neolithic; originally there were single articulated burials under inaccessible, long mounds ('based on the houses of ancestral past') and later defleshed multiple deposits in an open chamber.⁸⁵ Orkney's Neolithic Tomb of the Eagles included 'whole communities', according to John Hedges, who argued that community life 'centred round the tomb,' estimating Quanterness held '394 people'.⁸⁶ Open access permitted bone removal for display as valued ancestors and others added. By the EBA Clava Cairns, although never far from their community, resembled Kilmartin cemetery with only 'one or two individuals' in the passage-graves, Henshall provided 'one person's remains' for Kinchyle.⁸⁷ Burl noted the 1828 Balnuaran SW excavation 'recovered 2 broken pots and cremated bone 'now lost'; so few burials suggested they could not be 'just charnel-houses for the dead', but were ritual centres.⁸⁸ At Corrimony Piggott found the evidence of a 'single crouched burial' without grave goods: (figure 2.4.3).⁸⁹



Figure 2.4.3. Stuart Piggott found this body stain on the undisturbed centre of the chamber at Corriemoney, indicating individual burial.

⁸⁵ Bradley, *Significance*, p.61.

⁸⁶ John W. Hedges, *Tomb of the Eagles A window on Stone Age Tribal Britain* (London: John Murray, 1984), [Hereafter Hedges, *Tomb*], pp. 105. 106. 107.

⁸⁷ Henshall, *CT*. Vol. 1, pp. 29. 30.

⁸⁸ Max Milligan and Aubrey Burl *Circles of Stone: the prehistoric rings of Britain and Ireland* (London: Harvill Press, 1999), p. 80; Aubrey Burl, *Prehistoric Astronomy and Ritual* (Aylesbury: Shire Archaeology, 1997 [1983]), [Hereafter Burl, *Prehistoric Astronomy*], p.27.

⁸⁹ Piggott, *Excavations*, pp. 183.182.

Burial methods had radically altered. The few individuals found exemplify final tomb usage, although Clava cairns were partially sealed soon after construction; many were reused in the mid/late Bronze Age, thus burial numbers cannot define the building's initial purpose. The propensity for later groups to build near Clava cairns is described by Stephen Driscoll who argued that the past was 'politically valuable' to Pictish 'early medieval' nobles (c.500-1000 CE) 'anyone aiming at leadership built their fortresses near ancient sites already known for their significance.'⁹⁰ This conferring of past authority continues today, Hayman suggested that the ritual crowning of British monarchs over the Scottish coronation Stone of Scone (also known as Stone of Destiny) last used with Queen Elizabeth II, was derived from the Pictish tradition that 'Kings were inaugurated at Grenish' Clava cairn.⁹¹ Scottish Kings traditionally married the land on coronation and John Waddell described a similar Irish sacral kingship marriage to the land at 'cairn Carnfree' in 1310 CE, where otherworld authority was conferred upon the king.⁹²

Picts were subsumed into Scottish culture when defeated by Kenneth MacAlpin, whom Eric Simpson described as 'King of Dal Riata' in 844 CE.⁹³ Noting the Pictish bones buried at Balnuaran Central, Driscoll stated they wished to incorporate ancient sites into their 'ceremonial landscapes' to maintain control.⁹⁴ Histories and genealogies described descent from mythical heroes and 'all ancient places had a meaning, a *dindshenchas*,' transforming old tombs into cultural objects served political ends.⁹⁵ Modern clan-conscious Scots still regard cairns as culturally significant.

This section discussed the archaeological background of the Clava tradition. It began with the broad geological/geographical context, described cairns, their liminality, timescale, continuity and cultural context. Finally changes in burial practices were discussed, as well as their continued significance for local people.

⁹⁰ Stephen T. Driscoll, 'Picts and Prehistory: Cultural Resource Management in Early Medieval Scotland' *World Archaeology*, Vol. 30, No. 1, The Past in the Past: The Reuse of Ancient Monuments (Jun., 1998), 142-158, [Hereafter Driscoll, Picts and Prehistory], pp.145.142.

⁹¹ Hayman, Riddles, p.11.

⁹² John Waddell, *Archaeology and Celtic Myth: an exploration* (Dublin: Four Courts Press, 2014), [Hereafter Waddell, Archaeology and Celtic Myth], p.137.

⁹³ Eric Simpson, *Discovering Banff Moray & Nairn* (Edinburgh: John Donald Publishers Ltd., 1992), [Hereafter, Eric Simpson, Banff, Moray & Nairn], p. 9.

⁹⁴ Driscoll, Picts and Prehistory, p. 148.

⁹⁵ Driscoll, Picts and Prehistory, p. 155.

3. Literature Review the archaeoastronomy of Clava Cairns

This chapter briefly discusses the history of archaeoastronomy for Neolithic and EBA monuments. It explores solar alignments and considers how lunar orientations work, especially the MLL. Skyscape archaeology for the Balnuaran group is considered in greater detail, including the author's preliminary study.

3. 1. What is archaeoastronomy?

Ruggles defined archaeoastronomy as 'the study of beliefs and practices relating to the sky in the past, and the uses to which people's knowledge of the skies were put', while Silva is more specific with 'the study of how people have understood, conceptualized and used the phenomena in the sky and what role the sky played in their cultures, by analysing their material remains'.⁹⁶ Archaeoastronomy bridges astronomy and archaeology, borrowing techniques and theories from both disciplines. Marrying these disciplines encompassed works by Norman Lockyer (1836-1920) and Thom (representing physics, astronomy and engineering) plus those of Childe, Piggott and Jacquetta Hawkes (1910-1996) (representing archaeology). Ruggles explained they were initially 'speaking different languages' and unable to fully appreciate what each discipline offered, generating a 'cultural divide'.⁹⁷ A widening divide, as Ronald Hutton explains, because some of Lockyer's data was 'wrong' and what was correct was 'difficult to refute', plus Thom's work was largely read by 'astronomers and statisticians'.⁹⁸ Hawkins' work on Stonehenge sparked interest and Anthony Aveni commented that both Hawkins' and Thom's

⁹⁶ 'Stonehenge and Ancient Astronomy'

http://www2.cliveruggles.com/images/cliveruggles.com/documents/ras_stonehenge_factsheet.pdf [Accessed 19 January 2015]; Fabio Silva, 'The Role and Importance of the Sky in Archaeology: an introduction', in *Skyscapes: The Role and Importance of the Sky in Archaeology* ed. by Fabio Silva and Nick Campion, (Oxford: Oxbow Books, 2015), [Hereafter Silva Role and Importance of the Sky], p.2.

⁹⁷ Ruggles, *Prehistoric*, p. 7.

⁹⁸ Ronald Hutton, 'The Strange History of British Archaeoastronomy' *Journal of the Study of Religion, Nature and Culture* Vol. 7, No. 4, (2013), 376-396, Sheffield, Equinox Publishing Ltd., [Hereafter Hutton, *Strange History*], pp.379.381.

demonstration of 'quantifiable knowledge about the sky' generated a worldwide 'tidal wave of investigation of ancient remains'.⁹⁹

Until recently the widespread early onset of skywatching has been undervalued academically; Cornell noted skilled knowledge of astronomy was 'overlooked' in 'preliterate cultures'.¹⁰⁰ Moreover Silva stated that skyscapes influenced previous cultures' 'social, economic, religious and political spheres'.¹⁰¹ The real antiquity of human sky-viewing came to light when Alexander Marshack provided evidence of notches linked to 'phases of the moon' in antler bones from around 13,000 – 15,000 BP or 'late middle Magdalenian period'.¹⁰² Marshack also saw river valleys, such as at Clava, as ideal feasting or meeting locations for hunter-gatherers and biannual migrations enabled humans to divide 'time and space'.¹⁰³

Ireland experienced 'increased precipitation' from '3600 to 3000 BC' which coincided with larger complex megalithic designs, which Hensey posited, was generated by changing agricultural conditions.¹⁰⁴ Climate change is also suggested by Gail Higginbottam for a 'dramatic collapse' in Scottish pine c.2000-1800 BCE and by Cornell who noted that Britain changed from 'cloudless horizons' to 'fog and rain' which he said caused lost astronomical knowledge and residual rituals; unconsciously implying the superiority of 'observational astronomy' over ritual.¹⁰⁵ Skywatching probably always was ritually imbued and the purpose likely to be community orientated. In Scotland the aurora borealis is often visible; Norman Davidson commented that this is 'one of nature's most arresting sights' and from

⁹⁹ Anthony F. Aveni. *Stairways to the Stars: skywatching in three great ancient cultures* (New York: J. Wiley, 1997), [Hereafter Aveni, Stairway], p.75.

¹⁰⁰ Cornell, *First Star-gazers*, p.42.

¹⁰¹ Silva, *Role and Importance of the Sky*, p. 6.

¹⁰² Alexander Marshack, *The Roots of Civilisation* (London: Weidenfeld and Nicolson, 1972), [Hereafter Marshack, *Roots*], p. 147.

¹⁰³ Marshack, *Roots*, p.374.

¹⁰⁴ Hensey, *First Light*, p. 29.

¹⁰⁵ Gail Higginbottam, *The World ends here, the World begins here: Bronze Age monuments on the Isle of Mull in Western Scotland* (Draft edited 29-7-16). https://www.academia.edu/22473630/The_World_begins_here_the_World_ends_here_Bronze_Age_megalithic_monuments_on_the_isle_of_Mull_in_western_Scotland_Draft_Edited_29-7-16_18_00_Aus_CST, [Accessed 05 February 2017], p.32, [Hereafter Higginbottam, *World*]; Cornell, *First star-gazers*, p. 82.

personal experience it is certainly dramatic, so it must have been a focus for sky-watchers in prehistory, although hard to research.¹⁰⁶

Discovering alignments in isolation is inadequate and cultural relevance is absolutely essential, Aveni asked did 'stonehengers' witness sunrise or believe they participated in its rise and can 'celestial timings' tie in with known innovations?¹⁰⁷ Aveni saw Stonehenge as somewhere to celebrate 'cosmic encounters' and suitable for conducting rites, this also applies to Clava cairns.¹⁰⁸ Burl commented that EBA people were familiar with their horizons, seeing sunset change 'during the course of the year' but not all alignments were 'astronomical' some being to topographical features.¹⁰⁹ Burl compared megalithic sites with south-west orientations: (figure 3.1.1).¹¹⁰

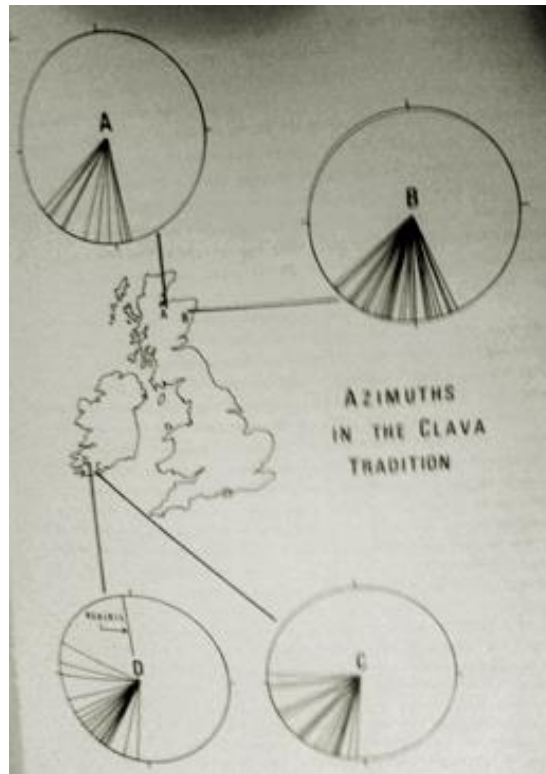


Figure 3.1.1 Burl's azimuth comparisons for A. Clava, B. RSCs C & D. Irish Wedge-shaped tombs.

¹⁰⁶ Norman Davidson, *Astronomy and the Imagination: A New Approach to Man's Experience of the Stars* (London: Routledge & Kegan Paul, 1985), [Hereafter Davidson, *Astronomy*], p.184.

¹⁰⁷ Aveni *Stairway*, pp.85.75.

¹⁰⁸ Aveni *Stairway*, p.91.

¹⁰⁹ Burl, *Prehistoric Astronomy*, pp. 16.10.

¹¹⁰ Aubrey Burl, 'Pi in the Sky' in *Archaeoastronomy in the Old World* ed. by D. C. Heggie (Cambridge, Cambridge University Press, 1982), [Hereafter Burl, *Pi*], p. 149.

Burl thought Clava cairns were 'progenitors' of RSCs and his declinations were largely untested 'in the field' being based on Alexander Thom's diagrams.¹¹¹ Chris Scarre suggested that RSCs provided a 'window' for solar, lunar or significant stellar risings or settings, especially the 'midsummer full moon'; the main theme of this dissertation.¹¹² Scarre incorrectly referred to Clava Cairns as orientated towards 'dawn at winter solstice', also referring to Newgrange and Maes Howe as aligned to 'midwinter sunrise'.¹¹³ However Scarre recognised Clava cairns, Irish wedge-shaped tombs and the 'later stages of Stonehenge' as contemporaneous, while Ruggles described Clava as the 'last vestiges of the passage-grave tradition'.¹¹⁴ Scarre stated that Irish wedge-tombs face the sea and sunset then argued that changes from 'sunrise at Newgrange to sunset in much later tombs' indicated altered beliefs, although he never described Clava's midwinter sunset orientation.¹¹⁵ Such a change in belief systems is likely. Bradley noted that Clava cairns 'share a common characteristic' with Irish wedge tombs, Cornwall and Scilly Isles' entrance graves plus Calanais' additional chambered cairn: that of 'not facing the rising sun', but are orientated southwest.¹¹⁶

Orkney's Maes Howe aligns with winter solstice sunset, although Ruggles noted it is 'orientated on peaks on Hoy'.¹¹⁷ Magnus Spence (1853-1919) provided an early study of solar alignments and Lockyer was inspired by Spence's linking of midwinter sunset, Beltane and Halloween at Maes Howe: (figure 3.1.2).¹¹⁸ Laurence Durdin-Robertson noted the Celtic tradition celebrated Beltane sunrise and Halloween sunset, or 'Samhain Eve', not the reverse indicated in Spence's diagram.¹¹⁹

¹¹¹ Burl, *Dating*, p. 165; Burl, *Pi*, p. 148.

¹¹² Chris Scarre, *The Megalithic Monuments of Britain and Ireland* (London: Thames & Hudson, 2007) [Hereafter Scarre, *Megalithic Monuments*], p.60.

¹¹³ Scarre, *Megalithic Monuments*, pp. 59. 20; Chris Scarre, 'Coast and Cosmos the Neolithic monuments of northern Brittany' in *Monuments and landscape in Atlantic Europe* ed. by Chris Scarre, (London & New York: Routledge, 2002), p. 99.

¹¹⁴ Scarre, *Megalithic monuments*, p.145; Ruggles, *Prehistoric*, p. 14.

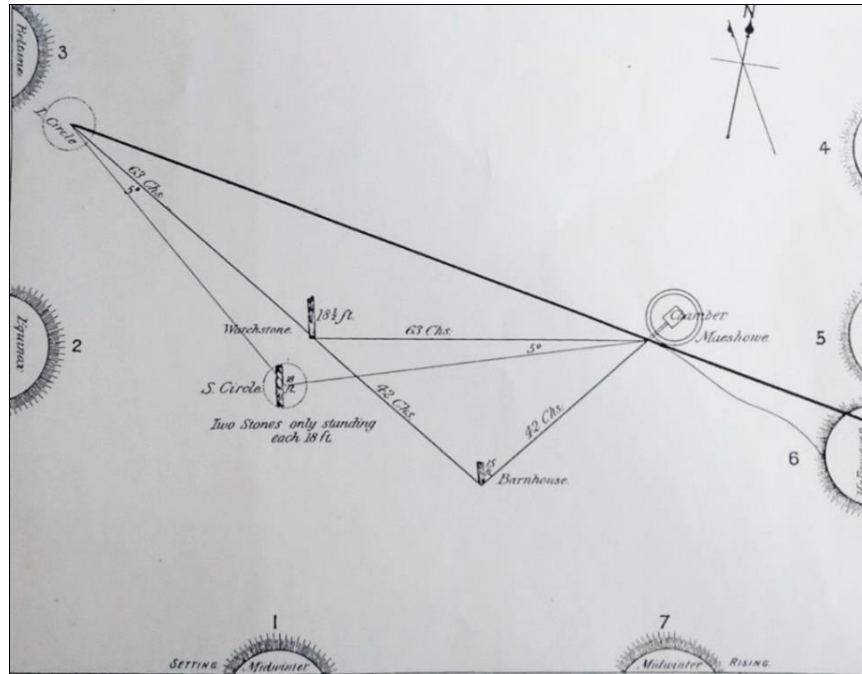
¹¹⁵ Scarre, *Megalithic Monuments*, pp.145.146.

¹¹⁶ Richard Bradley, *Use and Reuse of Stone Circles*, p. 113.

¹¹⁷ Ruggles, *Prehistoric*, p. 130.

¹¹⁸ Magnus Spence, *Standing Stones and Maeshowe of Stenness* With a plan of Maeshowe (Paisley and London: Alexander Gardner, 1903 [1894]), [Hereafter Spence, *Maeshowe*], Diagram in addendum.

¹¹⁹ Laurence Durdin-Robertson, *Juno Covella, Perpetual Calendar of the Fellowship of Isis* (Enniscorthy: Cesara Publications, 1982), p.227.



RSC's inspired interest, Childe commented the recumbent's 'straight upper edge' could aid observing stars rising heliacally while Thom considered 'Deneb' rising at Clava's Druid Temple.¹²⁰ Although Douglas Heggie warned against using stellar orientations to identify construction dates, in case of 'chance' alignment.¹²¹ Henty noted Burl's suggestion that RSC's were orientated on the moon 'high in the sky' at northern rise and set.¹²² Burl also suggested the 'low-rising moon' could 'float' on the RSC's recumbent's flat surface.¹²³ However Ruggles considered the recumbent stone enabled viewing the 'midsummer moon's passage' noting the horizon prevented seeing MLL midsummer full moon at 'Midmar Kirk (RSC71)'.¹²⁴ The focus of this research is based on just such an observation in relation to Clava cairns.

Ruggles suggested monuments symbolically connect the builders via an 'annual interplay of nature' connecting them to the 'cosmos at an auspicious time of the year' providing a 'backdrop for sacred ceremonial'.¹²⁵ Calanais provides an example, described by Margaret and Ronald Curtis: the MLL 'moon's path' rises out of 'an earth mother' with the last reappearance through Calanais being a 'human silhouette set against the moon's orb'.¹²⁶ The Sun's orientation is obvious at Balnuaran, the intention here is to explore whether the Moon's MLL cycle could inform regarding sacred ceremonial. Bradley commented that Clava cairns are largely inconspicuous and close to habitation, but RSCs are built on high ground away from settlements where they connect 'earth to the sky' while intertwining the living and the dead.¹²⁷ Clava cairns, Tomnaverie RSC and the 'Sarsen horseshoe at Stonehenge' exhibit tapering from the northeast to the southwest which Bradley stated contrasted with earlier stone circles which lack tapering.¹²⁸

Bradley found 'evidence of fire' at RSC's and Clava, monuments he linked with the moon, but Hutton associated fires with 'sun-worship'.¹²⁹ Therefore fires to regenerate Sun or Moon are considered. James Napier (1810-1884) noted that in 'post reformation' Scotland, Christmas was discouraged as a Catholic festival, so all public festivities were 'transferred' to New Year's Eve, known as Hogmanay.¹³⁰ Today's Hogmanay festivities include fiery celebrations originally held at Christmas, Midwinter Solstice and Celtic New Year (Samhain). Joseph McPherson (1875-1944) stated Findhorn fishermen continued yule's 'heathenish idolatrous custom' of Clavie-burning in the 1870's.¹³¹ Midsummer fires, now ceased, had similar traditions.

¹²⁵ Ruggles, Prehistoric, p. 98.

¹²⁶ Margaret Curtis and Ronald Curtis, 'Callanish: maximising the symbolic and dramatic potential of the landscape of the southern extreme moon' in *Archaeoastronomy in the 1990s: Papers derived from the third 'Oxford' International Symposium on Archaeoastronomy, St Andrews UK, September 1990* Oxford International Symposium of Archaeoastronomy ed. by Clive Ruggles, pp. 309-316 (Loughborough: Group D Publications, 1993), [Hereafter Curtis and Curtis Callanish], p.309.

¹²⁷ Bradley, Scottish stone circle, p.137.

¹²⁸ Bradley, Use and Reuse of Stone Circles, p. 114.

¹²⁹ Richard Bradley, *The Moon and the Bonfire: An Investigation of Three Stone Circles in North-east Scotland* (Edinburgh: Society of Antiquaries of Scotland, 2005), p. 111; Ronald Hutton, *The Stations of the Sun A history of the Ritual Year in Britain* (Oxford: Oxford University Press, 1996), [Hereafter Hutton, Stations of the Sun], p.320.

¹³⁰ James Napier, *Folk-lore or, Superstitious beliefs in the West of Scotland, within this century With an appendix showing the probable relationship of the modern festivals of Christmas, May Day, St. John's Day, and Halloween, to ancient sun and fire worship* (Paisley: Alexander Gardner, 1879), [Hereafter Napier, Folk-lore], p.154.

¹³¹ Joseph McKenzie McPherson. *Primitive Beliefs in the North-East of Scotland* (London: Longmans, Green & Co., 1929), [Hereafter McPherson, Primitive], p. 21.

3. 2. Major Lunar Limits and their context

Hawkins defined sunset as the 'lower rim of the Sun' touching the horizon, therefore this dissertation defines moonset as the moment the lower rim of the moon touches the horizon.¹³² The moon's motions are more complex than the sun's, Giulio Magli discussed lunar wobble, which has 'a cycle of 173 days' making lunar limits oscillate up to nine minutes of arc.¹³³ L.V. Morrison provided this diagram of the MLL showing the lunar path (dotted lines) above the southern horizon (near S) to be very low, but the northern path (near M) is high in the sky: (figure 3.2.1).¹³⁴

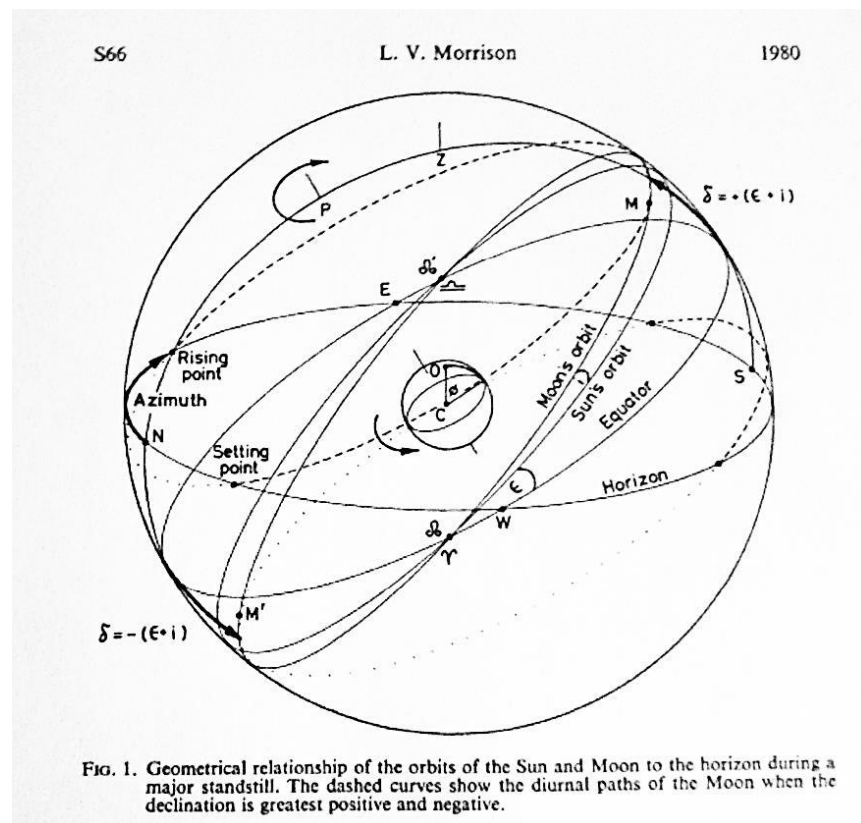


Figure 3.2.1 Morrison's diagram describing the Geometrical relationship of the orbits of the Sun and Moon to the horizon during major lunar limit. The dashed curves are lunar declinations.

¹³² Gerald S. Hawkins 'Sun, Moon, Men, and Stones', *American Scientist* Vol. 53, No. 4 (1965), 460A, 391-408, Sigma Xi, The Scientific Research Society, [Hereafter Hawkins Sun, Moon, Men, Stones], p.395.

¹³³ Giulio Magli. *Mysteries and Discoveries of Archaeoastronomy, from Giza to Easter Island* ((New York: Copernicus Books, 2009). p.403.

¹³⁴ L. V. Morrison, 'On the Analysis of Megalithic Lunar Sightlines in Scotland', *Journal of the History of Astronomy Archaeoastronomy Supplement* Vol. 11 (January 1980), Science Research Council of the United Kingdom, S65-S77, p. S 66.

The moon's orbit precesses around the Sun's orbit every 18.61 years. During an MLL year the extreme northerly and southerly rising and settings occur each month. As Davidson commented during one month the Moon rises and sets along all the positions which the 'Sun occupies on the horizon' during a year.¹³⁵ David Connolly provided a lunar declination range between $+27.7^\circ$ and -29.5° during MLL years, which is when the Moon reaches both highest and lowest in the sky.¹³⁶ Approximately nine years later, half way through the cycle, the moon reaches its least extreme range or mll. There are eight notable moon-risings and settings, Sims provided azimuths for Stonehenge (figure 3.2.2).¹³⁷

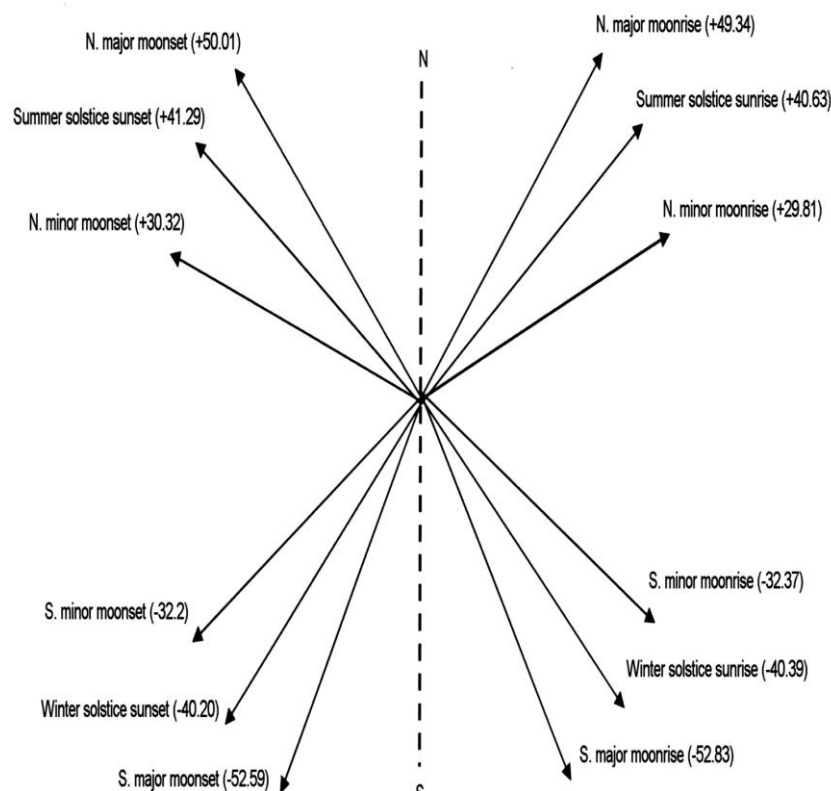


Figure 3.2.2 Sims' Solstitial and lunar significant bracketed figures are azimuths above and below the east/west horizon for Stonehenge 2500 BCE (non- calibrated). N = northern S = southern

As all Clava cairns orientate southwest the lower left in Sims' diagram is important: this emphasis is illustrated by the southwestern horizon full moonset with MLL and new moonset with mll (figure 3.2.3).

¹³⁵ Davidson, *Astronomy*, p. 78.

¹³⁶ David Connolly, *Archaeoastronomy for Archaeologists* Guide 43 (BAJR Series 2016), p.14.

¹³⁷ Lionel Sims, 'What is a minor standstill of the Moon', *Journal of Skyscape Archaeology* Vol. 2, No. 1 (2016), 67-76, p. 68.

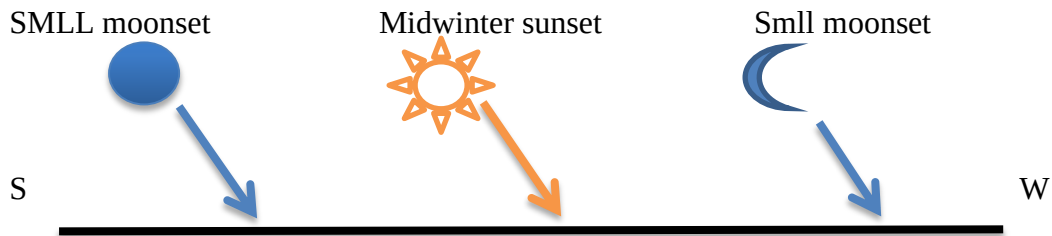


Figure 3.2.3. The southwestern horizon, southern major moonset (full moon) is more southerly than southern minor moonset (new moon) and the midwinter sunset falls roughly half way between the two.

Sims argued that at Stonehenge there were 'lunar-solar pairings at winter settings' meaning that during mll southern lunar moonset the dark Moon (first crescent) appears in the upper trilithon window at winter solstice.¹³⁸ César González-García contradicted this, stating the metonic and nodal cycles go 'out of phase', therefore winter solstice is not simultaneous ('meaning within eleven days') with mll dark Moon.¹³⁹ Lunar-solar alignments do change over time. However Sims responded by explaining that in his model there was a 'shift' from observing the lunar-solar conjunction (new Moon), to viewing the Moon in relation to the horizon at the time of midwinter solstice.¹⁴⁰ Essentially Sims suggested the solar orientations at Stonehenge, was a means of transcending an 'earlier engagement with the Moon',¹⁴¹

Sims argument that the new moon nearest midwinter during mll years was the 'longest darkest night of the year' remains valid and conversely the full moon nearest midsummer during MLL years is the longest lightest day of the year.¹⁴² Significantly with this scenario full Moon does not necessarily coincide with midsummer solstice, nor new Moon with midwinter, González-García is correct in indicating that this does not occur often, but the extra light at full Moon and summer is significant for this research, so any full Moon at the height of summer during MLL produces a very low Moon on the horizon, if not invisible. This dissertation explores that juxtaposition of light and dark, full versus new moon, summer versus winter in relation to Clava cairns.

¹³⁸ Sims, *Solarization*, p.197.

¹³⁹ A. César González-García, 'Lunar Extremes, Lunar Cycles and the Minor Standstill' *Journal of Skyscape Archaeology* Vol. 2, No.1 (2016), pp. 77-84, pp. 79.80.

¹⁴⁰ Sims, 'Forum Reply' *Journal of Skyscape Astronomy* Vol. 2, No. 1 (2016), pp. 95-102, p. 97, Equinox Publishing.

¹⁴¹ Sims, *Solarization*, p.193.

¹⁴² Sims, *Solarization*, p.203.

Hayman noted that Diodorus Siculus (c.100-1 BCE) a Greek historian based his Hyperborean tale on the writings of 'Hecateus of Abdera' (c.400 BCE).¹⁴³ Diodorus referred to a Hyperborean circular island temple, a 'precinct of Apollo'; he described the moon appearing closest to the earth from this island and 'the god visits the island every nineteen years' when the stars return to the same heavenly place which Greeks call the 'year of Meton', thus accounting for the Metonic cycle.¹⁴⁴ However Aveni explained that the Meton Cycle is when a 'given phase of the moon' recurs on the same date of the year is '6,940 days' long, not to be confused with the lunar nodal cycle of '6,797 days'; which is our focus the MLL cycle.¹⁴⁵ Diodorus also referred to how the god 'dances continuously the night through from the vernal equinox until the rising of the Pleiades'.¹⁴⁶ Somerville quoted Diodorus suggesting he described Calanais on Lewis, Outer Hebrides, where the skimming moon phenomenon occurs 'every 18.61 years'.¹⁴⁷ Somerville stated the Pleiades 'rose visibly from March 21st to April 10th' in 1750 BCE; however Stellarium simulations indicate that their proximity to the Sun made the Pleiades invisible until late-June.¹⁴⁸ According to Curtis and Curtis Calanais radio-carbon dates cover '8,000 BCE to 800 BCE'.¹⁴⁹ Hayman reproduced Somerville's survey, noting it was the very 'first study of lunar alignments', although Cornell noted this plan 'was inaccurate in several respects': (figure 3.2.4).¹⁵⁰

¹⁴³ Hayman, Riddles, p.187.

¹⁴⁴ <http://www.britannica.com/biography/Diodorus-Siculus> [Accessed 05 December 2015]; Diodorus Siculus *Bibliotheca Historica* ii.47.2-6, Loeb Classical Library 1935, [Hereafter Diodorus]. http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Diodorus_Siculus/2B*.html Accessed 05 December 2015].

¹⁴⁵ Aveni, Stairway, p.88.

¹⁴⁶ Diodorus, ii, 47. 6.

¹⁴⁷ Somerville, Outer Hebrides, p.36.

¹⁴⁸ Somerville, Outer Hebrides, p. 36.

¹⁴⁹ Curtis and Curtis, Callanish, p. 310.

¹⁵⁰ Hayman, Riddles, p.181; Cornell, First Star-gazers, p. 81.

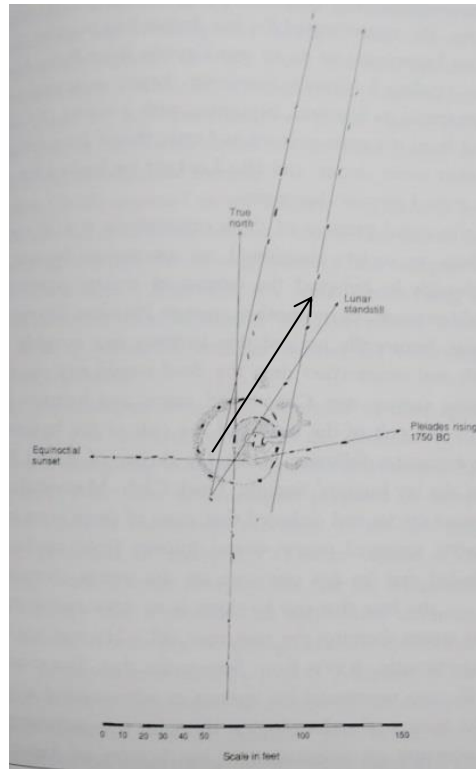


Figure 3.2.4 Hayman's reproduction of Somerville's survey of Calanais, Lewis Outer Hebrides. True North is to the top. Lunar standstill is indicated by the arrow, Equinoctial Sunset to the west stone line (left) and Pleiades Rising 1750 BC on the east stone line (right). Scale reads 150 feet (45.72m).

Hawkins thought Diodorus described 'Stonehenge' but Diodorus could equally have described Orkney, although the lunar phenomena at Calanais are the most distinctive.¹⁵¹ Cornell described how the moon 'skims across the southern skyline' and Grimble's diagram of the skimming moon at Calanais is based on Thom's analysis, also noting significant lunar sightlines to the Helia Cliffs on Hoy, seen from the Ring of Brodgar in Orkney: (figure 3.2.5).¹⁵²

¹⁵¹ Hawkins, *Sun, Moon, Men, and Stones*, p. 399; Oliver, *History*, p. 116.

¹⁵² Cornell, *First star-gazers*, p.78; Grimble, *Highland Man*, p.33.

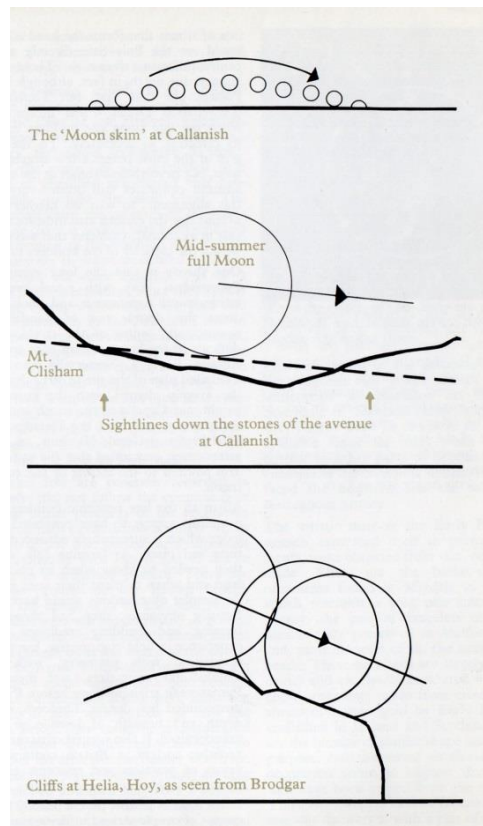


Figure 3.2.5 Grimble's Moon skim at Calanais, the Calanais avenue sightlines and the Midsummer Full Moon, plus the Moon's descent along the Cliffs at Helia on Hoy as seen from Orkney's Ring of Brodgar.

Just how visible the skimming moon would be is not straightforward, Peter Brown listed 'refraction, horizon dip, parallax' and temperature as factors which can effect visibility as well as cloud cover and mist.¹⁵³ Heggie recognised these problems but said it was worth recording lunar extremes because variations are 'almost the same for some centuries'.¹⁵⁴ Ruggles delineated several problems for accurately predicting where the moon sets, concluding that prehistoric observers required 'several scores of years' to allow for how close the moon is to lunistice, standstill and lunar wobble.¹⁵⁵

Ruggles showed the MLL midsummer full moon rose 'behind a prominent horizon peak' in north Mull, but Hutton undermined these findings suggesting it was

¹⁵³ Peter Lancaster Brown, *Megaliths, Myths and Men: An introduction to Astro-archaeology* (Poole: Blandford Press, 1976), p.199.

¹⁵⁴ Douglas C Heggie, 'Megalithic observatories: an astronomer's view' in *Megaliths from Antiquity* ed. by Timothy Darvill and Caroline Malone (York: antiquity Publications Papers 3, 2003), [Originally in *Antiquity* Vol. 46, No. 181, (1972)].

¹⁵⁵ Ruggles, *Prehistoric*, p. 61.

only important because of 'Scotland's northerly latitude'.¹⁵⁶ South of latitude 57°N the Moon largely rises and sets normally. Thom noted the Moon was 'almost circumpolar' in Shetland and Alvar Ellegård explained some nights the 'Moon will never set' north of 62°N, so the phenomenon only occurs within this geographical band.¹⁵⁷ Malmström suggested that 'losing sight of the moon' at MLL was more important for megalithic people than lunar circumpolar action.¹⁵⁸ The lunar/horizon boundary is ultra-significant in Scotland's latitudes: the earth's curvature emphasises the southerly moon's low elevation at major lunastices. Sims argued that more southerly latitudes took advantage of 'complex architecture', such as Silbury Hill, to generate a similar horizontal event for the new mll moon.¹⁵⁹ Describing the route selected by the builders of Avebury avenues Sims states they avoided building 'across a featureless level plain' choosing instead to have the sight of the moon interrupted by two hills.¹⁶⁰ In Scotland the main feature is the low midsummer full moon, crossing the southerly horizon, often appearing to disappear or reappear as hills intervened. Exploring these phenomena formed the backbone of this research.

3.3 Balnuaran of Clava, midwinter sunset and lunar limits.

Michael O'Kelly's (1915-1982) Newgrange excavations provided radio-carbon dates 'c.3,200' BCE thus older than the earliest Stonehenge phase, which Edwin Krupp gave as 'around 2,800 BCE'.¹⁶¹ Edwin Wood commented there is no 'lunar equivalent of Newgrange'; he thought lunar-orientated sites came later, suggesting Stonehenge and the Dorset Cursus had lunar orientations.¹⁶² Scarre's diagram indicates 'Newgrange at Brú na Bóinne' is orientated south-east on

¹⁵⁶ Clive Ruggles, 'An integrated approach to the investigation of astronomical evidence in the prehistoric record: the North Mull Project' in *Archaeoastronomy in the 1990s: Papers derived from the third 'Oxford' International Symposium on Archaeoastronomy, St Andrews UK, September 1990*, Oxford International Symposium of Archaeoastronomy ed. by Clive Ruggles, pp. 185-197 (Loughborough: Group D Publications, 1993), p. 193; Hutton, *Strange History*, p. 386.

¹⁵⁷ Thom, *Lunar Observatories*, p. 22 ; Alvar Ellegård, 'Stone Age Science in Britain? [and Comments and Reply]', *Current Anthropology*, Vol. 22, No. 2 (Apr., 1981), 99-125, Publ. by The University of Chicago Press on behalf of Wenner-Gren Foundation for Anthropological Research, p. 105.

¹⁵⁸ Malmström, *Callanish Connection*, [Accessed 16 September 2015].

¹⁵⁹ Sims, *Underworld*, p.386.

¹⁶⁰ Sims, *Underworld*, p.396.

¹⁶¹ Michael J. O'Kelly, *Newgrange archaeology, art and legend* (London: Thames and Hudson, 1984) p. 22; Edwin C. Krupp, *Skywatchers, Shamans & Kings astronomy of the Archaeology of Power* (New York: John Wiley & sons Inc., 1997), p.135.

¹⁶² Edwin John Wood, *Sun, Moon and Standing Stones* (Oxford: Oxford University Press, 1978. p.100, [Hereafter Wood].

midwinter sunrise, unlike Bradley's Balnuaran Southwest: (figures 3.3.1 and 3.3.2).¹⁶³

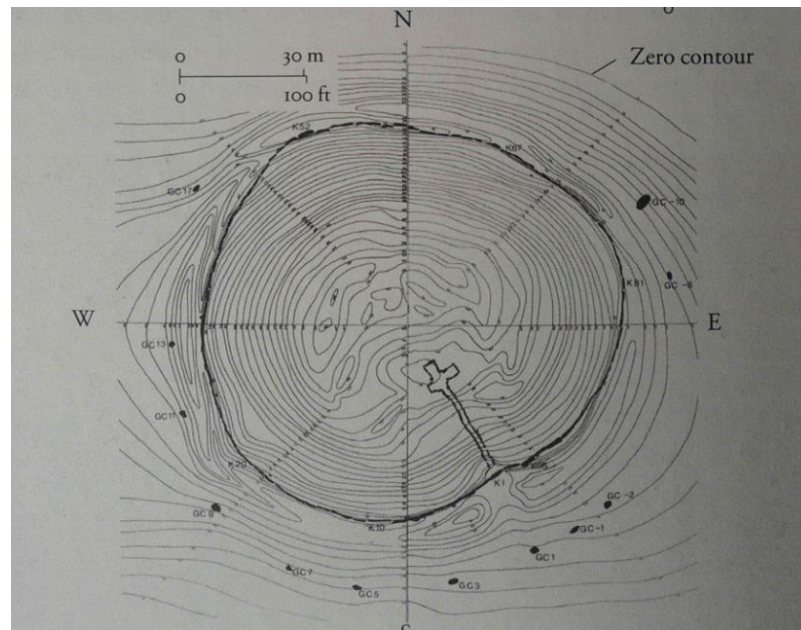


Figure 3.3.1 Chris Scarre's diagram of Newgrange at Brú na Bóinne, Eire - a passage-grave orientated southeast towards the midwinter sunrise

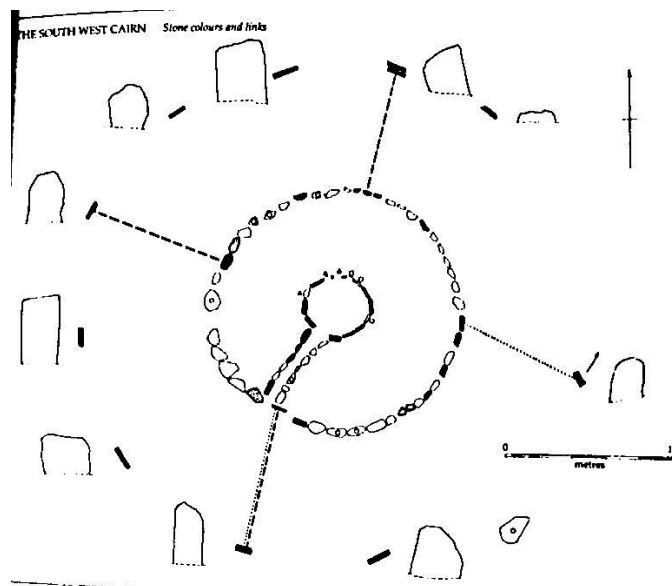


Figure 3.3.2 Richard Bradley's diagram of Balnuaran of Clava Southwest passage-grave - orientated towards midwinter sunset. Scale reads 0-10m.

Historic Scotland currently protects the main monuments at Balnuaran in an enclosure, shown in Canmore's aerial photograph: (figure 3.3.3).¹⁶⁴ Balnuaran's

¹⁶³ Scarre, *Megalithic Monuments*, p. 138; Bradley, *Good Stones*, p. 31.

passage-graves align with midwinter sunset; Ruggles showed two of the central ring-cairn's circle stones are part of that alignment and their solar shadows are dramatic: (figure 3.3.4).¹⁶⁵



Figure 3.3.3 Canmore image of Balnuaran enclosure from above. Balnuaran of Clava Northeast passage-grave is at the top, while Balnuaran of Clava Southwest passage-grave is next to the road.

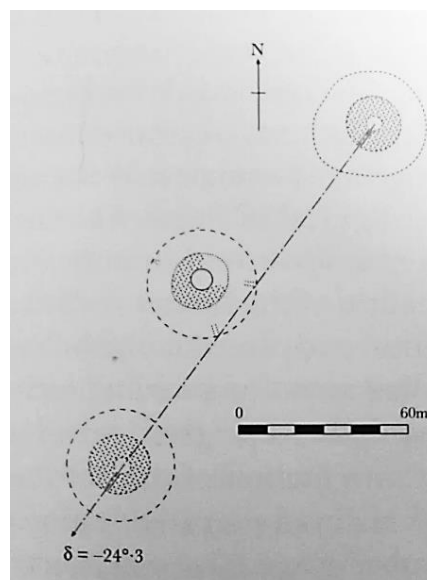


Figure 3.3.4 Ruggles' diagram showing midwinter sunset alignment at Balnuaran (after Thom) connecting two stones from the Central Ring-cairn's circle.

¹⁶⁴ <http://canmore.org.uk/collection/1490126>, [Accessed 20 February 2017].

¹⁶⁵ Ruggles, *Prehistoric*, p. 131.

Given Balnuaran's solar alignments it seemed possible that mll may be significant. Sims stated that both Triathlons and bluestones at Stonehenge are 'stepped in height towards the southwest' as are all kerbstones and encircling monoliths at Clava sites, suggesting potentially similar cosmology.¹⁶⁶ John North said that Stonehenge was 'meant to align' on the southern mll, while Sims' argued that the double alignment 'conflates winter solstice sunset with dark moon – not full moon,' (dark moon, throughout this dissertation, means first waxing crescent).¹⁶⁷ This was partially supported by the author's preliminary survey at Balnuaran; midwinter sunset alignments combine with the northern minor moonrise and moonset, see Bradley's Balnuaran 'enclosure' adaptation: (figure 3.3.5).¹⁶⁸

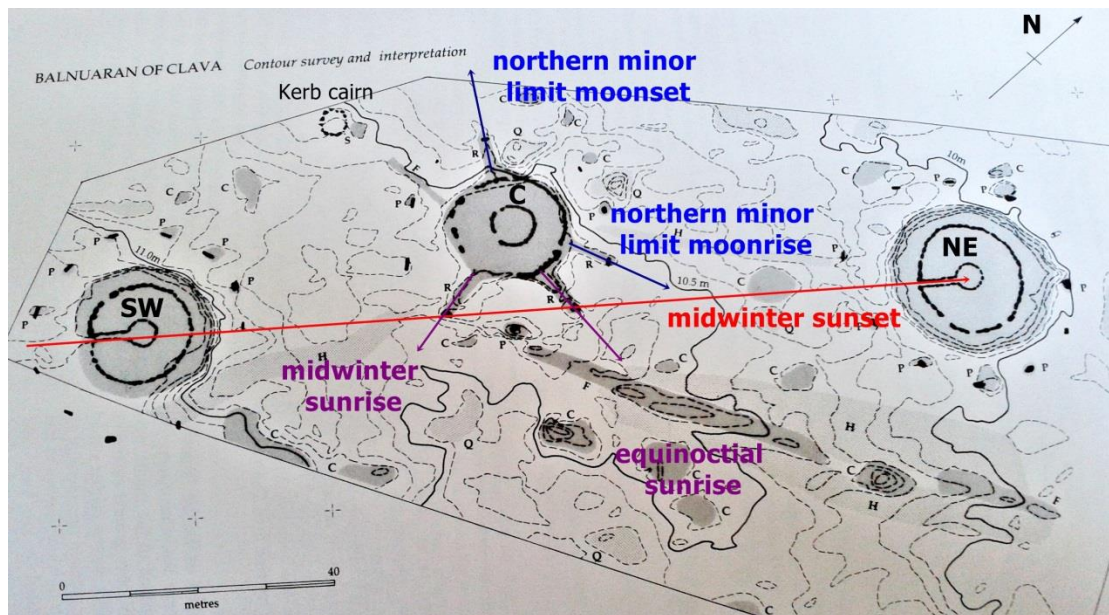


Figure 3.3.5 Bradley's Balnuaran of Clava enclosure area. Four cairns - two passage-graves: NE (northeast) and SW (southwest), one ring-cairn C (Central) and one later Bronze Age Kerb cairn. The passage-graves align with midwinter sunset, which passes through two of the Central Ring-cairn's circle monoliths (red line) as in figure 3.2.4. Central's two other radials (grey areas, between the cairn and four stones) align with the northern minor lunar limit moonrise and moonset (blue lines) and the others align with equinoctial sunrise and midwinter sunrise (purple lines). North indicated (arrow). Scale reads 40m

Southern minor moonset was found, but Northeast's largest orthostat had been restored in antiquity, making it less secure than Central's undisturbed radial

¹⁶⁶ Sims, *Solarization*, p.195.

¹⁶⁷ John David North, *Stonehenge: Neolithic Man and the Cosmos* (London: Harper Collins, 1996), [Hereafter North, 1996], p.471; Lionel Duke Sims, 'What is a lunar standstill? Problems of accuracy and validity in 'the Thom paradigm', *Mediterranean Archaeology & Archaeometry*, Special Issue, Vol. 6, No. 3, (2006), 157-163, [Hereafter Sims Lunar standstill], p.160.

¹⁶⁸ Bradley, *Good Stones*, p.60.

alignments (described below). Sims also noted a connection between 'major and minor northern standstills and the summer solstice' and this connection probably was significant to the builders as Bradley noticed midsummer sunrise is offset at Balnuaran due to the topography, catching the back of Balnuaran northeast and Balnuaran Central: (figure 3.3.6).¹⁶⁹

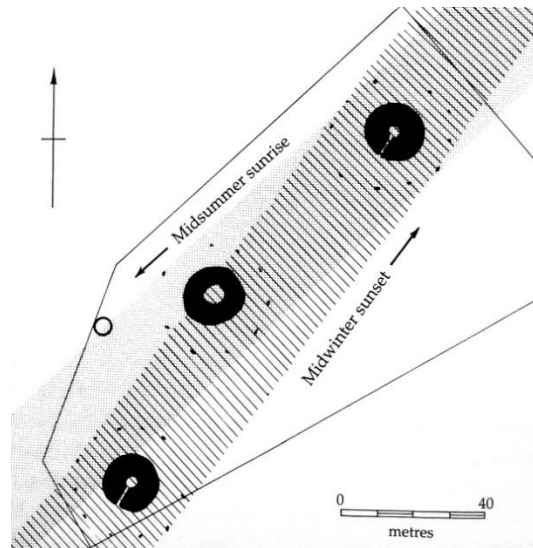


Figure 3.3.6 Bradley's Balnuaran Enclosure. Midsummer sunrise (faint dots) from the northeast also catches the late Bronze Age Kerb-cairn (small circle), the midwinter sunset (stripes) is from southwest.

Sims argued that every nineteen years at mll, the new Moon nearest midwinter embodies the 'longest darkest night' and is most suitable for dark moon festivals of fertility and initiation.¹⁷⁰ Theoretically dark Moon, winter and mll equate with rituals of darkness (potentially passage-grave events), then full Moon, summer and MLL might equate with rituals of light (possibly ring-cairn events).

Two of Balnuaran's Central Ring-cairn radials align with Ruggles' estimate for northern minor limit '+17.95' c.2000 BCE: northern minor moonrise and northern minor moonset: (figure 3.3.5).¹⁷¹ Full details are in Appendix II. The other two radials align with equinoctial sunrise and midwinter sunrise, (Ruggles estimated -23 95° for c.2000 BCE), connecting with circle-stones in the path of midwinter sunset, reinforcing the interconnectedness of the cemetery scheme.¹⁷² Henshall and Ritchie

¹⁶⁹ Sims, 'Forum Reply', *Journal of Skyscape Astronomy* Vol.2 No. 1 (2016), 95-102, Equinox Publishing, p.98; Bradley, *Good Stones*, p. 126.

¹⁷⁰ Sims, *Solarisation*, p.203.

¹⁷¹ Ruggles, *Prehistoric*, p. 57.

¹⁷² Ruggles *Prehistoric*, p. 57.

described the cairns as 'unitary' suggesting they were coetaneous.¹⁷³ Given Bradley's building schedule, mentioned above, the midwinter solar alignment was possibly designed first and lunar alignments subsequent, relying on encircling monoliths, although it was anticipated when placing kerbstones.

Balnuaran northeast's largest circle-orthostat was measured from the kerb's main orthostat, similarly the central ring-cairn's largest circle-orthostat aligned with its main kerb-orthostat and both align with the southern minor moonset (NE declinations -19.33° to -22.75° , Central -17.49° to -22.75°): (figure 3.3.7). Ruggles suggested -19.6° for southern minor moonset around 2000 BCE (SW declinations -12.12 to -22.75).¹⁷⁴ The methodology section details how this was measured. Henshall and Ritchie state both circle-orthostats were 're-erected' pre-1870 making these findings problematic despite tallying with North and Sims.¹⁷⁵ Conversely the southern major moonset did not generally feature in the Balnuaran complex, because the southern horizon is dominated by a ridge which prevents seeing the low moon at MLL. This finding generated several questions about its importance or significance to Clava builders, forming the core of this research.

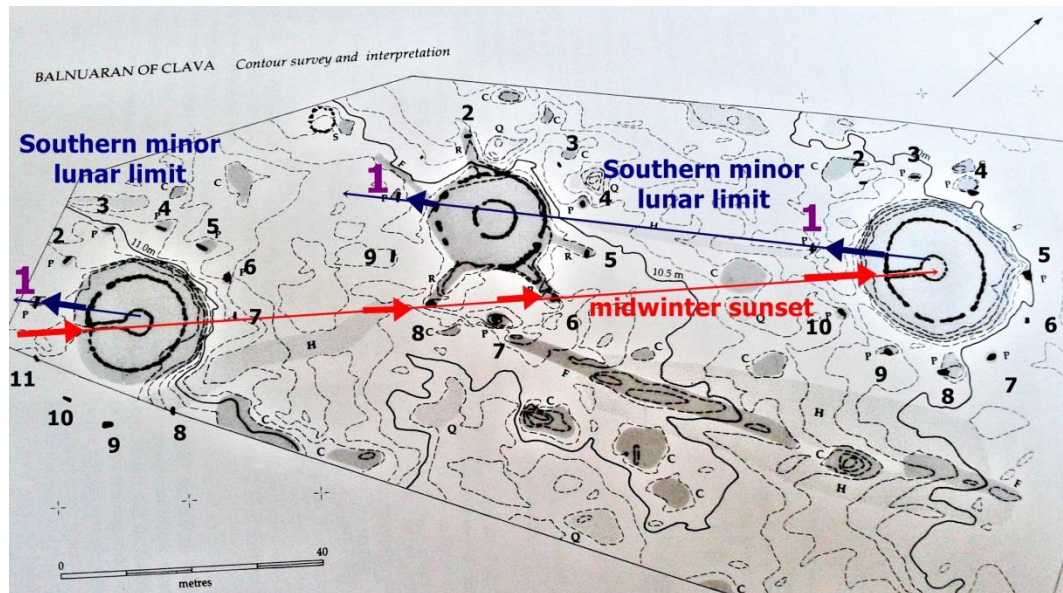


Figure 3.3.7 Bradley's Balnuaran enclosure. The Northeast cairn links up with the central cairn via their largest circle-orthostats (marked 1) which align with the southern minor lunar limit (blue line) as does the largest circle-orthostat (1) for Balnuaran southwest. Midwinter sunset alignment (red line) aligns with both passage-grave passages. All circle-stones are numbered. Scale reads 40m.

¹⁷³ Henshall and Ritchie, *Chambered Cairns*, p. 116.

¹⁷⁴ Ruggles, *Prehistoric*, p. 57.

¹⁷⁵ Henshall and Ritchie, *Chambered Cairns*, pp. 200.205; North, 1996, p. 357; Sims *Lunar Standstill*, p. 161.

In Sim's cosmology the 'crescent Moon' can be considered as having metaphorically entered 'the underworld' when seen 'below the background horizon' at Silbury Hill.¹⁷⁶ In this research the MLL full Moon could be described as entering the underworld. Unfortunately without a definition underworld might imply a Greco-Roman/Egyptian concept, which informed Christian cosmological views of the underworld, and this seems inappropriate. It is possible that the moon's journey was into the Clava people's equivalent of the otherworld, as described in Celtic myth and lore. Ethan White commented upon traditional folk-tales that 'Little People' dwelt in chambered tombs and going through hills enabled you to 'reach the realm of faerie'.¹⁷⁷ Waddell described the 'Otherworld' in Celtic folklore, (accessed through caves, mounds, monuments and mountains) as 'supernatural', chaotic, yet 'protective'.¹⁷⁸ In local tradition Clava cairns were faerie-mounds and generally respected. In Celtic lore the landscape is alive with magical essences in hills, trees, caves and water. Hypothetically Clava peoples may have had a similar worldview; indeed their juxtaposition of cairns and rivers implies a sacred connection. The definition of otherworld used in this dissertation is that realm accessed by going into cairns or the earth. As the underworld and otherworld have different meanings, it could be argued that, where Clava cairns are concerned, the Moon metaphorically visits the otherworld precursor of Celtic tradition. Alternatively the moon visits the Earth itself, place of the ancestors.

This chapter introduced the discipline of archaeoastronomy, from its historical beginnings, noting the early solar work at Maes Howe and the lunar exploration of Calanais. Lunar limits were discussed and how they are pertinent to any enquiry at these latitudes. It considered the scholarly endeavours covering the range of lunar limits, and lunar skimming in general and then looked at the specifics of Balnuaran monuments. The author's preliminary findings at Balnuaran were used to attempt to identify why Balnuaran is so different. Finally how Clava cairns might fit into this cosmological perspective was introduced.

¹⁷⁶ Sims Underworld, p.404.

¹⁷⁷ Ethan Doyle White, 'Devil's Stones and Midnight Rites: Megaliths, Folklore and Contemporary Pagan Witchcraft' *Folklore*, Vol. 125, No. 1, (April 2014), 60-79, p. 65.

¹⁷⁸ Waddell, *Archaeology and Celtic Myth*, pp. 56. 61. 67.

4. Methodology

This section explores regional topography and some cairns. The potential visibility of MLL midsummer full moon is considered; defining what deserved inclusion. It introduces rivers, establishing reasons for selection or deselection, contemplates how travelling EBA people witnessed sky phenomena and what constitutes a suitable measuring point. It explores fieldwork instruments, measuring techniques and which software or online resources were used. It considers how a phenomenological approach alters interactions with the environment.

4. 1. Riverine, hilltop and coastal cairns

The first site visit was December 2014 to measure midwinter sunset as part of a preliminary survey, (Appendix IV) and for this dissertation five visits were undertaken between winter and autumn 2016. To test the hypothesis regarding significant MLL midsummer full moons at Clava, similar regional topography and visual phenomena were assessed. Primary survey targets were northeast/southwest orientated river valleys, with suitable hills.

Hilltop cairns have a broad landscape view and were unsuitable for these purposes, as the midsummer moon rises and sets normally. Ruggles said it was essential for rigorous reasoning while selecting 'sites to visit and survey'.¹⁷⁹ Four Clava-valley cairns, described by Bradley as 'Late Bronze Age additions', were deselected.¹⁸⁰ Kinchyle a hilltop cairn overlooking Loch Ness, (orientated northeast/southwest), was included due to its unique land-bridge location. Low southerly hills made the coastal region a poor candidate, so non-riverine coastal cairns were eliminated. Ruggles recommended we consider the 'wider archaeological context' and too few coastal cairns survive to provide sufficient context.¹⁸¹

¹⁷⁹ Ruggles, *Megalithic Sightlines*, p. 86.

¹⁸⁰ Bradley, *Good Stones*, p. 129.

¹⁸¹ Clive Ruggles, 'Pushing back the frontiers or still running around the same circles? Interpretative archaeoastronomy' thirty years on', in *Proceedings of International Astronomy Union Symposium 278*, (the 9th "Oxford" International Symposium on Archaeoastronomy), Lima, Peru, 4–14 January 2011, ed. by Clive Ruggles (Cambridge: Cambridge University Press, 2011), p. 10 [Hereafter Ruggles, *Interpretive Archaeoastronomy*].

4. 2. Selecting Rivers

The three major considerations about the likelihood of witnessing sky phenomena were: 1) were these river valleys accessible during Neolithic and EBA periods, 2) were they suitable sites for habitation or cultivation and traversed during the period and 3) to what extent does the local topography inhibit or encourage viewing the midsummer full moon?

Surveys were carried out along valleys deemed suitable for EBA cultivation or habitation, inaccessible rivers sections were deselected. Appropriate survey locations were selected, avoiding mountainous, vertiginous river-stretches which block sight and few people traverse, then or now. Glens and east/west stretches of river were considered too ravine-like to permit viewing the midsummer moon. Local topography varies enormously. Rivers flowing southwest to northeast parallel Clava cairn orientations generating sightlines towards significant solar/lunar events. This orientation derived from ice sheet action and the natural phenomenon was perhaps exploited by EBA Clava cairn builders. Figure 4.2 shows the seven selected rivers all, except Enrick, are northeast/southwest orientated.

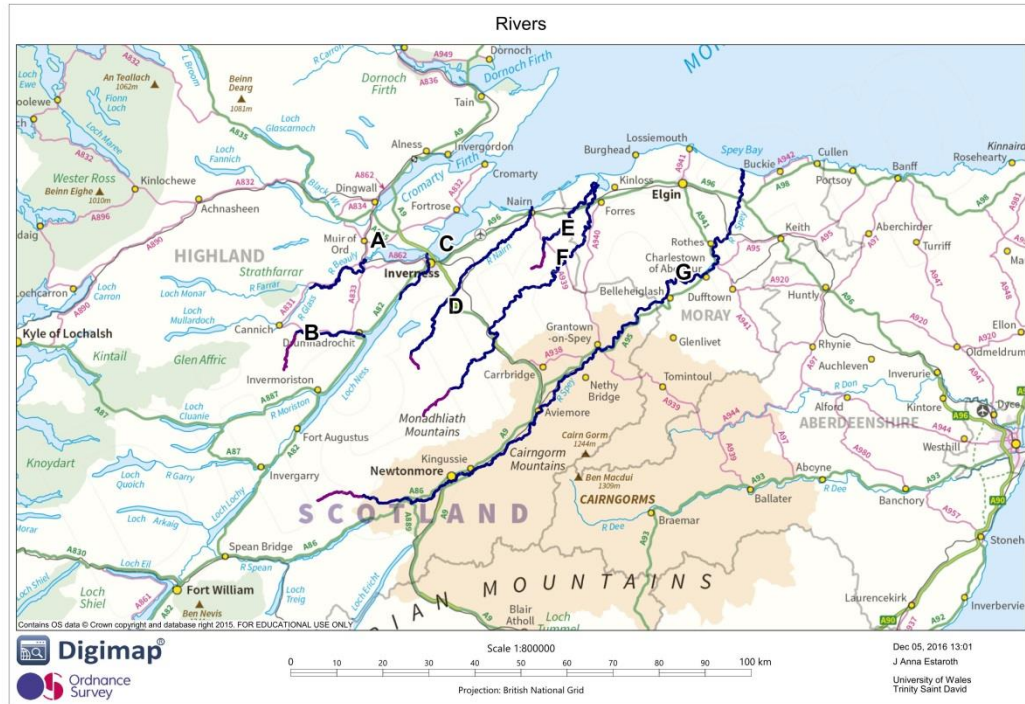


Figure 4.2. Selected rivers are labelled A to G: A Beauly, B Enrick, C Ness, D Nairn, E Muckleburn, F Findhorn and G Spey. Upper reaches of rivers are marked in purple, indicating less accessible and thus non-measured sections of the rivers. Scale reads 1:800000 100 Km.

Rivers Beauly and Enrick are in the cultural territory of OCH cairns and different geology, being east of Loch Ness. Rivers with Clava cairns were included: Beauly, Enrick, Ness, Nairn, Muckleburn and Spey. Findhorn having similar orientation but no cairns required explanation, so was included. Rivers Lossie, Isla and Avon were deselected: they lack cairns and are coastal, east/west orientated, or very steep-sided.

4. 3. Instruments and software

Fieldwork instruments utilised were: a Suunto KB-14 compass measured azimuth, (0.33° precision, minimum uncertainty 1°), an Eyeskey sighting tandem compass clinometer (0.5° precision, uncertainty 0.75°) measured altitudes and a handheld Garmin etrex10 Global Positioning System gave GPS co-ordinates (accurate to three metres). Precision estimates are based on manufacturer's guarantee and repeated measurements. One and two metre ranging poles improved accuracy and provided photographic proportions, plus a metal ruler measured short distances.

Magnetic deviation per site was tested by comparing opposing azimuths: (figure 4.3.1.)



Figure 4.3.1 Balnuaran of Clava Northeast Passage-grave, measuring for magnetic anomalies, ranging poles were placed in the chamber and outside the entrance. Measurements were taken in both directions as indicated by the white arrow. Any discrepancies indicate that the granite stones had a magnetic anomaly. Photograph MacInnes 18/12/14.

Site compass readings were converted to true north, before being entered into diagrams using NOAA's website (National Oceanic and Atmospheric Administration) which gives estimates for magnetic declination, allowing for alterations between visits.¹⁸² Photoscape software was used to specify objects in photographs and Digimaps were used for illustrative purposes.¹⁸³ Stellarium software enabled exploration of Bronze Age MLL declinations at cairn locations and sites with potential lunar-sighting events.¹⁸⁴ Some sites were explored using the website heywhatsthat which gives a virtual panorama, providing better perspective than map locations alone.¹⁸⁵

When cairns were encountered a 'window of visibility' was measured as advocated by Silva: it helps ascertain the area of sky visible from within the chamber

¹⁸² <http://www.ngdc.noaa.gov/geomag-web/#declination>, [Accessed 16 April 2015].

¹⁸³ <http://www.photoscape.org/ps/main/index.php> first accessed 05/02/14: <http://digimap.edina.ac.uk/> [Accessed 29 October 2015].

¹⁸⁴ http://www.stellarium.org/en_GB/, [Accessed 15 November 2014].

¹⁸⁵ <http://www.heywhatsthat.com/>, [Accessed 07 March 2015].

and whether sunlight penetrated the chamber.¹⁸⁶ Bradley's diagram of Balnuaran Northeast (after Henshall and Ritchie) is adapted to indicate measuring for windows of visibility: (figure 4.3.2).¹⁸⁷

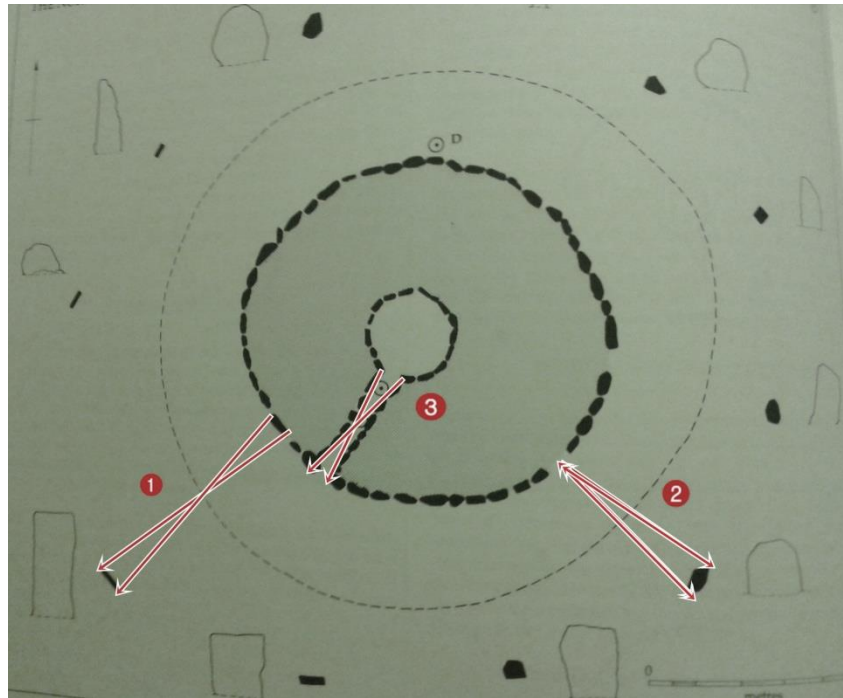


Figure 4.3.2 Balnuaran Northeast - measuring for windows of visibility. 1. Measuring azimuths from the largest kerb-orthostat to the largest circle-monolith. 2. Where the kerb orthostat was missing, from ranging pole to both sides of the monolith and in reverse direction. 3. Measuring from orthostats within the chamber to the opposite outside orthostats.

Clava Cairns generally have the largest kerb-orthostat opposite the largest circle-monolith, so a window of sky was designated by measuring from the left edge of the kerb-orthostat to the right edge of the circle-orthostat, and from the right edge of the kerb-orthostat to the left edge of the circle-orthostat (the arrows for one in figure 4.3.2). If no kerb orthostat existed a ranging pole marked the central measuring point; both sides of the circle-monolith were measured and again in reverse directions (two in figure 4.3.2). For passages: measurements were taken from the last stone in the chamber on the left to the last stone at the entrance on the right and again from chamber right to entrance left (three in figure 4.3.2). One and three in figure 4.3.2 are more accurate, where ranging poles marked stone edges and measurements taken pole to pole. The ring-cairn method was to place a ranging pole at the measured centre of the circle/oval and measure a window of visibility from the

¹⁸⁶ Silva, Tomb, p. 27.

¹⁸⁷ Bradley, Good Stones, p.34.

ranging pole to either side of the largest kerb-orthostat and/or largest circle-orthostat (where one existed) and in reverse direction like two in figure 4.3.2. Measurements from the largest kerb-orthostat to the largest circle-monolith (one in figure 4.3.2) were also taken where possible with ring-cairns.

Throughout the Clava-valley the southerly hills are three to five degrees high, so topography is crucial to understanding the midsummer moon at MLL. Bradley noted local 'topography' meant that midsummer sunrise is not opposite midwinter sunset (figure 3.3.6).¹⁸⁸ The survey consisted of travelling along valleys, stopping at each available turn in the landscape to measure the hills' southerly altitudes. This generated a series of locations noting azimuth and altitude. The relationship with the horizon was primarily significant. North stated small altitudinal changes had a 'very marked effect' on sunrise, so accurately measured locations were essential.¹⁸⁹ Figure 4.3.3 indicates methods of measuring the horizon.

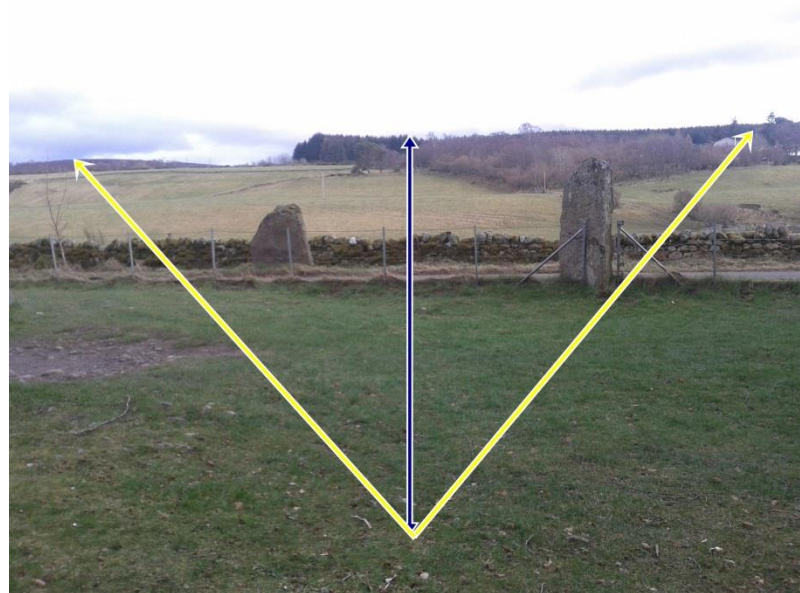


Figure 4.3.3 Measuring hills, Balnuaran South-West facing east - Blue line is due south, yellow lines are the sea-level lunar rising and setting azimuths 157° and 202° for these latitudes - all horizon variations were noted between 150° and 210°. Lines are not to scale. Photograph Estaroth 28/03/15.

Whenever there was an alteration in hill sightlines several altitude measurements were taken, starting with the height of the hill due south, (azimuth 180° blue line figure 4.3.3). Yellow lines are azimuths 157° and 202°; the rising and

¹⁸⁸ Bradley, *Good Stones*, p.125.

¹⁸⁹ North, 1996, p. 227.

setting MLL azimuths for these latitudes, between which the moon was potentially visible during summer. The horizon profile between 150° and 210° was recorded. Wood's diagrams indicate the moon's diameter as 'half a degree'.¹⁹⁰ During MLL years the lunar centre attains a minimum height of approximately 2° 50' due south (variations occur annually) any hills over four degrees make it invisible. Hills less than one degree means lunar skimming cannot occur and those over six degrees were less interesting. The focus was always the horizon between hill and sky, where lunar phenomena occur, in order to comprehend how human beings might have responded.

Hills are never straight in figure 4.3.3 the hill height dictated which azimuths were required. At each stage the actual topography dictates what is visible, all, part or none of the moon. It was impossible to predict how many potential lunar viewing sites would occur along the river valleys, but many were likely. While travelling along the valleys any changes in the direction of river flow, alterations of height for southerly hills, or opening up of the landscape into a vista were places meriting measurement. With the preponderance of valleys orientated southwest the lunar setting position had potentially greatest significance.

4. 4. Phenomenology

The individual functions as a reflexive research tool for exploring the environment and this is a core feature of a phenomenological approach advocated by Maurice Merleau-Ponty, Tim Ingold and Christopher Tilley.¹⁹¹ Charlotte Davies says this is a form of 'self-reference' and it is essential to avoid becoming over-subjective.¹⁹² Becoming fully immersed in the environment led to insights as to how it may have operated in the past, plus a means of appreciating lasting significance. My approach was to breathe deeply, relaxing into a semi-meditative state, while generating what Maja Nazaruk calls a 'heightened awareness' of occurrences around

¹⁹⁰ Wood, pp. 108. 109.

¹⁹¹ Maurice Merleau-Ponty, *Phenomenology of Perception* Smith, Colin trans., (London & New York: Routledge and Kegan Paul, 1964 [1945]), [Hereafter Merleau-Ponty Phenomenology]; Tim Ingold, *The Perception of the Environment Essays on livelihood, dwelling and skill* (London & New York: Routledge, 2000) [Hereafter Ingold. Perception]; Christopher Tilley, *A Phenomenology of Landscape: Places, Paths and Monuments* (Oxford: Berg, 1994) [Hereafter Tilley, Phenomenology].

¹⁹² Charlotte Aul Davies, *Reflexive Ethnography: A Guide to researching selves and others* (London: Routledge, 1999), p.4.

me which releases habits of thinking.¹⁹³ Sounds intensify: the wind, rustling bushes, birdsong, racing rivers. Exploring the world of the senses you become immersed into the landscape. Ingold proposes that as we breathe in air, we mingle with the environment; by releasing air we contribute to that environment perpetually participating in 'the transformations of the weather world'.¹⁹⁴ Focusing on Ingold's message and mingling with the landscape allowed a greater appreciation of how few changes occurred over millennia. Barring landslides valley and mountain shapes appear relatively unaltered.

Sketching was undertaken to enhance exploration. Merleau-Ponty rejects the notion that we simply observe: it was essential to become fully involved, he says 'either experience is nothing or it is total'.¹⁹⁵ Winter fieldwork generated speedy sketches, but a maximum amount of time was spent feeling my way into the landscape. Gaining a semi-meditative state permits understanding the non-living, in this case hillsides - Ingold and Gisli Palsson explain that barriers between 'human and non-human'... living and non-living' can be traversed.¹⁹⁶ Non-effort permits alternative perceptions: Ingold says 'different creatures... attend to the world in different ways'.¹⁹⁷ An example would be predawn, 18th June 2015 at Balnuaran: an oyster catcher accompanied me into the enclosure, flitting from stone to stone, there was mutual awareness. With its mate they flew a dramatic dawn chorus display; swooping knee-high around me, in-between soaring above the monuments and fields several times. Ingold might refer to them as 'fellow participants'; I remember their song and still feel saturated by the experience.¹⁹⁸ We all experienced Balnuaran differently that day, David Abram uses the term 'intersubjective phenomena - phenomena experienced by a multiplicity of sensing subjects'.¹⁹⁹

¹⁹³ Maja Nazzari, 'Reflexivity in anthropological discourse analysis', *Anthropological Notebooks* Vol. 17, No. 1 (2011), 73-83, p. 73.

¹⁹⁴ Tim Ingold, 'Earth, Sky, Wind and Weather', *The Journal of the Royal Anthropological Institute* Vol. 13, Wind, Life, Health: Anthropological and Historical Perspectives (2007), S19-S38, Publ. by Royal Anthropological Institute of Great Britain and Ireland, p. S.19.

¹⁹⁵ Merleau-Ponty *Phenomenology*, p.301.

¹⁹⁶ Tim Ingold and Gisli Palsson, *Biosocial Becomings: Integrating Social and Biological Anthropology* (Cambridge: Cambridge University Press, 2013), p.19.

¹⁹⁷ Tim Ingold, *The Perception of the Environment Essays on livelihood, dwelling and skill* (London & New York: Routledge, 2000), p.51, [Hereafter Ingold, Perception].

¹⁹⁸ Ingold, Perception, p. 51.

¹⁹⁹ David Abram, *The Spell of the Sensuous - perception and language in a more than human world* (New York: Vintage Books, 1996), p.38.

Highland landscapes appear wild, but these valleys were sculpted by human activities, over centuries humans denuded the land and planted species to suit ourselves. Tilley recommends walking alert to these changes and an awareness of how landscape paintings specifically determine a culturally defined 'particular way of seeing'.²⁰⁰ These are naturally dramatic landscapes with fierce weather conditions, intriguing wildlife and few humans. Like the monuments themselves, where questions about intentionality remain, here the researcher's intentions are paramount, to be prepared for the unexpected.

This chapter defined which river-valleys were deemed significant, some sites were deselected. The focus remained cairns and river-valleys where MLL phenomena could be on the horizon. Utilising instruments and software detailed how the survey was conducted. A phenomenological approach was considered.

²⁰⁰ Tilley, *Phenomenology*, p.24.

5. Survey Results and Discussion

This chapter provides details of all rivers and some cairns. River results are listed individually, with maps; see Appendix II for diagrams and legends. Some result figures are included illustrating different lunar phenomena. There is data analysis of rivers and cairns.

Figure 5.1 is most of the region's rivers including some cairns. The upper Spey is given in figure 5.2.

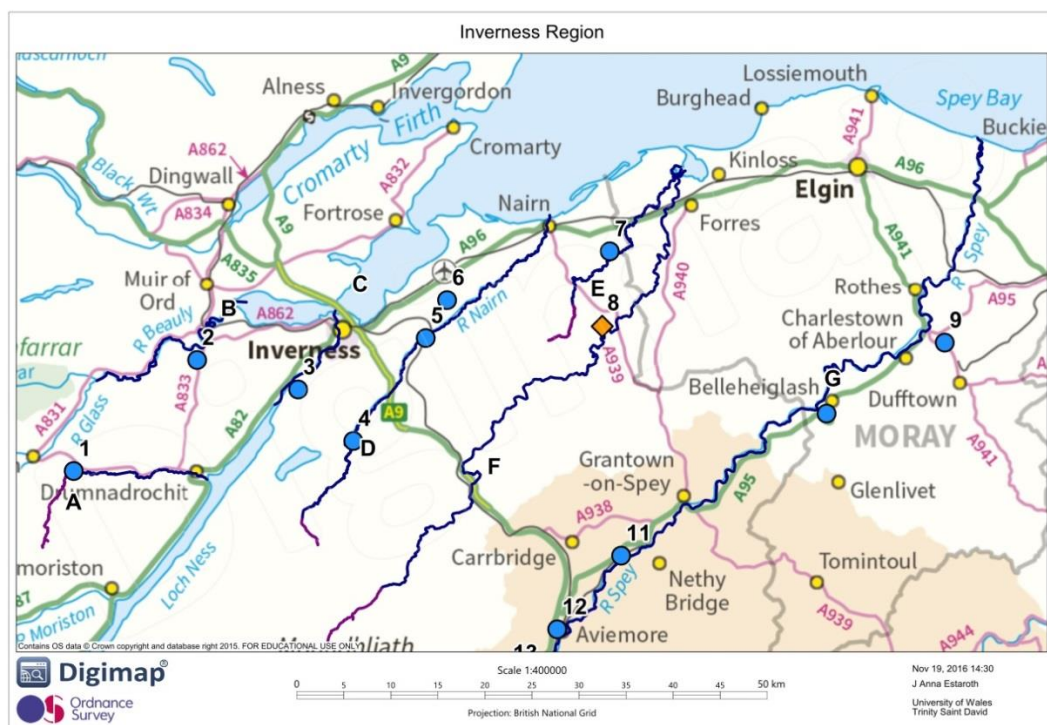


Figure 5.1. Region the seven rivers are labelled A to G. Some cairns are indicated (blue circles): 1 Corrimony on the Enrick, 2 Belladrum North on the Beauly, 3 Kinchyle of Dores on the Ness, 4 Tordarroch on the Nairn, 5, Clava 6 Dalcross Mains, 7 Mains of Moyness on the Muckleburn, 8 Levrattich on the Findhorn (non clava diamond), 9 Buchrumb on the Fiddich, 10 Marionburgh on the Spey 11 Tullochgorum and 12 Aviemore. Scale reads 1:400000 50 km.

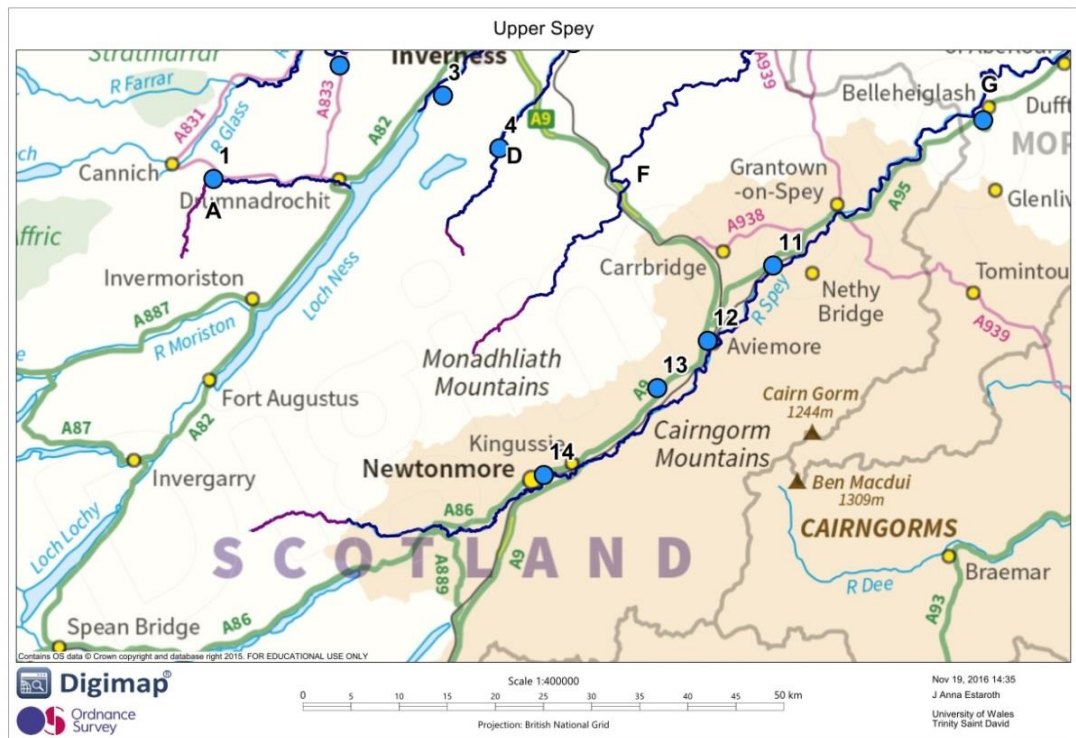


Figure 5.2. Upper Spey River. Cairns 11. Tullochgorum as in figure 5.1, 12 Aviemore, 13 Dalfour, 14 Altarie. Loch Ness connects to the Irish Sea via a series of lochs and the Spey (G) connects with Loch Ness via hill passes, as does the Nairn, (D) but not the Findhorn (F). Scale reads 1:400000 50 Km.

Rivers connect the Beaulieu to the Enrick, with links with Loch Ness which has hill-passes to the Nairn and Spey rivers. Hill-passes connect the Findhorn with the Nairn and Muckleburn. Most roads follow the waterways through the mountains; much as their counterparts would have done in the Bronze Age, the current A9 and railway being the exception, due to modern advances (bridges and viaducts). Measurements are listed numerically on maps: one being the upper reaches of the river increasing until river mouth and were taken where it was safe to stop and a skyline was visible.

Using Stellarium the survey found that every location exhibited lunar phenomena during MLL and often on adjacent years (including normal near the coast).²⁰¹ These are defined as:-

²⁰¹ <http://www.stellarium.org> [Accessed on 3rd January 2017].

1) Invisible - the site is in darkness during peak MLL years, high hills prevent the moon rising above the horizon: (figure 5.3).

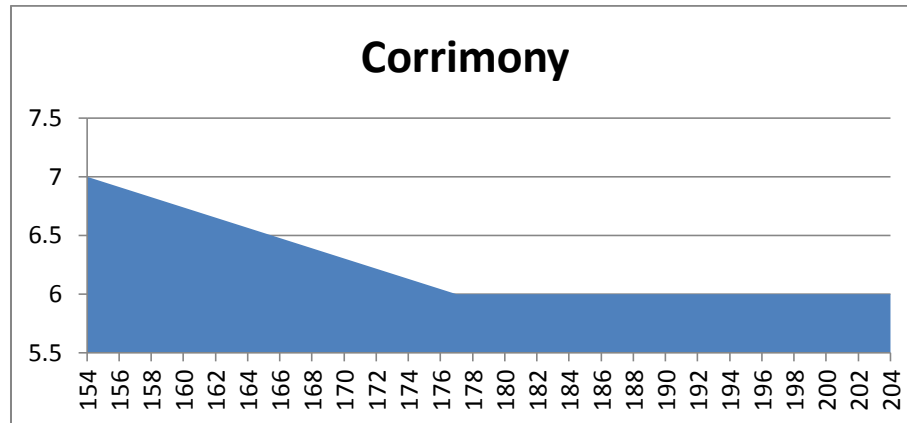


Figure 5.3. Invisible Full Moon. Corrimony. Horizontal figures are true azimuths (where 177° is true south) and vertical figures are hill heights in clinometer degrees, hills are blue. Although hills drop to a height of six degrees due south, the MLL moon cannot achieve that height, so the site is in darkness. The moon achieves $3^\circ 03' 04.1''$ on 24 June 2015 BCE true south at 1hr 16m 57s, Dec. $-29^\circ 36' 52.1''$. Appendix II gives details of Stellarium BCE moon positions for this site.

2) Disappearing Moon - where the moon rises then vanishes into a taller southwest hill before setting. The left rim of the moon is the last seen, not the upper rim as in normal setting, as though it enters the earth: (figure 5.4).

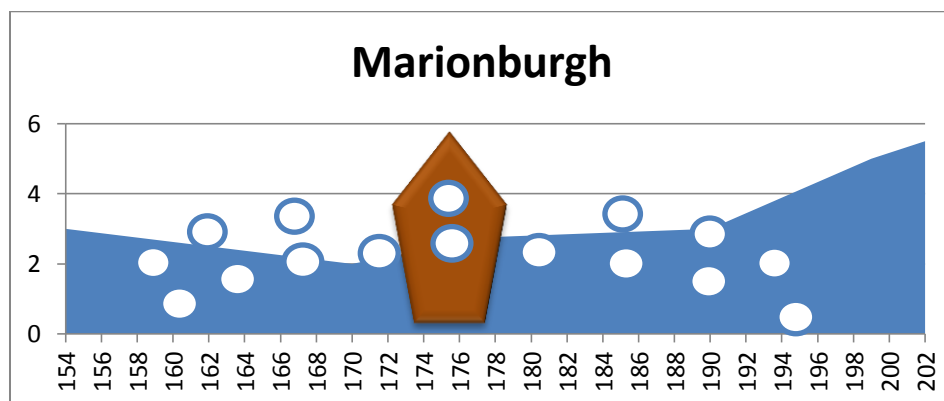


Figure 5.4 Marionburgh ring-cairn. Two lunar examples are given; the lower curve for MLL. Lunar centre reaches $2^\circ 56' 41.3''$ at 1hrs 11m 26s on 24 June 2015 BCE Dec $-29^\circ 36' 49.5''$. The moon enters the hill, behind the main circle monolith (brown shape). The upper curve is two years later: Moon reaches $3^\circ 29' 57.0''$ due south at 23 hr 45m 32s on 30 June 2013 BCE Moon Dec $-29^\circ 03' 33.8''$, when the moon sets into the hill (upper rim last seen). The siting of the monolith reinforces a natural event.

3) Emergent moon - the moon emerges from a hillside, the right rim is first visible, as though it is coming out of the earth: (figure 5.5).

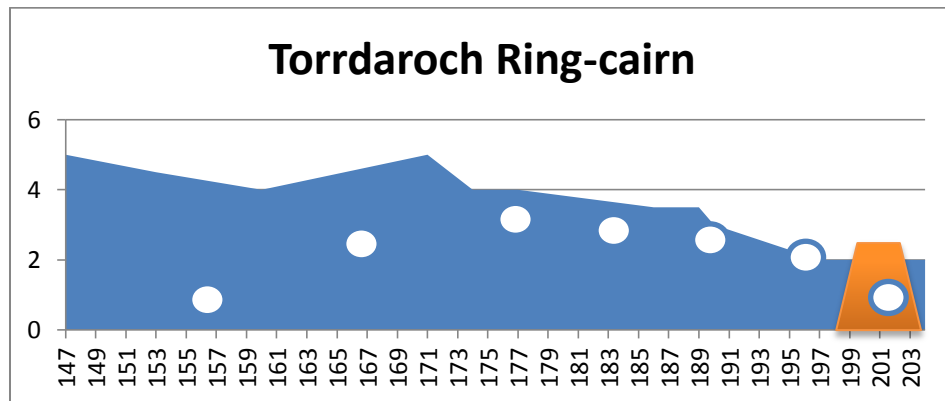


Figure 5.5. Emergent Moon. Torrdaroch ring-cairn. The Moon emerges from the hill before setting into the main monolith.

4) E&D - Emergent and Disappearing moon, where the moon emerges from one hillside before vanishing behind another, occasionally the gap is so narrow that the moon appears held in the embrace of the hills (cupped moon): (figure 5.6).

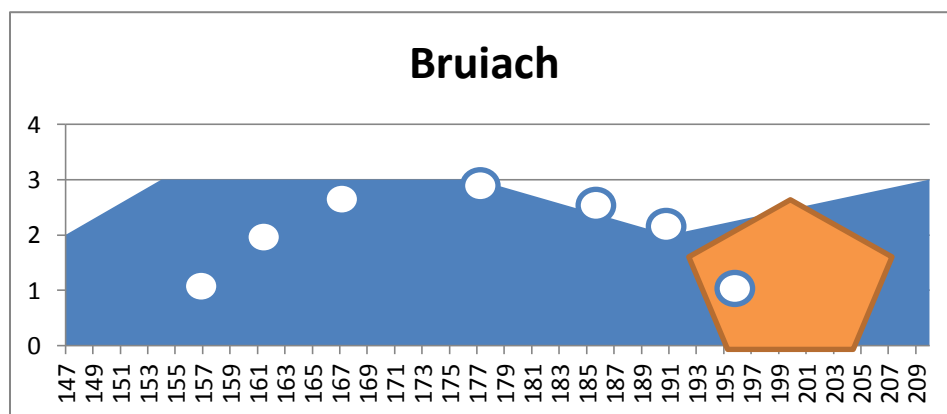


Figure 5.6. Emergent and disappearing. Bruiach ring-cairn, the moon slides out of one hill before setting into the stone. Kinchyle of Dore described in 5.3 is a good example of a 'cupped' moon.

5) Partial moon - where half or the upper rim of the moon is seen on the horizon, due south, sometimes the moon's rim travels along the southerly horizon: (figure 5.7).

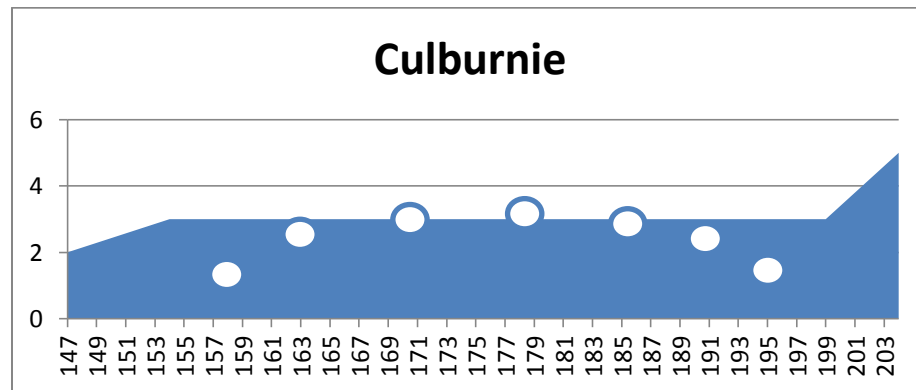


Figure 5.7. Culburnie ring-cairn partial moon at MLL, the moon achieves $2^{\circ} 56' 38''$ due south on 24 June 2015 BCE at 1hr 16m 13s, Dec $-29^{\circ} 36' 51.9''$ just failing to clear the horizon. Only the horizon and lunar phenomenon are indicated, for an image with houses and trees see Appendix II.

6) Skimming moon - where the moon appears to sit or skim along the horizon, never raising much above it: (figure 5.8).

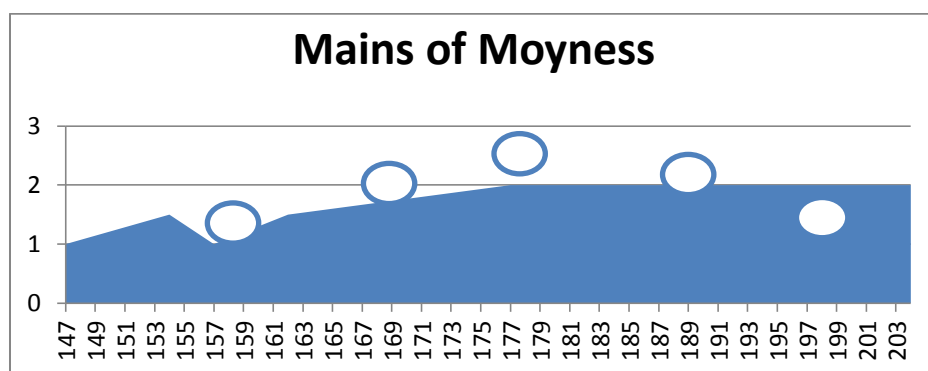


Figure 5.8. Mains of Moyness ring-cairn, the MLL moon skims along the horizon. The moon appears bigger as the scale is smaller than for earlier figures. Moon reaches $2^{\circ} 49' 30.3''$ on 24 June 2015 BCE at 1hr 13m 3s. Dec $-29^{\circ} 36' 50.7''$. MLL moon height variations mean a partial moon can occasionally be a skimming moon, but not in reverse, this hill is too low. This event resembles Calanais.

7) Normal moon - when the moon rises and sets briefly at MLL, which occurs at coastal sites: (figure 5.9).

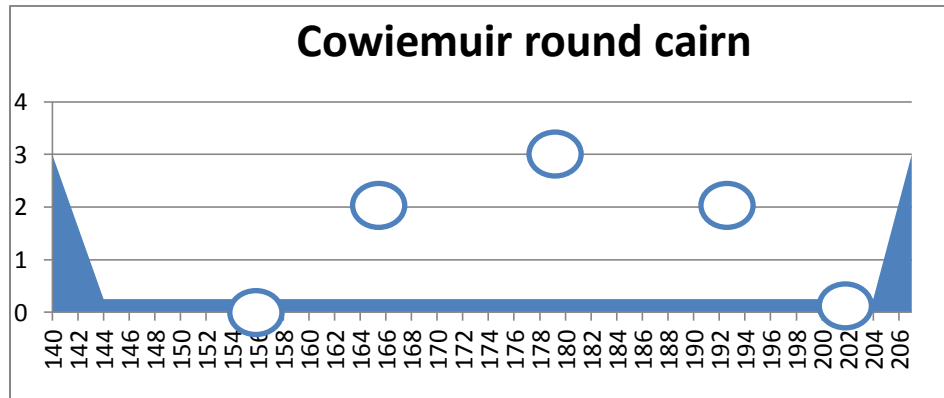


Figure 5.9. Cowiemuir round cairn, no Clava cairn exhibited a normal rising or setting moon as shown here. This cairn is a later Bronze Age Cairn and has a completely flat horizon of 0. The blue hills shown here were added purely to generate the figure. A normal rising and setting moon starts and ends with the upper lunar rim being visible first and then last. Moonrise on 23 06 2015 BCE is at 23 hr 21m 29s at 157° 15' 41" apparent moonset (in strong twilight and lunar extinction -8.03) is at 2hr 58m 11s on 24th at 202° 36' 06.9" allowing for variations in visibility, this constitutes the norm.

Figures 5.4 to 5.9 indicate the MLL moon reflecting light; approximate percentages of dark-moon versus light-moon sites are given per river in the following sections. Results are given per river, moving from east to west.

5. 1. Beaully

The Beaully rises from Loch Monar discharging into the Beaully Firth west of Inverness. Sixteen measurements were taken and five cairns investigated near Kiltarlity: (figure 5.1.1). Three Clava ring-cairns were surveyed: Culburnie, orientated on midwinter sunset, Bruiach and Belladrum North, aligned with southern major moonset. An indeterminate cairn at Home Farm and an OCH cairn Belladrum South were also assessed. The steepness of the gorge prevented much settlement, although hut circles remain above Aigas Field Centre, which had lunar extreme phenomena.

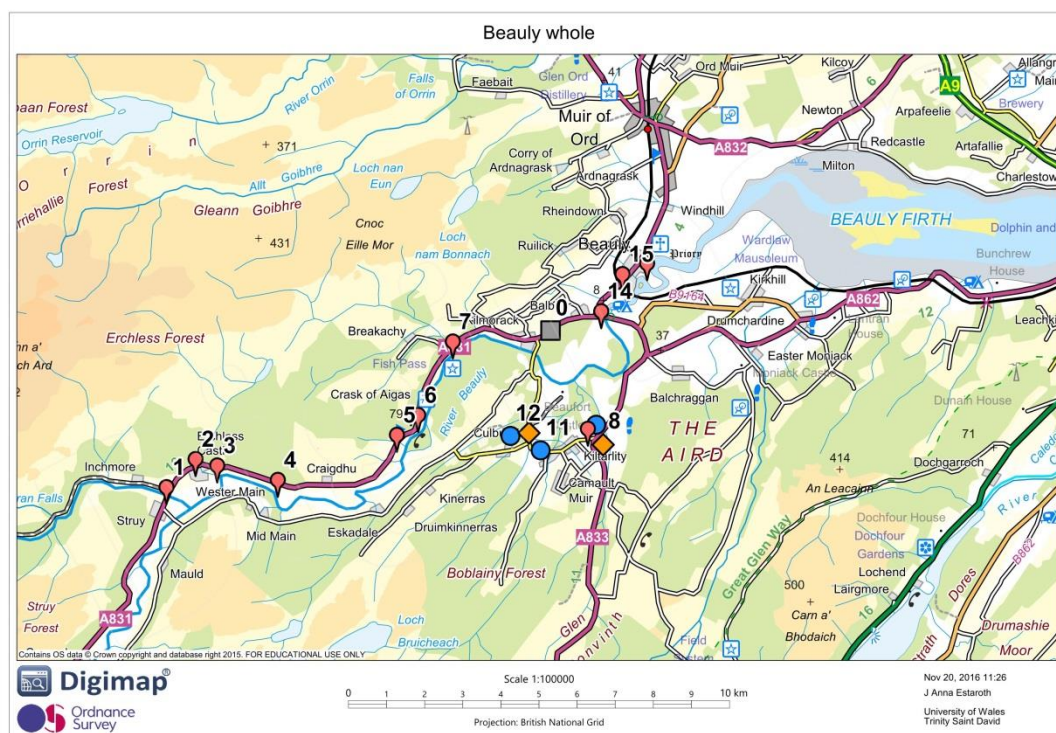


Figure 5.1.1. Measurements along the Beauly river: 1, Struy (non-cairn site bubble), 2 Erchless castle, 3 Bend on the river, 4 Crunaglack, 5 Aigas Field Centre, 6 Grask of Aigas 7 Aigas Gorge, 8 Belladrum South OCH cairn (diamond), 9 Belladrum North clava ring-cairn (blue circle), 10 Kiltarlity clearance cairn 11 Bruiach ring-cairn 12 Culburnie ring-cairn 13 Home Farm cairn 14 Lovat Bridge, 15 Beauly Station 16 Beauly Riverside. 0 Ballblair woods (grey square - Kist-cairn - trees blocked horizon). Scale reads 1:100000 10 km.

Extant cairns are all situated south of the river. Marshall described the only valley-floor habitation at 'Balblair woods' having found thirty-eight Bronze Age structures.²⁰² Trees obscured the horizon of a Kist-style cairn near the site (marked 0 in Figure 5.1.1). Figure 5.1.2 shows Kiltarlity in greater detail.

²⁰² Marshall, NOSAS.

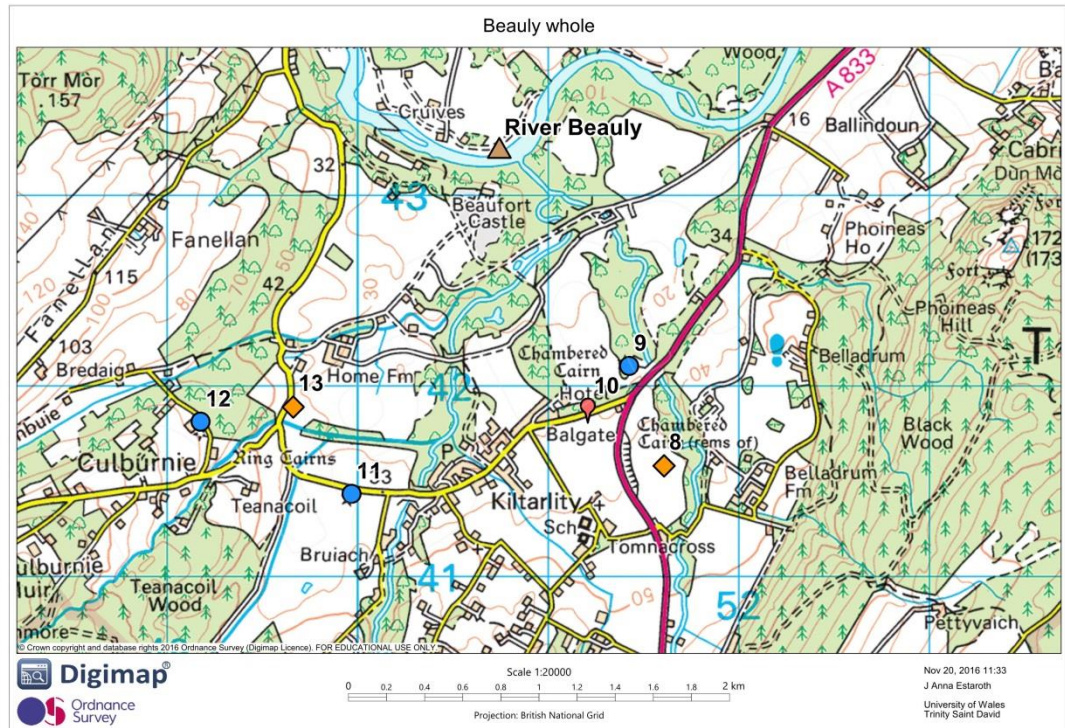


Figure 5.1.2. The five cairns measured near Kiltarlity: 12 Culburnie Ring-cairn, 13 Home Farm Cairn, 11 Bruiach Ring-cairn, 10 Kiltarlity Clearance Cairn (roadside), 9 Belladrum North Ring-cairn 8 Belladrum South OCH. Scale reads 1:20000 2 km.

The cairns would have been intervisible and as Tilley noted perhaps only 'approached from certain directions'.²⁰³ Figure 5.1.3 is Belladrum North and the diagram of Belladrum North's southerly horizon indicates a partial lunar site: (figure 5.1.4).

²⁰³ Tilley, *Phenomenology*, p. 94.



Figure 5.1.3. Belladrum North, Janita Stenhouse and Anne McInnes indicate the size of the largest southwest kerb-stone, overgrown in summer; winter permitted horizon measurements, seen through the trees. Photograph Estaroth 14/02.2016.

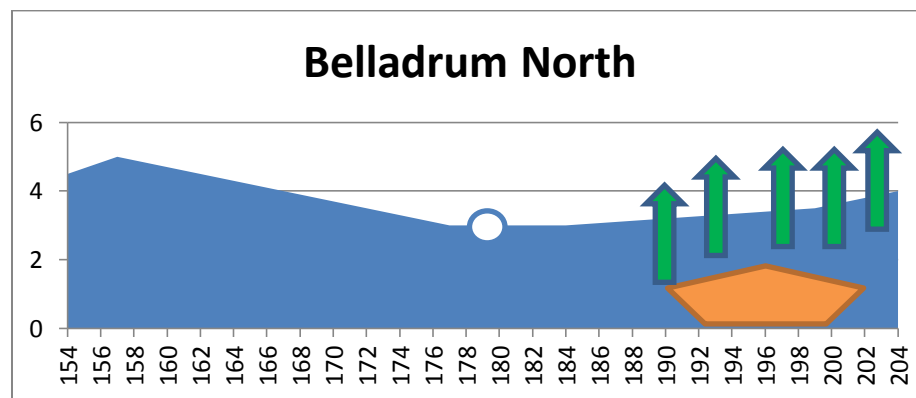


Figure 5.1.4. Diagram of the horizon for Belladrum North, for comparison with the above photograph, where the brown shape is the largest kerb-stone. Stenhouse is standing in front of the tree at 190°. It exhibits a partial moon, when the moon's rim travels along the low horizon.

Figures 5.1.5 and 5.1.6 are Culbernie ring-cairn, which Childe described as the 'best-preserved monument of its type in the district' after Balnuaran.²⁰⁴

²⁰⁴ Childe and Graham, RCAHMS, p. 40.



Figure 5.1.5. Culburnie ring-cairn, from one of the surrounding circle stones, looking northeast. The cairn wall has been restructured and trees have grown within the ring. Photograph Stenhouse 14/02/2016.



Figure 5.1.6. Inside Culburnie ring-cairn: the ranging pole marks the measured centre of the ring, taking measurements of the southern horizon (above the neighbouring house roof). Photograph Stenhouse 14/02/2016.

The hills of this bowl-shaped valley do not impede lunar rising on extreme years and they exhibit the partial, emergent or disappearing moon. Significantly there are no extant passage-graves along the Beaully and a notable absence of Clava cairns on the north side of the basin. The Beaully is approximately 56% dark, 44% light and has 6% of all known Clava cairns.

5. 2. Enrick

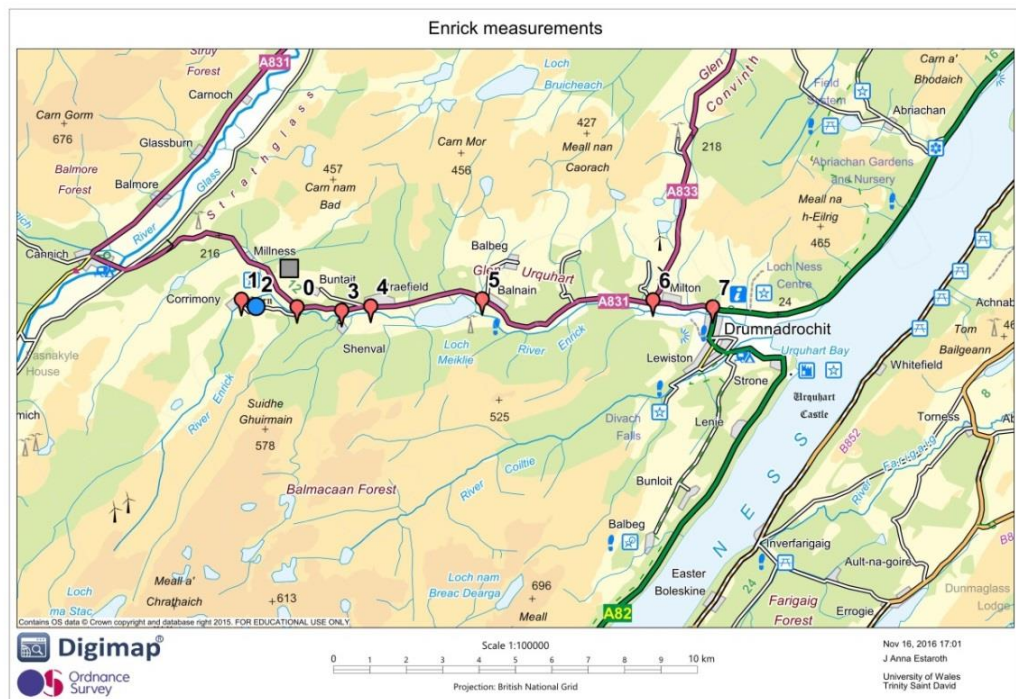


Figure 5.2.1. The Enrick: 1 Enrick Ford, 2 Corrimony Chambered Cairn, 0 Enrick Bridge, (trees obscured skyline), 3 Opposite entrance to Shenval, 4 Outside Hostel, 5 Near Balnain, 6 Easter Milton, 7 Drumnadrochit opposite war memorial. The excluded cairn (probably OCH) above Upperton of Buntait is marked with a grey square. Scale reads 1:100000 10 km.

River Enrick starts at Loch ma Stac and flows through Glen Urquhart to discharge into Loch Ness near Drumnadrochit. Seven measurements were taken: (figure 5.2.1). The east/west section has high hills with no lunar phenomena. The amphitheatre-shape valley at Corrimony is evocative of Beaully indicating habitation and agro-pastoral potential. At Enrick Ford the landscape opens into a lush agricultural basin with southerly hills uniformly over five degrees. It appears a perfect place to easily defend livestock from cattle-thieves. Evidence of Bronze Age

habitation exists on the hills, but was probably destroyed on the valley floor. Corrimony is the only Clava passage-grave to retain passage lintels in situ. Piggott said the passage was 'twenty-three feet long' (7m) and MacKie noted it was not 'accessible' in the 1970's.²⁰⁵ Crawling through this passage was reminiscent of entering Orkney's Neolithic Tomb of the Eagles, (which was accessed lying flat on a wheeled board). John Hedges gave its passage height as 'less than half a metre'.²⁰⁶ Henshall provided 'three feet' (91cm) for Corrimony.²⁰⁷ Entering this tunnel separates participants from normality. Sims and Xabi Otero suggested that crawling into the Palaeolithic cave at Praileaitz had the effect of 'infantilizing participants'.²⁰⁸ Newgrange and Maes Howe have walk-through low passages; Clava resembles some Orcadian practices and Corrimony exhibits strong acoustic alterations.

Figures 5.2.2 and 5.2.3 are Corrimony's interior and exterior. The cairn is in hill-shadow during Midsummer Full Moon on MLL years, although the other side of the valley would be brightly lit. The Enrick has 100 % dark sites and 3% of Clava cairns.

²⁰⁵ Piggott, Excavations, p. 180; MacKie, Scotland Guide, p. 210.

²⁰⁶ Hedges, Tomb, p. 40.

²⁰⁷ Henshall, CT, Vol 1, pp. 23. 368.

²⁰⁸ Lionel Duke Sims and Xabi Otero, 'Praileaitz I: A Magdalenian lunar-solar cave at 15,500 BP in the Basque Country' *International Journal of Mediterranean Archaeology and Archaeometry* Vol. 16, No 4, (2016), pp. 275-282, p.280.



Figure 5.2.2. Corrimony from inside the chamber. Photograph Estaroth 17/12/2014



Figure 5.2.3. Corrimony entrance is on the left, facing southeast hills. Photograph MacInnes 17/12/2014.

5.3. Ness

The Ness flows from Loch Ness to Moray Firth through Inverness: (figure 5.3.1). Excluded from this survey are Raigmore, relocated as part of Simpson's

'rescue archaeology' Torbreck, which Henshall says is the only 'free-standing stone circle' in the clava region and Aldourie, also relocated.²⁰⁹ Canmore stated Aldourie was moved across the road 'prior to 1870' and Henshall commented it was probably an 'artificial arrangement' of a 'dismembered Clava-type tomb'.²¹⁰ Aldourie lies between Kinchyle and Loch Ness harbour at Dores. Kinchyle is next to General Wade's Military Road (built c.1746), which was the main southern route to and from Inverness until the A9 (built 1923). Kinchyle overlooks the southwest orientated Great Glen and was probably pivotal for trading purposes with Ireland via Loch Ness; historical Digimaps note a 'stone battle axe' found nearby in 1870.²¹¹ Two dark cairn sites at Midtown lie on the easiest route to the Nairn.

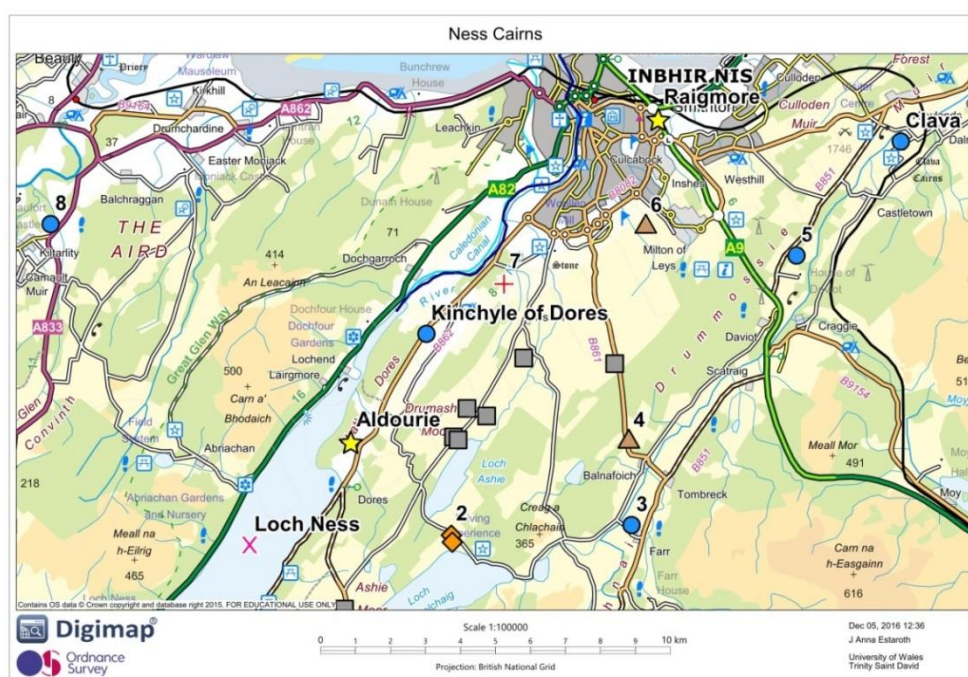


Figure 5.3.1. Inverness (Gaelic *Inbhirnis*) and river Ness - marked in blue to distinguish it from the Caledonian Canal. Buildings in Inverness obscured the horizon. Loch Ness, Kinchyle of Dores, Clava, Raigmore and Aldourie are labelled, 1 and 2 are the Midtown cairns (diamond), 3 Tordarroch on the Nairn, 4 Càrn Gask (triangle - Clava previously surveyed), 5 Daviot on the Ness, 6 Druid Temple (previously surveyed), 7 Torbreck stone circle (cross) and 8 Belladrum North on the Beaully. The grey squares indicate upland non Clava cairns, excluded from the survey, suggesting prehistoric trade routes. Ness mouth cairns were probably lost through building or it may have been too boggy. Scale reads 1:100000 10 km.

²⁰⁹ Derek Simpson, Raigmore, p. 54; Henshall, CT. Vol 2, p. 274.

²¹⁰ <https://canmore.org.uk/site/12580/Aldourie>, [Accessed 28 November 16]; Henshall, CT, Vol. 1, p. 358.

²¹¹ <http://digimap.edina.ac.uk/roam/historic>, [Accessed 02 December 2016].

Kinchyle inspired antiquarian interest, being so accessible. Figure 5.3.2 is Henshall and Ritchie's plan, who noted the main orthostat unchanged since 'seen by R. Pococke' and A. H. Pitt Rivers' visit to 'inspect and record' in 1885: (figure 5.3.3).²¹² Henshall reported the 'cremated remains of a single individual', probably secondary.²¹³

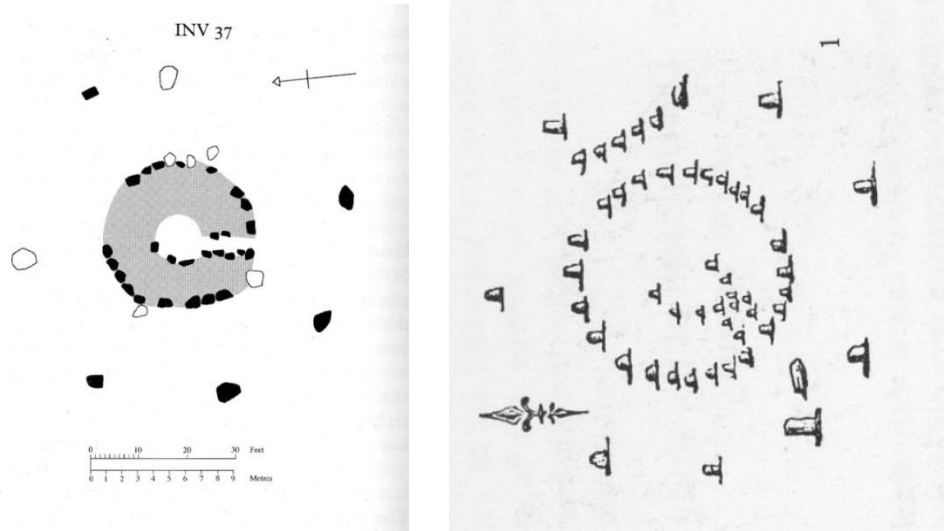


Figure 5.3.2. Left Henshall and Ritchie's plan of Kinchyle of Dores compared to George Anderson's 1824 plan on the right, Kinchyle of Dores is also known as Durriss, Scanipport or Ballindarroch.

Figure 5.3.2 includes George Anderson's 1824 drawing showing considerably more north-eastern stones; both indicate the southwest-orientated passage leading into a chamber.²¹⁴ Piggott included Anderson's five in the northeast in his diagram and Childe described tree removal accounting for their being removed and 'replaced ... further west'.²¹⁵ Figure 5.3.4 Kinchyle today.

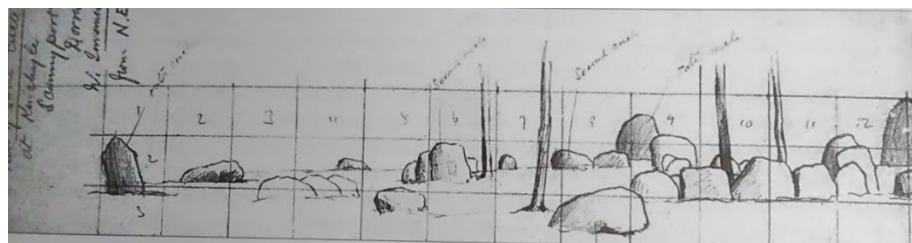


Figure 5.3.3. Tomkin's 1885 diagram undertaken during Pitt-River's official tour.

²¹² Henshall and Ritchie, *Chambered Cairns*, pp. 226. 227. 16.17.

²¹³ Henshall, *CT*, Vol. 1, p. 381.

²¹⁴ George Anderson, 'On some of the Stone Circles in the neighbourhood of Inverness: Paper read at the Scottish Society of Antiquaries in January 1824', *Archaeologia Scotia or Transactions of the Society of Antiquities of Scotland* Vol. 3 (1831) 211-222, p.212, [Hereafter Anderson, *Stone circles*].

²¹⁵ Piggott, *Excavations*, p. 187; Childe and Graham, *RCAHMS*, p. 18.



Figure 5.3.4. Kinchyle of Dores as it is today, rather overgrown and neglected facing north.
Photograph Stenhouse 14/02/2016.

Kinchyle is heavily overgrown during the summer and it is impossible to see Loch Ness from the monument although Anderson said it 'commands extensive views'.²¹⁶ Travelers on the Loch could find the safest harbour, below the cairn if a night bonfire or daytime flag was used. Land journeys to Inverness or Clava are outlined by cairns. The passage is orientated on major southern moonset, while the largest circle-orthostat aligns with minor southern moonset. Diagram 5.3.5 indicates the emergent moon setting into the passage and diagram 5.3.6 shows the passage, using Stellarium data.²¹⁷ This suggests that the lower rim of the moon touching the earth was sufficient for their purposes, which resembles Gerald Hawkins' theory about sunset and the 'lower rim of the sun', mentioned in chapter three.²¹⁸ The passage width allows for the degree of moonset 'wobble' discussed by Ruggles.²¹⁹ The Ness has 66% dark, 34% light and 11% of Clava cairns.

²¹⁶ Anderson, *Stone circles*, p.213.

²¹⁷ <http://www.stellarium.org> [Accessed on 3rd January 2017].

²¹⁸ Hawkins, *Sun, Moon, Men, and Stones*, p. 395.

²¹⁹ Ruggles, *Prehistoric*, pp. 60-61.

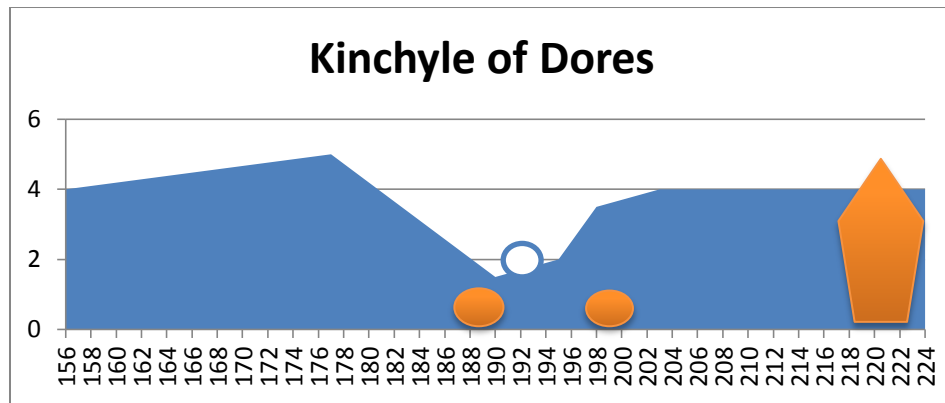


Figure 5.3.5 Diagram of the horizon above Kinchyle of Dores. The brown shapes are monument stones, the tall one is a circle orthostat (oriented on the minor southern moonset) while the round ones are at the entrance to the passage (aligned with the major southern moonset). This is an example of the hills 'cupping' the moon, which is included under the type emerging and disappearing.

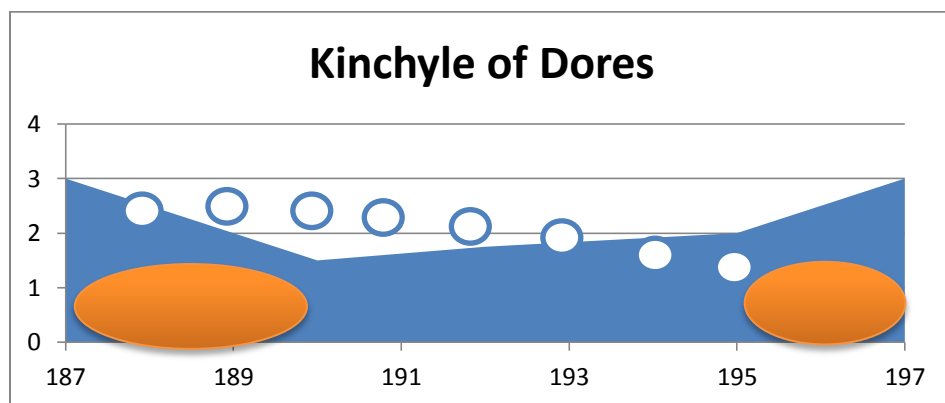


Figure 5.3.6. Kinchyle of Dores: lunar positions 24/06/2015 BCE at 01.53 am to 02.26 am from Stellarium. The passage entrance is from true azimuth 190° to 195°, marked by the brown stone shapes, which indicate the passage-entrance's peristalith orthostats.

5. 4. Nairn

River Nairn arises in the Monadhlaith Mountains, flowing through Strathnairn and Clava to the Moray Firth. Three maps indicate measured sites; figures 5.4.1 upper Nairn, 5.4.6 clava-valley and 5.4.11 lower Nairn. Eleven of the seventeen Nairn-cairns were selected.

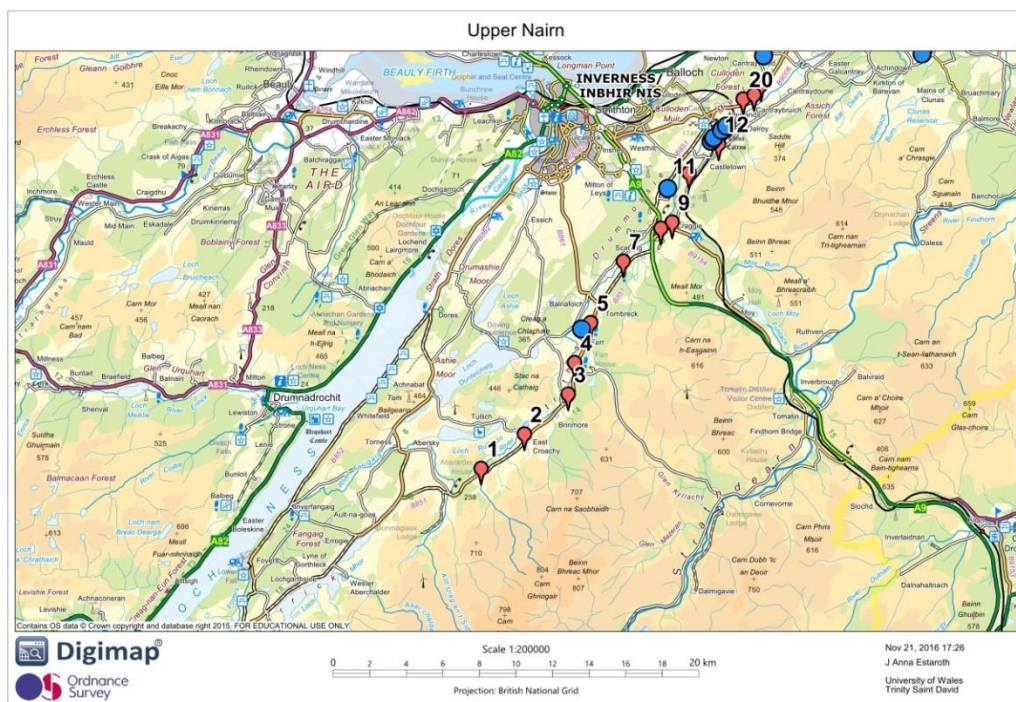


Figure 5.4.1. Upper Nairn, 1 Aberarder, 2 East Croarty, 3, Mains of Flichity, 4 near Woodside, 5 Farr woods, 6, Torrdaroch ring-cairn, 7, Near Dell Farm, 8 Daviot Farms, 9 Craggie, 10 Glenashdale, 11 Daviot ring-cairn, 12 Above Culdoich. Scale reads 1:200000 20 km.

Thirty one measurements were taken starting at Aberarder, through Strathnairn along what was probably an old drovers' route. Near Aberarder another river flows to Loch Ness. Tordarroch and Croftcroy are in the valley near Farr with Càrn Gask uphill, close to hill paths which connect with the Ness and Findhorn. Figures 5.4.2 to 5.4.4 are of Daviot which lies close to another hill-route to the Findhorn. The valley narrows before opening into the clava-valley which includes several monuments.



Figure 5.4.2. Daviot Ring-cairn in the environment, looking east. The cairn stones stand out in the snow (middle - left of the trees). Behind the cairn in the middle distance, at the edge of the white field are barely visible treetops, which indicate the steep drop to the Nairn River. The hill rises up on the other side of the river. Photograph McInnes 15/02/2016.



Figure 5.4.3. Daviot ring-cairn, unblemished snow, fabulous 360° sky view. Photograph Stenhouse 15/02/2016.

Like most ring-cairns Daviot has a particularly open aspect to the sky, and the midsummer full moon emerges from the small hill to skim along the horizon before setting behind the largest circle orthostat: (figures 5.4.3 and 5.4.4).

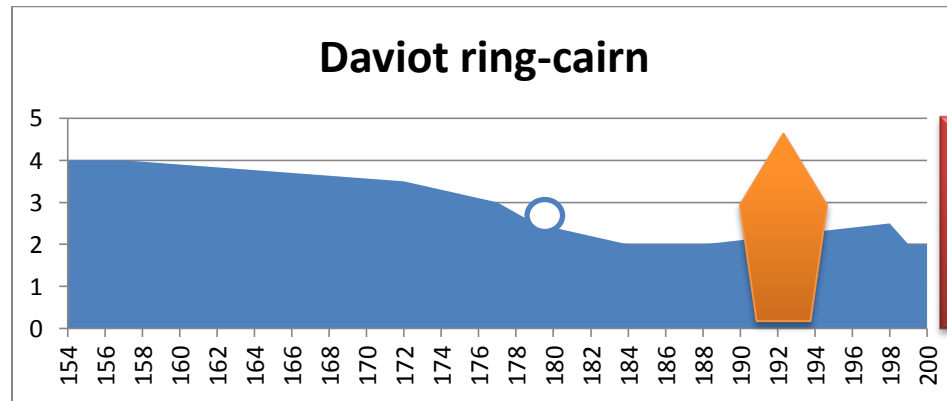


Figure 5.4.4. Daviot ring-cairn, the large orthostat is oriented on the Major Lunar Limit and on MLL years the moon emerges from the hills to travel along the horizon setting behind that stone (brown shape). The red shape is a telegraph pole. This is an emergent MLL moon.

Culdoich ring-cairn has one circle menhir remaining, which Henshall noted fell after '21 April 1958', making it difficult to assess the original alignment.²²⁰ Lack of circle stones was problematic with many other cairns. Barclay noted Culdoich's centre was 'filled in', constituting a deliberate sealing, which he likened to the widespread practice in eastern coastal cairns, and Historic Scotland suggested the same occurred at Balnuaran of Clava Central: (figure 5.4.5).²²¹ Closing the central space resembled the sealing of passage-graves and indicates an alteration in the way the sacred space was seen or utilised. The previously most sacred places (ring-cairn centre and passage-grave chamber) were replaced by space between cairn and stone circle.

²²⁰ Henshall, CT, Vol. 1, p. 371.

²²¹ Gordon J. Barclay, 'Are the Clava 'Passage Graves' really passage graves? A Reconsideration of the Nature and Associations of the Clava Passage Graves and Ring-cairns', in *Vessels for the Ancestors Essays on the Neolithic in Britain and Ireland in honour of Audrey Henshall* ed. by Niall Sharples and Alison Sheridan, pp. 77-82 (Oxford: Edinburgh University Press, 1992), p. 81; Historic Scotland on-site information.

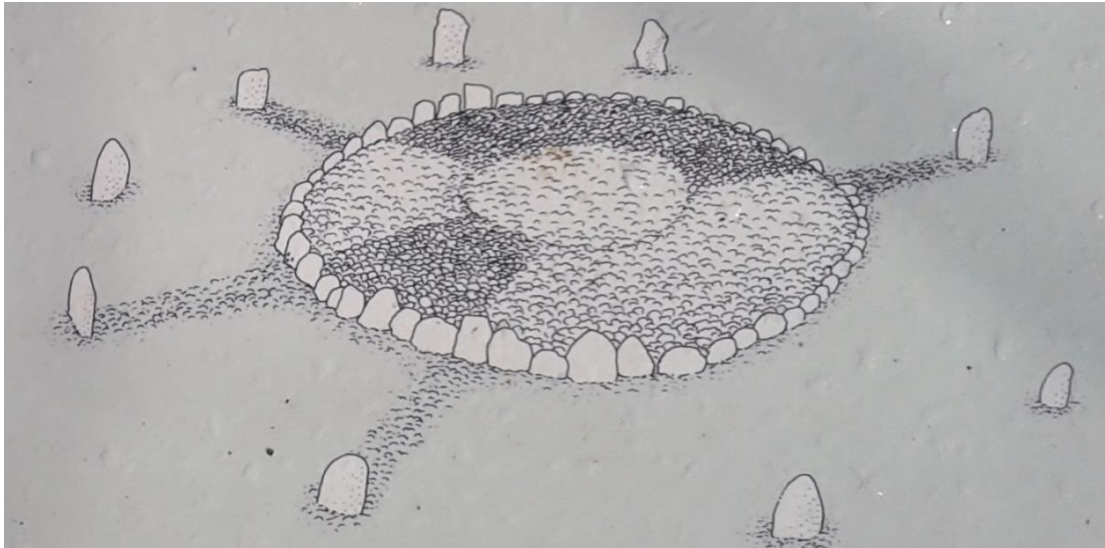


Figure 5.4.5. Historic Scotland's on-site diagram of Balnuaran Ring-Cairn. North is on the right.

The clava-valley complex has eleven extant monuments seven were selected, avoiding the later Bronze Age sites. Culdoich South, discovered by Bradley, was excluded as higher on the hill.²²² Balnuaran has five, Mains of Clava three, Culdoich one and Milton of Clava two (Milton of Clava South is disputed, but Niall Sharples suggested that a nearby mound 'may have been another Clava cairn').²²³ Lunar/solar combinations at the three main monuments at Balnuaran have been described by the author, concluding that the role of ring-cairns was as a teaching/gathering place, while the passage-graves functioned as a place of transformation, perhaps of the dead.²²⁴ Transforming the living in initiatory rites is plausible, as acoustics alter when other people share the passage-grave chamber. Little sound penetrates and emerging to find unheard people reinforces the other-worldliness of the chambers. Figure 5.4.6 shows the cairns evaluated in the clava-valley.

²²² Bradley, *Good Stones*, p.176.

²²³ Bradley, *Good Stones*, p.176: Niall M. Sharples 'Excavations at Milton of Clava, Inverness-shire' *Glasgow Archaeological Journal* Vol. 8 (1995), 1-9, [Hereafter Sharples, *Excavations*], p.8.

²²⁴ Anna Estaroth, 'Clava Cairns, midwinter sunset and the minor lunar limit', *Culture and Cosmos*, Forthcoming, [Hereafter Estaroth, *Culture and Cosmos*, 2017].

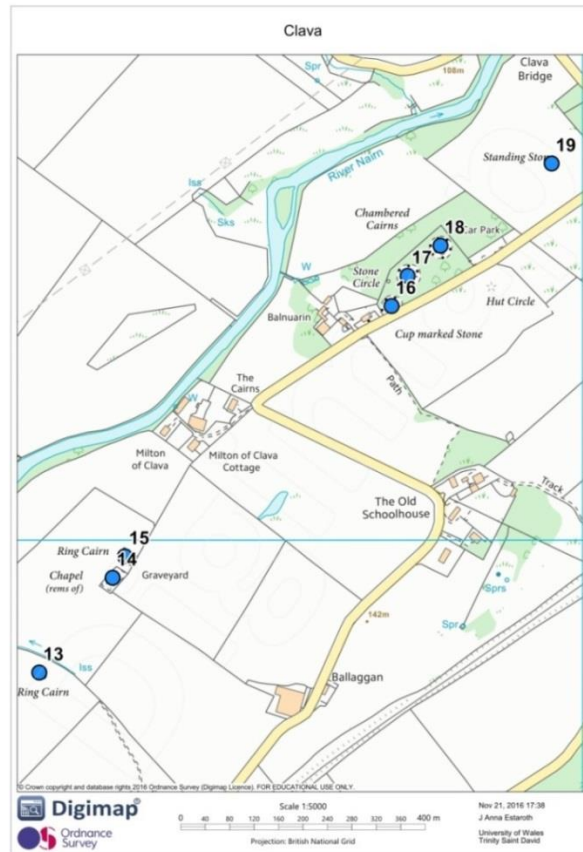


Figure 5.4.6. Clava valley: 13 Culdoich passage-grave, 14 Milton of Clava South, 15 Milton of Clava North, 16 Balnuaran of Clava Southwest passage-grave, 17 Balnuaran of Clava Central ring-cairn, 18 Balnuaran of Clava Northeast passage-grave, 19 Mains of Clava Northwest monolith. Scale reads 1:5000 400m.

Figure 5.4.7 is my adaption of Bradley's 'Balnuaran Central diagram' indicating measurements of the radials (or rays); these connect this ring-cairn with the path of midwinter sunset, via two of its radial-marked circle stones which align with equinoctial and midwinter sunrise, plus the alignments with the mll via the other two radials and largest circle-orthostat.²²⁵ William Jolly noted the radials were 'recently exposed' in 1881 and Piggott described them as 'a unique feature'.²²⁶ However Ruggles recognised that as potentially problematic, while the minor limits satisfy 'repeated trends' the radials' uniqueness might indicate 'regional diversity'.²²⁷

²²⁵ Bradley, *Good Stones*, p.20.

²²⁶ William Jolly, 'On cup-marked stones in the neighbourhood of Inverness with an appendix on cup-marked stones in the Western Islands', *Proceedings of the Society of Antiquaries Scotland* Vol. 16 (1881-82), 300-401, [Hereafter Jolly, Cup-marks], p.306; Piggott, *Excavations*, p. 190.

²²⁷ Clive Ruggles, 'Astronomy, cosmology, monuments and landscape in prehistoric Ireland', in *Astronomy, Cosmology and Landscape Proceedings of the SEAC 98 Meeting, Dublin, Ireland, September 1998* ed. by Clive Ruggles with Frank Prendergast, and Tom Ray, (Bognor Regis: Ocarina Books, 2001), p. 53.

Because all clava-valley cairns are in darkness at MLL, potential stars were considered and the largest circle-orthostats at all three Balnuaran EBA cairns align with the setting of Sirius. Significantly Bradley suggested the ring-cairn is highlighted by 'midsummer sunrise', as is the menhir for 'Mains of Clava North-west', (no specific stone alignment is indicated), while Douglas Scott's survey found orientations with sunrise on '20th May and 20th August'.²²⁸ Combined with my radial orientations it appears to be a complex cairn with lunar, solar and stellar connections.

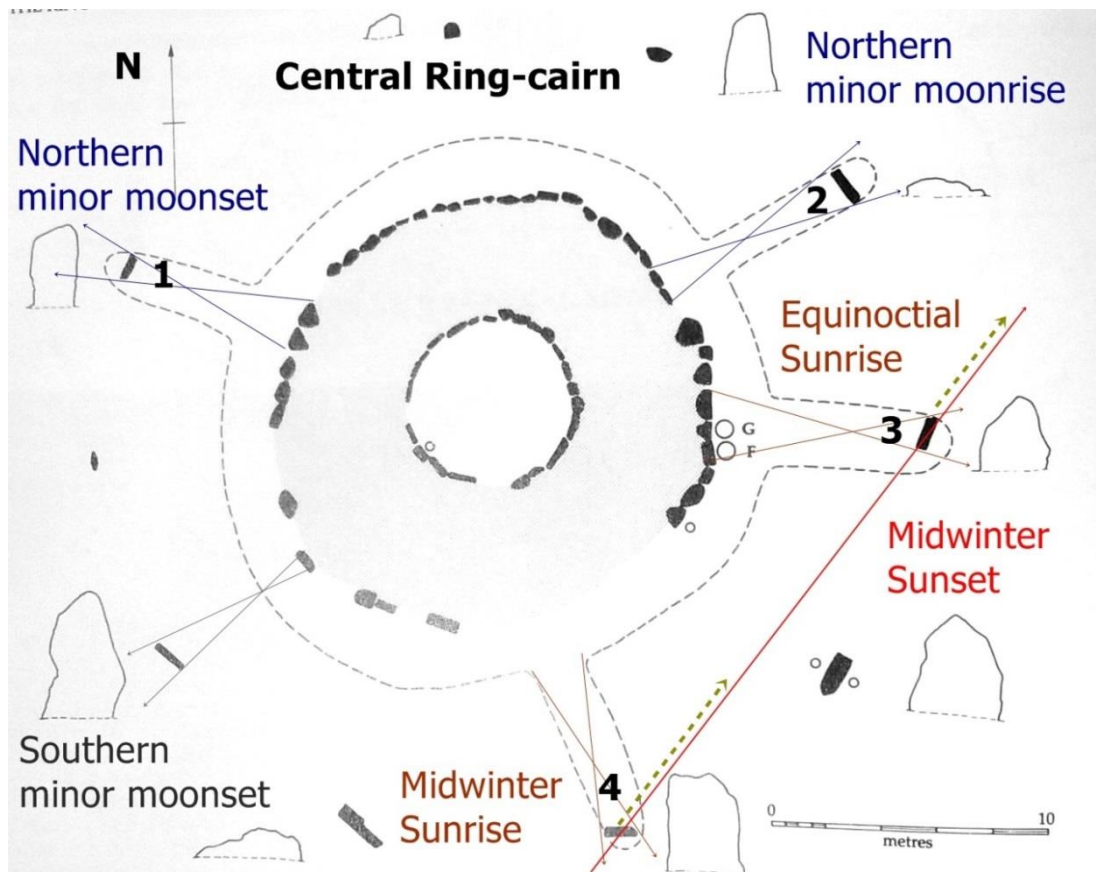


Figure 5.4.7 Balnuaran of Clava Central Ring-cairn, showing the four radials linking the cairn with four of the circle-orthostats. Radial 1 and 2 align with the northern minor moon setting and rising (blue lines). Ray 3 aligns with Equinoctial sunrise (and the summer rising of the Pleiades) while radial 4 aligns with midwinter sunrise (purple lines). The largest circle-orthostat aligns with the southern minor moonset (light blue lines). The path of the Midwinter sunset passes along the orthostats at the end of radials 3 and 4, creating shadows (depicted by the grey dotted lines) symbolically connecting this cairn with the two passage-graves. Diagram adapted from Bradley.

The shadows of two circle-orthostats at midwinter sunset resembles stone pairs described by Olwen Pritchard, who suggested they were deliberately 'arranged

²²⁸ Bradley, *Good Stones*, pp.126.125; Douglas Scott, 'The Solar-Lunar Orientations of the Orkney-Cromarty and Clava Cairns' *Journal of Skyscape Archaeology* Vol. 2, No. 1, (2016), Equinox Publishing, pp.45-66, p. 52, [Hereafter Scott, Solar-Lunar].

to create shadow phenomena' at the solstices, but these lack dimorphism.²²⁹ Clava-valley cairns are in darkness at Midsummer full moon on MLL years, frequently dark on years adjacent to MLL peak and occasionally, for years bordering those, only the partial moon is visible. During the nineteen year lunar cycle, five can be unusual in this valley. Figures 5.4.8 and 5.4.9 show an invisible moon site.

Balnuaran South-West is an example of a false positive; the circle orthostat to the left of the entrance aligns with the feature on the hill at azimuth 202° Southern major moonset, a false positive alignment, as the hill prevents this event being seen: (figure 5.4.10).



Figure 5.4.8. Balnuaran of Clava Southwest southern horizon. Photograph Estaroth 13/02/2016.

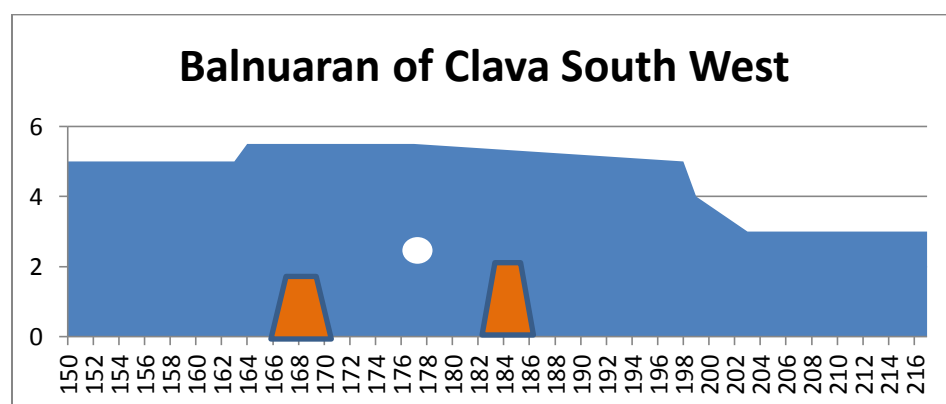


Figure 5.4.9. Balnuaran of Clava south-west passage-grave, looking south towards two of the circle orthostats and example of an invisible MLL lunar site.

²²⁹ Olwen Pritchard, 'Shadows, Stones and Solstices', *Journal of Skyscape Archaeology* Vol. 2, no. 2 (2016): pp. 145-164, p.160.



Figure 5.4.10. Balnuaran of Clava South-West passage-grave from within chamber. The circle-orthostat was measured from its kerb counterpart and from the cairn centre when two metre poles were used to measure either side of the circle-orthostat, not shown here. Photograph Estaroth 04/01/2016.

The complexity of the Balnuaran enclosure led the author to conclude that it exhibited a special interplay of light and dark: midwinter sunset casts light into the dark passage-grave chambers during the darkest part of the year, while the invisible midsummer full moon on MLL years generates hill-shadow, casting darkness onto the normally light ring-cairn's centre, during the lightest part of the year.²³⁰ Figure 5.4.11 indicates the sites along the lower Nairn. Dalcross Mains is on the hill and Little Urchany above a tributary.

²³⁰ Estaroth, Culture and Cosmos, 2017.

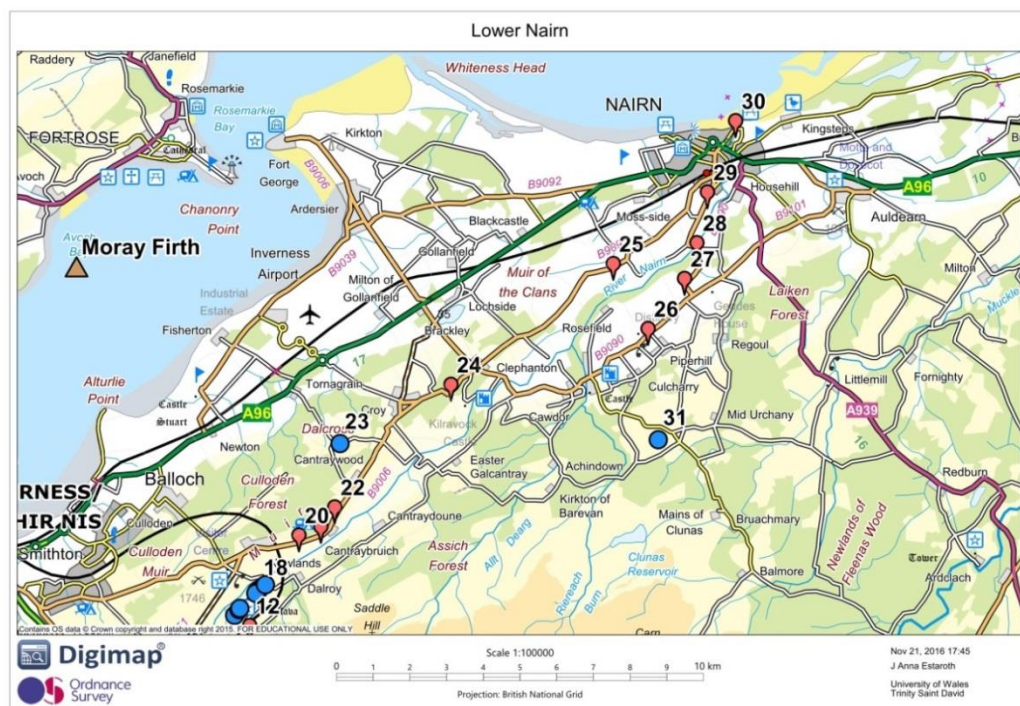


Figure 5.4.11. Lower Nairn measurement sites: 20 Cantraybuich, 21 Overlooking Viaduct, 22 Kinrea, 23 Dalcross Mains passage-grave, 24 Above Kilranoch Castle, 25 Missing Cairns, 26 Brachla, 27 Allanaha, 28 Nairnside, 29 Firhall, 30 Nairn Harbour and 31 Little Urchany passage-grave. Scale reads 1:100000 10 km.

Figures 5.4.12 and 5.4.13 are of Dalcross Mains: 5.4.14 the horizon diagram.



Figure 5.4.12. Dalcross Mains looking north, from the passage, the cairn material is missing. Laura Stenhouse in the chamber, preparing to take a panorama, the larger stones indicate the remains of the outer cairn peristalith, good views to the Moray Firth in the background. Photograph Estaroth 06/04/16.



Figure 5.4.13. Dalcross Mains southern horizon and largest orthostat. Photograph Estaroth 06/04/16.

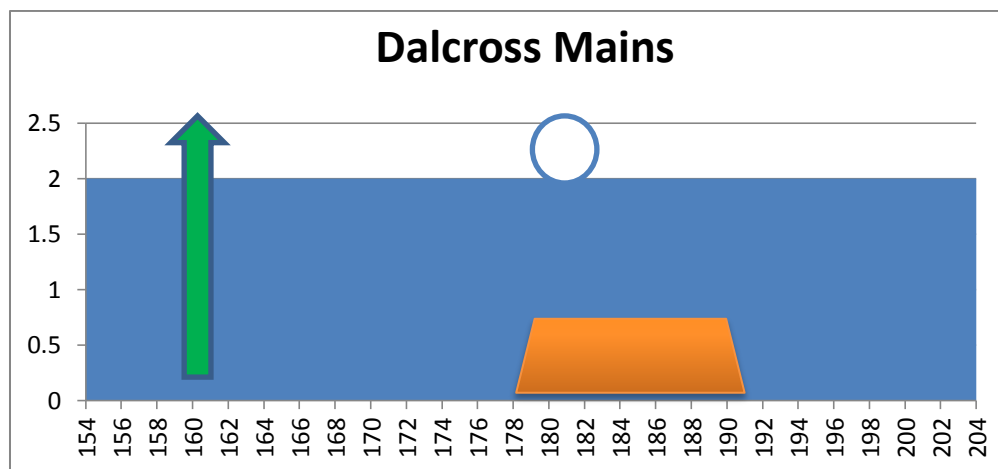


Figure 5.4.14. Dalcross Mains, a passage-grave on the hill above the Nairn. On MLL years the moon would not rise fully above this horizon; the orthostat is aligned with the major lunar limit -29.83° to -30.46° (true azimuths $178-191^{\circ}$). It is an example of a skimming moon site.

The river acts as a conduit, groups journeying from Loch Ness would view the unusual nearly-full moon's relationship with the horizon as they travelled; assessing how long before arriving for a festival at Clava. People travelling upriver from the Moray Firth could note the distinctive nearly-full Midsummer Moon skimming along the horizon and setting in the direction of travel. This suggests a pilgrimage pathway. The Nairn has 58% dark, 42% light and 40% of Clava cairns.

5.5. Muckleburn

The Muckleburn arises near Carn Sqùmain reaching Moray Firth via Findhorn Bay. Nine measurements were taken, (figure 5.5.1), started at Achavraat near a river-ford including the tumulus Shian Hillock: (figure 5.5.2), which George Bain (1862-1937) noted linked with Little Urchany via the 'Shian Road' (fairy road).²³¹ Local people linked two monuments which were separated by cultures and centuries.

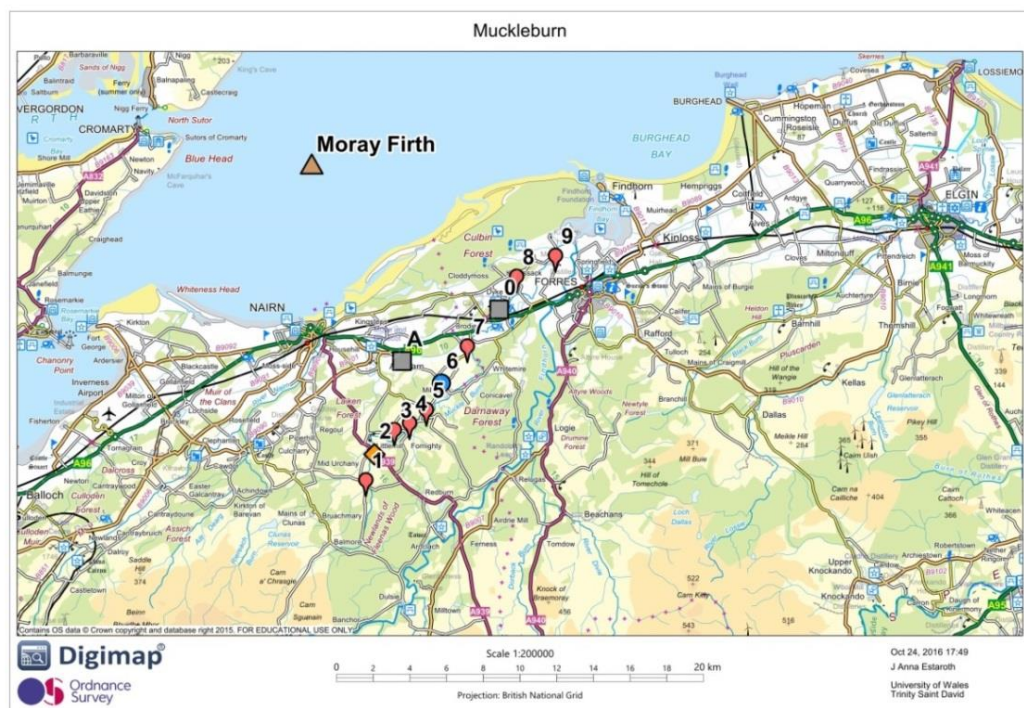


Figure 5.5.1. Muckleburn Measurements: 1 Achavraat, 2 Shian Hillock, 3 Braeside, 4 Near Fornightly, 5 Burnside, 6 Mains of Moyness Ring-cairn, 7 Boghole Farm, 8 Mudhall, 9 Moy House, also A Auldearn and 0 Rodney's Symbol Stone, where trees blocked both horizons. Scale reads 1:200000 20 km.

²³¹ George Bain, *History of Nairnshire* (Nairn: Telegraph Office, 1928 [1893]) [Hereafter Bain, History], p. 27.



Figure 5.5.2. Shian Hillock, Anne McInnes on the summit. A Neolithic tumulus: local folklore said fairies inhabited it and the fairy procession emerged at full moon. Photograph Stenhouse 15/02.2016.

Mains of Moyness ring-cairn had a fallen monolith, (now removed) which Bain called a 'rocking-stone or loggan' and John Smith named a '*clach-bhrath*' or judgement stone: if it moved, while a suspected person stood on it, they were considered guilty: (figure 5.5.3).²³² Hill-roads link Findhorn's Levrattich cairn to Little Urchany near the Nairn, via a ford near Achavraat. A few sites have unusual lunar phenomena, for people travelling towards the cairn. The Muckleburn running through the coastal plain has 34% dark, 66% light and 10% of Clava cairns.



Figure 5.5.3. Main of Moyness ring-cairn, a skimming moon site. Photograph Estaroth 16/02/2016.

²³² Bain, History, p.3; John Smith, *Galic antiquities consisting of History of the Druids particularly those of Caledonia A dissertation on the Authenticity of the Poems of Ossian and a Collection of Ancient Poems translated from the Galic of Ullin, Ossian, Orran etc.* (Edinburgh: C. Elliot, 1780), [Hereafter Smith, *Galic Antiquities*], p.71.

5. 6. Findhorn

Findhorn flows from the Monadhlaith Mountains to Findhorn Bay. Twenty two measurements were taken. This twisty river-glen frequently had trees obscure the horizon. Figures 5.6.1 and 5.6.2 indicate measured locations. No roads penetrate the steep-sided valley between nine and ten, with hills too high for lunar events.

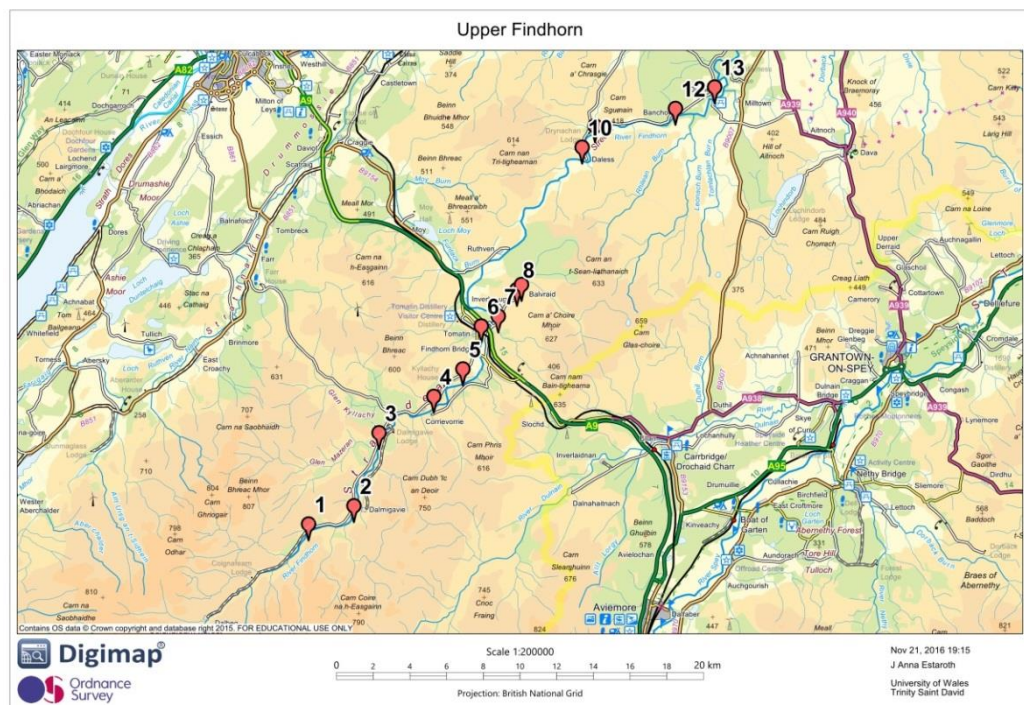


Figure 5.6.1. Upper Findhorn: 1 Coignafearn, 2 Coignascallan-Dalmigavie 3 Glenmazeran-Dalmigavie Lodge, 4 Corrievorrie-Auchintoul, 5 Mid Morile, 6 Under railway bridge, 7 Corryburgh, 8 near Edinchat, 9 near Balvraid 10, Dales, 11 Drynachan Lodge, 12 Banchor, 13 Princess Stone. Scale reads 1:200000 20 km.

Henshall suggested there were no Clava cairns along the Findhorn because it is not 'directly accessible to the Great Glen'.²³³ Six non-Clava cairns exist. This river was included to ascertain why no Clava cairns occur here. The steepness of the riverside creates difficult river access; this implies that river access was significant for Clava cairn builders.

²³³ Henshall, CT, Vol. 1, p. 17.

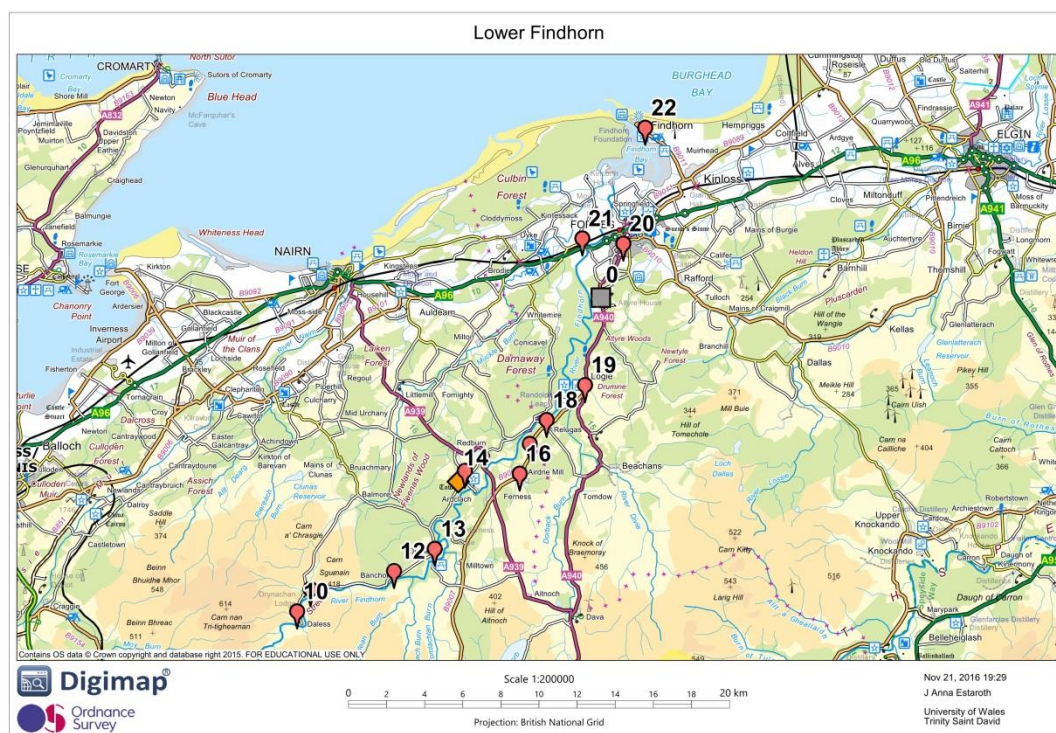


Figure 5.6.2. Lower Findhorn measurements: 14 Levrattich Cairn, 15, Ardclach Church, 16 Little Lyne, 17 Airdrie-Achnagairn, 18 Gleneney-Darnaway crossroads, 19 above Logie Steading, 20 Forres, 21 Bridge near Grangegreen 22 Findhorn Village. 0 Fairyhill Quarry (trees blocked horizon). Scale reads 1:200000 20 km.

Levrattich cairn (figure 5.6.3) appeared to have a passage and the midsummer full moon disappears into the southwest hill. The east-west sections of the river were reminiscent of the Enrick. Other cairns were not accessed, but all occur at places with hill-passes to other rivers, except Daless which has a ford. Levrattich is probably a round cairn (Bronze Age), it is near a potential old drovers' road to the Muckleburn and Nairn. Cairns earmark potential trade routes and could have functioned as gathering or fording points. The Findhorn flows into Findhorn Bay near where Simpson noted evidence of 'Mesolithic campsites': (figure 5.6.4).²³⁴ The Findhorn has 55% dark, 45% light and 0% Clava cairns.

²³⁴ Eric Simpson, Banff, Moray and Nairn, p. 1.



Figure 5.6.3. Levrattich cairn, very damaged, no surrounding circle, but what appeared to be a passage orientated on the major limit moonset and a disappearing moon at MLL. Photograph Estaroth 23/08/2016.



Figure 5.6.4. Early winter sunset south west Findhorn bay, showing low coastal horizon, ranging pole is at magnetic azimuth 180°. Photograph Estaroth 06/01/2016.

5. 7. Spey

The Spey flows from above Loch Spey to Spey Bay in the Moray Firth. Fifty measurements were taken: (figures 5.7.1, 5.7.6 and 5.7.9). Many sites were once

gathering-grounds and conveyed ancient authority: Richard Oram noted the Kingussie standing stones ('swept away' in 1792) were where 'Alexander Stewart, the Wolf of Badenoch, convened his court' settling a land dispute with the Bishop of Moray in 1380.²³⁵

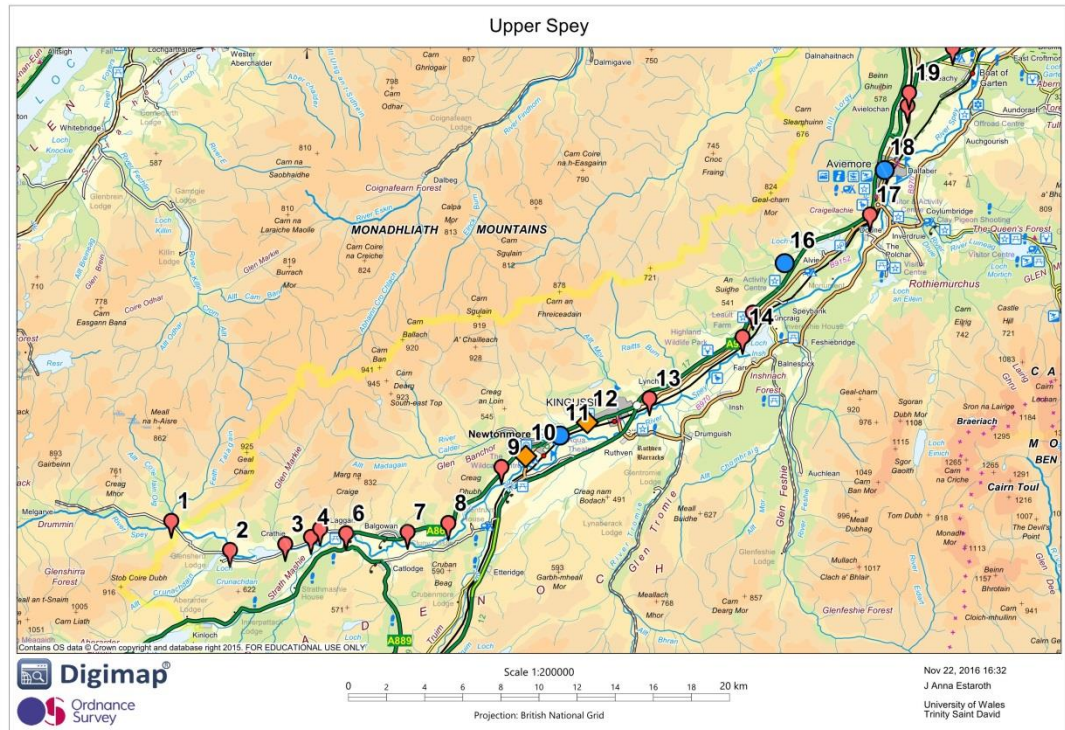


Figure 5.7.1. Upper Spey measurements: 1 Garva Bridge, 2 Glenshero, 3 Spey Dam, 4 Coul Farm, 5 Blagen Farm, 6 Laggan Spey Bridge, 7 Cluny Castle, 8 Auchmore, 9 Biallaidbeg cairn, 10 Newtonmore Cairn 11 Altarie Cairn 12 Tigh-na-Gaoth Cairn, 13 Kingussie Cemetery, 14 Leaping Cat Lodge, 15 Layby A9, 16 Delfour Ring-cairn, 17 Waterworks, 18 Aviemore Cairn, 19 Avielochan cairn. Lower Loch Ness is just visible upper left. Scale reads 1:200000 20 km.

While cairns appear all along the river, they also concentrate at certain sections, such as near Newtonmore (four) and Aviemore (six cairns within four kilometres). The Newtonmore cairns mark a potential easy river crossing and access southwards via Glens Truim and Garry. At Aviemore the River Drueie joins the Spey, so both river and valley widen. Dalfour ring-cairn faces Glen Feshie and is well preserved: (figures 5.7.2, 5.7.3). Scott's photograph shows midwinter sun setting into the largest orthostat; (figure 5.7.4).²³⁶ Caleb Cash's (1857-1917) 1905 survey noted

²³⁵ Richard Oram, *Moray and Badenoch: an historical Guide* (Edinburgh: Birlinn, 1996), [Hereafter Oram, Moray], pp. 15.16.

²³⁶ <http://her.highland.gov.uk/SingleResult.aspx?uid=MHG4428>, [Accessed 26 November 2016].

'considerable change' since the 1845 Statistical account and during his visit, he considered it a 'heap of loose stones', but much of that material has been cleared from the centre today.²³⁷



Figure 5.7.2. Delfour Ring-cairn looking NEE. Photograph Estaroth 17/10/2016.



Figure 5.7.3. Delfour ring-cairn facing SW. Photograph Estaroth 17/10/2016.

²³⁷ Caleb George Cash, 'Stone Circles at Grenish, Aviemore, and Delfour, Strathspey', (Part II.), *Proceedings of the Society of Antiquaries of Scotland*, Vol. XL, No. 245 (12 March 1906), [Hereafter Cash, Strathspey Stone Circles], pp. 245. 252.

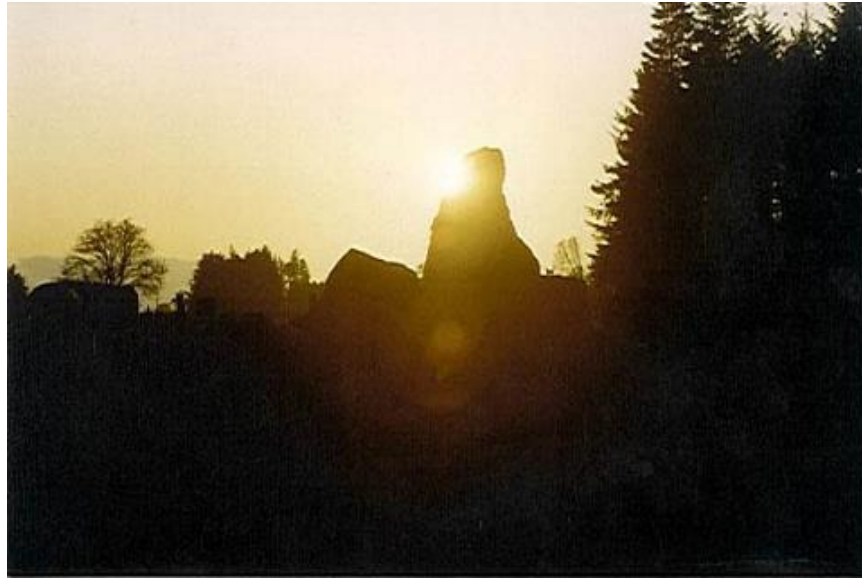


**Figure 5.7.4. Midwinter sun setting behind the main orthostat at Delfour.
Photograph Douglas Scott. 1995.**

Aviemore ring-cairn is preserved in the middle of a bustling town: the council plaque described it as a 'ceremonial gathering place': (figure 5.7.5).²³⁸



Figure 5.7.5 Aviemore ring-cairn surrounded by housing, the council plaque described it as a meeting-place. Photograph Estaroth 18/10/2016.

²³⁸ Badenoch and Strathspey district council onsite plaque.

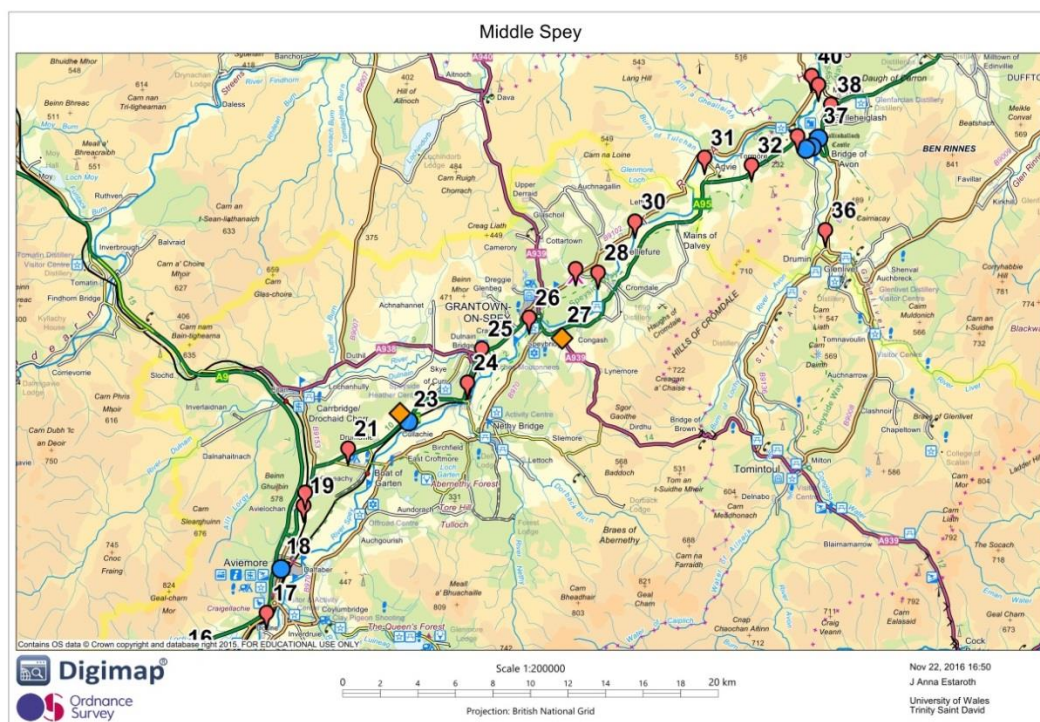


Figure 5.7.6. Middle Spey 19 Avielochan, 20, Loch Vaa, 21 Deishar, 22 Toun Tyleich cairn, 23 Tullochgorum Cairn, 24 near Curr Woods cairn, 25 Ballintomb, 26 Granttown on Spey, 27 Inchbroke cairn, 28 Cromdale Bridge, 29 Upper Port Stones, 30 Dalriach, 31 Deldow, 32 Achvochkie, 33 Garline Farm, 34 Upper Lagmore Cairn, 35 Lower Lagmore Cairn, 36 Doune of Dalmore, 37 Marionburgh Cairn. Scale reads 1:200000 20 km.

As noted in chapter two Grenish was the site for inaugurating kings. Tullochgorum ring-cairn is overgrown with an open-air feel and was visited in 1693 by James Garden, (1647-1726) who wrote to the antiquarian John Aubrey (1626-1697) with a tale of prayer at the stones and a sacred wood where 'no body will cutt a branch out of it'.²³⁹ This inherent sacredness of stones is a repeating theme; Browne noted people referred to going to church would say they were 'going to the stones' because *Clachan* means both stone and church.²⁴⁰ Nearby is Toun-Tyleich, described by Oram as a 'most magnificent' unexcavated Bronze Age cairn, its beehive shape probably resembles what Clava passage-graves once looked like: (figure 5.7.7).²⁴¹

²³⁹ John Aubrey, *Monumenta Britannica, or, a Miscellany of British Antiquities by John Aubrey illustrated with notes of Thomas Gale and John Evelyn, annotated by Rodney Legg archaeological consultant William Noade language advisor Robert J. Briggs literary editor John Fowles* (Sherborne: Dorset Publ. Co., 1980 [1695]), [Hereafter Aubrey, 1695], p.211.

²⁴⁰ Browne, *Antiquities*, p.18.

²⁴¹ Oram, *Moray*, p.32.



Figure 5.7.7 Toum-Tyleich an unexcavated Bronze Age cairn. Photograph Estaroth 18/10/2016.

There are standing stones by the Spey and two cairns on its tributary River Dulnain, potentially marking gathering places for river crossings, trade, hospitality and ritual. Jan Harding suggested rivers were 'staging-posts' and 'socially neutral locations' for the exchange of resources and information.²⁴² The cairns and stones nearest the river fulfilled that role. Oram noted the 'assembly place of local courts' and 'rallying-place' at Ballintomb stones.²⁴³ The next cairn-grouping is at Lagmore (four) where the River Avon joins the Spey, from here northwards it is a much wider river. It is deceptively gentle at Granton-on-Spey, where the council notice described the bridge-destroying 'muckle-spate of 1829': (figure 5.7.8).²⁴⁴ Spey floods are notorious MacPherson said the river was considered so 'bloodthirsty' it required an annual human death.²⁴⁵

²⁴² Jan Harding, *Cult, Religion and Pilgrimage: Archaeological Investigations at the Neolithic and Bronze Age Monument Complex of Thornborough, North Yorkshire* (York: CBA Research Report Council for British Archaeology, 2013), p.200.

²⁴³ Oram, Moray, p.33.

²⁴⁴ Granton-on-Spey council, on-site notice.

²⁴⁵ McPherson, Primitive, p. 64.



Figure 5.7.8. River Spey near Granton on Spey. Photograph Estaroth 17/10/2016.

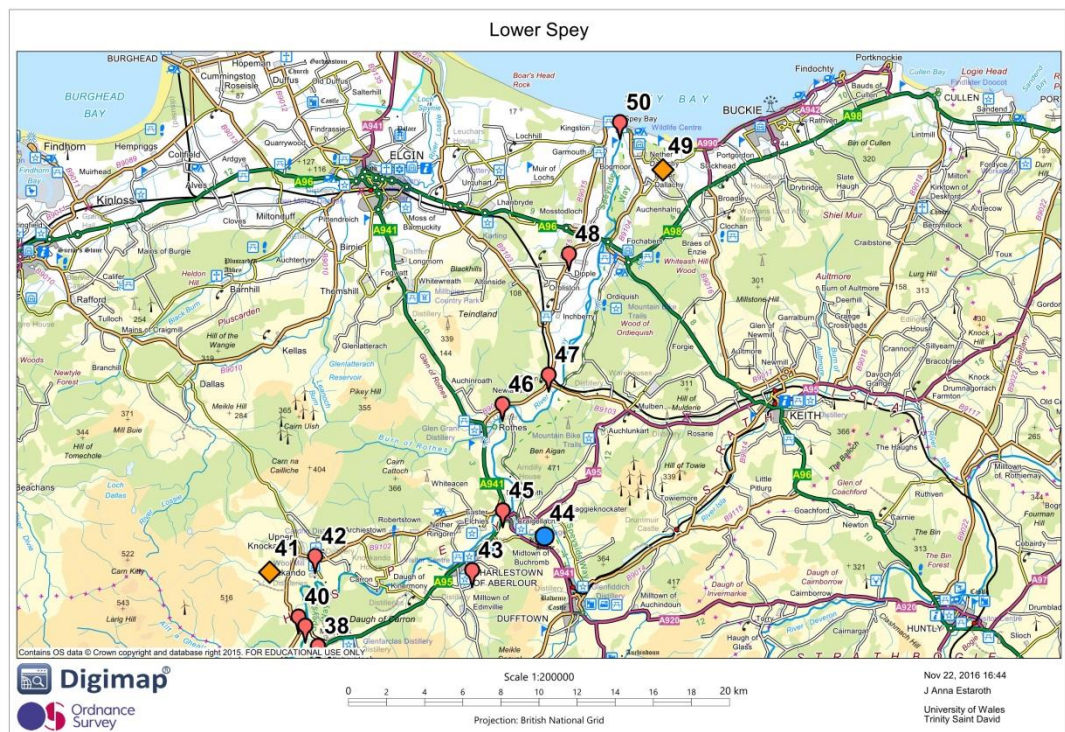


Figure 5.7.9. Lower Spey. 38 Belleheighlash, 39 Blackboat Bridge, 40 Bishop's Croft cairn. 41 Leakin Cairn, 42 Knockando Mill, 43 Hatton cairn, 44 Buchromb Ring-cairn, 45 Telford Bridge, 46 Aikenway Castle, 47 Orton, 48 Cairn End Farm, 49 Cowiemuir Cairn and 50 Spey Bay Nature Reserve. Scale reads 1:200000 20 km.

Three cairns were accessed along the lower Spey. Buchromb ring-cairn overlooking the Fiddich River (a Spey tributary) provided excellent sky views where the

midsummer full moon at MLL disappears into the SW hill, (figures 5.7.10 and 5.7.11).



Figure 5.7.10. Buchromb, a very large ring-cairn, the ranging pole marks magnetic azimuth 180° (177° true azimuth), excellent sky views close to the river Fiddich, a tributary of the Spey. Photograph Estaroeth 25/08/2016.

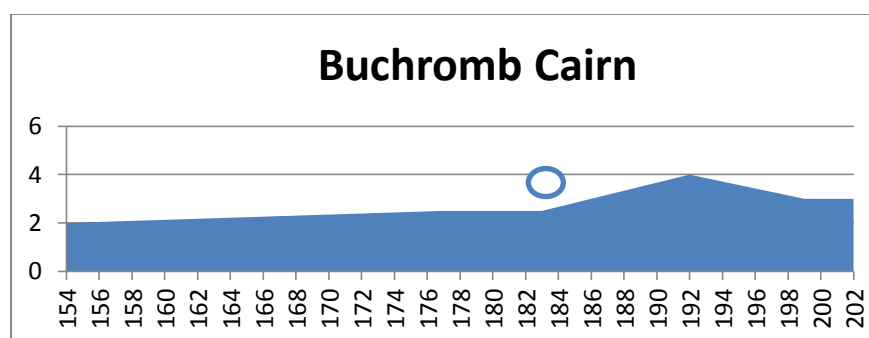


Figure 5.7.11. Buchromb ring-cairn. An example of a disappearing moon site.

The Spey is longer and wider than other surveyed rivers, with fewer dark sites. The Spey has 32% dark sites, 68% light (a similar proportion to the Muckleburn), and 23% of Clava cairns. Other rivers have a higher proportion of dark sites. Significantly 60% of Clava sites occur in rivers with a preponderance of darkness and yet, except at Corrimony and clava-valley, cairn locations largely favour MLL light. The 'lighter' Spey and Muckleburn account for 33% of cairns, the other 7% being excluded hilltop, Black Isle and coastal cairns. The MLL

Midsummer Full Moon appears to roll along the horizon disappearing into the southwest hills hinting at a pilgrimage way - people travelling upriver follow the vanishing moon. The moon often emerges and then vanishes into cairn-site hills, so cairn-builders appear conscious of lunar variations.

5.8. Summary of Findings and Discussion

Clava cairn builders operated in a monumental landscape. Bradley and Simpson noted 'Mesolithic activities' along the 'Moray coast', while Neolithic OCH cairns and RSCs bordered their territory.²⁴⁶ Evidence that sol-lunar orientations were local practice comes from Liz Henty's work on RSC's (who noted Ruggles, Burl and Thom found the 'recumbent aligned on lunar events' although concluding the 'lunar paradigm was now outdated') and Scott's work on OC cairns (who found orientations to the 'Equinox or early November/February sunset').²⁴⁷ Higginbottam's investigations at Mull indicated both near and distant horizons were 'integrally involved' in site locations, which this research endorses; many hills were distant, but some were close.²⁴⁸

Most cairns are near Bronze-Age hut circles and field systems, despite vanished habitation, cairn-builders probably also lived nearby. Hut circles avoid potential flooding, are near agro-pastoral land and access water-way transport. Cairns spread along the rivers at convenient stopping places bunching in certain locations, such as Kiltarlity (five), Craggie (four), Lagmore (four) Aviemore (six) and Newtonmore (four), where tributaries or hill-trails link with other rivers. Clava-valley (eleven) is exceptional, invisible from the sea, but locatable by coastal cairns.

Paired cairns, (e.g. Torrdaroch and Croftcroy), occur at easy river-crossings suggesting they were halting places, where groups gathered and hospitality was available. Taking a calf in a currach (coracle) across the river encourages cows to follow, leaving no archaeological remains, such as EBA jetties or plank-boats, studied by Robert Van de Noort who suggested that 'crossing water' embodied a

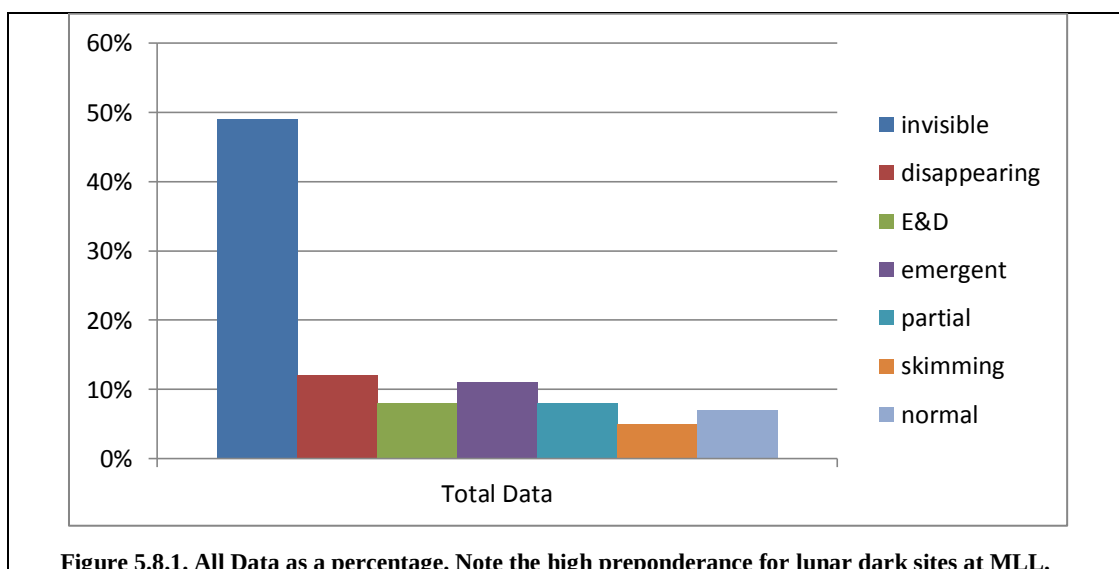
²⁴⁶ Bradley, *Good stones*, p.115; Eric Simpson, *Banff, Moray and Nairn*, p.1.

²⁴⁷ Henty, *Divide*, p.21; Liz Henty, 'The Archaeoastronomy of Tomnaverie Recumbent Stone Circle: A Comparison of Methodologies', *Papers from the Institute of Archaeology University College London* Vol. 24, No.1 (19 September 2014), 1-15, p.12; Scott, *Solar-Lunar*, p. 64.

²⁴⁸ Higginbottam, *World*, p.44.

'ritual component of travel' and prehistoric travel meant 'to reach into the "other world"'.²⁴⁹ Cairns for pilgrimage and trade foreshadow modern towns.

Every location exhibits MLL lunar phenomena, including ten coastal sites with normal lunar rising and setting. One hundred and thirty eight locations were measured: thirty eight cairns and one hundred river/roadside sites. Figure 5.8.1 summarises sites: corresponding tables are in Appendix III, with tables of river data. Figure 5.8.1 is all data, 5.8.2 non-cairn sites, 5.8.3 all cairns and 5.8.4 Clava cairns only. Non-cairn sites predominate: figure 5.8.1 resembles 5.8.2, which constitutes a base-line for expected data. Visible lunar horizon variations are largely under ten percent.



²⁴⁹ Robert Van de Noort, 'Exploring the ritual of travel in Prehistoric Europe: The Bronze Age sewn-plank boats in context', in *Bronze Age Connections Cultural contacts in Prehistoric Europe* ed, by Peter Clark, pp.159-175 (Oxford: Oxbow Books, 2009), pp.171.172.

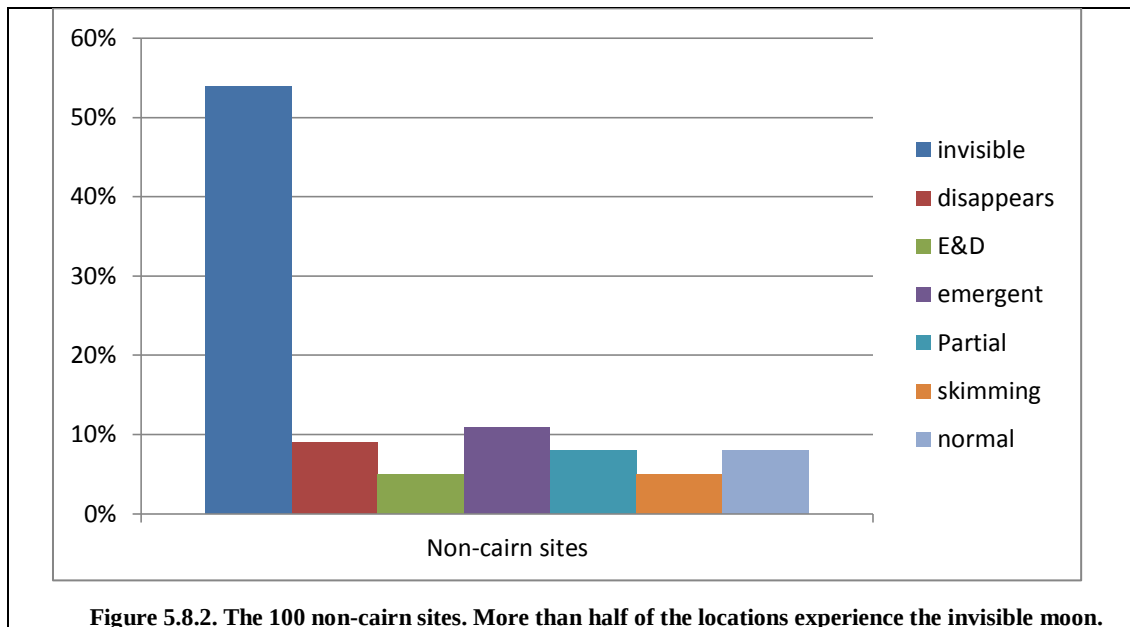


Figure 5.8.3 summarises thirty eight mixed-cairn sites, only Cowiemuir was normal. Lunar invisibility is less dominant: nearly half of the sites have emerging or disappearing moons and visible lunar variations are favoured (sixty six percent).

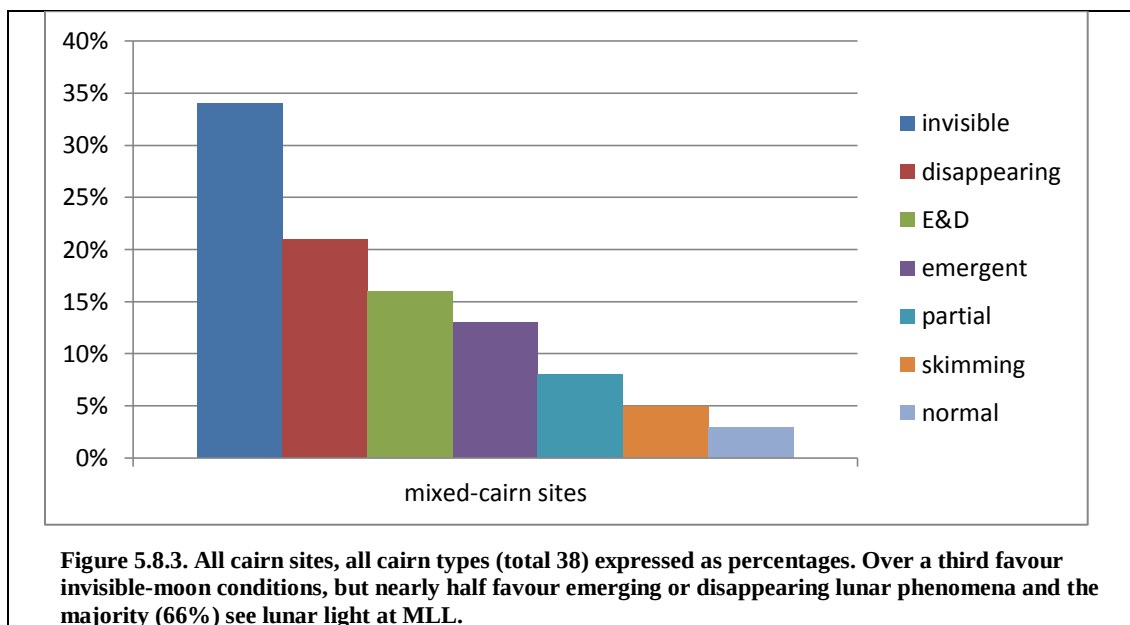
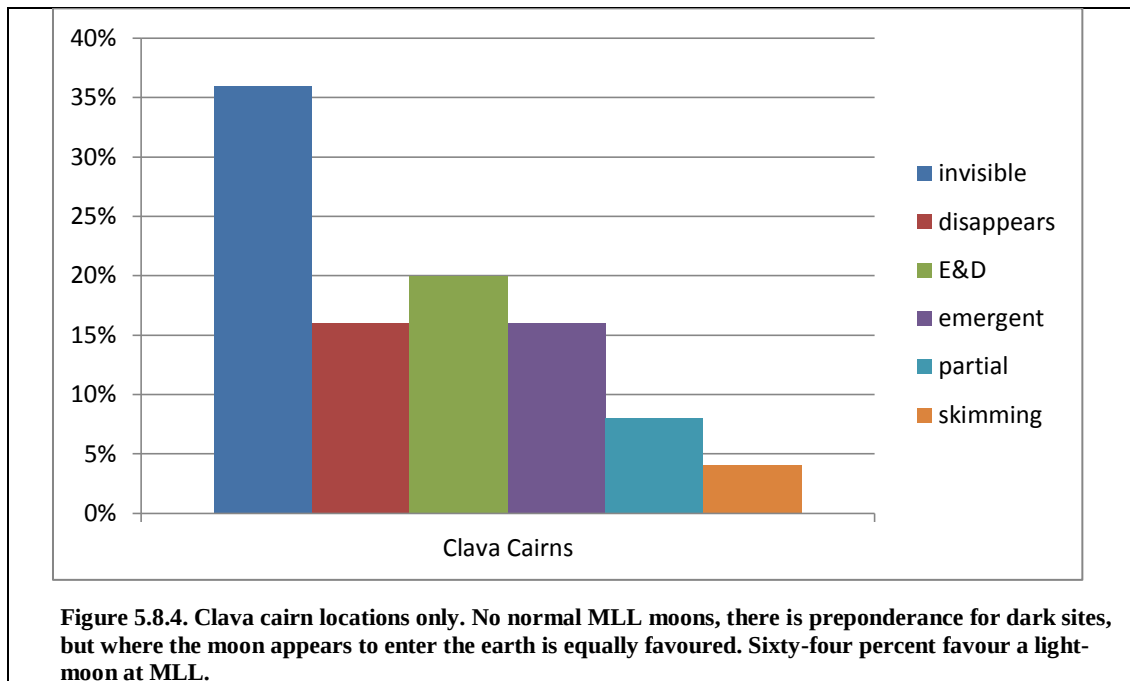


Figure 5.8.4 refers to the twenty five Clava Cairns. Clava-valley's dark cairns predominate, but sites where the moon appears to enter the earth are equally popular. It suggests that at Clava and Corrimony stars were possibly targeted.



Chi squared tests were attempted for varied data, but sample sizes were too small for validity. However amalgamating visible-moon sites (all categories except invisible) compared to invisible-moon sites for both non-cairn and cairn locations, graphpad.com gave 'chi square = 5.991 with 1 degree of freedom and two-tailed P value 0.0144' which is statistically significant.²⁵⁰ Differences between cairn sites and Clava cairn sites (combined light vs invisible MLL Moon) were negligible ('Chi square = 0.045 with 1 degree of freedom, P value 0.8328').²⁵¹ The road/riverside expected data is statistically unlike cairn sites, indicating cairn builders selected sites aware of the southern horizon and the MLL moon, largely preferring visible moons.

More partial moons were viewed in the west, while emergent and disappearing moons were favoured in the east. Precision viewing of rising and setting MLL midsummer full Moons was probably less important than the regular rhythm of repeated types of lunar journeys across the southern horizon conferring sacredness on the site. Clava-valley's seven dark cairns are unlike other Clava sites and this location dramatically alters visible versus invisible cairn distribution. Figure 5.8.5 compares light to dark sites while figure 5.8.6 removes Clava-valley data (seven cairns and two road/riverside sites).

²⁵⁰ <https://graphpad.com/quickcalcs/chisquared1.cfm>, [Accessed 02 December 2016].

²⁵¹ <https://graphpad.com/quickcalcs/chisquared1.cfm>, [Accessed 02 December 2016].

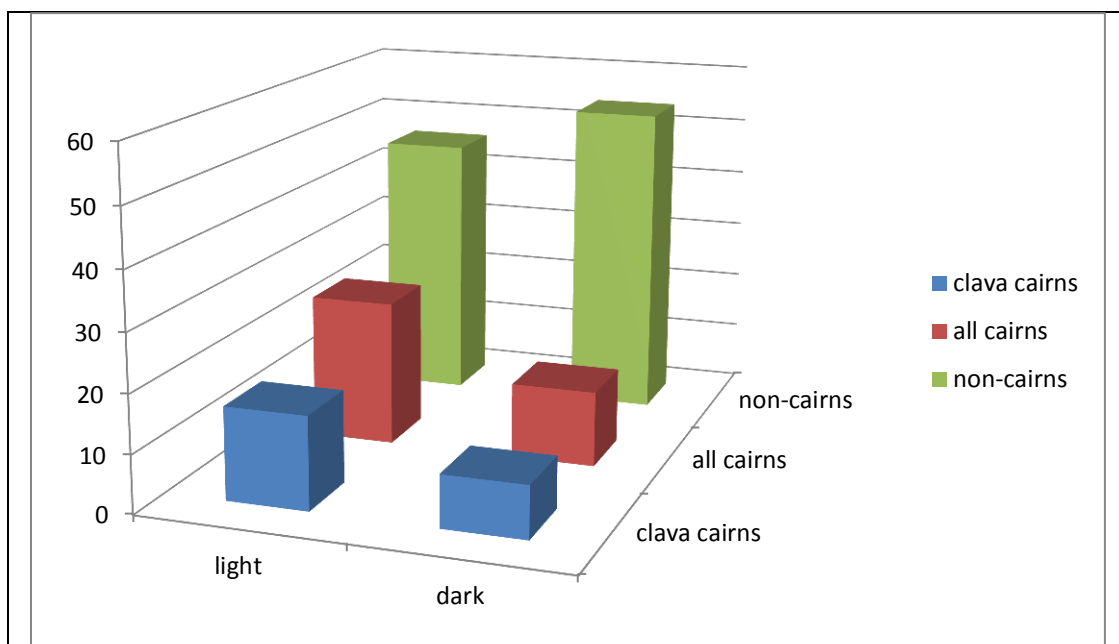


Figure 5.8. 5. Illustrating the difference between invisible-moon and visible-moon sites. Non-cairns (green) are all road/riverside measurements (total 100) all cairns (red) (total 38) includes Clava cairns, with Clava Cairns (blue) (total 25). These are numbers not percentages. Cairn sites generally favour light, where the moon is visible in an environment (non-cairns) which is more dark than light.

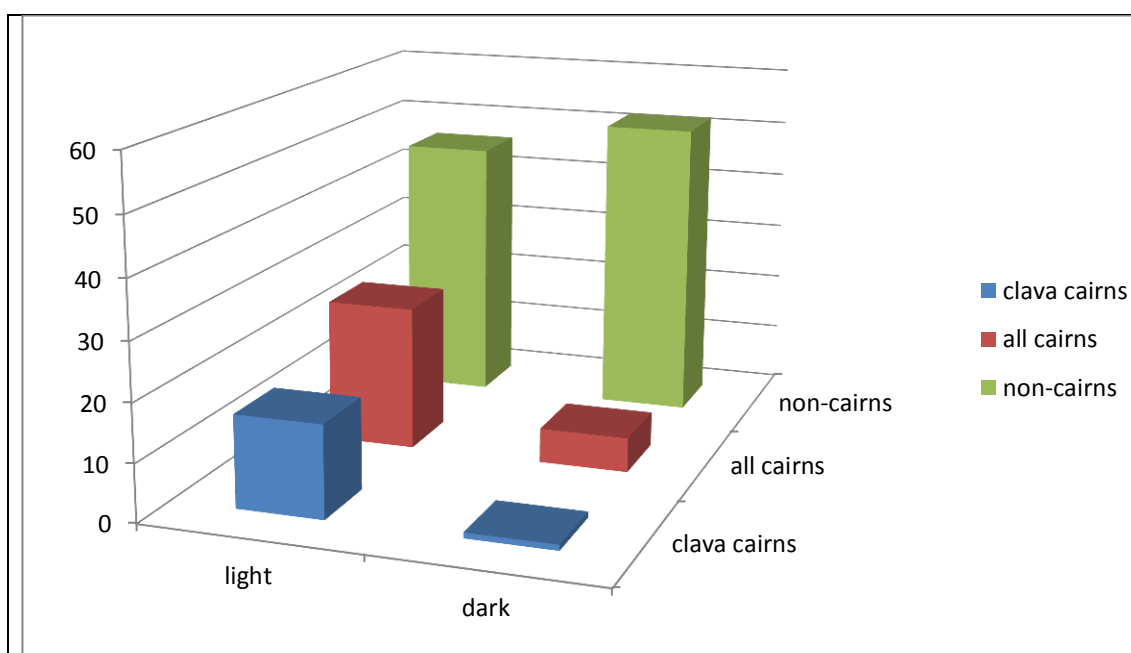


Figure 5.8.6. Illustrating the difference between invisible moon and visible moon-sites, with Clava-valley data eliminated. Non-cairns are all road/riverside measurements, minus the Clava-valley, all cairns exclude those in the Clava-valley and Clava cairns exclude the seven in the Clava-valley.

Clava-valley's MLL moon invisibility alters our perception of Clava cairn builders' site selection, making it unique among Clava cairns. Burl and Scott provided figures for two passage-graves for which I obtained no data and some findings marginally differ, due to dissimilar methodologies: my measurements are on-site locations, standing positions and the windows-of-visibility method.²⁵² Full moonset is visible at sunrise, despite lunar extinction; in my experience the dimmed moon remained visible during full moonset/sunrise at Callanish.

Where a dark-site cairn appears aligned with southern major moonset, such as Balnuaran southwest, moonset cannot be the designated alignment feature (being invisible) and stars were potentially targeted. Milton of Clava North and Little Urchany are tentative examples as both sites are unusual. The table lists lunar phenomena where the first category is Clava cairns, the second is other cairns. Unclear alignments are where the largest orthostat is missing or fallen. Rivers refers to nearby lochs or tributaries and some stars are suggested.

Abbreviations used are: MWSS = Midwinter Sunset, MSSR = Midsummer Sunrise, MWSR = midwinter sunrise, ESR = equinoctial sunrise, Nmll = Northern minor lunar limit, SMLL = Southern Major Lunar Limit and Smll = Southern minor Lunar Limit. E&D = emerging and disappearing. Those in parenthesis are symbolic connections. The MLL moon types are defined at the start of chapter five.

Clava Cairns	Type	Alignment	MLL moon	Stars	Rivers
Altclarie	Ring	unclear	emerging		Yes
Aviemore	Ring	SMLL	E&D		Yes
Balnuaran NE	Passage	MWSS passage Smll orthostat	dark	Sirius	No
Balnuaran SW	Passage	MWSS passage Smll orthostat (SMLL orthostat)	dark	Sirius	No

²⁵² Burl, Prehistoric Astronomy, pp. 28-29; Scott, Solar-Lunar, p. 64.

Balnuaran Central	Ring	MSSR ring Smll orthostat Nmll radials MWSR radial ESR radial (MWSS radials)	dark	Sirius Pleiades	No
Belladrum North	Ring	SMLL	partial		Yes
Buchromb	Ring	unclear	disappearing		Yes
Bruiach	Ring	SMLL	E&D		Yes
Corrimony	Passage	MWSS	dark		Yes
Culburnie	Ring	MWSS	partial		Yes
Culdoich	Ring	unclear	dark		Yes
Dalcross Mains	Passage	Smll passage SMLL orthostat	skimming		No
Daviot	Ring	SMLL	emerging		Yes
Delfour	Ring	MWSS	E&D		Yes
Kinchyle of Dores	Passage	SMLL passage Smll orthostat	E&D		No
Lower Lagmore	unclear	unclear	disappearing	Alnilam	Yes
Little Urchany	Ring	MWSS	dark	Deneb Algedi	Yes
Mains of Clava NW	Single stone	MSSR	dark		No
Mains of Moyness	Ring	unclear	skimming		No
Milton of Clava N	Passage?	SMLL	dark		No
Milton of Clava S	unclear	SMLL orthostat	dark	Sirius	No

Marionburgh	Ring	SMLL orthostat	disappearing		Yes
Tordarroch	Ring	SMLL orthostat	emerging		Yes
Tullochgorum	Ring	MWSS orthostat	disappearing and emerging		Yes
Upper Lagmore	Passage	unclear	disappearing	Antares	Yes
Other Cairns					
Belladrum South	OCH	None	dark		Yes
Inchbroke	OCH?	None	dark		Yes
Cowiemuir	Round	None	light - normal		Yes
Home Farm	Round	None	disappearing		Yes
Leakin	Round	None	dark		Yes
Levrattich	Passage?	SMLL passage	disappearing		No
Midtown NE	Round	None	dark		Loch
Midtown SW	Round	None	dark		Loch
Newtonmore	unclear	None	partial		Yes
Shian Hillock	Tumulus	None	E&D		Yes
Tigh-na- Gaoth	unclear	None	skimming		Yes
Toum- Tyleich	Beehive	None	disappearing and emerging		Yes
Upper port	Standing stones	None	E&D		Spring

6. Further Considerations

Of the Clava cairns studied, twice as many ring-cairns (fifteen) have survived as passage-graves (seven); three being inconclusive (Lower Lagmore, Mains of Clava NW and Milton of Clava south). Passages vary: Corrimony, Balnuaran NE and SW align with midwinter sunset, but Kinchyle and Milton of Clava North align with southern major moonset, while Dalcross Mains aligns with southern minor moonset. Upper Lagmore's passage-orientation was unclear. Scott's photographs (at HER) proved the sun reaches Balnuaran's chambers at midwinter, but the Midsummer Full Moon cannot cast moonlight into Kinchyle's passage, due to twilight conditions.²⁵³ At Balnuaran northeast, Somerville noted the largest circle-orthostat aligned with 'November day sunset': (figure 6.1).²⁵⁴ This research indicates it also aligns with the southern minor moonset and the setting of Sirius, the brightest star in the sky, as does the largest circle-orthostat for Balnuaran SW, Balnuaran Central and Milton of Clava South.

²⁵³ HER, <http://her.hIGHLAND.gov.uk/SingleResult.aspx?uid=MHG3013>, [Accessed 24 November /2016], the website of Highland Environment Record.

²⁵⁴ H. Boyle Somerville, Royal Anthropological Institute, MS 267, f.159, [Hereafter Somerville, RAI, MS 267, f.159].

South was orientated on Sirius' setting it suggests a construction period about fifty years earlier than Balnuaran, but without radio-carbon evidence this theory is unsubstantiated: as Heggie stated in chapter three it could be due to 'chance'.²⁵⁹

Ring-cairn size varies considerably: Henshall gives interior diameters from '16-34 feet' (4.8-10.3m) while passage-grave chamber diameters are between '10-13 feet' (3-3.9m).²⁶⁰ Figure 6.2 compares sizes of 'modern yurts'; essentially thirty to over a hundred people could fit in a ring-cairn, but only ten to twenty could fit comfortably in a passage-grave chamber.²⁶¹

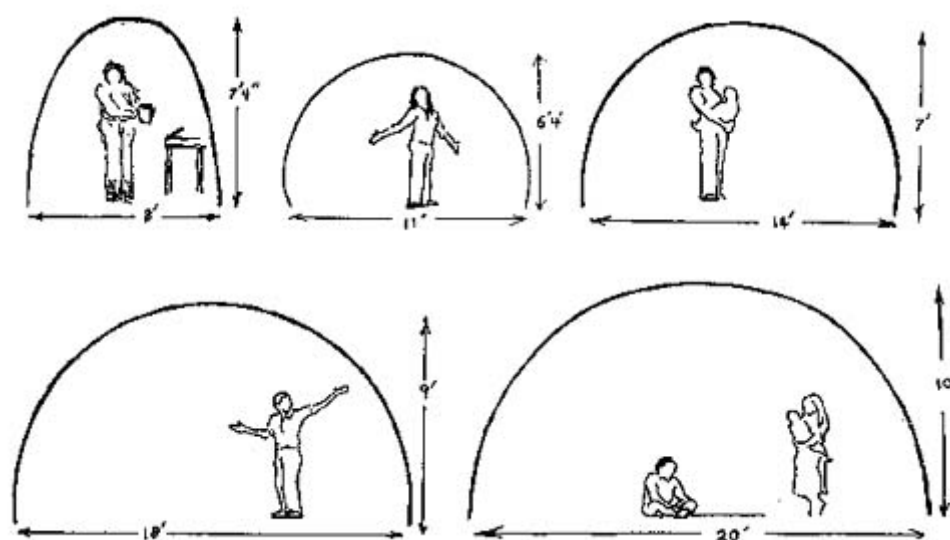


Figure 6.2. Relative sizes of domes in feet. The passage-grave chambers range between figures one (8 feet/2.4m), two (11 feet/3.3m) to being smaller than three (14 feet/4.2m). Ring cairn centres (without dome) start about figure four and reach sizes much bigger than five. This diagram was designed for modern yurts, but the principle of relative space still applies. Clava roof shape can only be conjectured, as none survives, but similar corbelled rooves, such as at Maes Howe, fit these images.

Càrn Gask is the best-preserved ring-cairn which Childe recorded as 'eighty five feet' (25.9m) and Anne MacDonald estimated the central area had a thirty-four feet diameter ('10.30m'); many people could occupy this space.²⁶² Buchromb is similar in size; both have a commanding presence in the landscape. They could be interpreted as way-markers, attracting travellers. Summer Ring-cairn ceremonies would be more inclusive than passage-grave events. Long daylight hours suit easier

²⁵⁹ Heggie, *Megalithic Science*, p.228.

²⁶⁰ Henshall, *CT*. Vol. 1, p. 25.

²⁶¹ <http://www.shelter-systems.com/sizes.html> [Assessed on 19 December 2016].

²⁶² Childe and Graham, *RCAHMS*, p. 60; Anne Macdonald, 'A Ring-Cairn at Gask, Farr, Inverness An archaeological Survey' *Association of Field Archaeologists Occasional Paper* 115 (2012), 1-22, p.12.

summer travel; it continues today with Scotland's clan gatherings, a major feature of Scottish tourism, perhaps mirroring prehistoric family groups returning to their Clava cairn of origin.

Of the fifteen ring-cairns four lack notable kerb-stones or circle-orthostats for orientation. Four are orientated on midwinter sunset: Culbernie, Delfour, Little Urchany and Tullochgorum. The MLL-moon disappears behind one hill then re-emerges at Tullochgorum, much like Sims described at Avebury: builders designed the pathway so two hills 'interrupted viewing options', enabling participants to see the new moon's waxing crescent as though it was 'under the horizon and in the underworld', indicating different Moon types but similar techniques.²⁶³ No orthostat indicated MLL moonset, so these ring-cairns suited midwinter ceremonies associated with darkness, mll, initiation and regeneration (rebirth). These four, plus the binary-orientated Balnuaran Central, are evenly spread across the region: (figure 6.3).

Six ring-cairns are orientated on the MLL midsummer full moon. Daviot and Tordarroch see an emergent moon, symbolic of the moon arising out of the earth, (underworld or otherworld), light increasing. Aviemore and Bruiach see an emergent and disappearing moon, symbolic of a changing perspective; increased light vanishing, needing revitalisation. Belladrum North sees a partial moon indicating connections with the otherworld (or underworld), while Marionburgh sees the moon vanish into south-westerly hills, potentially carrying the participants' hopes and communications into the earth or otherworld, returning to darkness. These locations suit ceremonies of light, learning and revitalisation (reimpregnation). The full moon's height increases during the months following ceremonies, suggesting proof of effective human intervention.

Figure 6.3 is an estimate for territory potentially serviced by surviving cairns. It suggests distances people might travel, while recognising Tim Sørensen's warnings regarding our perceptibility to 'cultural perceptions' of movement.²⁶⁴ Winter (MWSS) has purple and black circles, while summer (SMLL) has red and yellow.

²⁶³ Sims, *Underworld*, pp.396. 404.

²⁶⁴ Tim Flohr Sørensen, 'Meaningless Movement: A Critique of the Bronze age Mobilities Paradigm' in *Forging Identities. The mobility of Culture in Bronze Age Europe Report from a Marie Curie Project 2009-2012 with Concluding Conference at Aarhus University, Moesgaard 2012* Vol. 1 ed. by

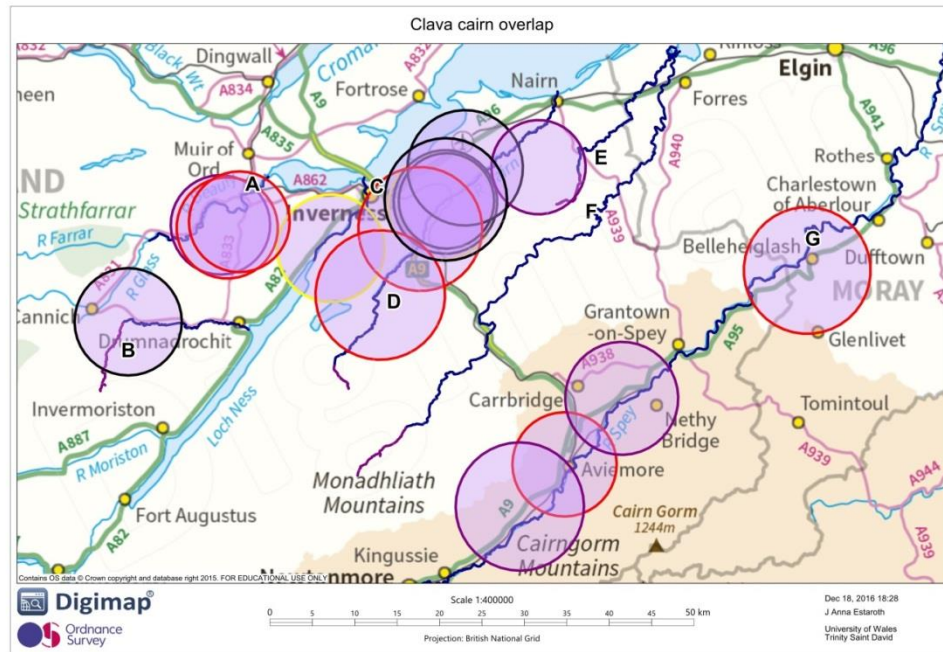


Figure 6.3. Clava cairns - summer and winter usage: Passage-graves with midwinter sunset (plus one minor lunar limit) are at the centre of black-rimmed circles and Ring-cairns with midwinter sunset are at the centre of purple-rimmed circles. They deal with winter festivals. Passage-graves with MLL moonset are yellow (Kinchyle and Milton of Clava North- which is hard to detect due to the concentration at Clava) while Ring-cairns with MLL moonset are red. They deal with summer festivals. Eight cairns for winter and eight for summer. For binary-functioning cairns only the passage is given. Scale reads 1:400000 50km.

Balnuran central ring-cairn has connections with midsummer sunrise, midwinter sunset, equinoctial sunrise, midwinter sunrise, the mll, Samhain sunset, Sirius' setting and Pleiades rising. The significance of Samhain sunset, Celtic New Year, would appeal to Picts and their forebears who reused this site, as described in Chapter two. Midsummer full moon darkness makes it unique: a counterpart to lighting up the passage-graves in winter. It is suitable for rituals of star-gazing, story-telling and summer initiations; including marriages and alliances involving the extended family, or clan.

Perhaps fires were required to summon the midsummer moon from the underworld, just as midwinter fires reinvigorate the low sun. Most Moray coast villages had Clavie-burning: tar-barrels, constructed McPherson said 'without iron', and therefore thought to stem from great antiquity, which were carried through the

village, re-distributing fire per household to revitalise the midwinter sun, the custom survives today with a single, static, Clavie-burning at 'Burghead': (figure 6.4).²⁶⁵



Figure 6.4 Burghead Clavie-burning near Elgin on the Moray coast, an annual event on 11th January, since 1750's calendar revision, once Hogmanay (New Year's Eve) and previously midwinter.

Hogmanay is more deeply imbued in the psyche of Scotland than any other annual event. Stonehaven's fireball festival survives, encapsulating vividly the sun's cycle from low to high in the sky and back to low again: (figure 6.5).²⁶⁶ Hutton noted no neighbour would rekindle an extinguished fire at New Year, or the 'luck of the house' would disappear, also described by Napier.²⁶⁷ Edinburgh's Hogmanay

²⁶⁵ McPherson, *Primitive*, p. 20; <http://www.burghead.com/clavie>, [Accessed 17 February 2017], the website of the Burghead Visitor Centre.

²⁶⁶ <http://stonehavenfireballs.co.uk/albums/StonehavenFireballs/5128941339730136466> and <http://stonehavenfireballs.co.uk/albums/StonehavenFireballs/5128941421334515154>, [Accessed 25 October 2016]. The website of the Stonehaven fireballs festival.

²⁶⁷ Hutton, *Stations of the Sun*, p.53; Napier, *Folk-lore*, p.160.

celebrations, attended by thousands, incorporate a torchlight procession and fireworks, still regenerating the midwinter sun.



Figure 6.5 Stonehaven's Hogmanay Fire Festival, 31st December, at one time a similar procession occurred in every east coast town. Balls of fire are swung round, by many participants.

Hutton stated Midsummer Eve bonfires were once widespread throughout Europe and common in Scotland, where there was a strong 'English or Scandinavian influence'.²⁶⁸ Scandinavians, originating from where the midsummer full Moon vanished, travelled throughout Europe and probably influenced their Anglo-Saxon and Frankish neighbours. Hutton noted 'midsummer pyrotechnics' were disused post-Reformation, despite 'fifteen or more' centuries of documentation, referring to Pliny's description of farmers' summer fires 'to protect the crops from disease'.²⁶⁹ Hutton described Midsummer Eve fire-wheels in 'Buckfastleigh in Devon', which he said resembled festivities in 'ancient Aquitaine'.²⁷⁰ However Spence described midsummer fire-wheels 'rolled down' Orkney's hills during his lifetime and the author participated in a re-enactment of fire-wheel rolling in the 1980's.²⁷¹

The Scottish Kirk considered midsummer 'neidfyr' idolatrous although John Stuart stated they were used to 'cure cattle' in the 1600's.²⁷² Needfire required

²⁶⁸ Hutton, *Stations of the Sun*, p.319.

²⁶⁹ Hutton, *Stations of the Sun*, pp. 316.321. 320.

²⁷⁰ Hutton, *Stations of the Sun*, p. 311.

²⁷¹ Spence, *Maeshowe*, p. 7.

²⁷² John Stuart, (Ed.) *Extracts from the Presbytery Book of Strathbogie AD. MDCXXXI - MDCLIV* (Aberdeen, The Spalding Club, 1843), p. 51.

extinguishing all fires, generating what Christina Hole called 'purifying flame', then redistributing fire throughout the village.²⁷³ MacPherson noted Margaret Innes of Elgin was threatened with banishment after confessing to 'Biggin on of Midsummer Fires' in 1591 and midsummer fires were lit annually in Aberdeenshire until mid-eighteenth century'.²⁷⁴ McPherson also stated people left bequests for summer fires to be lit, such as at 'Cairnshee' Hill in 1790, still being lit in his lifetime.²⁷⁵ Fire to regenerate the low midwinter sun makes sense, but the summer sun needs no such revitalisation. While Hutton gave 'protection' as the rationale for midsummer fires, their original purpose was more likely to be regenerating the light of the vanishing MLL moon.²⁷⁶

The Clava cairn constructors benefitted from sky-expertise learnt over centuries, perhaps indirectly from observers at Newgrange and Calanais, people recognised sol/lunar events. Clava Passage-graves and Orcadian passage-tombs have many similarities. Sara Reardon and Noble's dates for 'final use of Skara Brae' and 'Maes Howe' coincide with Bradley's dates for the start of Balnaran.²⁷⁷ Perhaps some sky-aware Orcadians wished to benefit from the supply and demand of bronze trading. The similarities between pottery found at Balnaran and Skara Brae, mentioned by Henshall, plus midwinter sunset orientation as described by Spence at Maes Howe are too great to be coincidental.²⁷⁸ It is possible that they considered the Clava-valley a suitable place to create a centre of excellence, connected but not too convenient, at least this coincidence implies connections and deserves to be explored.

This survey appears linear but the process was river-like, organic and sinewy. The addition of non Clava cairns occurred on day one when Belladrum South (OCH) was easily found, while Belladrum North was hidden. The shortest route to the Muckleburn from the Nairn at Dalcross Mains passes Little Urchany via the Fairy

²⁷³ Christina Hole, 'Winter Bonfires' *Folklore*, Vol. 71, No. 4 (Dec., 1960), 217-227, Published by Taylor & Francis, Ltd. on behalf of Folklore Enterprises, Ltd., p.221.

²⁷⁴ McPherson, *Primitive*, pp. 14. 16.

²⁷⁵ McPherson, *Primitive*, pp. 18. 19.

²⁷⁶ Hutton, *Station of the Sun*, p. 320.

²⁷⁷ Sara Reardon, 'Archaeologists Race Against Sea Change in Orkney.' *Science*, New Series, Vol. 334, No. 6059 (25 November 2011), 1054-1055, Published by the American Association for the Advancement of Science, p.1054; Noble, *Neolithic*, p.107; Bradley, *Good Stones*, pp.115. 116.118.119.120.

²⁷⁸ Henshall, *CT*, Vol. 2, p. 182; Spence, *Maeshowe*, addendum.

road to Shian Hillock, two further additions. MacGregor described 'sitheanan' (pronounced shian) as a fairy dwelling, and travelling the road at night was considered dangerous for fear of encountering the fairy procession, especially at full moon.²⁷⁹ Eliminating non Clava cairns was considered, but their similar horizontal information added wider cultural context, which Ruggles stated 'enhances interpretation'.²⁸⁰

Cairn builders designed two cairn types; dark cave or womb-like passage-graves and open sky-oriented ring-cairns, used according to the constructors' beliefs. Passage-graves isolate while ring-cairns connect. In addition to dark versus light and, rock versus sky views, entering a passage-grave requires going down and under, whereas a ring-cairn is up and over. Passage-graves heighten sound, sight and smells; their liminality fits Cummings' three realms. A shamanic vision-quest is easy to envisage in a passage-grave, but the ring-cairn probably provided a different, mystical, shared teaching/learning experience. The dark-moon site at Balnuaran Central potentially functioned as an education centre, where future generations learnt about the aurora borealis, star patterns and star lore. Evidence-based reasons for this stylistic dichotomy were never resolved during fieldwork, as both types orientate to winter or summer.

Dark passage-grave chambers are liminal in nature, described in chapter two: they encourage initiatory participation 'shamanic ritual', as defined by Vicki Cummings, suggesting rebirth, while the open ring-cairn suits reimpregnation and celestial education, such as viewing overhead stars, like Alpha Draconis, which Vivian Robson said was 'pole star' c.2700 BCE.²⁸¹ Both cairn styles indicate a desire to connect with celestial objects. Ring-cairns seem inclusive, but the area inside passage-grave circles could hold as many people. Both passage-grave chambers and ring-cairn centres were rendered inaccessible.

Cairns are built at river confluences, generating a socio-spiritual transport network; trade and pilgrimage require predator-safe locations. Cummings commented that Neolithic journeys were 'intimately connected to cosmology and

²⁷⁹ MacGregor, *Highland Superstitions*, p.27.

²⁸⁰ Ruggles, *Interpretative Archaeoastronomy*, p. 10.

²⁸¹ Vicki Cummings, *The Anthropology of Hunter-gatherers Key themes for archaeologists* (London & New York: Bloomsbury Academic, 2013), p.81; Vivian E. Robson, *The Fixed Stars in Constellations in Astrology* (York Beach Maine: Samuel Weiser, 1984 [1923]).

ideology' and said there was insufficient consideration of travel 'between chambered tombs'.²⁸² Variable lunar phenomena experienced while travelling along Central Highland's rivers reinforces Cummings' argument that 'landscapes encountered' while journeying to or from sites were potentially as significant as landscapes that were 'visible from the site itself'.²⁸³ Barclay commented on the region's many 'cursus monuments' and Wood described the Dorset Cursus providing 'sightlines for the moon' at MLL'.²⁸⁴ Despite Bradley finding such structures aligned with both 'sunset' and 'sunrise', none appear to be associated with Clava cairns.²⁸⁵

Good river-accessibility suggests cairns were built for a wider community. Gordon Noble discussed the importance of periodical gathering to 'renew social connections' with accessibility crucial to how community connectivity was perceived.²⁸⁶ Findhorn has no Clava cairns because long stretches are steep-sided. Clava-valley's river-access resembles the 'natural route' linking Stonehenge and River Avon described by Tilley, hinting at ritual integration such as Parker-Pearson describes when 'Durrington Walls' links with Stonehenge via the Avon journey.²⁸⁷ Upriver from Clava-valley are rapids, which Tilley said were potentially 'openings into the underworld'.²⁸⁸

Celestial connections were essential, enhanced by local topography. While this study has largely focused on midsummer full moon and light, darkness has proven equally significant. At midwinter darkness reigns for eighteen hours, while at midsummer darkness lasts, according to John Lister-Kaye, a local naturalist a mere 'ninety minutes'.²⁸⁹ The winter sun is so low on the horizon that it blinds walking people for several hours a day for over three months. Aveni recognised that the full moon especially in winter provided much-needed light, once a month there is light

²⁸² Vicki Cummings, 'Megalithic journeys: moving around the monumental landscapes of Neolithic western Britain', in *Prehistoric Journeys* ed. by Vicki Cummings and Robert Johnston, (Oxford: Oxbow Books, 2007), [Hereafter Cummings Megalithic Journeys], pp.55.56.

²⁸³ Cummings Megalithic Journeys, p.60.

²⁸⁴ Gordon J. Barclay, 'Neolithic Buildings in Scotland', in *Neolithic Houses in Northwest Europe and Beyond: Neolithic Studies Group Seminar Papers 1* ed. by Timothy Darvill and Julian Thomas, (Oxford: Oxbow Monograph 57, 1996), p.71; Edwin John Wood, *Sun, Moon and Standing Stones* (Oxford: Oxford University Press, 1978), p.102.

²⁸⁵ Bradley, Dark, p. 56.

²⁸⁶ Gordon Noble, 'Monumental Journeys: Neolithic monument complexes and routeways across Scotland' in *Prehistoric Journeys* ed. by Vicki Cummings and Robert Johnston, (Oxford: Oxbow Books, 2007), p.72.

²⁸⁷ Michael Parker-Pearson, *Bronze Age Britain* (London: B. T. Batsford, 1993), p.67.

²⁸⁸ Tilley, Phenomenology, p.109.

²⁸⁹ John Lister-Kaye, *Song of the Rolling Earth* (London: Abacus, 2004), p.148.

from 'dawn to dusk and back to dawn again'.²⁹⁰ During MLL years the winter full moon is especially high in the sky enabling Clava peoples to see during night calving, lambing and human births. Conversely darkness is deeper at new moon with only starlight defining the landscape during an essential journey, such as to the cairns for a ceremony of darkness.

Sims has focussed on the first sight of the new 'crescent moon' and there is an abundance of literature about its significance, not least for lunar calendars.²⁹¹ Such a cosmology has not been highlighted with Clava cairns, probably because it is still unexplored. With four ring-cairns orientated on midwinter sunset, plus three passage-graves this could be pursued, by looking at all the circle-stones to see if one of them regularly picks up a first viewing location, although caution is required as Burl noted many circle-stones at Corrimony were 'modern additions' or 'reset'.²⁹² Corrimony resembles dark-moon Balnuaran, with easy river access and Scott confirmed the sun penetrates the chamber at 'midwinter, early November and February'.²⁹³

MLL events occur roughly once every nineteen years. The dual-nature of some monuments suggests that EBA builders recognised the period between two MLL events, (one generation) which seems significant. My experience of the 2006 MLL midsummer full moon at Callanish was warm, noisy, light and communal; contrasting with the 2015 mll dark moon at Balnuaran which was cold, quiet, dark and solitary. Between these two experiences the moon was in Great Wane, contracting its range, followed by the Great Waxing period, expanding its range. EBA people responded to this cycle distinguishing each human generation.

This section compared cairns in relation to the horizon, it looked at potential usage according to floor-space and how groups in the cairn hinterland might travel. Consideration was given to how midwinter fires transferred to Hogmanay, midsummer fires were lost and how these might relate to seasonally low celestial objects.

²⁹⁰ Aveni, Stairway, p.87.

²⁹¹ Sims, Underworld, p. 403.

²⁹² Burl, Guide, p. 131.

²⁹³ Scott, Solar-Lunar, p. 52.

7. Conclusions

This chapter summarises the main research findings for Clava Cairns and river-valleys. Differences between Clava-valley and other Clava cairns are recognised and the role of rivers for journeying is discussed. Comparisons between passage-graves and ring-cairns are also considered.

Balnuaran's 'midwinter sunset' orientation generated scholarly discussion by Ruggles and Burl distinguishing Balnuaran as separate, so this research explored its distinctiveness from a lunar perspective.²⁹⁴ The Clava-valley group remains different from most cairn sites; although cairn-clustering near tributaries is normal, such a large concentration, without tributaries, is unusual. Clava-valley is in darkness on MLL years at midsummer full Moon, while most other cairns view the MLL midsummer full Moon's light. Midwinter sunset lights up the dark passage-graves, while the hills cast shadow on the normally light ring-cairn near midsummer at MLL: answering the primary research objective, Balnuaran's MLL midsummer full moon was a unique experience.

However Clava-valley's darkness resembles Corrimony suggesting that other activities were paramount at these locations, such as aurora and star-viewing. Where 'radio-carbon' dated research, such as Bradley's, was available stellar orientations were considered.²⁹⁵ A potential candidate is Sirius's setting, which deserves further exploration. Balnuaran's invisible-Moon site was an appropriate place to teach star lore to future generations. It is hard to sufficiently emphasise how much light there is during summer. Due to the length of twilight summer constellations would be rarely viewed. They are visible around new Moon but, for a few years around MLL, they are also seen at full Moon which appears significant. Sky tales involving these constellations, plus what the Moon is doing in the otherworld and how to restore the Moon would be likely at that time.

The research considered the southern horizon of the whole river-landscape of Clava region, because only by so doing can you argue that cairn-placement was

²⁹⁴ Ruggles, *Prehistoric*, p.130: Burl, *Guide*, p.129:

²⁹⁵ Bradley, *Good Stones*, pp. 115-116.

deliberate, much as Sims considered the landscape around Silbury Hill.²⁹⁶ While lunar skimming, such as occurs at Calanais, might be expected seven varieties of lunar horizon phenomena were encountered along-route, hinting at pilgrimage staging posts and potentially different rituals, depending on how the Moon was perceived. It enabled comparing visible to invisible moon for cairn and non-cairn locations. While hills and hill-shadow would be expected to dominate in a mountainous landscape, Clava cairn builders located most of their cairns in the fewer available visible-moon-sites in the west of their territory.

Partly due to the data collection mode of journeys alongside rivers it was not surprising that water-access was notable. Rivers provide pilgrimage-pathways and excellent trading routes. Clusters of Clava cairns occur at river confluences and crossing points, although none as large as at Balnuaran, suggesting that cairns earmarked significant travel stages for trade and pilgrimage, some becoming precursors of today's towns. Ease of river access was considered significant for cairn rituals and Findhorn's high river-banks may explain its lack of Clava cairns.

Regarding other Scottish monuments Clava cairns appeared at the boundary between late-Neolithic and EBA. Sufficiently similar buildings and sol/lunar orientations connect Clava cairns with Orcadian practices, making it worth exploring further whether the connections with culturally dominant Ness of Brodgar, led to developing Balnuaran as a centre benefitting from bronze trading and sustaining sky expertise.

A secondary aim was to explore potentially varied uses of contrasting cairn-types. Comparing ring-cairns and passage-graves led to considering Fowler and Cumming's exploration of 'liminal locations', which reinforced otherworldly connections.²⁹⁷ It also generated theories about pairing. Some cairns appear paired: Tordarroch-ring (MLL) with Croftcroy-passage (mll), suggesting they were designed to cater for different seasonal festival/ritual needs. Intervisibility is rare, but applies to cairn-pairs. Similarly Kinchyle is the exact opposite of Dalcross Mains in their passage versus orthostat orientations hinting at centrally-controlled design. Dual-functioning cairns and cairn-pairings are an area which deserves further study.

²⁹⁶ Sims, *Underworld*, p.389.

²⁹⁷ Fowler and Cummings, p. 13.

However contrasting styles did not yield a dichotomy of purpose as both provided the same seasonal facilities to the community. An unexpected discovery was that, surviving cairns catering for summer festivals are evenly distributed with cairns catering for winter events. This emphasis on seasonal light and dark appeared important. It implied that contrasting cairn-styles were significant for ritual, but cairn-style made no detectable difference when both types focus on winter (sunset and mll) or summer (sunrise and MLL). Summer and winter rituals have left their mark on current Scottish traditions, but how, why and when Clava peoples utilised different cairn styles remains a mystery.

This dissertation explored the role of MLL midsummer full Moon light and dark sites along Central Highland Rivers and some riverside Clava cairns. It referred to how prehistoric peoples may have responded in winter and summer, because of the exceptionally low horizontal Sun and Moon at these latitudes, but it does have wider implications. Mountains everywhere block out the Sun or Moon, during some part of their horizontal journeys, demarcating spaces in the landscape that were, and still are, considered sacred.

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Appendices

Appendix I: Cairns included in the Survey

The archaeological reference number is provided by Henshall, Bradley also uses this categorisation.²⁹⁸ (BAN is Banffshire, NAI is Nairnshire and INV is Inverness-shire). The name of the cairn is given and map location. Co-ordinates are based on my Garmen etrex 10 GPS system. Clava Cairn is *Càrn Chlàbhalaig* in Gaelic.

INV 3 Altlarie Cairn NN 72681 99571 (57° N 04' 09.2" 004° W 06' 07.8")

INV 6 Aviemore Ring-cairn NH 89686 13482 (57° N 11' 55.5" 003° W 49' 38.6")

INV 8 Balnuaran of Clava Central NH 75713 44433 (57° N 20' 22.76" 004° W 04' 26.79")

INV 9 Balnuaran of Clava Northeast NH 75767 44477 (57° N 28' 24.25" 004° W 04' 23.63")

INV 10 Balnuaran of Clava Southwest NH 75688 44381 (57° N 28' 21.01" 004° W 04' 28.25")

INV 11 Belladrum North NH 51423 42103 (57° N 26' 41.5" 004° W 28' 38.1")

INV 12 Belladrum South NH 51609 41579 (57° N 26' 24.72" 004° W 28' 25.99")

INV 14 Bruiach NH 49971 41437 (57° N 26' 18.00" 004° W 30' 3.28")

Buchromb Ring-Cairn NJ 30866 43955 (57° N 28' 50.1" 003° W 09' 16.1")

INV 17 Corrimony NH 38306 30301 (57° N 20' 04.10" 004° W 41' 16.23")

Cowiemuir Cairn NJ 37092 63105 (57° N 39' 12.3" 003° W 03' 21.2")

INV 19 Culburnie NH 49182 41808 (57° N 26' 29.18" 004° W 30' 52.00")

INV 21 Culdoich NH 75115 43782 (57° N 25' 01.2" 004° W 05' 01.9")

INV 26 Dalcross Mains NH 77981 48468 (57° N 30' 35.7" 004° W 02' 17.7")

²⁹⁸ Henshall, CT., Vols. 1 & 2; Bradley, Good Stones.

INV 28 Daviot NH 72735 41198 (57° N 26' 35.6" 004° W 07' 19.2")

INV 29 Delfour Ring-cairn NH 84430 08582 (57° N 09' 12.6" 003° W 54' 43.3")

Home Farm Cairn NH 49652 41882 (57° N 26' 32.3" 004° W 30' 23.9")

Inchbroke Cairn NJ 04665 25753 (57° 18' 44.6" 003° W 35' 03.6")

INV 37 Kinchyle of Dores NH 62158 38961 (57° N 25' 12.1" 004° w 17' 48.4")

Leakin Cairn NJ 16443 42069 (57° N 27' 40.4" 003° W 23' 39.7")

Levrattich Cairn NH 94477 45684 (57° 29' 20.7" 003° W 45' 42.9")

Lower Lagmore NJ 17969 35950 (57° N 24' 24.29" 003° W 21' 55.64")

NAI 5 Little Urchany NH 86654 48565 (57° N 30' 46.9" 003° W 53' 37.2")

INV 40 Mains of Clava North-West NH 75948 44616 (57° N 28' 28.96" 004° W 04' 12.53")

Mains of Moyness NH 95273 53659 (57° N 33' 39.0" 003° W 45' 07.2")

BAN 3 Marionburgh Ring-cairn NJ 18311 36409 (57° N 24' 38.7" 003° W 21' 41.2")

Midtown North East NH 62896 33025 (57° N 22' 06.8" 004° W 16' 50.5")

Midtown South West NH 62861 33198 (57° N 22' 06.9" 004° W 16' 54.3")

INV 43 Milton of Clava North NH 75250 43974 (57° N 28' 07.4" 004° W 04' 53.16")

INV 44 Milton of Clava South NH 75222 43927 (57° N 27' 05.86" 004° W 04' 55.13")

Newtonmore Cairn NN 70847 98444 (57° N 03' 32.0" 004° W 07' 52.0")

Shian Hillock NH 91637 49786 (57° N 31' 30.5" 003° W 48' 40.1")

Tigh-na-Gaoth Cairn NH 74062 00216 (57° N 04' 33.1" 004° W 04' 43.5")

Toum-Tyleich Cairn NH 96018 21753 (57° N 16' 28.2" 003° W 43' 34.1")

INV 48 Tordarroch Ring-cairn NH 68017 33503 (57° N 22' 22.0" 004° W 11' 47.0")

INV 39 Tullochgorum Ring-cairn NH 96478 21312 (57° N 16' 14.5" 003° W 43' 05.9")

BAN 1 Upper Lagmore Passage-grave NJ 17653 35832 (57° N 24' 19.5" 003° W 22' 19.7")

Upper Port Standing Stones NJ 05378 29131 (57° N 20' 43.4" 003° W 34' 25.5")

Appendix II: Survey results

Digimap diagrams use the following legends. Blue circles are Clava cairns, brown balloons indicate road/riverside sites, and yellow diamonds are non-Clava cairns and grey squares are non-measured cairns or where trees prevented horizon measurement, except in figure 2.2.6 where they are hut circles. Occasionally a cross indicates a previously surveyed Clava cairn or a stone circle and a star indicates a clava cairn excluded due to relocation. GPS coordinates are taken to 3 meters accuracy (on many occasions 2m). All Cairn sites were tested for magnetic anomalies, see the methodology chapter.

Diagrams indicate the hill heights and significant trees, manmade structures/buildings or orthostats are marked by green arrows, red triangles/squares/oblongs and brown shapes respectively. Azimuth degrees are along the horizontal axis and hill heights along the vertical. Figures are adjusted for true north throughout with special attention given for cairn sites, allowing for alterations between visits, thus true south is 177°. Some diagrams have a white circle (blue edges) moon to denote a possible MLL position. All measurements are taken by the author. When accompanied, this is stated and colleagues were asked to measure the same angles at cairns, as a means of double checking. If discrepancies occurred (by using different compasses etc.,) we continued to check measurements until these were resolved. For those unfamiliar with Scots or Gaelic the term Burn means a small river, Allt is a small burn and Caochan is a stream, small being relative; all can turn into torrents during rainy winters and springtime, flooding occurs frequently.

River Beaully

The Beaully begins at the confluence of rivers Glass (south) and Farrar (west). Water transport links eastwards to the Moray Firth plain, southwards to Strathglass,

Glen Urquhart and Loch Ness, plus north-westwards to the Cromarty Firth via river Conan. Struy marks the start of the river which flows through the Aigas Gorge before discharging into the Beauly valley, a relatively low-lying area of approximately twenty square kilometres. Visits were carried out on 5th January 2016 excellent weather, dry but overcast, cold but not extremely cold, sharp wind, accompanied by Anne MacInnes (NOSAS member) all day. Winter: early sunset limits the amount of work which can be undertaken, but lack of summer vegetation allows ease of vision and in many cases access to cairns. 13th February 2016 revisited Beauly cairn area (Kiltarlity) to complete cairn measurements of Home Farm Cairn, Culburnie Ring-cairn and Belladrum North Ring-cairn accompanied by Anne MacInnes and Janita Stenhouse. It was cold, snow-covered ground, not too deep and a clear sky while near the Beauly. Home Farm, Bruiach and Culburnie cairns were easy to access, both Belladrum North and South required crossing empty stubble fields and might be inaccessible in the summer, when plant growth may also make it hard to discern stones, neither Belladrum is visible from the road.

1) (1) Struy 57° N 25' 17.28" 004° W 39' 56.70" elevation 78m.

See Figure 1. Moon invisible when Full at MLL, although it can sit framed by the hills on other years and times, as this is looking south towards one of the rare river valleys which flows from due south. The rim of the moon sits directly south on non-MLL years.

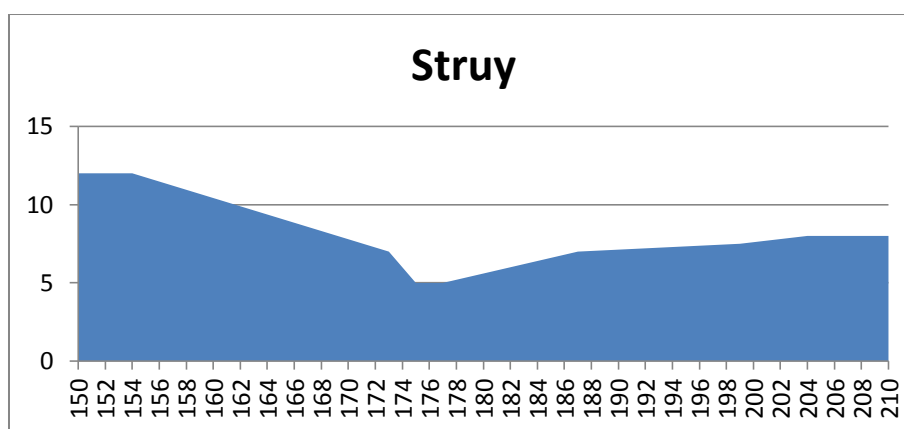


Figure 1 Struy Southerly Hills

2) (2) Near Erchless Castle 57 ° N 25' 51.39" 004° W 38' 47.32" elevation 72m.

See Figure 2. The sudden opening up towards the south and Strathglass after the narrow Aigas Gorge was very noticeable. Four degrees is the height of the Midsummer Full Moon on some years - it can be seen emerging out of the hillside before setting, which would be dramatic, but not at the peak lunar limit; it would drop below the horizon by azimuth 190°.

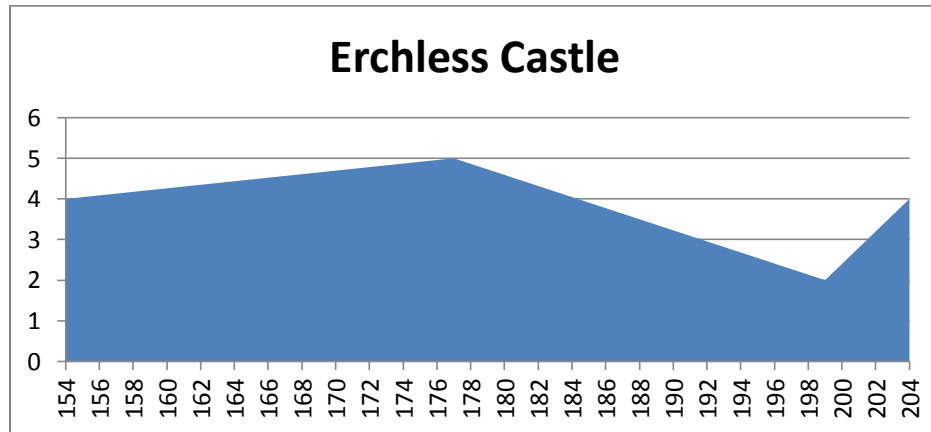


Figure 2 Erchless Castle

3) (3) Bend on the river roadside 57° N 25' 47.54" 004° W 38' 01.28 elevation 41m.

See Figure 3. The hills here provide a nice undulating line but scooping out into a hollow about one degree deep creating a notch/depression in the hill. Despite the interesting notch they are always over seven degrees and not significant.

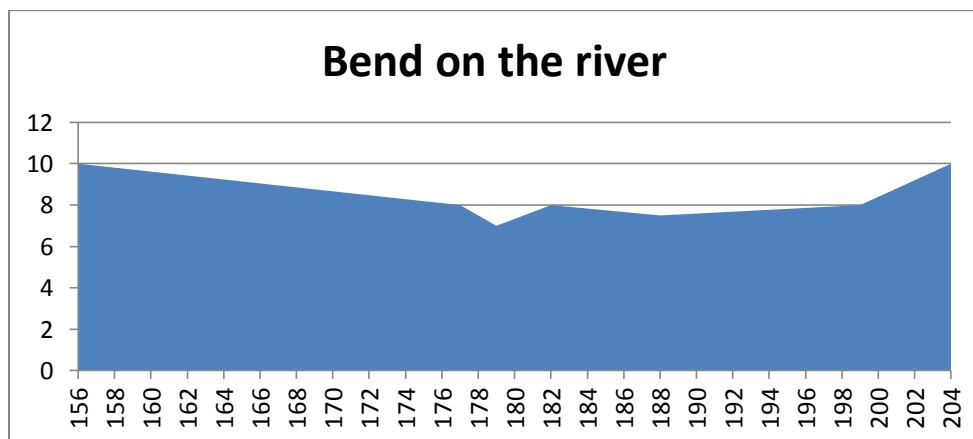


Figure 3 Bend on the River

4) (4) Crunaglack 57° 25' 39.48" 004° W 35' 09.65" elevation 47m.

See Figure 4. Gently rising hill, there can be no notable lunar activity.

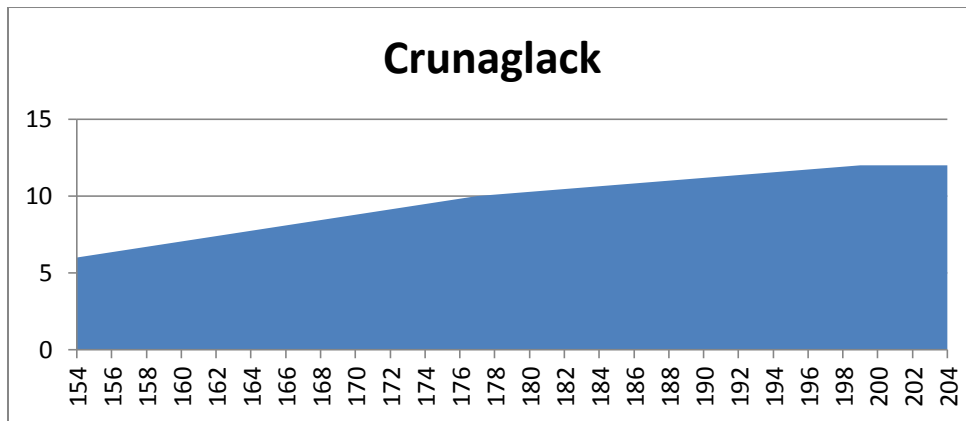


Figure 4 Grunaglack

5) (5) Aigas Field Centre 57°N 26' 21.55" 004° W 33' 49.95" elevation 53m.

See Figure 5. Hill in front is fairly uniform in height and starts to descend, but the southwest hill behind rises. There will be occasions when the near-full midsummer moon will sit on the southern horizon, but the full moon would not be visible. There are Bronze Age hut circles in the hills.

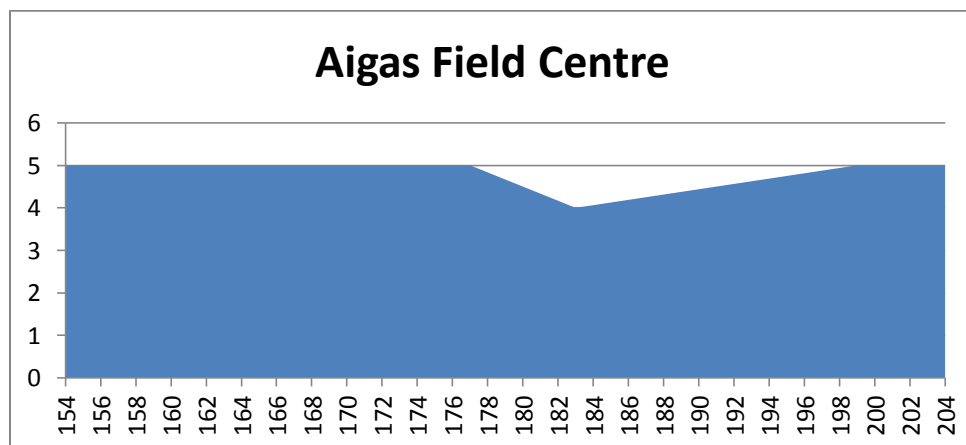


Figure 5 Aigas Field Centre

6) (6) Grask of Aigas 57° N 26' 39.54" 004° W 33' 16.35" elevation 72m.

See Figure 6. Because the river is a long way below us the hills here appear relatively low. This means that only the rim of the MLL moon was visible and the nearly Full Moon will sit on that horizon during MLL years, at other times it will rise and set as normal.

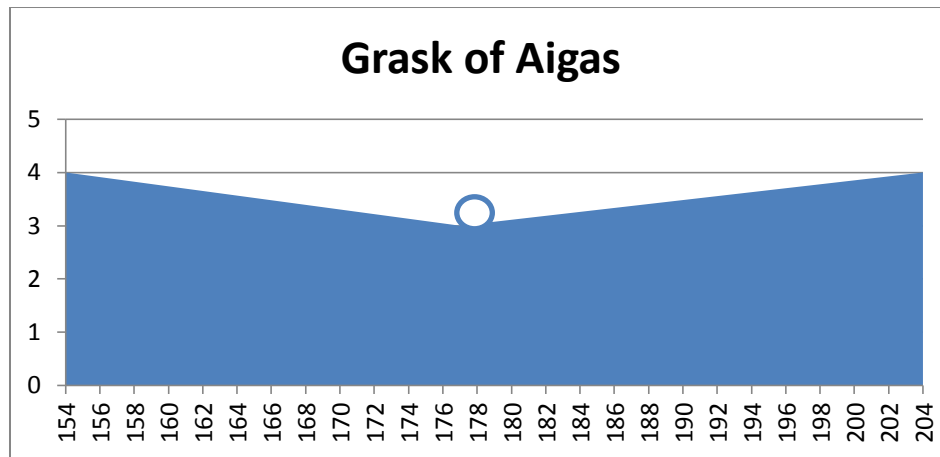


Figure 6 Grask of Aigas

7) (7) Aigas Gorge 57° N 27' 44.50" 004° W 32' 23.14" elevation 70m.

See Figure 7. Here the road has climbed higher than the river which has cut through this narrow V shaped section of hills. To the south the hills remain reasonably gentle. No interesting lunar phenomena.

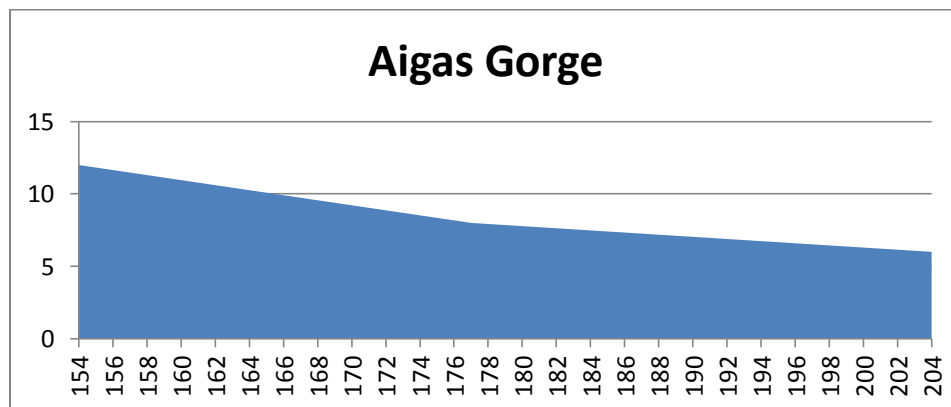


Figure 7 Aigas Gorge

8) (8) Belladrum South Chambered Tomb 57° N 26' 24.72" 004°W 28' 25.99" elevation 48m.

See Figure 8. It is next to Belladrum Burn a tributary of the Beaully. Placed on top of a small rise this site did not appear to be a Clava cairn, probably OCH. It could be the remnants of a Neolithic circular or long barrow, the top having weathered away. It is not buried beneath the soil and the chamber was much larger than cist burials I have seen at Kilmartin and Cairnpapple. It had a large stone which may have functioned as a capstone orientated eastwards. No stones of note to the south-west. There was an outlying raised area and many field clearance stones added to the

westerly side of the monument. It consisted of a central cist-type burial chamber with six large stones on their edges delineating the inner chamber. I thought the large stone was a fallen capstone, Anne thought it had fallen over in situ. It did not indicate southwest, nothing did. Even if agriculture had cleared all the orthostats of a stone circle, this had little to make it Clavaesque. The only possible entrance was to the east, it resembled neither a ring-cairn nor a passage-grave. Henshall visited in 1957 and referred to it as a 'possible polygonal O-C'.²⁹⁹ It was noteworthy through proximity to Clava cairns, while being of a different culture. This is a potential place to view the near-full midsummer moon, but MLL full moon would be invisible.

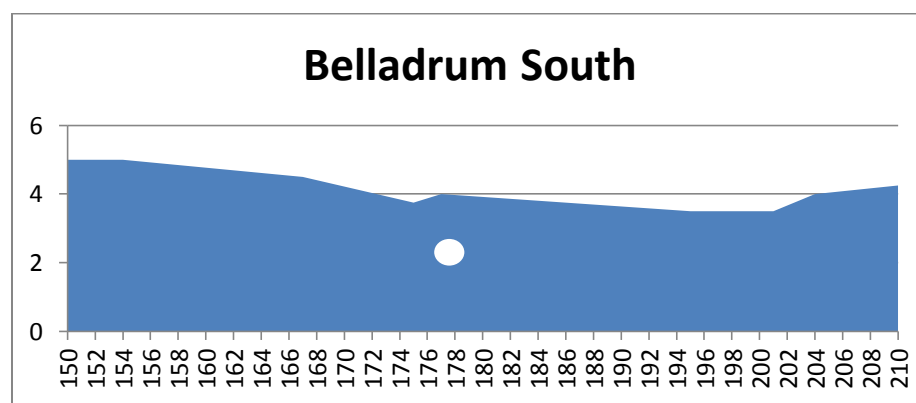


Figure 8 Belladrum South

9) (9) Belladrum North Clava Ring-cairn 57° N 26' 41.5" 004° W 28' 38.1" elevation 34m.

See Figure 9. This is next to Belladrum Burn, a Beaully tributary and listed by Bradley as a Clava cairn, while Henshall comments on it being one of the few which never had any evidence of a surrounding circle.³⁰⁰ It was in the woods accessed by crossing a stubble field near Kiltarlity Shinty field. Trees obscured the horizon to the south-west. The state of the cairn is rather ruinous and overgrown with vegetation, even in winter, so presumably very difficult to explore during summer grown; it took us a while to establish the centre, from which to take measurements. The inner ring diameter was 6.50m. The main southwest kerb-stone was not particularly high and lower than the horizon, providing azimuths 191° to 202°. This provided declination figures of -27.01° to -28.90° which are close to, but not accurate for, Ruggles'

²⁹⁹ Henshall, CT, Vol. 1, p. 366.

³⁰⁰ Bradley, Good Stones, p. 172; Henshall, CT, Vol. 1, pp. 27.366

southern major lunar limit figures of -29.95° for 2,000 BCE.³⁰¹ Modern trees prevented accurate measurement of the horizon above the stone as shown in the diagram. The Midsummer MLL full moon drops below the horizon before reaching that stone. The horizon would exhibit interesting lunar phenomena being reasonably low due south, where the Full Moon's rim slides along from 177° to 187° true azimuth, so it is a partial moon site. It may sit properly on the horizon on years leading up to MLL. So far I found no star which could have set into this stone.

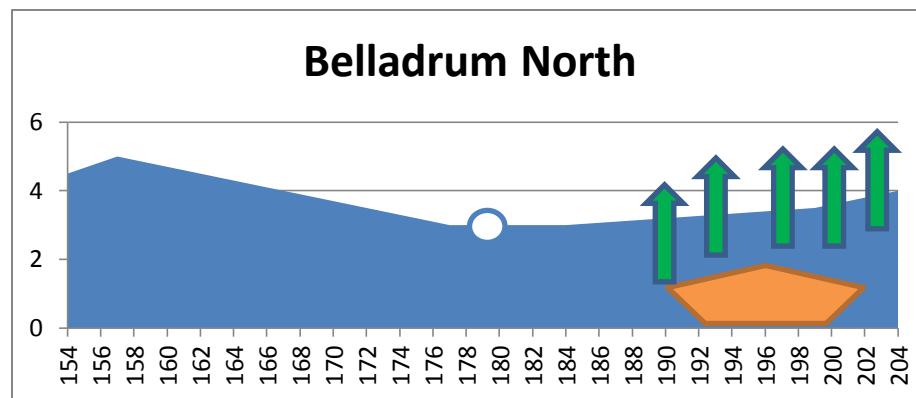


Figure 9 Belladrum North

10) (10) Kiltarlity clearance cairn 57° N $26' 33.75''$ 004° W $28' 50.46''$ elevation 25m. (This is a roadside measurement).

See Figure 10. We doubted that this was a burial cairn; it resembled Druid Temple in the moss-grown wear and tear on the stones and would be severely overgrown with brambles in the summer. It was hard to discern any pattern to it, so we considered it to be a clearance cairn. Henshall states that there was a cairn in Kiltarlity kirkyard 'now destroyed'.³⁰² The 1870 Digimap notes a stone coffin containing two Urns found in 1765 near Kiltarlity Kirk.³⁰³ Trees and Kiltarlity Kirk obscured the horizon from 168° - 184° (the cross and green arrows in the diagram), so it was impossible to measure hill height, which may have been as low as 2° , consequently this might, or might not, have been a good moon-viewing location. It is likely to be of the MLL moon disappearing into the SW hill. It is included among the non-cairn sites as a disappearing moon.

³⁰¹ Ruggles, Prehistoric, p. 57.

³⁰² Henshall, CT, Vol. 1, p. 380.

³⁰³ <http://digimap.edina.ac.uk/roam/historic> [Accessed on 2nd December 2016].

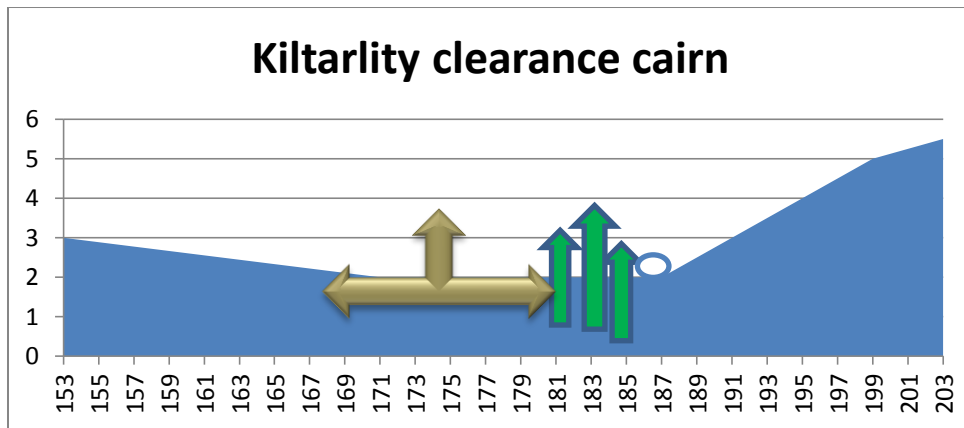


Figure 10 Kiltarlity clearance cairn

11) (11) Bruiach Clava Ring-Cairn 57° N 26' 18.00" 004° W 30' 3.28" elevation 27m.

See Figure 9. This is clearly a clava cairn and it lies next to the Bruiach Burn, a Beaully tributary. It easily accessed by the road. The circle was 13m by 13m. Magnet tests suggested a minor anomaly 1° variation in reverse figures. The Main circle orthostat is now incorporated into the outer part of the ring and was proud of the horizon. Henshall noted its 'conversion' into a duck pond.³⁰⁴ The ring appearance is deceptive: the outer circle is no longer free-standing, infill occupies the space between the circle and peristalith and the inner cairn material is missing. It appears orientated close to the southern major lunar limit for which Ruggles provides the declination as -29.95° for 2000 BCE).³⁰⁵ The largest circle-orthostat has a declination of -27.98° to -29.00° (Azimuth 197°-203° reverse 17°-22°) from the ranging pole placed at the centre of the ring, suggesting mild magnetic anomaly. The hills gradually rose towards the west from two to five degrees, as seen from the centre of the circle, the hilltops being approximately two kilometres from the cairn. The matching kerb-orthostat (which Childe and Graham explained is the exposed 'inner face') had a declination of -26.73° to -29.78° (Azimuth 192°-207° reverse 12°-26°) see brown stone shape in diagram.³⁰⁶ This suggests slightly imprecise orientation, compass inaccuracy may account for this, or the cairn's nineteenth's century pond conversion may have affected it. Either there was greater precision or perhaps this was adequate for their purposes. The outer edge of the ring has twelve

³⁰⁴ Henshall, CT, Vol. 1, p. 366.

³⁰⁵ Ruggles, Prehistoric, p. 57.

³⁰⁶ Childe and Graham, RCAHMS, p. 29.

large orthostats. The hills were low when measured from outside the monument. There is a road on one side and cultivated fields on the other, so some stones may have been removed a long time ago. This would be a perfect place to view lunar phenomena, the MLL midsummer full moon appearing to rise, sit on the horizon and set into the stone, or on certain years emerge from the hill to set into the stone. The cosy nature of the inner ring brought to mind many instances of sheltering from wind behind stones and the concept of a star-lore school seated around a bonfire, burnt low for cooking and allowing night viewing.

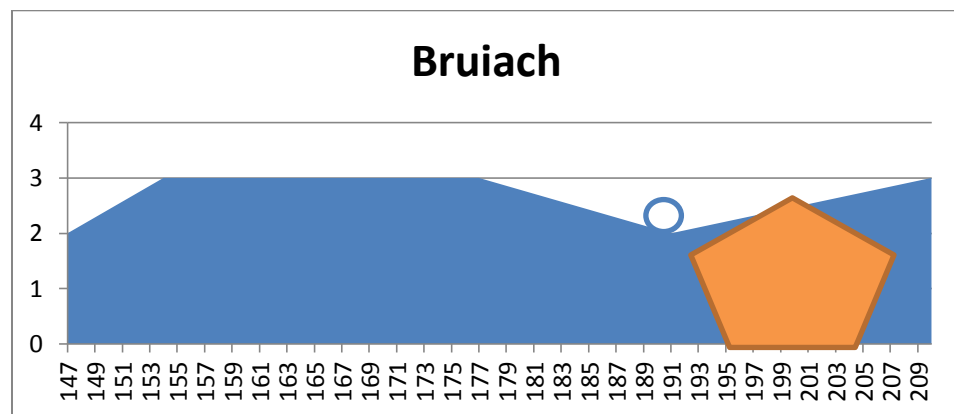


Figure 11 Bruiach Clava Cairn

12) (12) Culburnie Clava Ring-Cairn 57° N 26' 29.18" 004° W 30' 52.00" elevation 67m.

See Figure 12. This cairn lies within a front garden and is in good condition. It is next to Teanacoil Burn; a Beaully tributary. A small gate is provided to give access to the cairn. There was nobody home when we visited. The diameter of the inner ring was nearly circular at 5m 90. The outer circle was 13m north/south and 12m west/east. The window of visibility on the main monolith (2.13m high) from the centre of the circle produced a declination of -22.40° to -23.84° (azimuth 207°-212°). This would be close to the midwinter solstice sunset (Ruggles provides -23.85 1500 BC).³⁰⁷ Close trees obscured to the west and south while the horizon between 157° and 172° was obscured by the roof of the neighbouring house. Despite this the site is impressive, a modern wall is built above the kerb on the southwest side, but the outer ring of monoliths has one gap with eight stones remaining. Burl reported this missing pillar was 'removed by a nineteenth century mason' whom locals claim

³⁰⁷ Ruggles, Prehistoric, p. 57.

'died a sudden death in consequence of his violation'.³⁰⁸ Childe and Graham described this cairn as 'the best-preserved monument of its type in the district' after Balnuaran of Clava when they undertook an emergency survey in 1942-3.³⁰⁹ This site was visited by Henshall in 1964 who noted a 'recent' hole in the centre 1m wide and 0.66m deep.³¹⁰ Bruiach, Home Farm and Culburnie were considered by Cait McCullagh, who noted the old Statistical account listed 6 'druidical temples' ring and kerb cairns, with place names such as '*Bal na Carrachan*' (place of the circle) and '*Ard-druighnich*' (high place of the druids)'.³¹¹ The MLL midsummer moon would appear to partially sit on the horizon. Horizon height suggests that the upper rim of the MLL moon might travel along this horizon, although the building prevents verification.

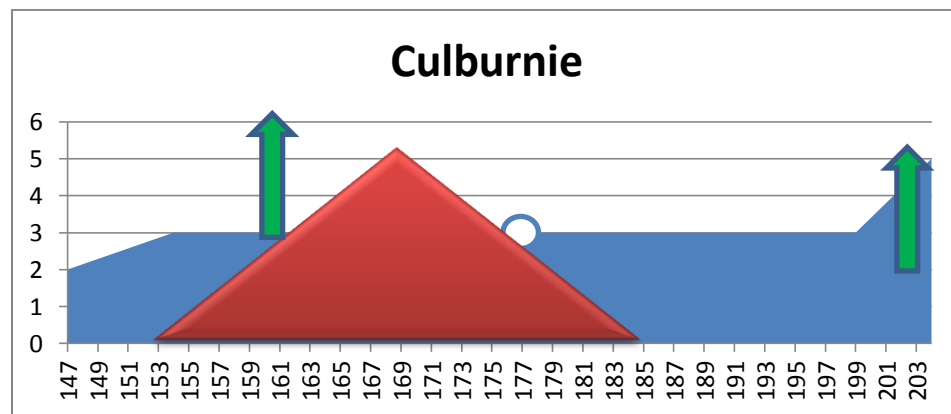


Figure 12 Culburnie

13) (13) Home Farm Cairn 57° N 26' 32.3" 004° W 30' 23.9" elevation 43m.

See Figure 13. It lies beside the road, and the Teanacoil Burn, but the style is indeterminate. The diameter was approximately 10.5 by 11m. Several rocks had been used or reused to construct a wall around it and it was very overgrown, so that it was impossible to be sure where stones might underlie the vegetation, despite prodding with poles. Trees both near and far obscured some sightlines. There was no existing stone circle left if any had existed; we thought it was not a Clava cairn but possibly a round cairn of a different date and culture. There was no distinctive upright stone to

³⁰⁸ Burl, Guide, p. 131.

³⁰⁹ Childe and Graham, RCAHMS, p. 40.

³¹⁰ Henshall, CT. Vol. 1, pp. 370-1.

³¹¹ Cait McCullagh, '*Culburnie No 19, Kiltarlity, Highland (Kiltarlity and Convinth parish), desk-based assessment and watching brief*' *Discovery Excavation Scotland, New, Vol. 10, (2009 b)* (Cathedral Communications Limited, Wiltshire, England), p. 103; <https://canmore.org.uk/site/12397/Culburnie> [Accessed 05 March 2016].

measure for window of visibility. This might have been a good sight for viewing lunar phenomena at MLL, the moon sitting exactly on true south, appearing to kiss the earth then crosses over a notch between hills before disappearing into the rise to the west.

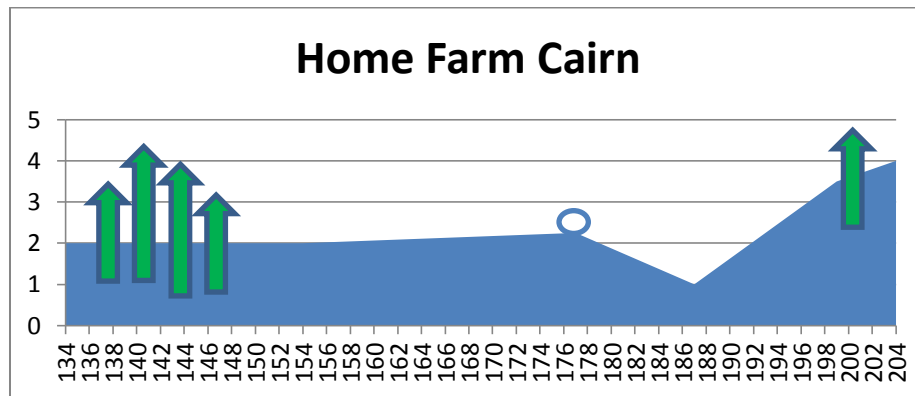


Figure 13 Home Farm Cairn

14) (14) Lovat Bridge 57° N 28' 13.20" 004° W 28' 35.97" elevation 6m.

See Figure 14. There was no great height above sea level, the hills were over five kilometres away, low and trees obscured 199° azimuth, indicated by the green arrows in the diagram. No distinctive lunar phenomena at MLL. It would be an invisible MLL moon site.

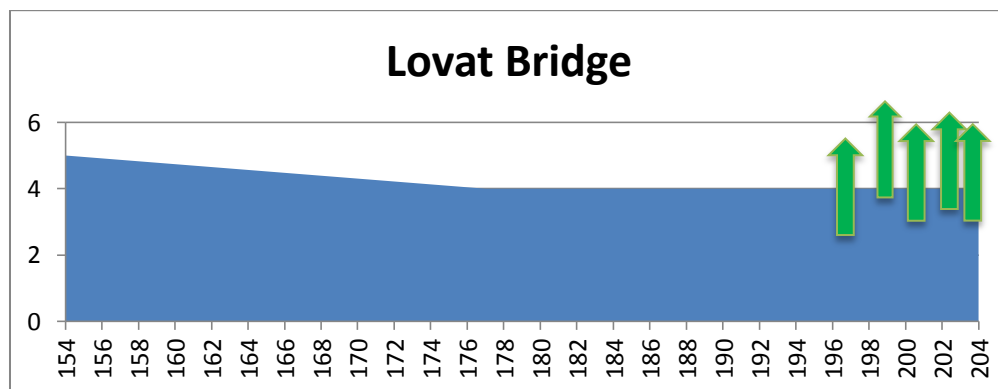


Figure 14 Lovat Bridge

15) (15) Beaulieu Station 57° N 28' 39.25" 004° W 28' 17.73" elevation 10m.

See Figure 15. The hills were low. The hill height of two and a half degrees due south is interesting: the MLL moon generally attains a height of 2° 50' so part of it would appear to sit exactly on the due south horizon at peak MLL years, at other times it would rise and set as normal. It suggests a potential viewing position,

weather-permitting plus an absence of a treeline along the horizon. Horizontal trees can attain a height of half a degree. Unfortunately this close to town does not bode well for the survival of Clava cairns, if there ever were any, and Bradley comments on the Beaulys frequent flooding.³¹²

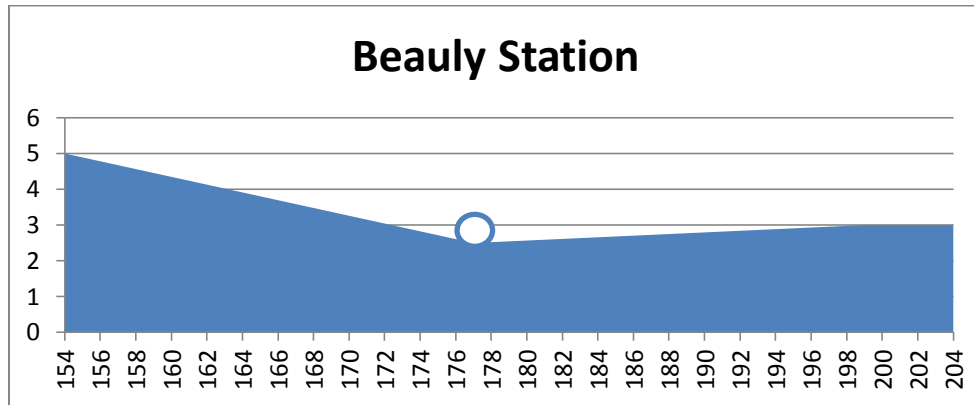


Figure 15 Beaulys Station

16) (16) Beaulys riverside 57° N 28' 55.97" 004° W 27' 27.18" elevation 9m.

See Figure 16. The town of Beaulys has residential properties right up to the riverside. The MLL moon is generally invisible.

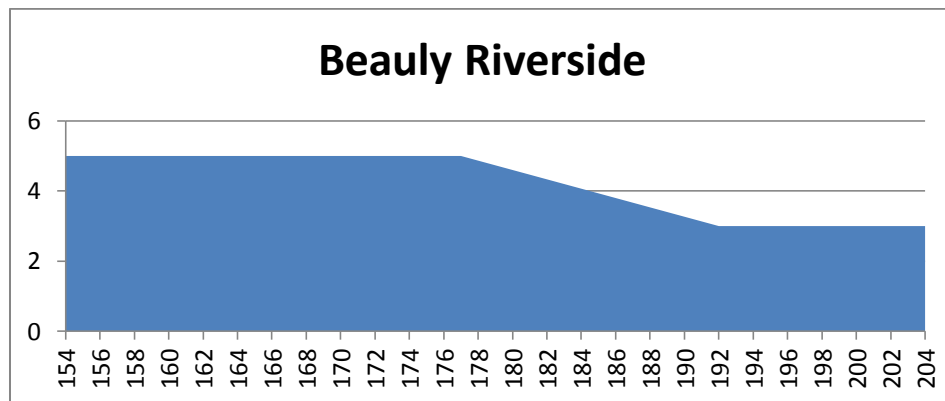


Figure 16 Beaulys Riverside

River Enrick

River Enrick starts at Loch ma Stac and flows through Glen Urquhart to discharge into Loch Ness at Drumnadrochit. The river meanders for 17.2 kilometres between Corrimony and Loch Ness, less than a day's sailing or walking. Transportable river-valleys connect northwards to Beaulys via Strathglass and eastwards to Loch Ness.

³¹² Bradley, Good Stones, p.178.

The Enrick was visited on 7th January 2016. It rained heavily all day, few pictures taken, none of interest, warmer than previous days, but still windy. Horizons were temporarily obscured by rain which quickly moved off thus making them visible..

1) (17) Enrick Ford 57°N 20' 05.75" 004°W 41' 40.52" elevation 150m.

See Figure 17. Hill has gradual undulations. Moon at ML is invisible.

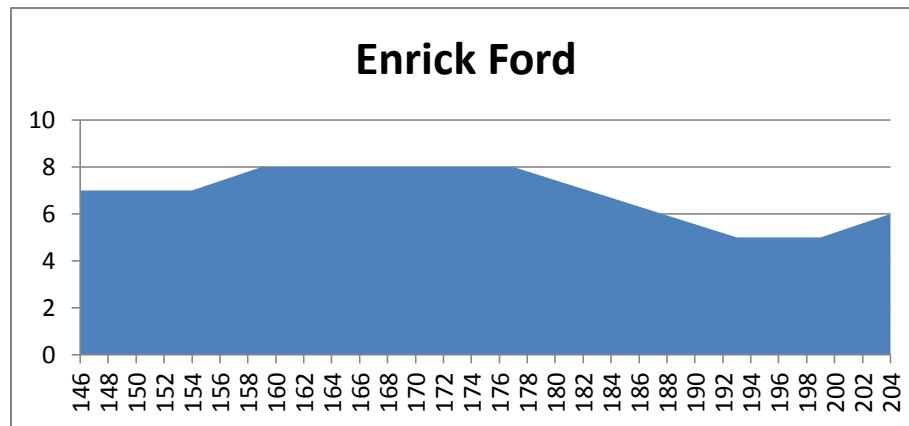


Figure 17 Enrick Ford

2) (18) Corrimony Passage-grave 57°N 20' 04.10" 004° W 41' 16.23" elevation 152m.

See Figure 18. Corrimony or *Càrn Choire Mhonaidh* is the only passage-grave to retain its passage roof-lintel in situ. It lies near where the Allt Feith Riabhachain joins the Enrick and may have controlled the passage to Strath Glass to the west. Bronze Age hut circles and field systems are uphill, and Highland Environment Record listed a non-Clava cairn 'above Upperton of Buntait', but this was not investigated.³¹³ A stone weighting about two tons, called the capstone, lies near the top and has multiple cup-marks; Childe noted a report suggesting it was 'placed in its present position in 1830' and Piggott suggested that was also when the 'central chamber had been refilled'.³¹⁴ Burl gives dimensions '2.4 x 1.5m' and Piggott estimated a corbelled height of eight feet (2.4m).³¹⁵ It has a largely uniform hill to the south. The nearly-full Moon sits above the horizon 6° 56' 30.4" at 180° rising at 168° and setting at 195° on the night of the 21/22 June 2015 BCE, invisible on the Full Moon night 23rd (4° 08' 15.6") and the following night (Peak Major standstill).

³¹³ <http://her.highland.gov.uk/SingleResult.aspx?uid=MHG2758> [Accessed on 02 September 2016].

³¹⁴ Childe and Graham, RCAHMS, p. 63; Piggott, Excavations, p. 176.

³¹⁵ Burl, Guide, p. 131; Piggott, Excavations, p. 181.

The rim of the moon is visible at Full Moon 22/23 June 2034 BCE ($5^{\circ} 41' 28.0''$ due south at 23hr 53m 1s). Mainly the MLL moon would not be visible reaching as its centre does $2^{\circ} 50'$ on many years, ($2^{\circ} 35'$ to $3^{\circ} 05'$). The passage-grave is orientated on the midwinter sunset the window of visibility of the passage providing declination figures of -20.51° to -26.10° (true azimuths 227-239 $^{\circ}$), note Ruggles' midwinter sunset declination of -23.95° around 2000 BCE.³¹⁶ Burl gave a 'provisional calculation of declination -18.9° '.³¹⁷

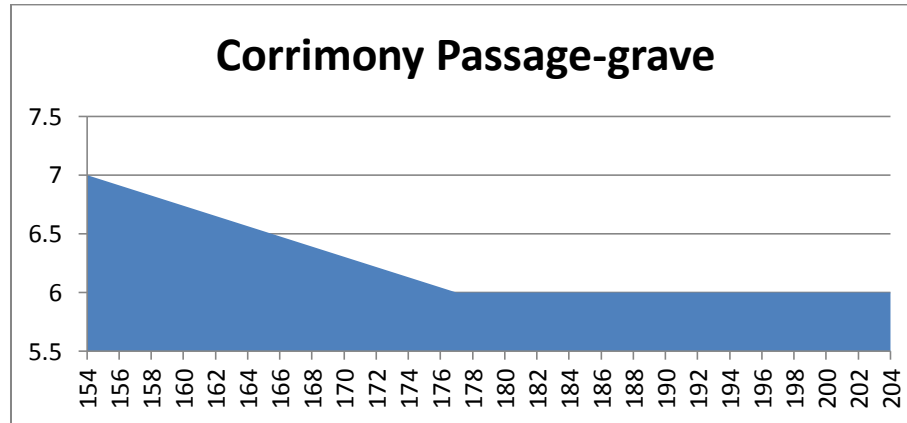


Figure 18 Corrimony Passage-grave

0) Bridge near main road. $57^{\circ} N 20' 01.23'' 004^{\circ} W 40' 08.95''$

Dense woodland prevented sight of hills southwards from the Enrick Bridge, despite winter lack of leaves.

3) (19) Opposite road to Shenval $57^{\circ} N 19' 59.32'' 004^{\circ} W 38' 54.82''$ elevation 127m.

See Figure 19. Hills are smoothly flowing, gently dropping and rising again southwards. No sharp ridges. The Full Moon sits on the horizon on 22/23 June 2034 BCE ($5^{\circ} 41' 29.9''$ due south at 23hr 52m 53s) although invisible for the following two nights. So this would guide travellers who would know they could arrive at Corrimony in time for any gathering.

³¹⁶ Ruggles, Prehistoric, p. 57.

³¹⁷ Burl, Prehistoric Astronomy, p. 29.

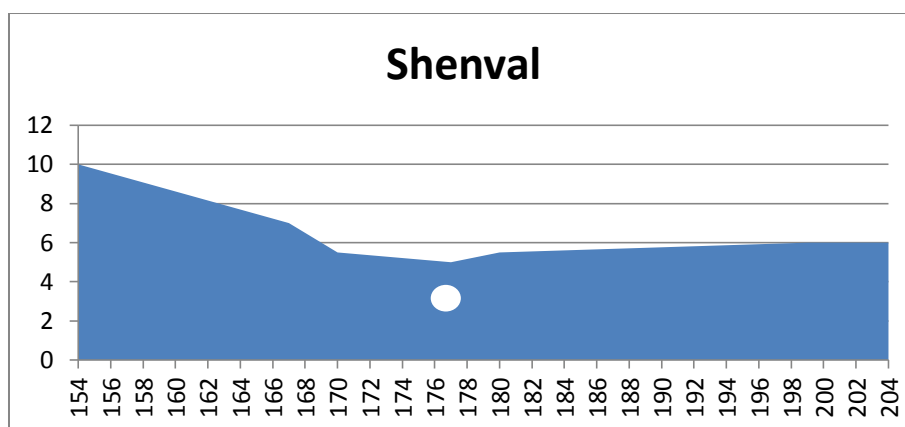


Figure 19 Shenval

4) (20) Hostel roadside 57° N 20' 04.14" 004° W 38' 08.02" elevation 126m.

See Figure 20. Hill is the same height across the southern horizon. No lunar phenomena.

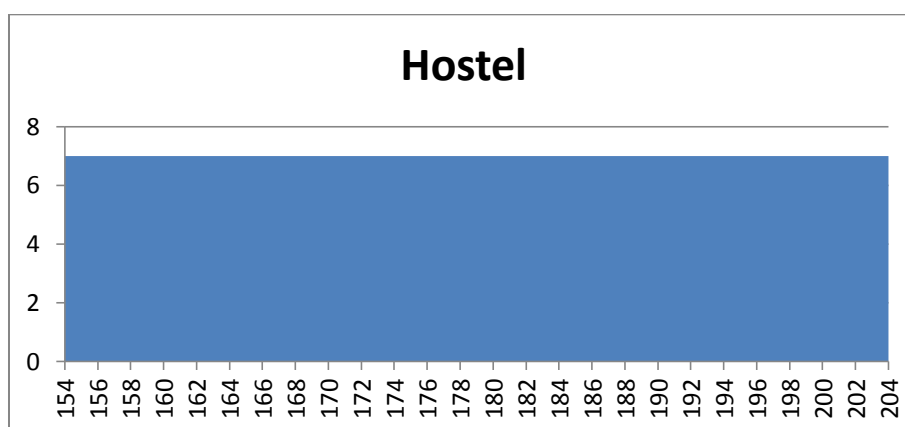


Figure 20 Hostel

5) (21) Near end of Loch Meiklie, Balnain 57° N 20' 14.13" 004° W 35' 05.39" elevation 127m.

See Figure 21. Hill has a uniform height in both directions.

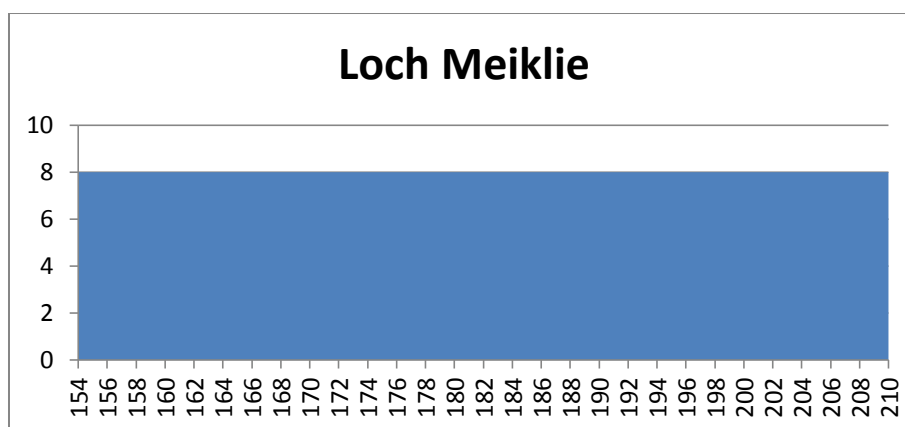


Figure 21 Loch Meiklie

6) (22) Road to Easter Milton 57° N 20' 19.11" 004° W 30' 25.05" elevation 47m.

See Figure 22. The hills are high, preventing any interesting MLL lunar phenomena. This is where the Gartally Burn joins the Enrick, which leads to Glen Convinth and the Beaully valley. Carn Daley, a Clava Cairn, is high up on a hilltop next to this river, deselected because it is a hilltop cairn.

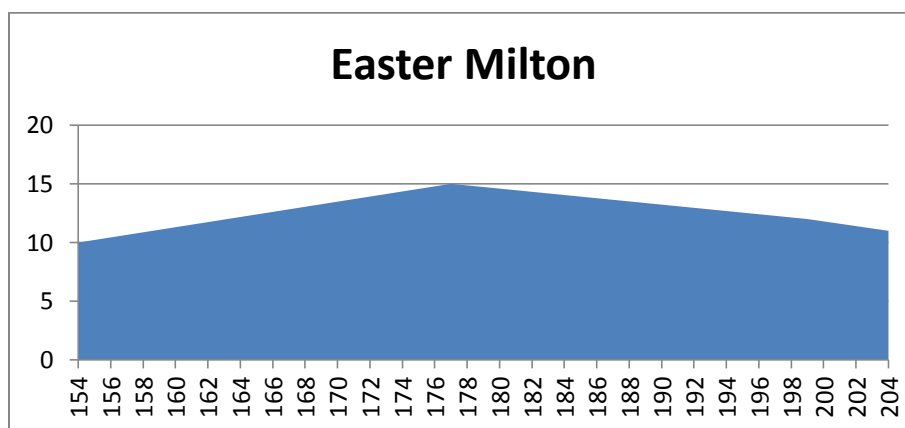


Figure 22 Easter Milton

7) (23) Drumnadrochit, opposite war memorial as the hills opened up to discharge the Enrick into Loch Ness 57° N 20' 15.13" 004° W 28' 46.36" elevation 49m.

See Figure 23. Due South is still land, the hills of Strom point and the low point is Glen Coilive as that river joins the Enrick to flow into the Ness. No distinctive lunar phenomena.

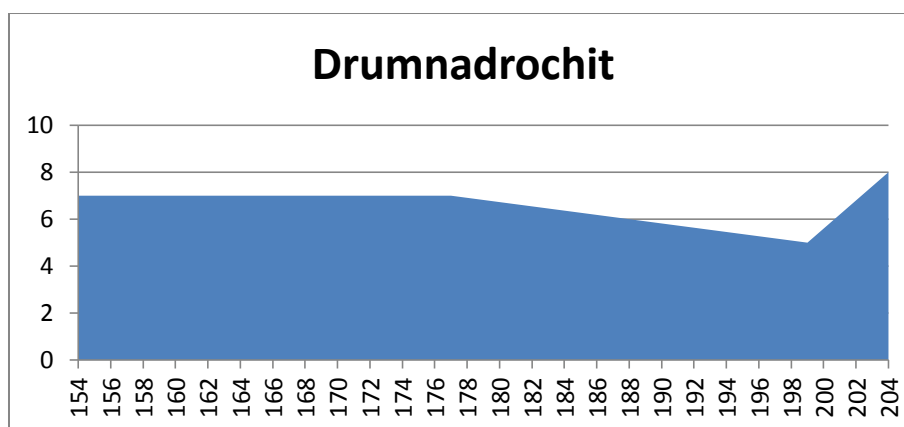


Figure 23 Drumnadrochit

River Ness

Visited 15th February accompanied by Janita Stenhouse and Anne McInnes, extremely cold, snow and sharp hail storm during visit - ground covered with snow. Eventually weather cleared sufficiently to see the horizon, which is partially obscured by trees. Revisited Kinchyle of Dores on 5th April with Laura Stenhouse during perfect weather, no wind, sunshine, both horizon and layout of stones were more visible. No roadside measurements were attempted, most of the Ness flows through the city of Inverness and buildings obscuring the skyline. None of these cairns are next to tributaries as they are hilltop cairns overlooking lochs.

1) (24) Kinchyle of Dores Passage-grave 57° N 25' 12.1" 004° W 17' 48.4" elevation 62m.

See Figure 24. Kinchyle was visited twice, during a hailstorm and snow in February, accompanied by Janita Stenhouse and Anne MacInnes then again in April 2016 with Laura Stenhouse in more clement, but windy weather, because thick snow had obscured the passage location. Kinchyle stands on a hill overlooking Loch Ness to the south west. It lies next to the old Inverness road and is close to General Wade's Military Road, so it marks territory which has been suitable for transit or transport for centuries and possibly millennia. The layout of hills and water suggest that this was the case in prehistory, there being no alternative routes until the 20th century. While Loch Ness cannot be seen from Kinchyle of Dores it is reasonable to assume that bonfires lit here would be visible from the water as well as flagpoles during daytime, where they would guide boats into the most accessible harbour on the north side of Loch Ness at Dores. There is a clava cairn (Aldourie) southwest of Kinchyle

on a slight rise above the Ness harbour of Dores. Altdourie is listed by Fraser as having been 'shifted' and by Henshall as having been 'artificially rearranged' and 'dismembered' when relocated before 1870, but is probably the remains of a Clava ring-cairn.³¹⁸ As part of a trade route it lies in a predictable location to be associated with the passage-grave of Kinchyle. The area is severely overgrown with bracken and more accessible in winter. Measurements were taken from the apparent centre of the circle which was approximately 8m by 9.50m. The cairn overlooks Loch Ness which is below the dip in the horizon to the south west and the main Orthostat has a declination of -19.58° to -22.19° (Azimuths $217-224^{\circ}$), which aligns with the minor lunar limit. The passage aligns with the major lunar limit, declination -29.33° to -30.53° (azimuths $190-198^{\circ}$). This may have been an excellent location to view the Major standstill moonset. It exhibits cupped lunar phenomena.

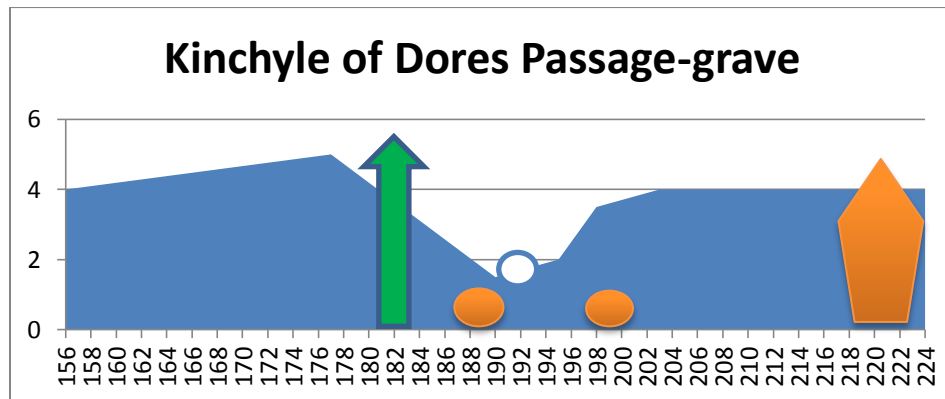


Figure 24 Kinchyle of Dores Passage-grave

2) (25) Midtown South West 57° N $22' 06.9''$ 004° W $16' 54.3''$ elevation 235m.

See figure 25. Midtown SW was near Kinchyle, we went there hoping to find the Clava ring-Cairn of West Town, nearby which could indicate the shortest overland route to the Nairn. There were two cairns in this field, neither appeared to be Clava, West Town was not visible in the snow, which was well over knee-deep, so these two were measured. It would be a dark location. No standing circle, not listed as Clava. The Diameter was 11.2m by 9.2m. HER note they were visited by A. A. Woodham in 1962 and considered burial cairns, but with much field clearance stone

³¹⁸ Fraser, Strathnairn, p. 329; Henshall, CT, Vol., 1, p. 358.

added which exaggerating their height.³¹⁹ Part of the horizon was obscured by cloud, in due course the whole horizon was blanked out by snow.

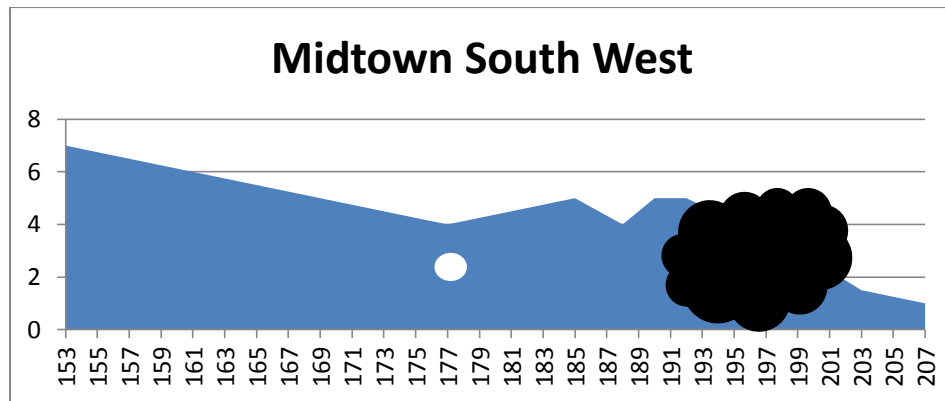


Figure 25 Midtown south west

3) (26) Midtown North East 57° N 22' 06.8" 004° W 16' 50.5" elevation 242m.

See Figure 26. This cairn is close to the other, measuring 11.5 by 10.5m. It was mostly circular, another dark location, although the moon might emerge from the hill before setting on some years. Both cairns overlook Loch Duntelchaig and mark a connecting route through to the Nairn, Tordarroch and Càrn Gask are only 5 km to the east. Another of General Wade's military roads, parallel to the one which goes by Kinchyle of Dores, is to the north, this time linking with the uphill cairn of Càrn Glas, which leads directly to the Clava Cairn of Druid's Temple within the outskirts of modern Inverness.

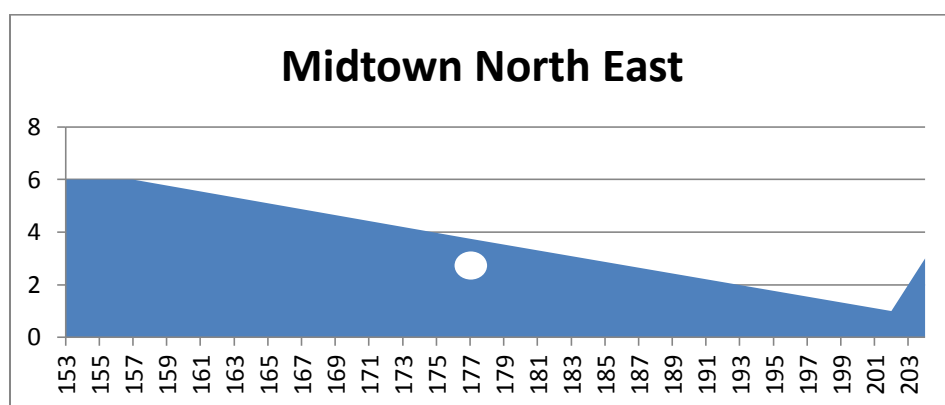


Figure 26 Midtown North East

³¹⁹ <http://her.hIGHLAND.gov.uk/SingleResult.aspx?uid=MHG3958>, [Accessed 23 November 2016].

River Nairn

River Nairn, whose source is between Beinn Bhuidhe (711m) and Coille Mhor (675m) in the Monadhliath Mountains flows through Strathnairn and past Clava on its way to the Moray Firth. There were multiple visits to Balnuaran between midwinter 2014 and midwinter 2015 as part of the preliminary project. This river was visited 3rd, 4th and 6th January 2016. Daylight was limited. The lower Nairn was completed on the 4th focusing on the Clava district. This was a perfect day for surveying cold but dry and I was able to undertake outdoor sketches without freezing fingers. Largely completed the upper Nairn on the 6th when bright low sunlight impeded travel to some degree and the freezing wind meant that most sketches were very swiftly done. Some sections were re-visited on 13th, accompanied by Janita Stenhouse, and on 15th February 2016, accompanied by Anne MacInnes and Janita Stenhouse. 13th was excellent with bright sunshine, a fairly thin layer of snow and relatively little wind but much snow had fallen by the 15th when road conditions were more treacherous - access to cairns involved crossing deeper snow, (above knee-height), slippery ice and uncertain rocky ground. However snowfall held off during the day and horizontal sightlines were easier to see. Also on 6th April to Clava and Dalcross Mains, accompanied by Laura Stenhouse, when there was light rain, cool wind, spring flowers and sunshine. Midsummer was wet and overcast for weeks, so no visit was attempted, but Balnuaran was again visited on 27th August accompanied by Sara, Alice and Ruben Derancy-Stenhouse, because it was a bright sunny day providing sunny summer photographs.

1) (27) Aberarder 57° N 17' 55.42" 004° W 17' 16.20" elevation 246m.

See Figure 27. This is where the Nairn flows down from the hills, and is relatively open territory: the Alt Crailtidh flows only 1,617 meters westwards (headwaters of the Farigaig River which empties into Loch Ness at Inverfarigaig). A cairn marks the territory between the two rivers, less than 500m from the Alt Crailtidh, but being densely surrounded by trees it was deselected for survey. There is no evidence of it being Clava. A burnt mound and Bronze Age hut circles are nearby. Fraser noted a cairn 'Dunhallow of Aberarder' as having been 'entirely removed', which may have been Clava and near here.³²⁰ Northwest lies Loch Ruthven with its Crannog and then

³²⁰ Fraser, Strathnairn, p. 328.

Loch Duntelchaig leading, via Westtown (a Clava cairn) and the Midtown cairns, to where Kinchyle of Dores lies beside the main route northward along the Ness. This could have been a drover's route, as the pass makes for sensible territory to transport cattle and the visible, originally white, stone cairn could have indicated the route. There are three distinct hills, the furthest in the southeast, then two which overlap in front of that hill. There are no distinctive MLL phenomena at this height, but the cairn is higher, the contours suggesting nearly 270m.

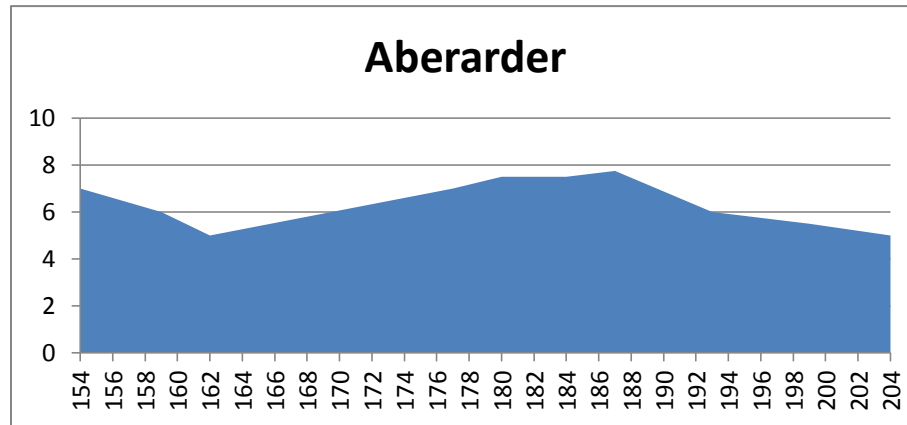


Figure 27 Aberarder

2) (28) East Croarty 57° N 19' 09.86" 004° W 14' 33.79" elevation 223m.

See Figure 28. This village looks southwards with an easterly hill sloping down to the south. Behind that hill another starts to rise and its height fluctuates gently to the west, but at no point does it drop below six degrees and no lunar phenomena of note occurs.

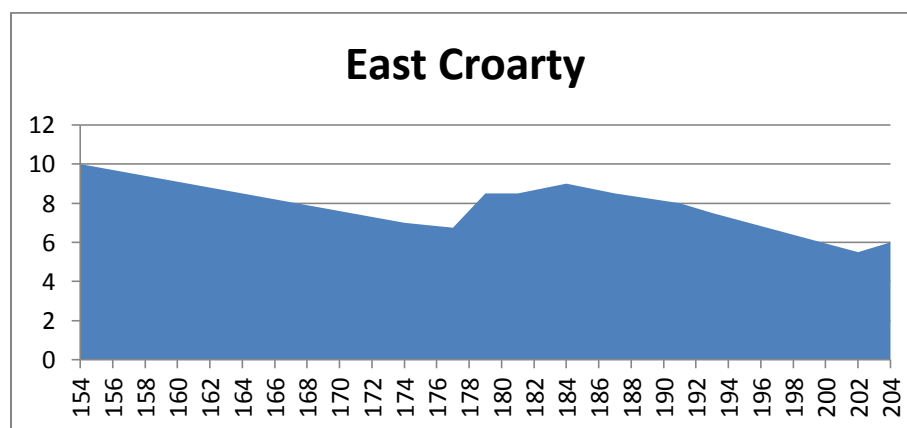


Figure 28 East Croarty

3) (29) Mains of Flichity (road to) $57^{\circ} \text{ N } 20' 17.27''$ $004^{\circ} \text{ W } 12' 22.82''$ elevation 217m.

See Figure 29. It's very cold here and quick sketch, snow on the hills despite heavy rains, so it must have snowed here instead of rain. I am much higher up so the hills are lower. There are two distinct hills the southwest one behind the southern hill. This would make for some lunar viewing. For instance the moon is at $2^{\circ} 56' 56.9''$ on 4 June 2051BCE at 2hr 32m 19s it largely sits just above the horizon due south. Allowing for clinometer inaccuracy this could be quite dramatic if the hill is half a degree higher, which it might be from some angles, the ground here is undulating. The moon would disappear into the SW hills.

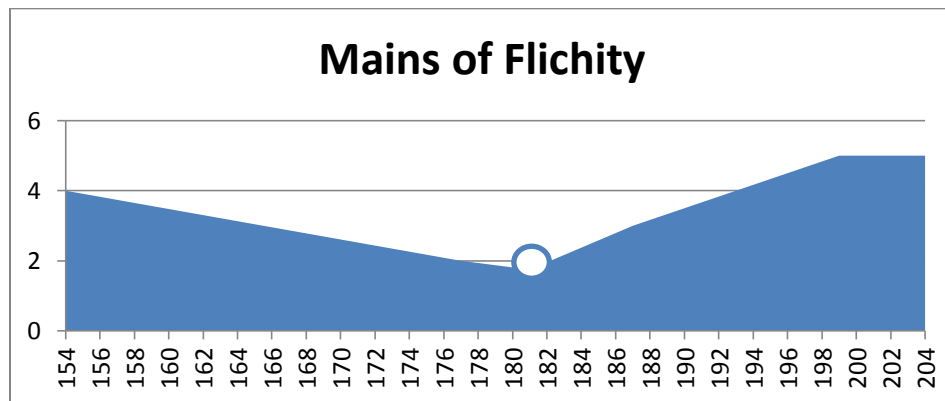


Figure 29 Mains of Flichity

4) (30) Concrete wall (Near Woodside) $57^{\circ} 21' 14.2''$ $004^{\circ} \text{ W } 12' 05.9''$ elevation 222m.

See Figure 30. This bend in the road is where the road becomes double track and the distinctive concrete wall starts. Roadworks on the right meant I measured from off the road in the roadworks area, which was later fenced off. There are three separate hills here one sloping down from the southeast, a small one in the middle and another arising behind that one to the south west. Lunar phenomena likely - for instance the Full Moon sits on the horizon at 180° south on 29 June 2032BCE at 23hr 46m 10" having $3^{\circ} 37' 25.3''$. Rising at 174° it would skim along the horizon until setting at 194° . It would often appear as an emergent moon.

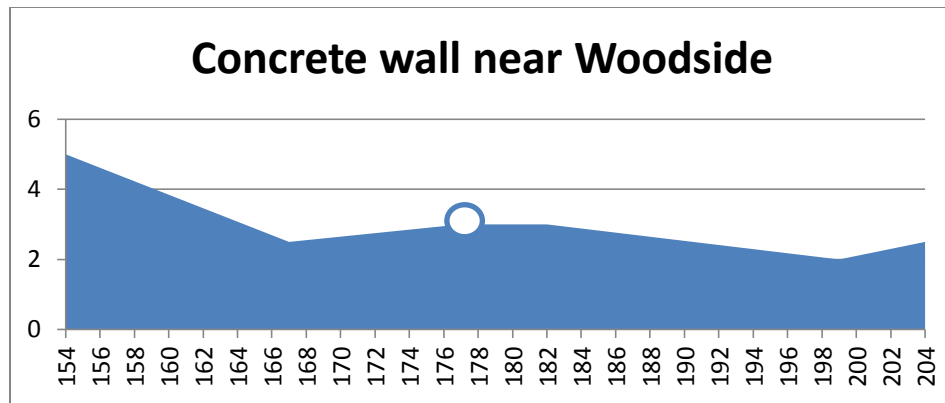


Figure 30 Concrete Wall

5) (31) Beside Farr Community Woods 57° N 22' 25.10" 004° W 11' 16.89" elevation 199m.

See Figure 31. Having not found Croftcroy Passage-grave (INV 18) in the nearby village; I took measurements from the Farr wooden parking area where it is possible to walk through to Torrdaroch Cairn. Burl says that Croftcroy was orientated on the Major Limit moonset (declination -29.1°).³²¹ The measurements were taken in bright sunshine by the roadside. Woods obscures hills at 154 -167°. Towards the southwest a hill arose behind the main hill. Some midsummer full moons would emerge while others would not.

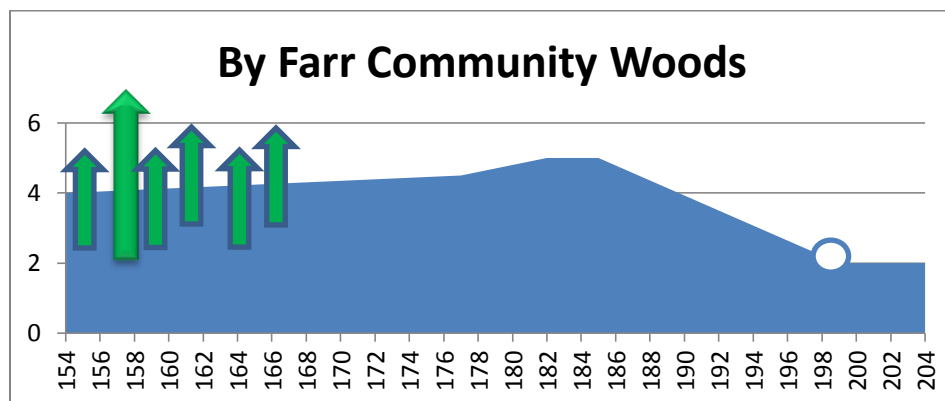


Figure 31 by Farr Community Woods

6) (32) Tordarroch Ring-cairn 57° N 22' 22.0" 004° W 11' 47.0" elevation 198m.

See Figure 32. The River Farnack joins the Nairn here. A road leads to Loch na Clachan (Loch of the Stones) and from there to West Town clava cairn and thence to Kinchyle. The approach involved going through the woods and crossing a boggy

³²¹ Burl, Prehistoric Astronomy, p. 28.

field in summer, (18 June 2015, a misty morning). The bog was frozen in winter but the snow was knee-deep and the ground treacherous with shifting stones. Quite a lot of nocturnal animal activity was evident from stains in melted snow, paw-prints and bird-prints. No magnetic anomaly found and the main monolith is proud of the horizon. This cairn has an interesting open-sky aspect, but it is ruined by the addition of a wall built across the southern side, probably using cairn material. Henshall noted the diameter as 'seventy feet' (21.336m) and one stone having '33-34 cup-marks'.³²² One tree did not obscure the horizon. There is a nearby pylon and a small hillock further south-west than in the diagram. The largest orthostat has a declination window of -27.57° to -29.07° (azimuths $197-204^{\circ}$) which is largely aligned on the major southern moonset (Ruggles -29.95°).³²³ Burl noted the same alignment and associated it with the kerbstone with 'over thirty cupmarks' which would have been hidden on its inner face.³²⁴ This is a good example of a topographically well-placed orthostat; the moon emerges from behind the hill as it sets behind that stone.

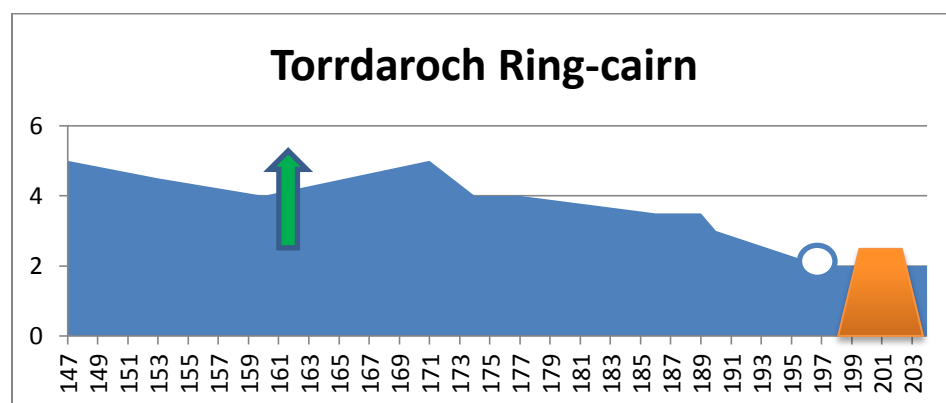


Figure 32 Torrdaroch Ring-cairn

7) Near Dell Farm 57° N 24° $15.82''$ 004° W 09° $36.65''$ Elevation 172m.

Hills straight at fifteen degrees, nothing of note as hills are obviously too high. This is before the A9, across from Daviot and the middle/lower Nairn measurements and as there was a passing place next to the river I stopped.

8) (33) Daviot Farms by the war memorial 57° N 25° $15.75''$ 004° W 07° $37.33''$ elevation 165m.

³²² Henshall, CT. Vol. I., p. 385.

³²³ Ruggles, Prehistoric, p. 57.

³²⁴ Burl, Guide, p. 134.

See Figure 33. The eastern hill was in front of two others of varying heights. With nothing below four degrees the midsummer full moon would be invisible. There are four cairns nearby at Craggie.

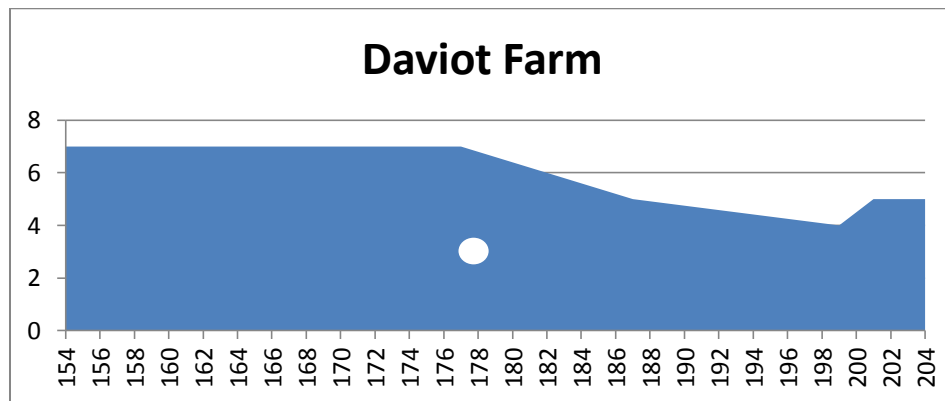


Figure 33 Daviot farm

9) (34) Craggie 57° N 25' 27.50" 004° W 07' 00.51" elevation 183m.

See Figure 34. Just after the road T junction. There are four non-clava cairns in the vicinity. MLL Midsummer full moon would be invisible most of the time but near-full moons could appear at the four degree height which is where one hill descends and the other rises, plus it attains this height on years bordering MLL years. Narrow hill-passes and possible drove routes, at this junction, lead to another cairn on the Findhorn, via the Craggie Burn.

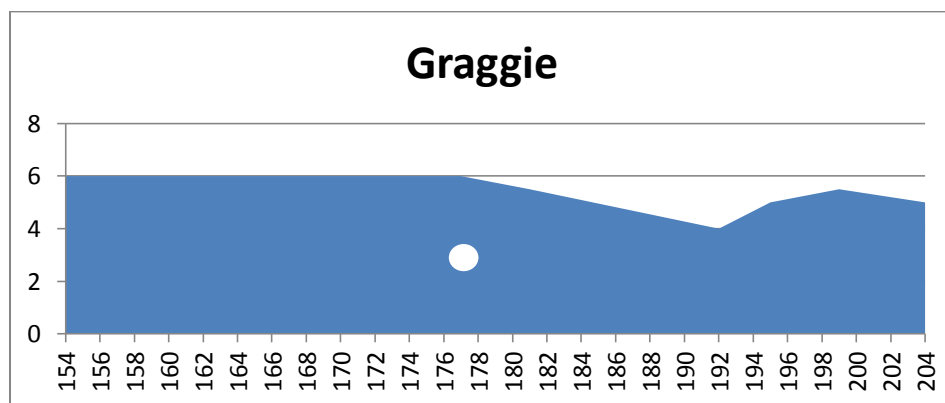


Figure 34 Graggie

10) (35) Glenashdale 57° N 25' 48.79" 004° W 06' 42.12" elevation 208m.

See Figure 35. This viewpoint is similar to Clava where the hill drops to three degrees at azimuth 205°. It is close to Daviot Ring-cairn and hugs the side of Meall Mòr marking the entrance to the open grassy Clava valley.

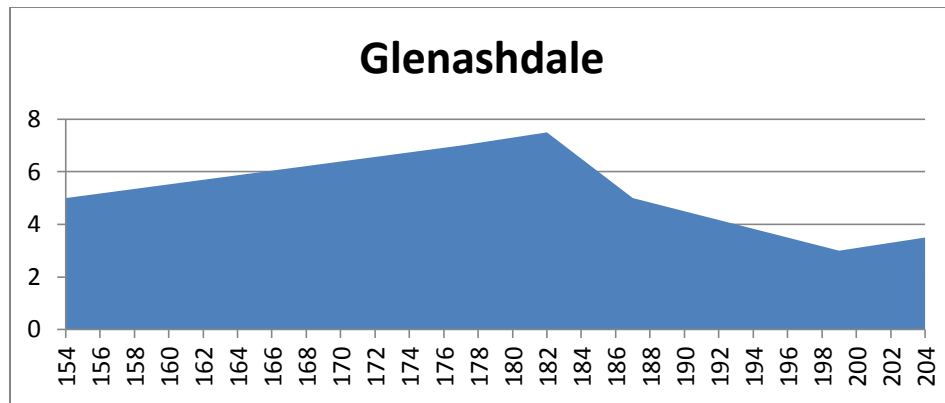


Figure 35 Glenashdale

11) (36) Daviot Ring Cairn 57° N 26' 35.6" 004° W 07' 19.2" elevation 194m.

See Figure 36. The Allt Lugie and Craggie Burn are nearby. This cairn is very impressive within the landscape, it has a wide open aspect to the sky; the hills surrounding it are reasonably gentle. The river is invisible but the tips of tree-tops which line the river can be seen to the south. A small hillock is upriver and one is downriver, it appears to nestle exactly in-between the up-valley and down-valley hillocks, perhaps that was intentional. It was sitting in pristine snow when we visited early morning, many other cairns had evidence of nocturnal or dawn animal visitors but this did not. Snow was quite deep. This is dramatically placed and that enhances the sense of it being a significant site. No buildings can be seen from the cairn, although a telegraph pole lies to the southwest. The main menhir is quite sizeable and of sandstone conglomerate, while the inner kerb orthostat was quartzite. The main menhir was proud of the horizon (+5°) with the horizon at 2° and the window of visibility provided by the stone was a declination of -29.49° to -30.01° (azimuth 190°-194°) while the kerb-orthostat slightly to the west of the main menhir when viewed from the circle centre had a declination of -28.82° to -29.77° (azimuth 192°-198°). This is close to the major lunar limit moonset. The Moon would emerge from the hill to sit on the horizon before setting behind the main orthostat on MLL years.

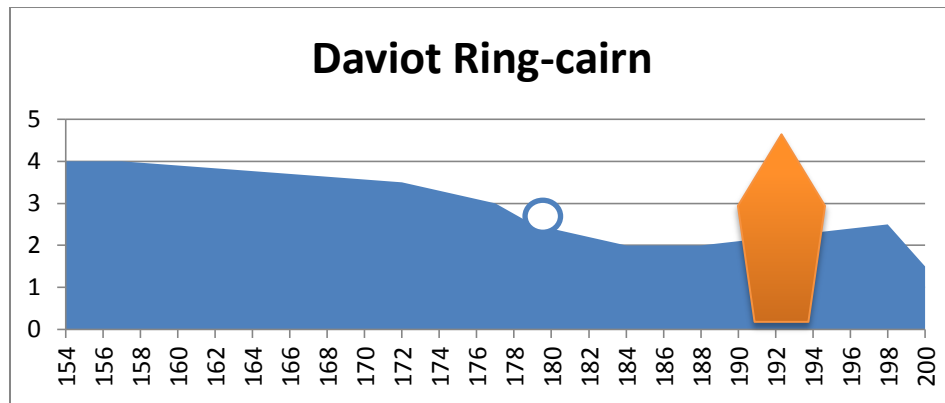


Figure 36 Daviot Ring-cairn

12) (37) Passing place above Culdoich 57° N 27' 36.2" 004° W 04' 53.4" elevation 189m.

See Figure 37. The hill drops fairly gently to where there is a bridge over the railway. This is not far from Culdoich South and Culdoich North (the cairn discovered by Bradley) lies in the valley below. Midsummer full moon would be invisible just as it is at Balnuaran.

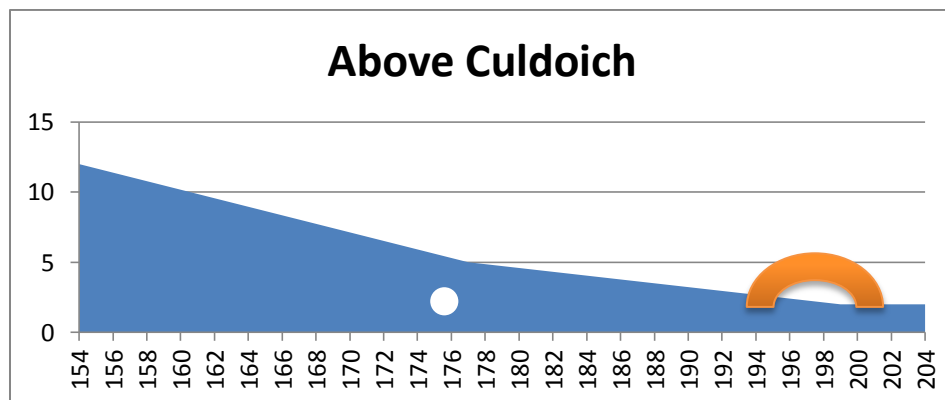


Figure 37 Above Culdoich

13) (38) Culdoich-ring-cairn 57° N 25' 01.2" 004° W 05' 01.9" elevation 112m.

See Figure 38. This is close to the Allt Ruidhe More, which flows into the Nairn. Innes listed this as a cairn first in 1857.³²⁵ It is part of the Clava cemetery, although no longer visible from Milton of Clava, since the main menhir fell, Henshall noted 'after 21 April 1958'.³²⁶ Piggott found the remains of one inhumation and suggested

³²⁵ Innes, Notice, p.48.

³²⁶ Henshall, CT Vol. 1, p. 371.

it was 'infilled' to close the site.³²⁷ The ring cairn is damaged by a quarry on the southeast side. J Barber excavated the fallen monolith finding a 'single sherd of pottery' probably dating from the second millennium.³²⁸ There were no significant alignments; the menhir fell on the southwest side. It lies rather neglected in the landscape where the hills make the midsummer full moon invisible. Trees obscure the skyline beyond the southwest.

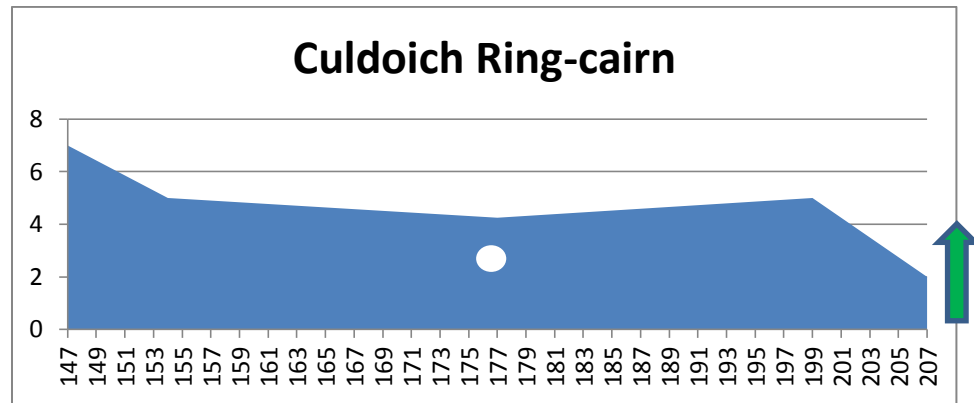


Figure 38 Culdoich Ring-cairn

14) (39) Milton of Clava South Chapel 57° N 27' 05.86" 004° W 04' 55.13" elevation 109m.

See Figure 39. There are no distinctive tributaries close to this site. This ruined chapel was said by Jolly to be dedicated to St Brigid, but by Bain (in HER) to be a Columbian chapel dedicated to St Dorothy.³²⁹ The chapel was thought by Anderson and Anderson, plus Fraser to be the remains of a Clava Cairn, although that has been disputed by Henshall and Ritchie.³³⁰ Anderson and Anderson referred to the burial of unbaptised children there, so when Innes found a freshly dug grave at 'Tarbert' he confirmed the practice's continuation in the 1850's.³³¹ The angle to the southeast hills is slightly different from Balnuaran where they appear higher. The midsummer full moon is still invisible at MLL as it generally reaches an elevation of 2° 50', but I was curious about whether on occasions the moon peaked from behind the hill before

³²⁷ Piggott, Excavations, p. 190.

³²⁸ J. Barber, 'A Fallen Stone at the Ring Cairn of Culdoich, Clava, Inverness', *Glasgow Archaeological Journal*, Vol. 9 (1982), 31-37, p. 33.

³²⁹ Jolly, Cup-marks, p. 321; <http://her.highland.gov.uk/SingleResult.aspx?uid=MHG3000> [Accessed 02 September 2016].

³³⁰ Anderson and Anderson, 1851 Guide, p. 370; Fraser, Strathnairn, p. 329; Henshall and Ritchie, p. 242.

³³¹ Anderson and Anderson, 1851 Guide, p. 370; Innes, Notice, p. 48.

setting at 202°. This might be a suitable place to view the emergent moon at moonset on years adjacent to major extreme. The main orthostat although small provides declination figures of -20.25° to -22.14° (azimuths 215-220°) as MLL is invisible it may be stellar orientated. Sirius would vanish behind this stone before setting at 226°. Fraser noted that a 'single standing stone at the SW corner' was all that remained of the previous cairn despite the creation of the chapel.³³² This suggests that the single stone could be in its original position. A post-medieval township nearby (1560-1900) is listed by HER.³³³ This period coincides with the rise of Protestantism, (when many chapels were destroyed) but local people tell me much of the area remained Catholic until after the 1745 rebellion, so there may have been continued use of the nearby graveyard. I have yet to find any reliable date for the Chapel's destruction.

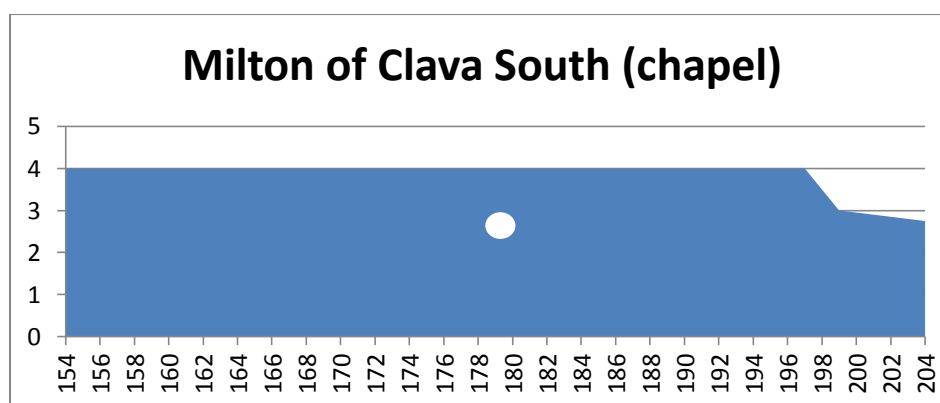


Figure 39 Milton of Clava South (Chapel)

15) (40) Milton of Clava North Passage-grave elevation 57° N 28' 07.4" 004° W 04' 53.16" elevation 111m.

See Figure 40. Bradley lists this cairn as a 'probable passage-grave' possibly because of the dimensions; Sharples gives '10 by 6m', but did not find a passage, although he identified a probable chamber.³³⁴ Milton of Clava north sees lower hills as compared to the angle at Balnuaran. Here the moonset is not quite visible. Certainly not at MLL but on some occasions the nearly-full moon will gleam before setting at 202°. Sharples comments that a nearby 'mound' may have been another Clava Cairn.³³⁵ The enigmatic large stone menhir appears to be orientated close to the Major lunar

³³² Fraser, Strathnairn, p.341.

³³³ <http://her.highland.gov.uk/SingleResult.aspx?uid=MHG25839> [Accessed on 29 November 2016].

³³⁴ Bradley, Good Stones, p. 174; Sharples, Excavations, p. 8.

³³⁵ Sharples, Excavations, p.8.

limit having a declination of -26.65° to -28.57° (azimuths 202-206°), as that moon would be invisible a stellar option remains, however I have as yet been unable to find a suitably high magnitude star which would set into this stone. However Sharples says this stone is considered to have been re-erected in the 'unrecorded past' and this monument is an enigma with 'essential ambiguity', which led him to conclude that 'we don't know that much about Clava cairns'.³³⁶

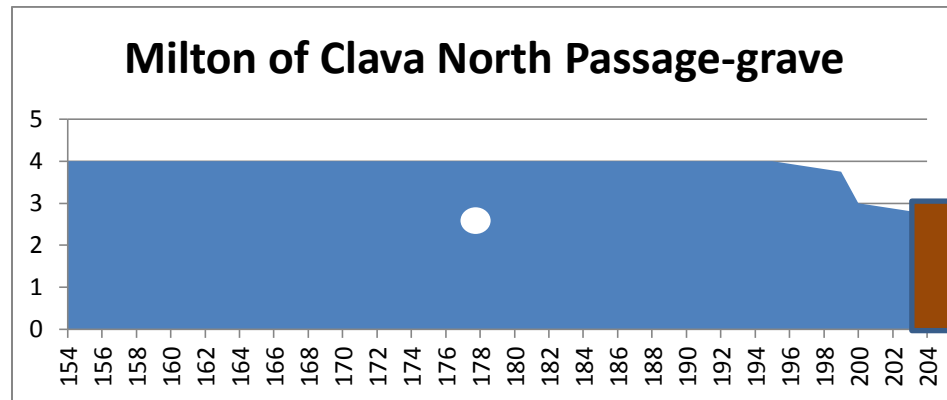


Figure 40 Milton of Clava North Passage-grave

16) (41) Balnuaran of Clava Southwest Passage-grave 57° N 28° 21.01" 004° W 04° 28.25" elevation 96m.

See Figure 41. A detailed sketch of the horizon was made here. Southerly hill measurements were taken from the entrance to the passage because Bradley states that the passage was closed within about 50 years of creation (apart from a gap permitting 'sunlight to penetrate the interior at midwinter') when the platform was added, so the majority of the viewing activity would have taken place outside the passage-grave.³³⁷ Measurements of the passage-orientation were taken from the chamber declinations. The hill drops in discrete settings not descending smoothly as with other hills in the survey, the diagram gives an imperfect idea of the horizon image. Further west the river enters the valley and midwinter sunset is unimpeded by tall hills so that it can enter the passage, magnetic anomaly was encountered (1°). Midsummer full moon is invisible. The area outside the cairn, but within the standing stone circle would be in darkness during the lightest part of the year. The midsummer sun sets and the sky became darker around midnight leaving a light blue skyline to the north which can stretch upwards several degrees of altitude. Stars are

³³⁶ Sharples, Excavations, p. 8.

³³⁷ Bradley, Scottish stone circle, p.130.

visible overhead, north and south. The sun starts to rise again far northeast around three thirty lightening up the sky. The local naturalist John Lister-Kaye noted that it is only dark for 'ninety minutes' at midsummer.³³⁸ On MLL years as the midsummer full moon rises when the sun sets there is no darkness, people can walk to the cairns in full light from the hills, entering darkness as they come into the valley. Within the valley darkness reigns and the summer constellation stars are still visible. This cairn's passage is orientated on the midwinter sunset with declinations of -22.63° to -26.27° (azimuths $205-217^{\circ}$ Alt.3). The circle stones increase in height to the south west except the main one which appears to be broken, it is opposite the largest kerb stone and this appears orientated on the minor lunar limit having a declination of -12.12° to -22.75° (azimuths $224-247^{\circ}$ Alt.0).

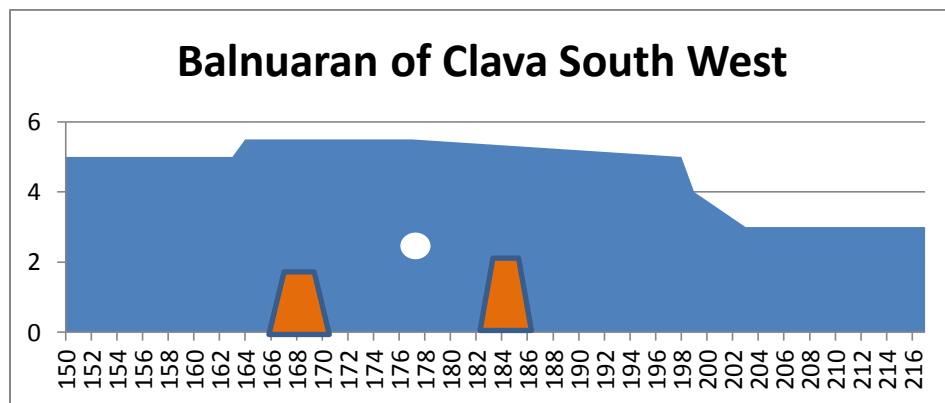


Figure 41 Balnuaran of Clava South West Passage-grave

17) (42) Balnuaran of Clava Central Ring-cairn 57° N 20° $22.76''$ 004° W $04'$ $26.79''$ elevation 99m.

See Figure 42. This ring cairn has the largest circle-orthostat which is orientated on the minor lunar limit moonset, having a declination window of -17.49° to -22.75° (azimuths $224-236^{\circ}$ Alt.0). However this orthostat has been re-erected in the 1800's so it cannot be a secure alignment, although the peristalith orthostat remains unchanged. Two radials line up with circle-stones which are part of midwinter sunset as they lie exactly along the sun's path and generate long shadows. It appears this connectedness between the three cairns was deliberate and reinforces building as a united group. The eastern radial is aligned with equinoctial sunrise -3.54° to $+8.20^{\circ}$ (azimuths $81-103^{\circ}$), which also picks up the summer rising of the Pleiades (see

³³⁸ John Lister-Kaye, *Song of the Rolling Earth* (London: Abacus, 2004), p.148.

Appendix IV). The south-eastern radial aligns with midwinter sunrise -23.01° to -27.00° (azimuths $147-163^{\circ}$) for which Ruggles estimated -23.95° for c.2000 BCE.³³⁹ The western radial is aligned with the northern minor limit moonset $+8.96^{\circ}$ to $+21.08^{\circ}$ (azimuths $282^{\circ} - 306^{\circ}$) and the broken stone radial is aligned with the northern minor limit moonrise $+8.11^{\circ}$ to $+22.45^{\circ}$ (azimuths $49^{\circ} - 78^{\circ}$). Ruggles suggested $+17.95^{\circ}$ for northern mll.³⁴⁰ These radials have not been altered in antiquity and are safer alignments.

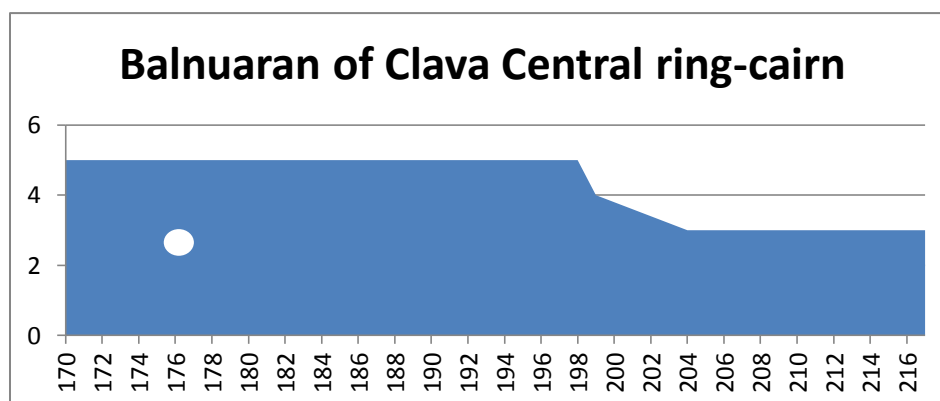


Figure 42 Balnuaran of Clava Central Ring-cairn

18) (43) Balnuaran of Clava Northeast Passage-grave $57^{\circ} \text{ N } 28' 24.25''$ $004^{\circ} \text{ W } 04' 23.63''$ elevation 98m.

See Figure 43. I made a more detailed sketch of the horizon in order to understand it better. As with Balnuaran SW measurements were taken from the entrance to the passage, but the passage-orientation was made from within the chamber (see methodology section). These hill drops are distinctive and not a smooth curve. The midsummer full moon at MLL is invisible - occasionally it is visible at near-full moon on adjacent years, but sometimes it too remains invisible. Very rarely it arises and sits on the horizon before descending and this occurs only on adjacent years. This cairn's passage is orientated towards the midwinter sunset -22.63° to -25.74° (azimuths $207-217^{\circ}$ Alt.3). The largest circle-orthostat is quite dramatic and the window of declination is -19.33° to -22.75° (azimuths $224-232^{\circ}$ Alt.0) which aligns with the minor lunar limit, but this stone has been re-erected in the 1800's making that tentative. All three cairns have their largest orthostat aligned with the minor lunar limit (Balnuaran NE circle-orthostat declination -19.33° to -22.75° (Az. 224° -

³³⁹ Ruggles, Prehistoric, p.57.

³⁴⁰ Ruggles, Prehistoric, p. 57.

232°), Balnuaran Central circle-orthostat declination -17.49° to -22.75° (Az. 224°-236°) and Balnuaran SW circle-orthostat declination -12.12 to -22.75° (Az. 224°-247°). Somerville orientated them towards the 'November day sunset' meaning Samhain sunset.³⁴¹ All three cairns appear to have this alignment which strengthens the argument that the minor lunar limit and the midwinter solstice sunset were deliberately part of the building plan. They are also aligned with the setting of Sirius. See Appendix IV.

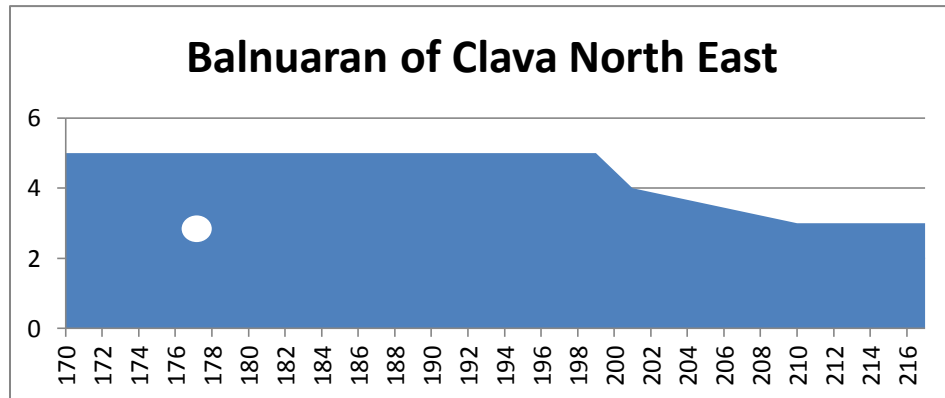


Figure 43 Balnuaran of Clava North East Passage-grave

19) (44) Mains of Clava North-West Menhir 57° N 28' 28.96" 004° W 04' 12.53" elevation 103m.

See Figure 44. This stone marks the northern end of the Clava cemetery area, the Cassie Burn is about 700m away, not as close as most tributaries are to cairn sites. This sole red standing stone is all that remains of a Clava Cairn, Bradley having estimated the foundation stones of the cairn lying beneath the soil from a soil-resistivity test.³⁴² The midsummer full moon would be invisible. Bradley includes a burial mound in the same field, and a cairn in the field over the road, which is a later addition to the cemetery (c. 700 BCE), although the mound could predate the cemetery.³⁴³ Bradley noted that the mound had a 19th century wall going through it which had stones of 'exceptional size', so it is unclear as to whether it had a stone structure.³⁴⁴ As the cairn is missing I considered it inadvisable to take measurements

³⁴¹ Somerville, RAI, MS., 267, f.159.

³⁴² Bradley, Good Stones, pp. 41-42.

³⁴³ Bradley, Good Stones, p.15.

³⁴⁴ Bradley, Good Stones, p.42.

for orientation purposes, but Bradley describes it as probably aligned with midsummer sunrise, which is plausible.³⁴⁵

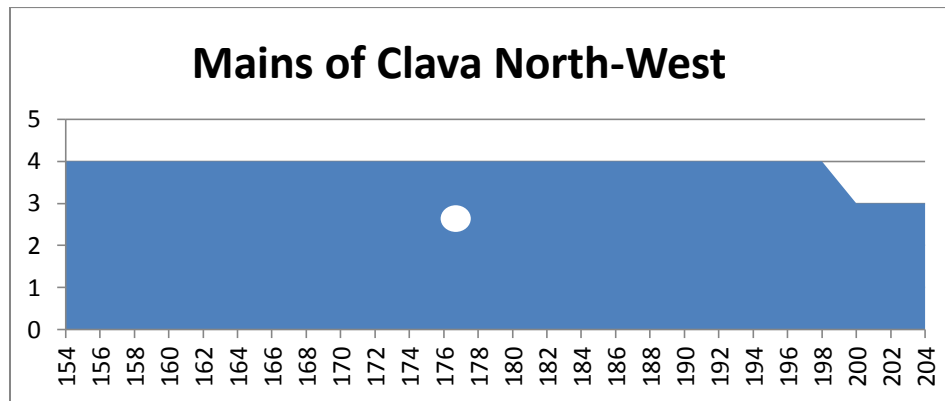


Figure 44 Mains of Clava North-West Menhir

20) (45) Near Cantraybuich, before the viaduct 57° N 29' 11.9" 004° W 03' 12.5" elevation 121m.

See Figure 45. This site was chosen because it was near Cantraybuich Clava Cairn, which was some distance below the road near the river, and from the rather ruinous cairn no MLL midsummer moon would have been visible. At this height the midsummer moon would also have been invisible, but near full moon would have been seen. It is as if the cairns mark a journey, like a pilgrimage. Trees obscured the horizon east of azimuth 162°.

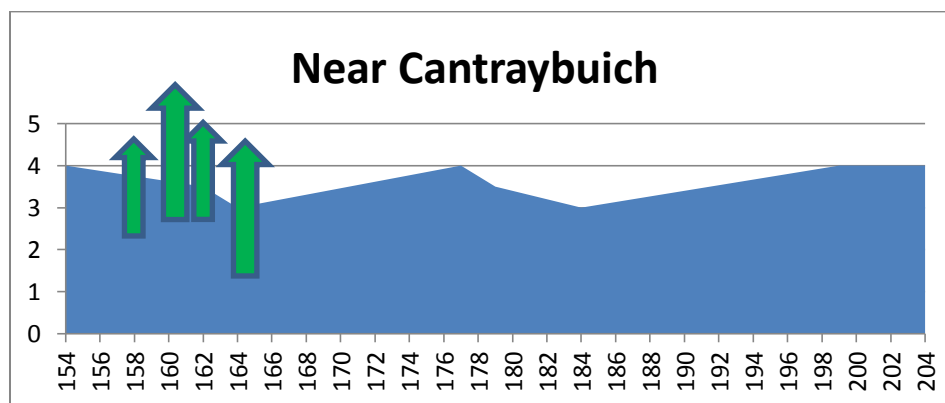


Figure 45 Near Cantraybuich above the Viaduct

21) (46) Overlooking Viaduct 57° N 29' 15.03" 004° W 02' 53.59" elevation 106m.

³⁴⁵ Bradley, Good Stones, p.125.

See Figure 46. Hills drop from five to two degrees in altitude, more smoothly than the diagram suggests. The midsummer full moon could sit on this horizon on occasion. This is at the head of the valley and the land drops quickly into the Clava district. It too could act as a visual experience along the way. The moon would emerge out of the hill.

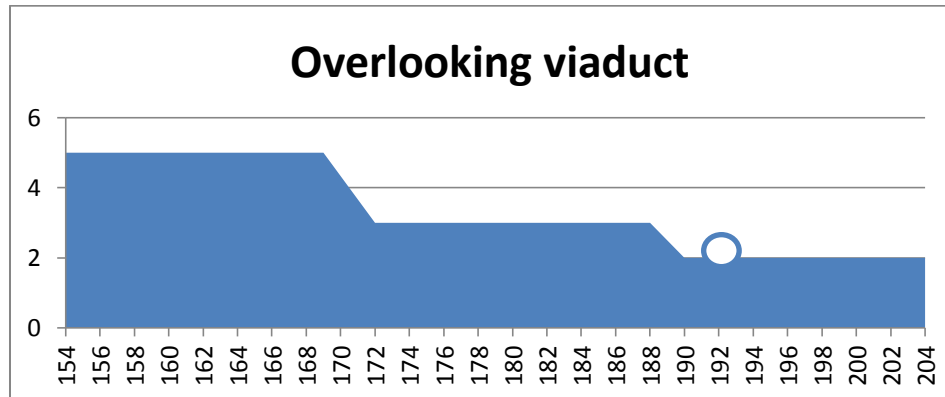


Figure 46 Overlooking Viaduct

22) (47) Kinrea Cornmill 57° N 29' 35.4" 004° W 02' 23.2" elevation 110m.

See Figure 47. After trees obscured any horizon this is a break in the treeline on this side of the river, so measurements were taken despite trees still obscuring due south. It is not far from Dalcross Mains Ring-cairn which was on slightly higher ground. No lunar phenomena.

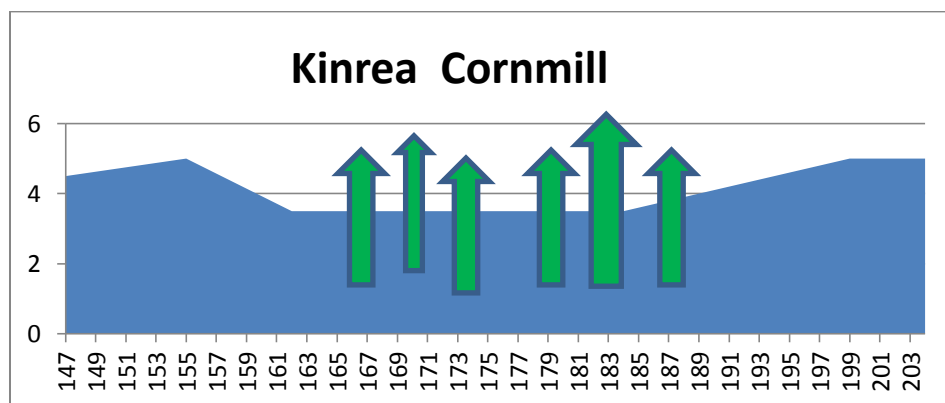


Figure 47 Kinrea Cornmill

23) (48) Dalcross Mains Passage-grave 57° N 30' 35.7" 004° W 02' 17.7" elevation 123m.

See Figure 48. This is an upland cairn and no tributary is close. This is a very pleasant cairn with spectacular views of the Moray Firth to the north. It lies on the top of a small hill, so would have been visible from the north and south. The low southerly hills are across the Nairn River. There are now individual trees on the site marked in the diagram and it took a while to comprehend the layout. The largest orthostat was well below the horizon (-5°) which only had an altitude of $+2^\circ$. The Midsummer MLL Moon would appear to travel along this horizon. The passage has a declination of -14.70° to -21.81° (azimuths $224-240^\circ$) southern minor lunar limit and Burl gives ' -18.9° ' as his 'provisional calculation of declination' for the passage, which is within this range.³⁴⁶ The main orthostat had a declination of -29.83° to -30.46° (Azimuths $178-191^\circ$) which aligns with the major lunar limit. This appeared a perfect place to witness the MLL midsummer moon.

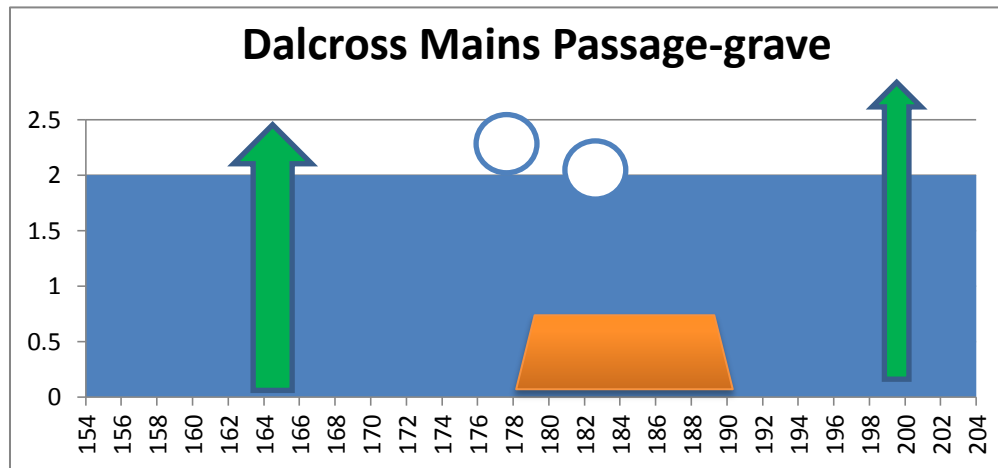


Figure 48 Dalcross Mains Passage-grave

24) (49) Above Kilranock Castle (Roadside B9091) $57^\circ \text{N } 31' 28.3'' 003 \text{ W } 59' 15.1''$ elevation 89m.

See Figure 49. After trees obscured all views to the south there was this small area where trees had been cleared. This location had hills similar to Clava but slightly lower. There are trees but visibility of the horizon was not compromised. There is an interesting notch where one hill descends and another rises through which the near full MLL moon would be visible on some years and the full moon would appear on years bordering MLL. On MLL years it would be invisible.

³⁴⁶ Burl, Prehistoric Astronomy, p. 29.

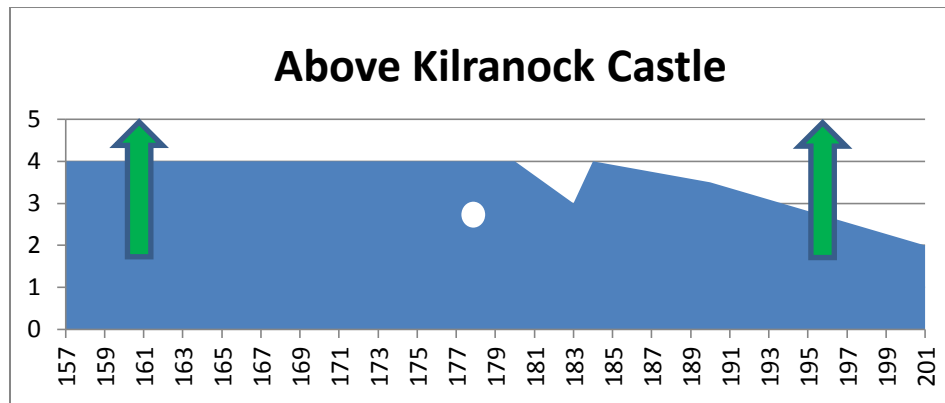


Figure 49 Above Kilranock Castle (Roadside B9091)

25) (50) Missing Cairns 57° N $33' 17.82''$ 003° W $34' 58.56''$ elevation 32m.

See Figure 50. I searched these fields for two cairns marked on the O.S. map, but failed to find them, they are missing from Digimap detailed view, so may have been recycled. The Alton Burn is nearby, but it flows into the Loch of the Clans not the Nairn River. The hills are low. The moon appears on the horizon, for instance on 7th June 2499 BCE the rim of the moon set at $1^{\circ} 35' 14.7''$ at 202° but was higher when due south so this may have been an interesting viewpoint. Some years it would appear to run up the hill.

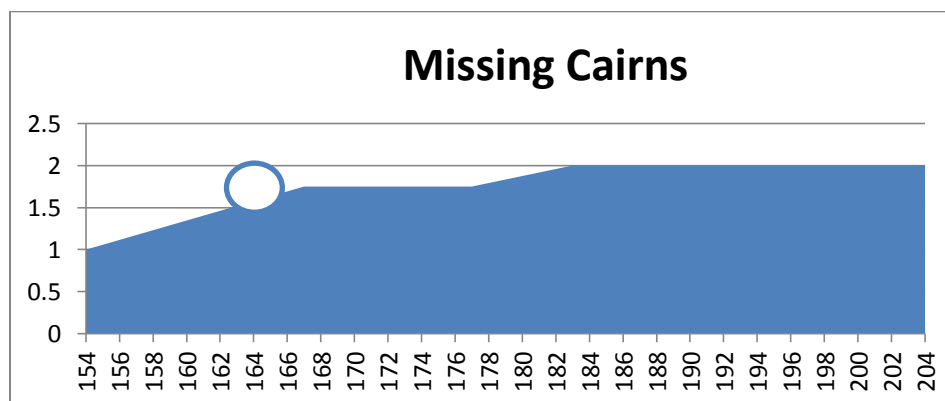


Figure 50 Missing Cairns

26) (51) Brachla 57° N $32' 20.55''$ 003° W $53' 58.78''$ elevation 28m.

See Figure 51. This is an interesting arrangement and may well have experienced the skimming moon, or the emergent moon as it appears out of the hills on its way to setting; the cairns I failed to find are nearby. The moon appears to emerge from the hill.

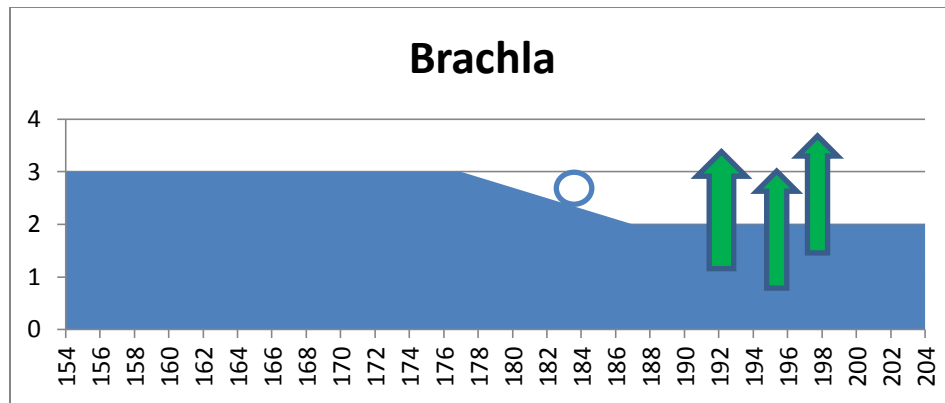


Figure 51 Brachla

27) (52) Allanaha 57° N 33' 05.35" 003° W 53' 01.07" elevation 25m.

See Figure 52. I sketched this hill arrangement because it was possible to be off the road and not impede traffic. The roads here are single track. The easterly hills drop sharply and another hill rises gently to the west. This is where the moon arises from one hill and sets into the Clava valley.

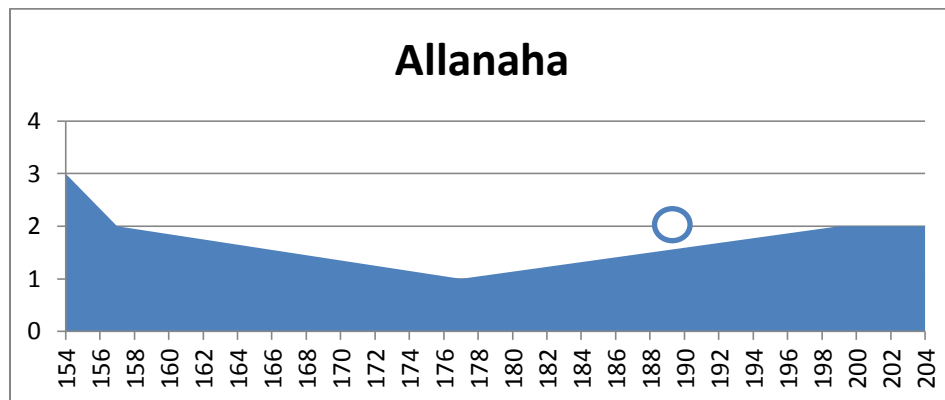


Figure 52 Allanaha

28) (53) Nairnside 57° N 33' 37.34" 003° W 52' 43.03" elevation 13m.

See Figure 53. The hills are quite a distance away but this is a potential site for viewing the standing moon as they are so low. At MLL the most frequent extreme position is 2°50' due south, curving up to this position and then curving down from it, so here it would slide along the horizon to the setting point at 202°.

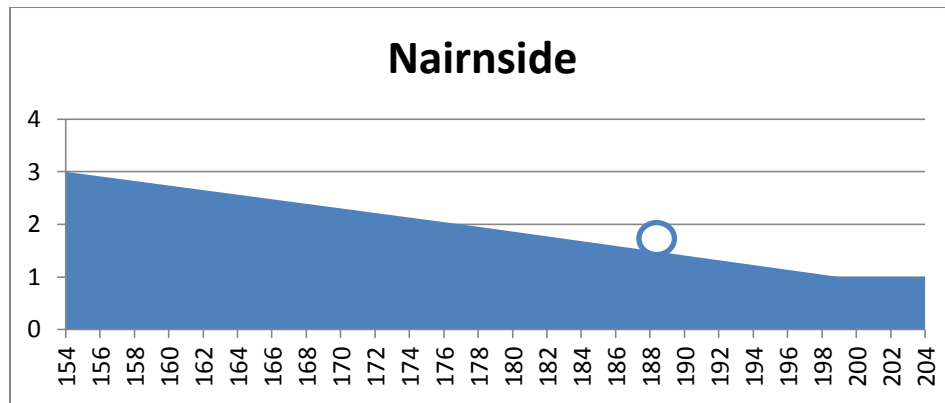


Figure 53 Nairnside

29) (54) Firhall 57° N 34' 21.88" 003° W 52' 27.71" elevation 12m.

See Figure 54. Houses block the horizon to the east but due south is completely flat. Nothing of a lunar significance can have occurred.

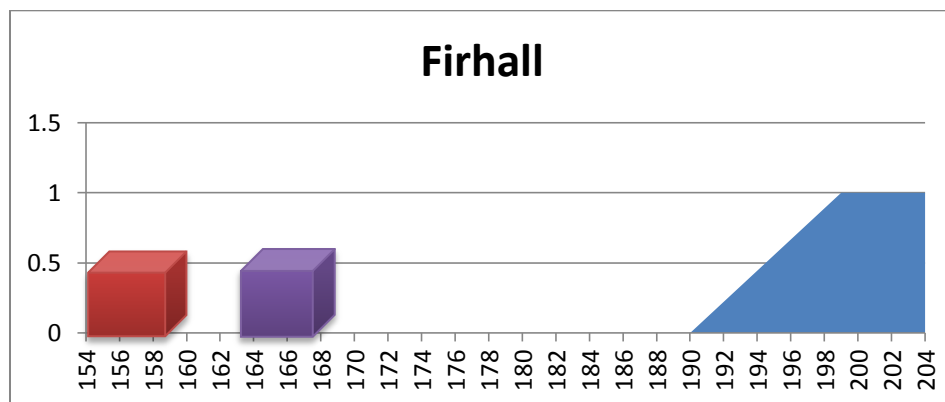


Figure 54 Firhall

30) Nairn Harbour 57° N 35' 25.54" 003° W 51' 44.88" elevation 4m.

The harbour horizon was zero degrees it was flat to the south until houses blocked the horizon. No special lunar phenomena could be expected.

31) (55) Little Urchany Ring-cairn 57° N 30' 46.9" 003° W 53' 37.2" elevation 142m.

See Figure 55. This was initially deselected as it was an upland cairn above the Riereach Burn, a tributary of the Nairn, but as we had to pass it to arrive at the upper reaches of the Muckleburn we decided to visit this cairn. The cairn was in very sad condition, a great deal of field clearance rocks had been deposited on it and it was difficult to ascertain the true dimensions. The inner ring had a diameter of 12m.

Trees obscured the horizon to such a degree that measurements were thought to be inconclusive. The rather low (2° high) main menhir had a declination of -21.72° to -25.21° (azimuth 201° to 214°) which would align with midwinter sunset, but the nature of the site was such that we thought the main menhir may have been removed. Digimap.edina.ac.uk shows evidence of a ruined chapel nearby.³⁴⁷ This would be an invisible MLL moon site. Deneb Algedi would set into this stone having a declination of $-25^\circ 36'$ disappearing into the hill before sunrise at 0hr 44m 12s on 21/07/2015 BCE.

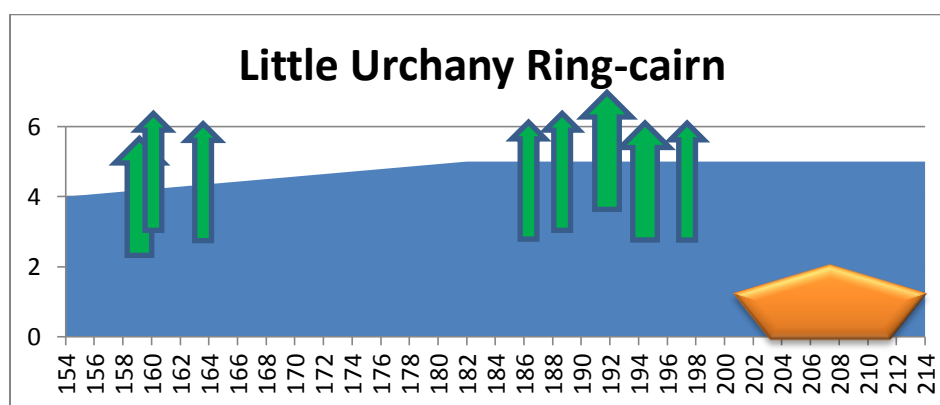


Figure 55 Little Urchany Ring-cairn

The Muckleburn

The Muckleburn arises near Carn Squùmain (417m), reaching the Moray Firth via Findhorn Bay. Muckleburn means sizeable small river. This river was measured on 16 February 2016, accompanied by Janita Stenhouse, apart from Shian Hillock which was explored the previous day with Stenhouse and McInnes. The 16th was cold, grey, overcast but not actually snowing, with occasional light drizzle and gusty wind, which required taking several clinometer measurements.

1) (56) Achavraat 57° N $30' 29.5''$ 003° W $49' 06.5''$ elevation 132m.

See Figure 56. The river did go further southwest, but was so completely surrounded by trees it would not have provided any sighting of the hills. There were trees all along the horizon so measurements were taken from the top of the tree-line; there was also a fine rainbow. On some years the moon vanishes into the SW hill.

³⁴⁷ Digimap.edina.ac.uk/ [Accessed on 11 February 2016].

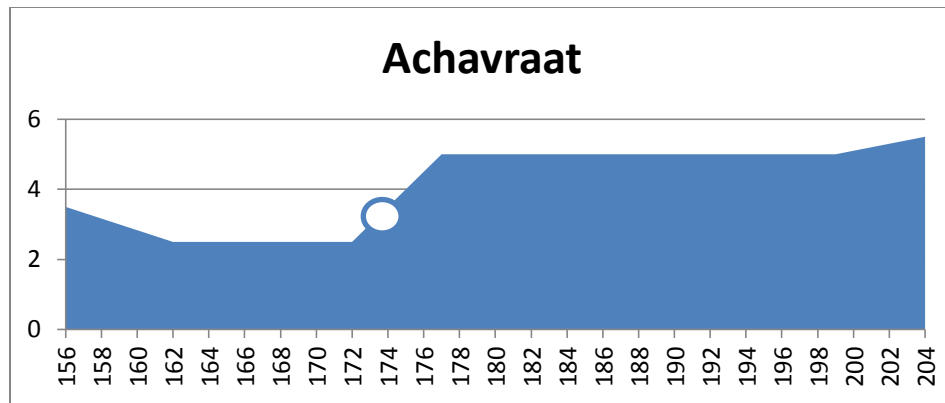


Figure 56 Achavraat

2) (57) Shian Hillock Tumulus 57° N 31' 30.5" 003° W 48' 40.1" elevation 126m.

See Figure 57. Shian is an anglicised form of the Gaelic *sìthean* (pronounced Shian), meaning belonging to the *Sìth* (pronounced Shee) or fairy folk, so Shian Hillock means fairy mound. This tumulus lies very close to the Muckleburn near where the Blackburn joins the river. It was about 5 metres high (depending on where you measured it from), it was on a slope. It had a facing of stones visible on the South-east kerb. It lay in a carrot field, with much evidence of animal activity including a fox having chased a small deer in the snow. There were two indents at the top of the mound indicating collapsed burial space within. Measurements were taken from the top of the hillock. The MLL midsummer full moon would have shone through the notches in the hills to the south. The tumulus is typical of Neolithic monuments found throughout Britain, but there are few in this area. Bain says it was excavated in 1845 and 1860, providing 'Pagan interments'.³⁴⁸ This horizon suggests interesting lunar events as it shines through the gaps.

³⁴⁸ George Bain, *History of Nairnshire* (Nairn: Telegraph Office, 1928) [1893], p.27. [Hereafter Bain].

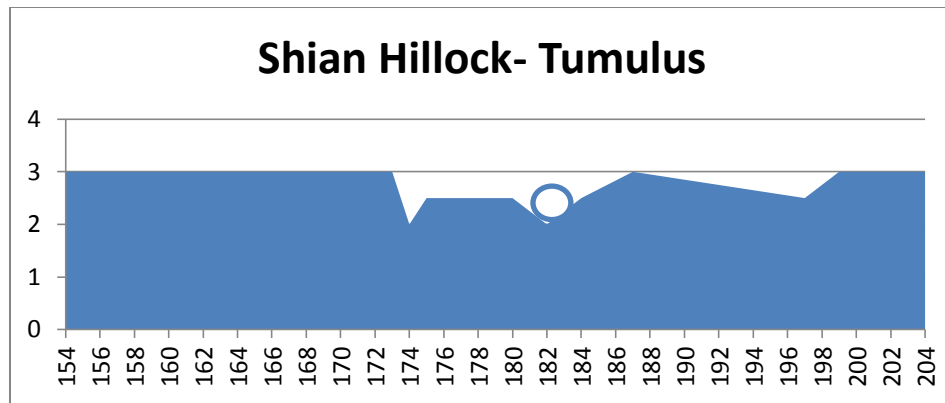


Figure 57 Shian Hillock - Tumulus

3) (58) Braeside Far 57° N 52' 20.3" 003° W 47' 38.2" elevation 135m.

See Figure 58. The MLL midsummer Moon would be invisible. On nearly MLL years the moon would slide along the top of the hills.

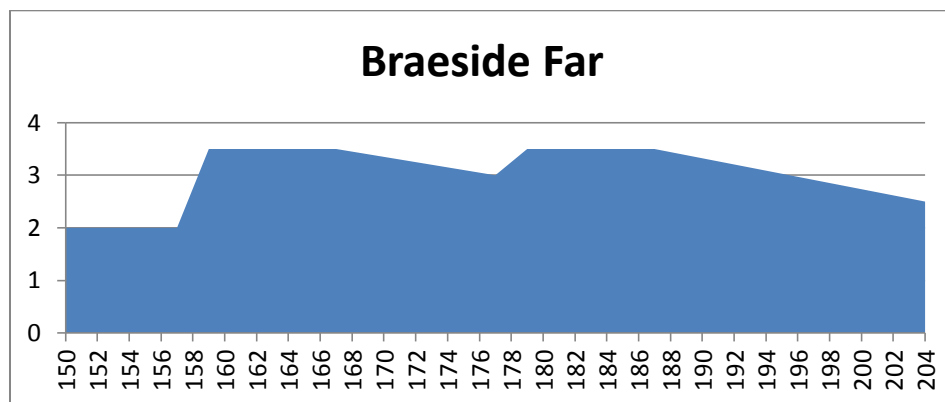


Figure 58 Braeside Far

4) (59) Fornighty 57° N 32' 18.3" 003° W 46' 47.6" elevation 91m.

See Figure 59. There was a hill to the south east and low ground to the south west. Seagulls were flapping making very slow progress into the headwind. The hill due south is insufficiently high to be touched by the MLL Midsummer Full Moon, which would emerge out of the SE hill.

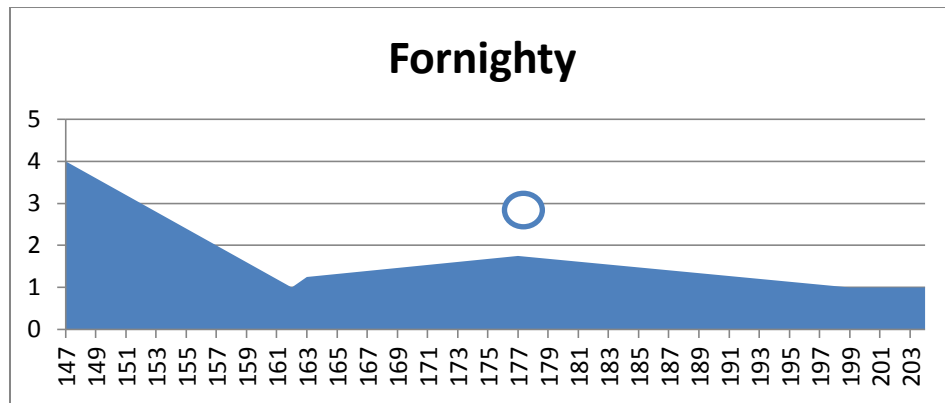


Figure 59 Fornighty

5) (60) Burnside 57° N 32' 55.6" 003° W 45' 39.4" elevation 83m.

See Figure 60. All the hills were forested so measurements were taken for the treetop height. The hills are also higher, so even reducing one degree of altitude to allow for tree height, these are not significant for viewing the Moon.

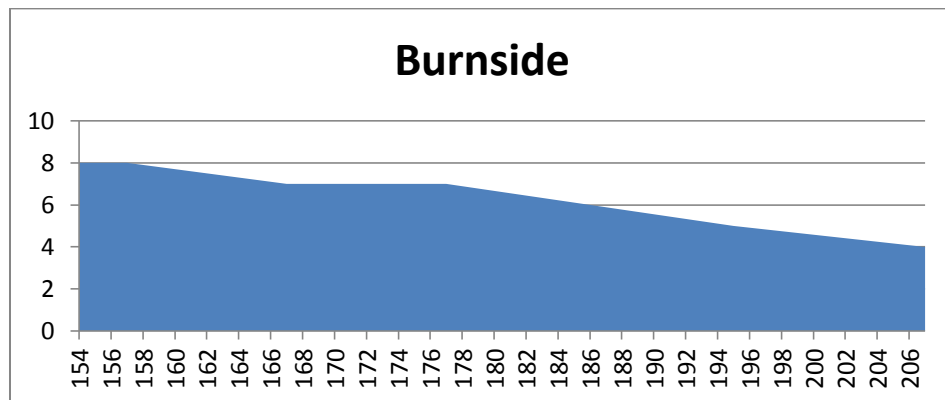


Figure 60 Burnside

0) Auldearn cairn and stone row

The hamlet of Auldearn was very quiet, not a soul about. No measurements were taken as the stone row and cairn were invisible from the roadside and apparently inaccessible. Stone Row House has large stones in the garden, but nobody was available to ask permission to access the fields behind the houses. Henshall classed Auldearn cairn as 'uncertain', but that Golford Clava cairn (listed by Fraser) was near here although 'removed in his time'.³⁴⁹ The Horizon was obscured by vegetation from

³⁴⁹ Henshall CT Vol. I., pp.387.388.

150-220°. We saw a hen pheasant. The 1645 Covenanter/Montrose battle-site is nearby.

6) (61) Mains of Moyness Ring-cairn 57° N 33' 39.0" 003° W 45' 07.2" elevation 107m.

See Figure 61. There are no tributaries near this cairn. This ring-cairn is fairly ruinous and the roadside stone wall cuts through part of it. No stones survive from the stone circle and there was no distinctive kerb cairn to try to take an orientation. Bain said it was opened in 1860 but the single 'urn and ashes', smashed during the excavation and that it had a 'laggan' or rocking-stone.³⁵⁰ Smith commented on how rocking-stones ('*clach-bhrath*') were used to judge guilt.³⁵¹ The Caledonian Mercury of April 16th, 1856, reported the rocking stone's removal, consequent local indignation and desire to protect the site from further erosion; the road construction having been many years previously.³⁵² The horizon was low, but could to be significant for MLL lunar phenomena although today obscured by trees at moon-set; the moon would be seen to arise out of the hill then sit on the horizon. The Figure shows sharper hills than in reality, where they have quite smooth contours.

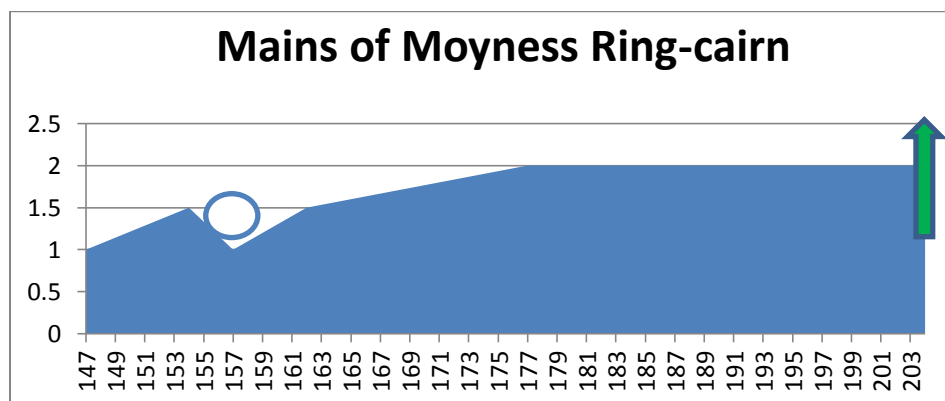


Figure 61 Mains of Moyness Ring-cairn

7) (62) Boghall Farm 57° N 34' 41.0" 003° W 43' 50.2" elevation 39m.

³⁵⁰ Bain, pp. 4.3.

³⁵¹ Smith, *Galic Antiquities*, p.71.

³⁵² http://www.themodernantiquarian.com/site/8947/mains_of_moyness.html#fieldnotes [Accessed on 10 August 2016]: On-site information board.

See Figure 62. Nothing significant is visible from here. Quite close to the burn and thus the hills were higher.

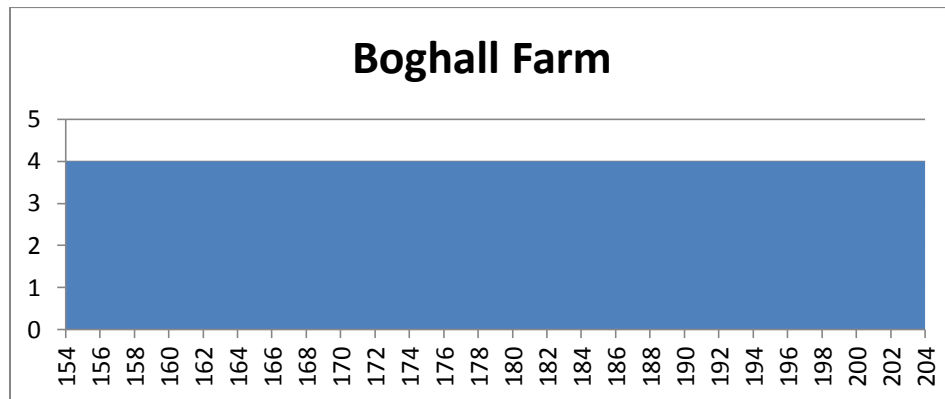


Figure 62 Boghall Farm

0) Rodney's Stone at Brodie Castle Pictish Carved Stone 57°N 35' 49.5" 003° W 42' 00.3" elevation 23m.

No Figure as the horizon was completely obscured by trees. This stone dates from the Iron Age/Early Medieval Pictish period and was in good condition despite having been used as a headstone and moved on several occasions. It is said to have originated near Moy, close to the mouth of the Muckleburn. One side is carved with Pictish symbols and the other has a Christian cross, so this may date to that transitional period when these stones were carved with both Pictish and Christian symbolism. Equally it may have been re-carved; the initials of the people who used it as a burial stone were added much later. There is an Ogham inscription which Oram translated as 'EDDARRNON' which was perhaps a 'personal name Ethernan'.³⁵³ We had to pass here on the journey. Nearby is Macbeth's hillock, overlooking the Muckleburn, where legend says Shakespeare's MacBeth met the three witches. The historical reality of 11th century MacBeth, Thane of Moray, is completely different from Shakespeare's tale.

8) (63) Mudhall 57° N 36' 39.6" 003° W 41' 09.7" elevation 21m.

See Figure 63. The horizon is quite low here and largely obscured to the south due to the farmroof and the trees, but measurements were taken because the plan was to measure every time the horizon altered. The moon would rise and set as normal.

³⁵³ Oram, Moray, p.65.

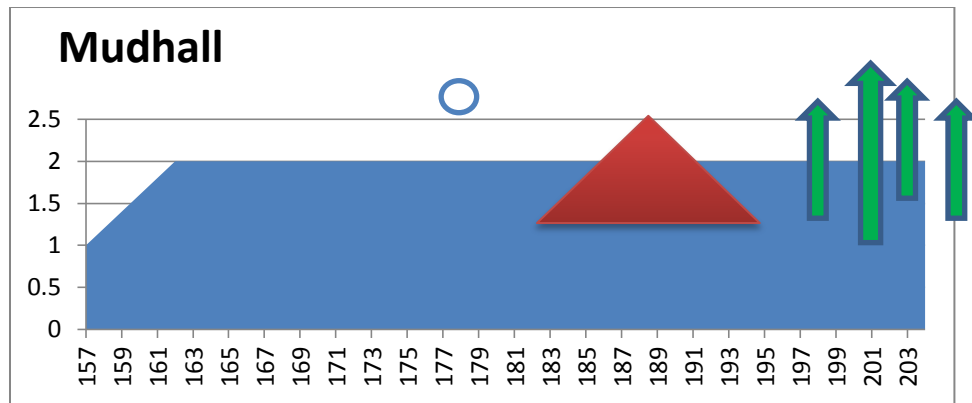


Figure 63 Mudhall

9) (64) Moy House Bridge 57° N 37' 22.6" 003° W 39' 03.8" elevation 9m.

See Figure 64. This is the first bridge over the Muckleburn and was near Moy House, Rodney's Stone (the Pictish Stone) was said to have originated near here. The horizon is fairly even to south-east and south-west but drops to zero due south as the burn cuts through the hills. Trees obscured the transitional area. The MLL moon would appear above the hills rising and setting as normal.

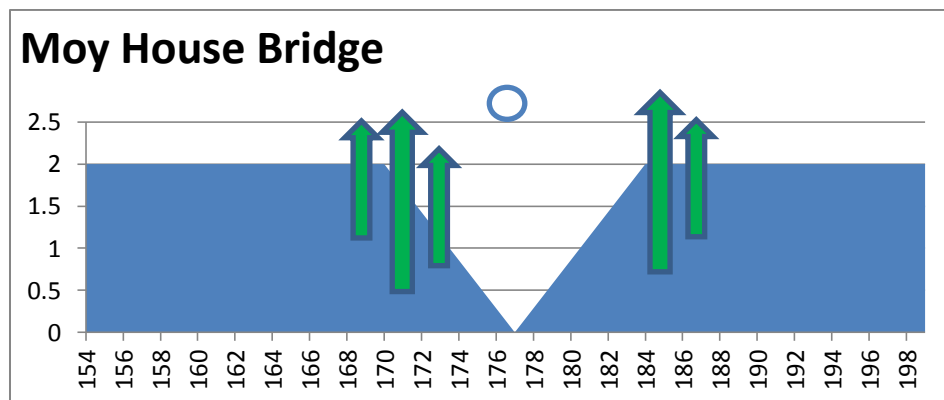


Figure 64 Moy House Bridge

River Findhorn

River Findhorn starts at the confluence of two major tributaries: the Dorbeck Burn and the river Divie; both having several tributaries. All of the measurements along the Findhorn were taken unaccompanied, except one near Grangegreen taken on the 16th February with Janita Stenhouse which was a cold clear day. I arrived as the sun was setting over the bay from Findhorn Harbour on 6th January 2016, when it was sharp and cold. Forres to Daless was measured on 23rd August 2016, a very

sunny warm day, with relatively little wind. The upper Findhorn, Coignafearn to Balvraid Steading, was measured on 16th October 2016 in windy conditions, when it rained a great deal, heavily from time to time, but not as constantly as along the Ettrick. Hilltops were occasionally obscured by low cloud or rain, which usually moved, if you waited long enough. The Findhorn rises in the Monadhliath Mountains and this stretch of the river was narrow, cold and windy, the region is known as Strathdearn, Anderson and Anderson said because it had once been the 'Earn' river.³⁵⁴ It felt quite isolated, but all the people I met were very friendly. There is a gap between Balvraid Steading and Daless which I never attempted. No roads extend along the river which becomes gorge-like, for about eight kilometres, with only a walking path along a steep hillside.

1) (65) Coignafearn 57° N 14' 06.4" 004 W 08' 12.7" elevation 382m.

See Figure 65. The road does continue past Coignafearn Lodge, but the valley becomes even narrower with steep hillsides. The hills rose up higher on either side than the 18 degrees at 154° and the valley floor is indicated by true south and southwest, however still too high for lunar phenomena. It was raining and very windy, making it hard to keep the ranging poles straight. This is the most remote I have felt on the whole project. Even the upper Spey felt less hemmed in by hills.

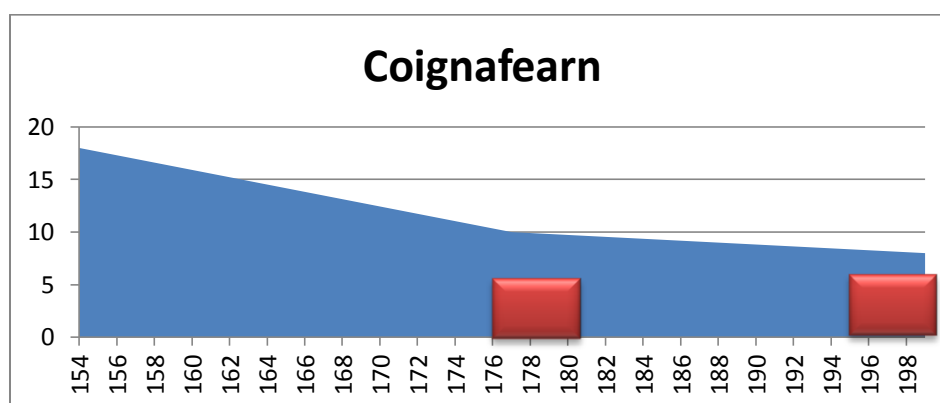


Figure 65 Coignafearn Lodge

2) (66) Between Coinascallan Farm and Dalmigavie (on the other side of the river) 57° N 14' 30.7" 004 W 06' 08.3" elevation 371m.

³⁵⁴ Anderson and Anderson, 1851 Guide, p. 302.

See Figure 66. Passing place where the river widened, similar to Ettrick, the southerly hills are too high to have notable lunar events. Even the drop of one hill where the river winds around it to the south is seven degrees in height and another hill behind rises to the right.

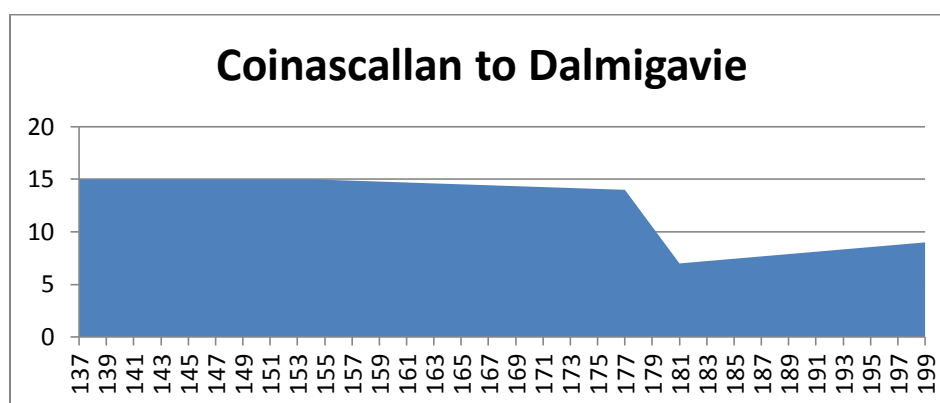


Figure 66 Coinascallan Farm to Dalmigavie

3) (67) Between Glenmazeran Lodge and Dalmigavie Lodge on the opposite side of the river 57° N 16' 47.0" 004 04' 31.10" elevation 341m..

See Figure 67. This is again at a place where I could pull into the roadside and was between two properties. Dalmigavie Lodge is a large hostel accommodating people on the other side of the Findhorn; I had earlier directed a lost couple there. I contemplated crossing over to inspect the cairns mentioned on the map, but Digimaps show they are on a steep hill facing north and the hill to the south would prevent any lunar sightings, plus they are not listed as Clava. They lie between two steams Caochan Seachdag and Caochan a' Phuill. Interestingly one nearest the river is opposite the church and graveyard, reinforcing my theory that cairns were located near good crossing routes. The modern graveyard might be simply continuing the tradition of burials. No lunar phenomena.

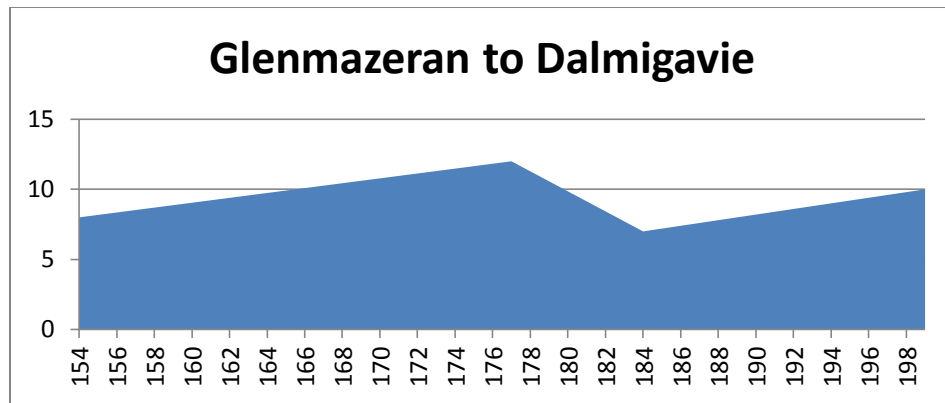


Figure 67 Glenmazeran Lodge to Dalmigavie Lodge

4) (68) Between Corrievorrie and Auchintoul 57° N 17' 58.2" 004°W 01' 37.5" elevation 345m.

See Figure 68. The hill rising in the figure is probably Carn Dubh (Black Cairn) which achieves 750m. The Monadhliath Mountains stretch away to the south. It's likely the moon could vanish into the hill and reappear, or rather glint before setting on years, bordering the MLL period. At MLL it would be invisible. The valley floor is quite flat here and in sharp contrast to the steepness of the hills. A small island has formed within the river, which is narrow at this time of the year. A fractious male pheasant kept calling in the woods behind me. There is a pass over the hills to Farr on the river Nairn between this measurement location and the previous one, up Kyllachy Glen and down Allt Beag.

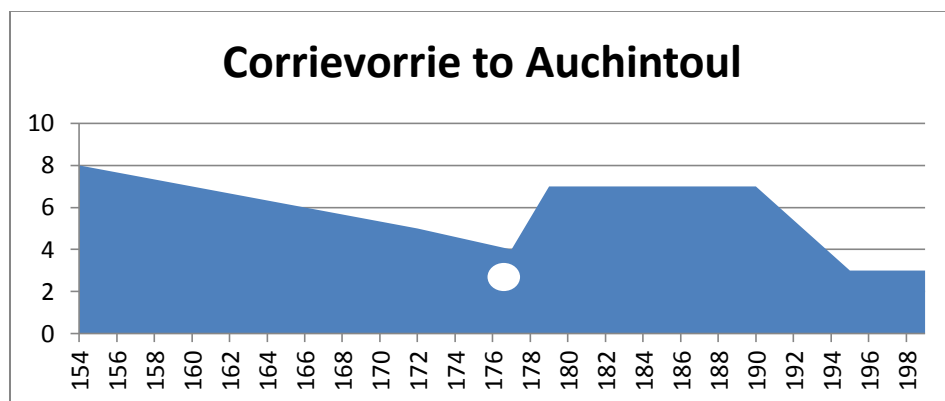


Figure 68 Corrievorrie to Auchintoul

5) (69) Mid Morile 57° N 18 57.1" 003° W 59' 54.2" elevation 316m.

See Figure 69. The hills are lower than further up the glen, and on years bordering on MLL years there could be lunar travel along the hilltops, setting towards where the

cairns are, but not during MLL years. Hut circles and a modern cairn are in the hills above Kyllachy House nearby. I met a cheerful couple walking their Labrador dog; they told me that the river rarely changes its course, at least not during his grandmother's lifetime. It is apparently becoming wetter and the river (quite narrow at this point) can dramatically rise several meters within minutes, which is perilous to anyone caught in its path. Anderson and Anderson recorded the worst flood 2nd to 4th 'August 1829' when the river gained forty feet (over 12m) above its normal course and 'it rolled along masses of rock from 6 to 8 tons' weight'.³⁵⁵ The soil is rich and serious floods rare.

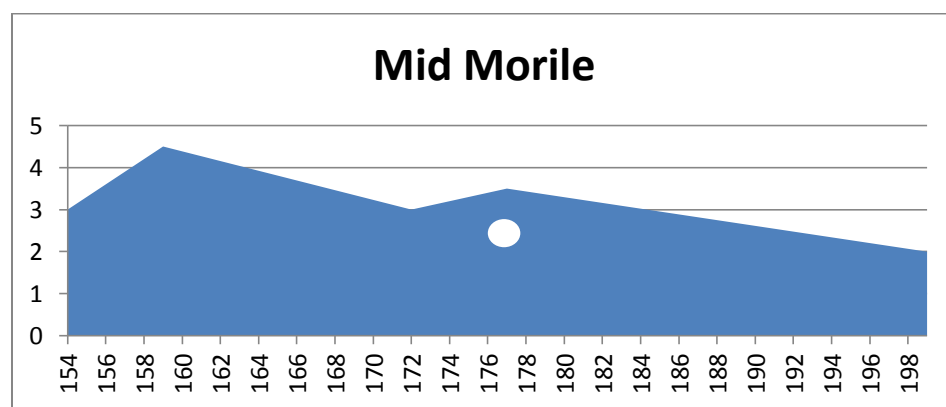


Figure 69 Mid Morile

6) (70) Below the Railway bridge 57° N 20' 04.7" 003° W 59' 10.6" elevation 290m.

See Figure 70. The rail and road bridges are way above this small road outside Tomatin. I stopped here because the river comes from the south for nearly three kilometres and is the only place along the river oriented this way except at the mouth of the river at Findhorn Bay. Interestingly the horizon is considerably lower than at other locations, allowing the moon to emerge out of the SE hill.

³⁵⁵ Anderson and Anderson, 1851 Guide, p. 313.

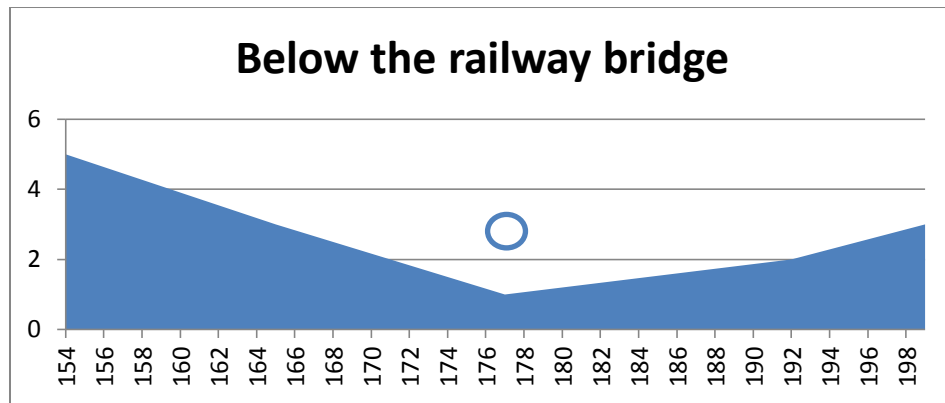


Figure 70 Below the railway bridge

7) (71) Corryburgh 57° N 20' 22.9" 003° S 58' 16.3" elevation 288m.

See Figure 71. This location had a lot of trees although it was possible to just see the horizon between trees. There are hut circles and field systems, in the hills, directly south of Corryburgh and General Wade's military road runs through the same hills. Today the A9 is close to that route, which it must do in order to go over Slochd summit. General Wade's road drops down from Slochd to cross River Dulnain, a tributary of the River Spey, before joining the Spey near Kinveachy. This location is interesting as the MLL moon would appear to emerge from the hill before sliding into setting.

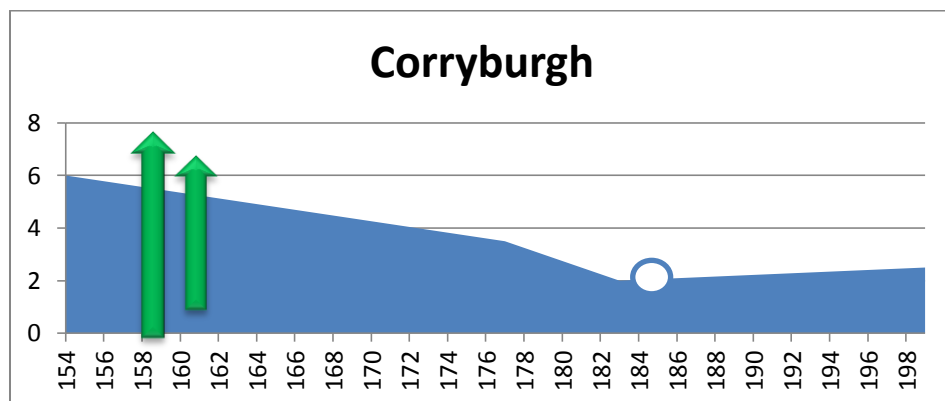


Figure 71 Corryburgh

8) (72) Near Edinchat 57° N 21' 13.0" 003° W 57' 14.7" elevation 307m.

See Figure 72. There is a cairn in the fields north of Edinchat, but it was along another stony, farm road and as my car exhaust had been damaged on similar roads the day before, I did not pursue this one. Close by is the Allt Bruachaig. It is worth noting that the Findhorn connects with the Nairn at this location, via the Funtrack

Burn, Loch Moy, the Moy Burn, Dalriach Burn and the Craggie Burn to join River Nairn at Craiggie where there are four cairns, not far from Daviot.

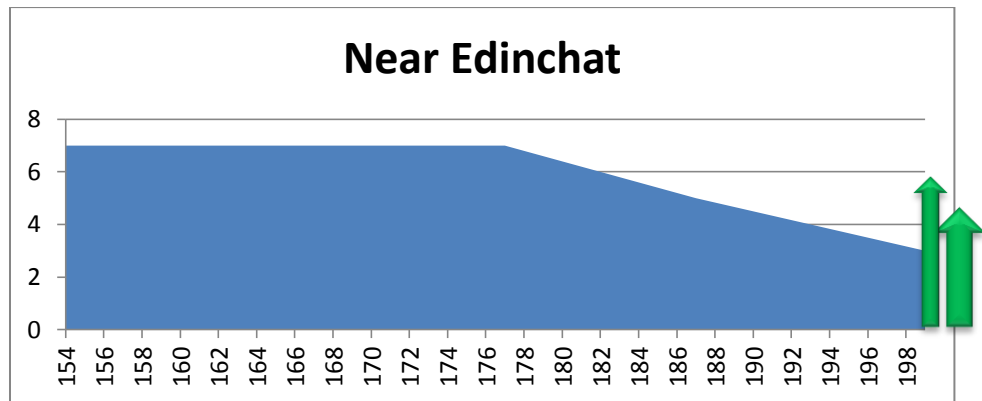


Figure 72 Near Edinchat

9) (73) Near Balvraid Farm 57° N 21' 16.1" 003° W 57' 09.3" elevation 313m.

See Figure 73. There was a road leading into the hills but this led away from the river, so I retraced my steps from here. This is not to be confused with Balvraid OCH Cairn, listed by Henshall, which is near the Isle of Skye. This was not a good location as the roadside had spruce trees across the whole horizon. I could measure hill height only as far as 180°, the tree branches became too low for me to peer through them. No lunar phenomena.

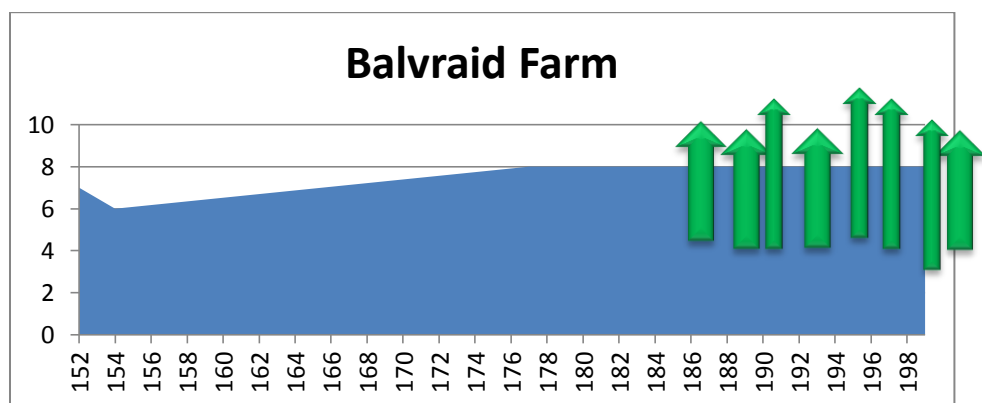


Figure 73 Balvraid Farm

10) (74) Daless 57° N 25' 24.2" 003° W 53' 59.0" elevation 243m.

See Figure 74. This stretch of road leading to this location was not as bad as it threatened to be; across a very rickety bridge the unwelcoming notice said Warning - road very steep, sharp bends and sheer drops. I was unable to locate the cairn, the track to it had a notice saying no access except 4 by 4's with a fishing licence,

although I knew it could not apply to walkers I went to the house to ask permission, only to be denied access, to what was in effect not their land - they said I had to have permission from the Cawdor Estate Manager, they only had cognisance of the walled buildings. With no telephone or Wi-Fi signal that would be difficult, so I took measurements from the parking area demarcating the end of the road. Two hillwalkers took a positive interest in the purpose of the survey. The hills were uniformly too high for lunar phenomena. I was on the same contour but the cairn view would have been very different. The Allt Breac is nearby and there is a ford. The red rectangle denotes the walled buildings.

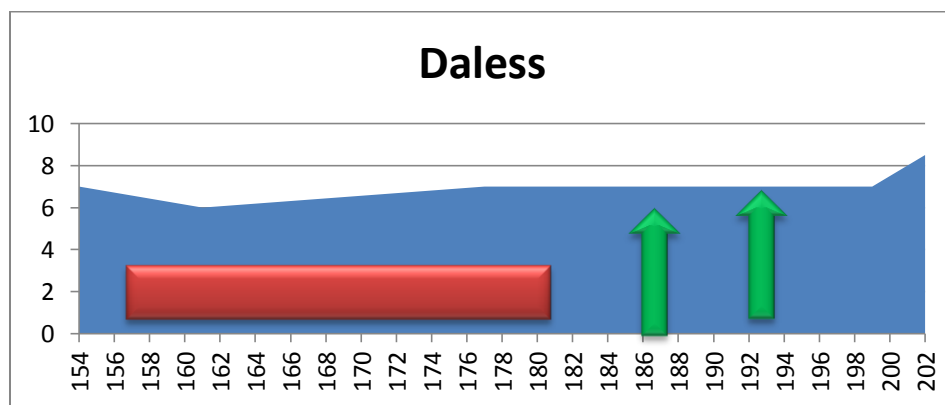


Figure 74 Dales

11) (75) Near Drynahan Lodge 57° N 26' 04.6" 003° W 53' 08.0" elevation 214m.

See Figure 75. This was a passing place just before Drynahan Lodge. This section of the river from Dulsie to Dales strongly resembles the Ettrick, in that the river flows from the east and the southerly hills are too high for lunar phenomena. At this location the hills drop to where the river flows more south west. The midsummer full moon would appear to emerge out to the hills and run along the river valley floor before setting into the westerly hill. (Perhaps this indicated towards the cairn location).

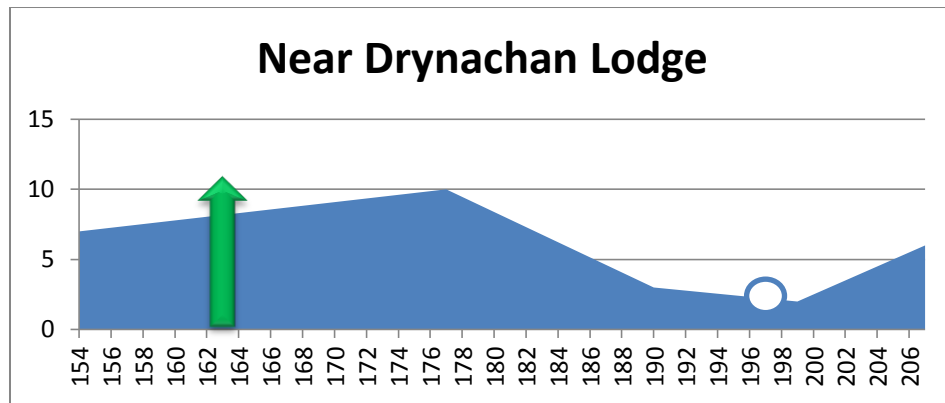


Figure 75 Near Drynachan Lodge

12) (76) Near Banchor 57° N 26' 37.0" 003° W 48' 57.3" elevation 256m.

See Figure 76. These hills are just too high for lunar phenomena.

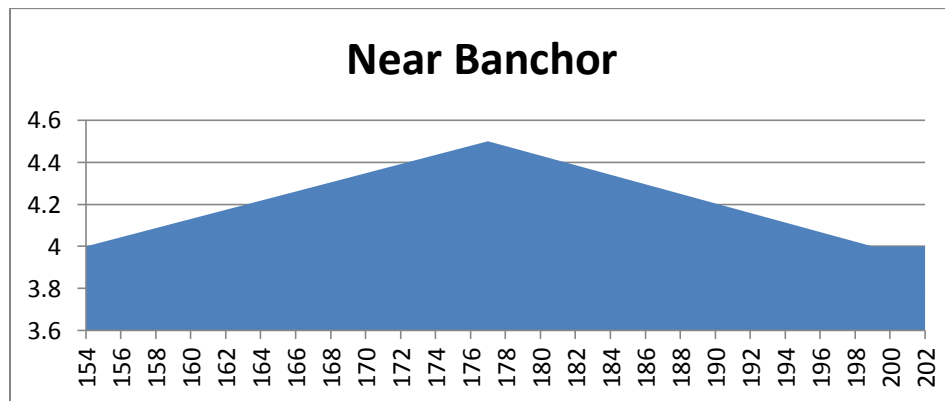


Figure 76 Near Banchor

13) (77) Near Princess Stone. 57°N 27' 33.0" 003° W 46' 47.8" elevations 212m

See Figure 77. Joined the old military road which leads from near the River Nairn to near Dulsie and stopped at the first opportunity not surrounded by trees. Princess Stone, a Pictish Symbol Stone, (also known as Glenferness) was across the river in thick woodland. The hills were too high for lunar phenomena.

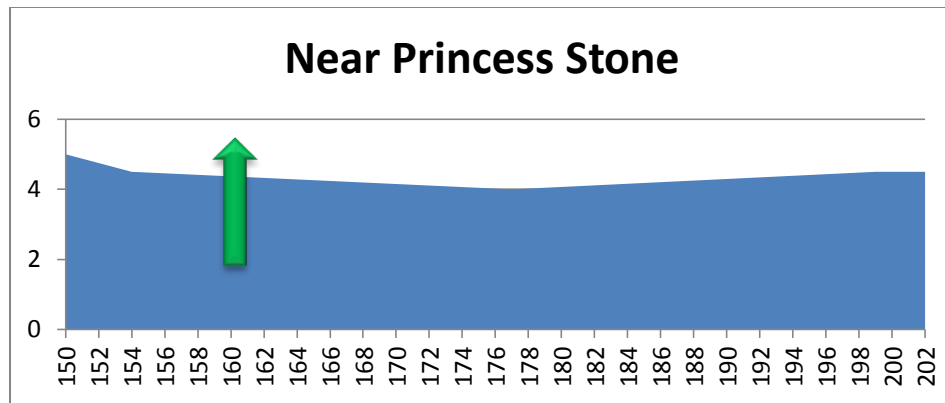


Figure 77 Near Princess Stone

14) (78) Levrattich Cairn 57° 29' 20.7" 003° W 45' 42.9" elevation 202m.

See Figure 78. This cairn is in a field overlooking the Findhorn and may have had a passage. The Red Burn is to the north but does not flow into the Findhorn. A large pylon was dominant at 167° and trees covered the nearer, lower hills from there to the south west, but did not impede the horizon. The cairn was very overgrown with grass and somewhat denuded; too small to be a ring cairn, but difficult to ascertain if it was a Clava cairn because of overgrowth and the lack of a stone circle. It is outside OCH territory so is probably a round cairn. It has a scenic aspect. There were 2 main peristalith stones, with a potential passage having four stones on the left side (discovered by pole prodding) and three on the right. If this was a passage it appears to be aligned on the southern major lunar limit providing declinations of -29.13° to -30.37° (Azimuths 164-175°). It was fairly egg-shaped approximately 11.09m by 6.85m. There were no stones remaining which could have been in an outer circle. The midsummer Full Moon would rise as normal and disappear into the southwest hills setting behind the hill. The potential passage aligns with where the moon vanishes. If the passage exists this might indicate a Clava rather than a round style. However Henshall said there were no clava cairns along the Findhorn, so it is probably a round cairn.³⁵⁶

³⁵⁶ Henshall, CT. Vol. I, p.17.

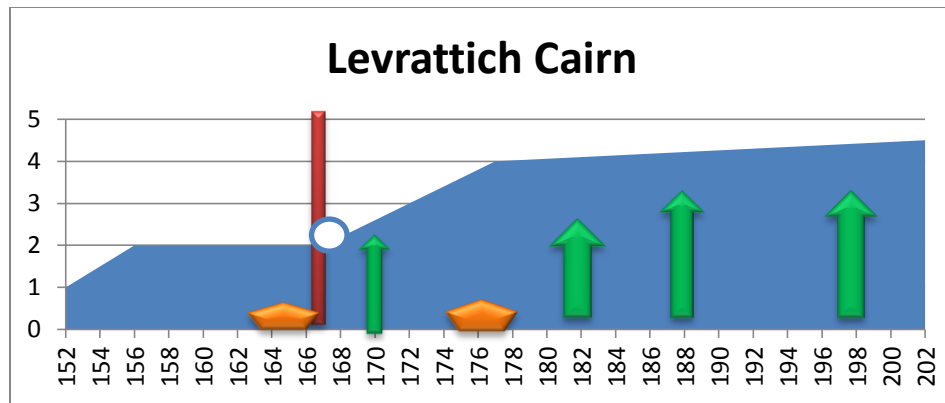


Figure 78 Levrattich Cairn

15) (79) Ardclach Church near the 1655 Bell Tower. 57° N 29' 30.8" 003° W 45' 22.4" elevation 183m

See Figure 79. Ardclach or *Aird Chlach* means high church or high stone. Browne argued that the Gaelic word *Chlachan* means both stone and Kirk (*church*) so 'the phrase "are you going to Kirk?" is stated "are you going to the stones?"', much as it does in Ireland and he noted two RSC's with Kirk in their name.³⁵⁷ The sitting moon could have been visible from here.

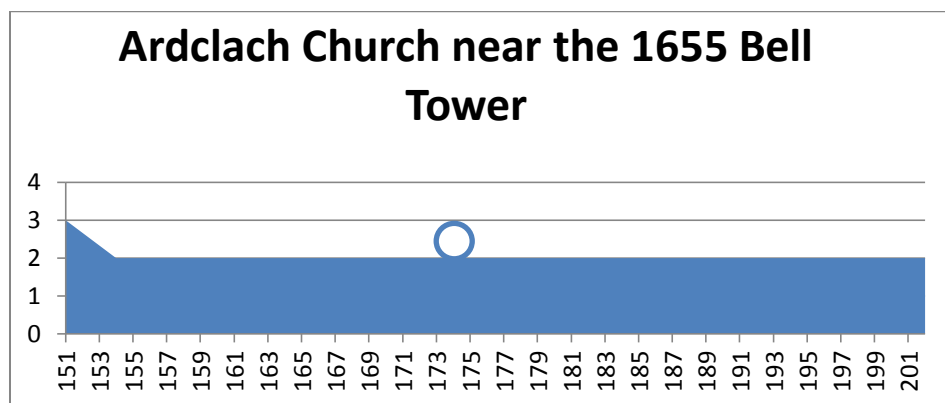


Figure 79 Ardclach Church near the 1655 Bell Tower

16) Little Lyne 57° N 29' 26.5" 003° W 42' 56.5" elevation 217m.

Measurements were taken above a steep drop down to the river consequently the horizon was level from 157 to 202 at zero degrees, so no diagram. The moon rises and sets normally.

³⁵⁷ Browne, Antiquities, p. 18.

17) (80) Between Airdrie and Achnagairn 57° N 30' 20.0" 003° W 42' 0.06" elevation 171m.

See Figure 80. Trees obscured horizon to the south east, but were thin enough to see that the horizon dropped, it is too high south and southwest to be significant.

Midsummer full moonrise quickly vanishes behind the hill.

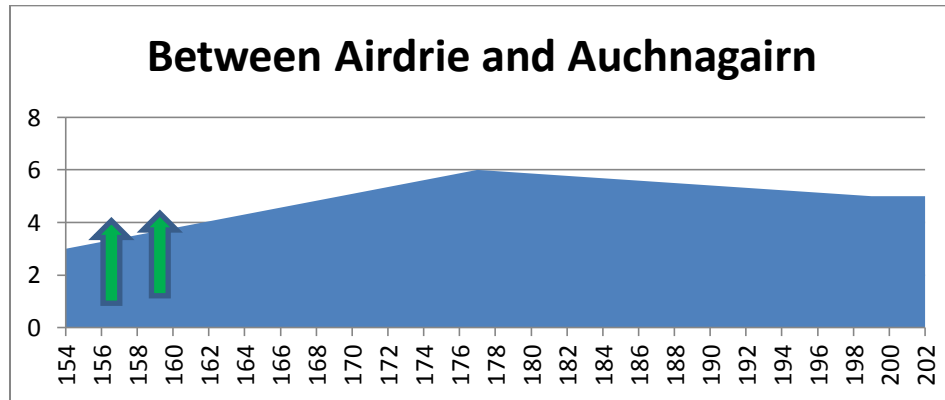


Figure 80 Between Airdrie and Achnagairn

18) (81) The Gleneney-Darnaway Crossroads 57° N 31' 01.4" 003° W 41' 07.7" elevation 146m.

See Figure 81. This is after Doune of Relugas where the Dorbackburn joins the Findhorn. The hills are too high to exhibit lunar phenomena.

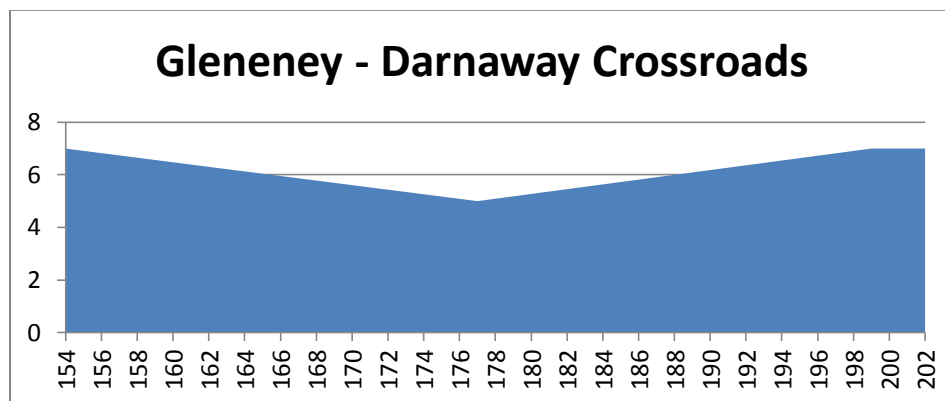


Figure 81 Gleneney-Darnaway Crossroads

19) (82) Above Logie Steading 57°N 32' 06.9" 003° W 39' 05.8" elevation 150m.

See Figure 82. There were many wind turbines from 138° to 145° (the object in the diagram), but southerly hills were too low to be of interest, except to the south west where the midsummer full moon would set directly into the hill.

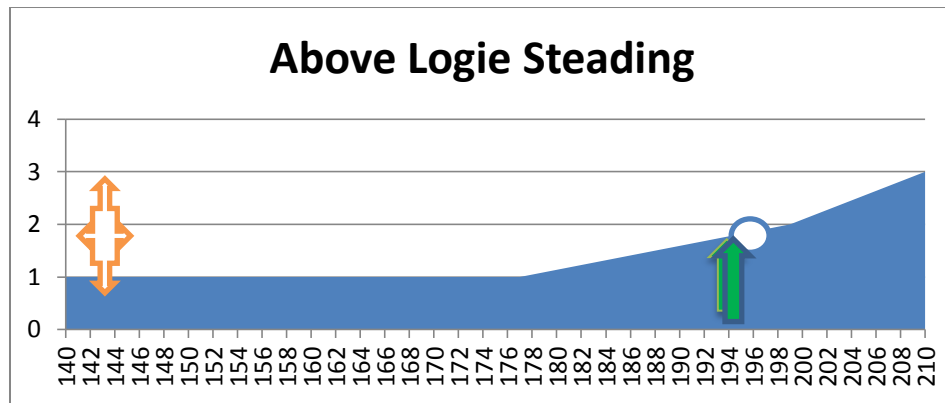


Figure 82 Above Logie Steading

0) Fairyhill Quarry 57° 35' 23.6" 003° W 37' 21.0" elevation 35m

Stopped here because of the name, I had driven a distance and was unable to see the southerly horizon due to 15m high trees on the roadside. Digimaps note there is a Cist nearby. This spot was surrounded by trees, from 360° to 233° where the north eastern horizon was 0° marked 0 on map.

20) Outskirts of Forres near playpark 57° N 36' 02.8" 003° W 37' 21.0" elevation 20m.

The horizon was completely flat between buildings, uniformly 0° from 157° to 210°. So the moon rises and sets normally.

21) (83) Near Grange Green 57° N 36' 25.6" 003° W 39' 51.3" elevation 13m.

See Figure 83. The hills were a uniform two degrees and some distance away. This area is very flat, the river flows uninterrupted and small bridges cross over both the Findhorn and nearby Muckleburn. A good quality Pictish Symbol Stone, Sueno's Stone, stands in nearby town of Forres. Many legends abound about this stone; it is probably one of the few in its original position, which is rare as John Stuart describes many used as parts of Churchyard walls or as gravestones.³⁵⁸ Normal if brief rising and setting occurs.

³⁵⁸ John Stuart, *Sculptured Stones of Scotland* Vol. 1 (Aberdeen: William Bennett for the Spalding Club, 1856), p. 8.

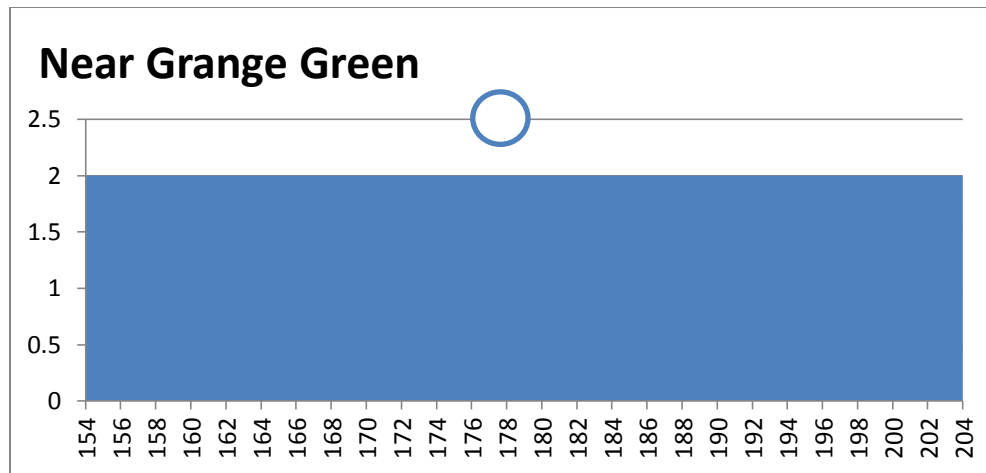


Figure 83 Findhorn near Grange Green

22) (84) Findhorn Harbour I reached the beach around sunset, which is low to the southwest in January 57° N 39' 21.10" 003° W 36' 22.17" elevation 3m.

See Figure 84. Hills are relatively low and a considerable distance away across the expanse of Findhorn bay. Simpson said there was evidence of Mesolithic campsites near here.³⁵⁹ A nearer hill (still across the bay) starts to rise before sunset away to the right of the diagram area. The Moon will emerge and sit on this horizon but perhaps the distance makes it less dramatic.

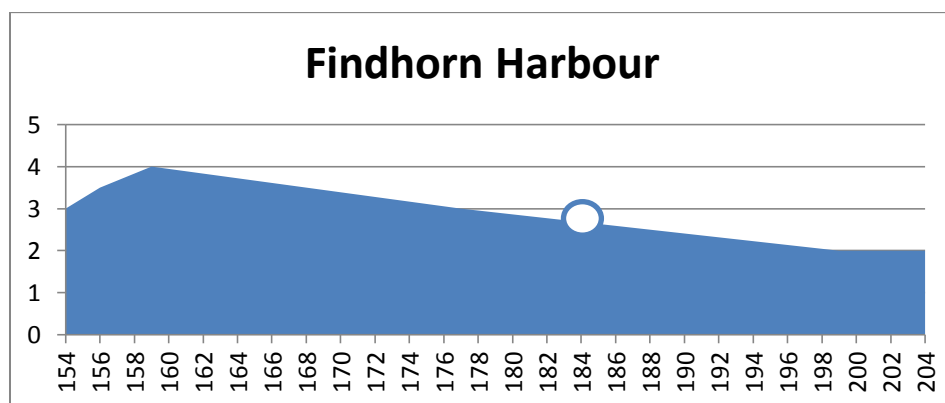


Figure 84 Findhorn Harbour

River Spey

River Spey, in Gaelic *Uisge Spe*, is the United Kingdom's eighth longest river and the second longest in Scotland at 109 miles (175.4 kilometres) it flows from

³⁵⁹ Eric Simpson, Banff Moray & Nairn, p.1.

sources above Loch Spey to Spey Bay in the Moray Firth, having a catchment area of 1,097 square miles (284,121 hectares).³⁶⁰ The upper Spey connects via Loch Laggan and River Spean with Loch Lochy, (close to lower Loch Ness) which leads to Loch Linnhe, the Firth of Lorn and the Irish Sea. Other tributaries connect directly with Loch Ness. All measurements along the Spey were unaccompanied. The beginning and middle of the Spey were measured on 13th to 17th October 2016. The weather was initially reasonably dry with sunny spells and short showers, which meant it was possible to measure horizons. Saturday 15th October was initially cold and wet, becoming progressively wetter and windier until I had to abandon measurements as fog prevented sight of any horizon. That night was stormy, but the following two days were better, cold and rainy at times, requiring steady pole placement to counter the wind and multiple measurements, but horizons were intermittently accessible. The final reaches of the Spey were measured on 25th August which was a sunny, warm, slightly overcast, windy day and 26th August which was also sunny, slightly more overcast and a great deal windier. The difficulty in surveying in summer is that fields have standing wheat which could not be disturbed, so some cairns were not accessed. The difficulty of surveying in the autumn is when the bull services cows in the field, preventing access to two cairns and fog really prevents any measurements.

1) (85) Garva Bridge 57° N 01' 11.8" 004° W 26' 10.1" elevation 300m.

See Figure 85. This was quite an isolated area, no sign of habitation, sheep were coughing. Carn Dubh 767m (Black Cairn) rises to the south. Across the bridge the road became a track and although this could have led to the standing stone (Clach Chathail) it was already dusk, so I decided not to pursue that location. The road here is General Wade's Military road which passes Clach Chatail to the Corrieyairack Pass which leads, via Glen Tarff, to Fort Augustus at the bottom end of Loch Ness. Fort Augustus has access via lochs, south to the Irish Sea and west to the Hebrides. Hills rose to the east, so azimuth 142° only indicates the lowest point, indicating the Spey. As hills are already at three degrees when the moon rises it would not be visible.

³⁶⁰ <http://localreviews1.knoji.com/facts/aboutscotland/sfivelongestivers>.first accessed 21/10/15.

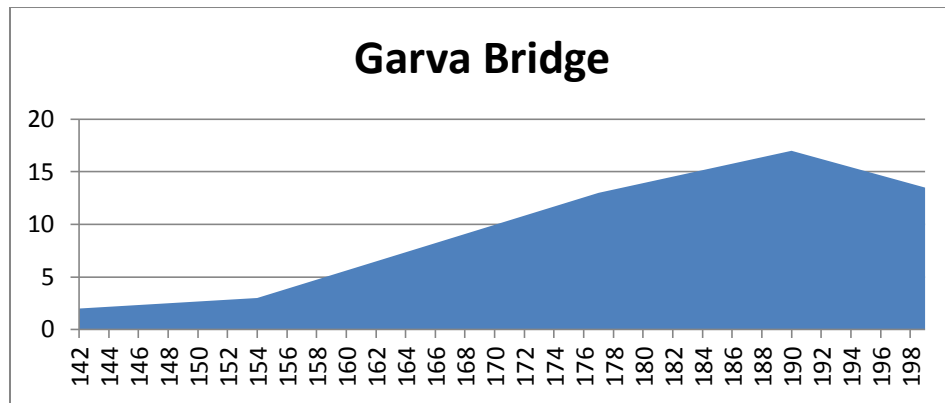


Figure 85 Garva Bridge

2) (86) Glenshero 57° N 00' 28.2" 004° W 23' 02.5" elevation 275m.

See Figure 86. The hills open out to the south and Glen Shirra, which is a tributary of the Spey. The hills are far too high to exhibit moon phenomena. They drop to only one degree above the Spey at azimuth 226°, but this is a narrow area with more hills rising to the west.

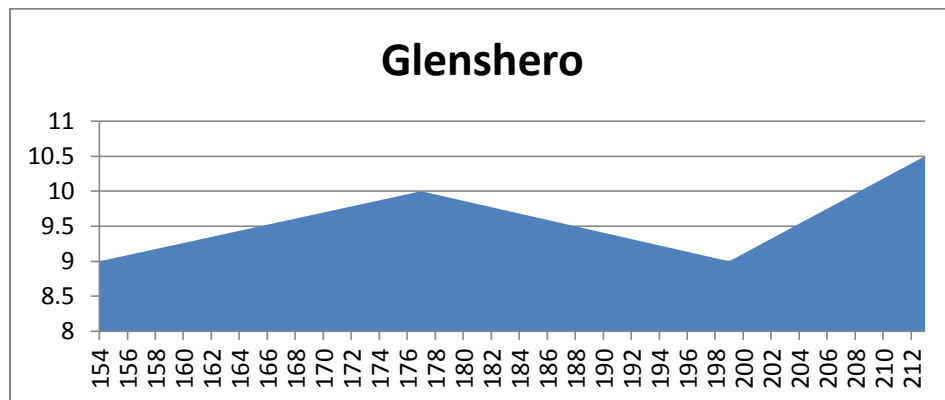


Figure 86 Glenshero

3) (87) Spey Dam 57° N 00' 42.0" 004° W 20' 10.8" elevation 267m.

See Figure 87. Hills are too high for lunar phenomena

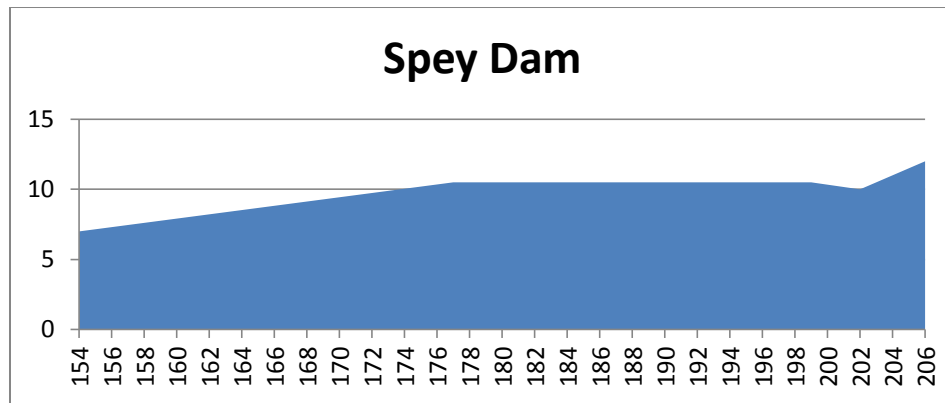


Figure 87 Spey Dam

4) (88) Near Coul Farm 57° N 00' 52.8" 004° W 19' 04.2" elevation 256m.

See Figure 88. Tree top height was taken as trees covered much of the hills. The river is flowing just behind the sparse trees between azimuths 160° and 175°. No lunar phenomena.

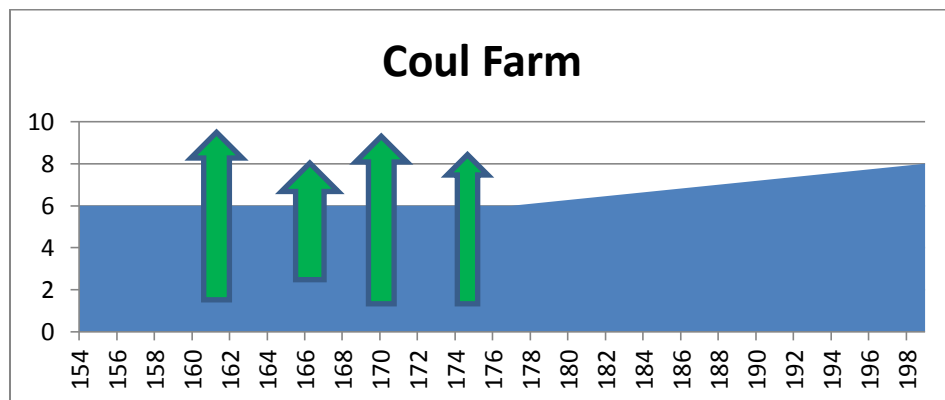


Figure 88 Coul Farm

5) (89) Below Blagen Farm 57° N 01' 01.7" 004 ° W 18' 32.0" Elevation 255m.

See Figure 89. This was a better place from which to take measurements. The dusk was further developed and shortly afterwards I saw a wildcat catching its prey in the bushes and an osprey, who would be the weaker young left behind after migration, taking a dead pheasant from the road. Pheasants are bigger and brighter-coloured than in August, but just as prone to run into the road in front of you. I reported the wildcat to the monitoring authorities as it had no signs of being a hybrid and they are a protected species. The hills are lower here, but still too high for lunar events, even at setting.

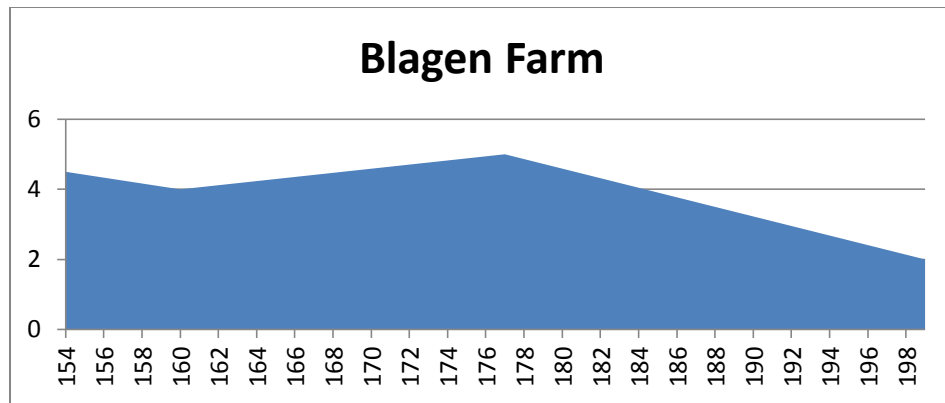


Figure 89 Blagen Farm

6) (90) Spey Bridge at Laggan 57° N 01' 02.9" 004° W 17' 02.6" elevation 255m.

See Figure 90. The hills are too high for interesting lunar events.

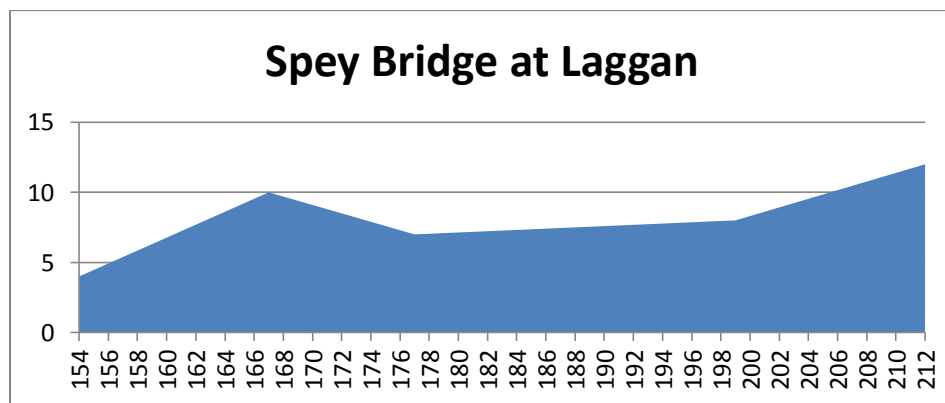


Figure 90 Spey Bridge at Laggan

7) (91) Near Cluny Castle 57° N 01' 05.7" 004° W 14' 45.5" elevation 251m.

See figure 91. Here the hills are interestingly low enough for the upper part of the moon to be seen due south. General Wade's Road runs on the south side of the valley at this stage having crossed the river. The river valley has widened since the narrow point at Laggan.

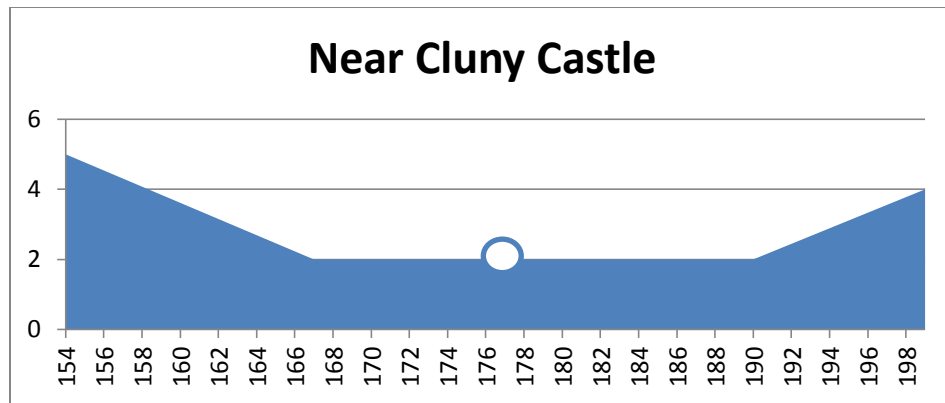


Figure 91 near Cluny Castle

8) (92) Near Auchmore 57° N 01' 26.3" 004° W 11' 58.8" elevation 272,

See Figure 92. Cruben Beag (590m) rises up due south preventing interesting lunar events. The dip in the horizon is where tributaries join the river. This is too high for lunar events.

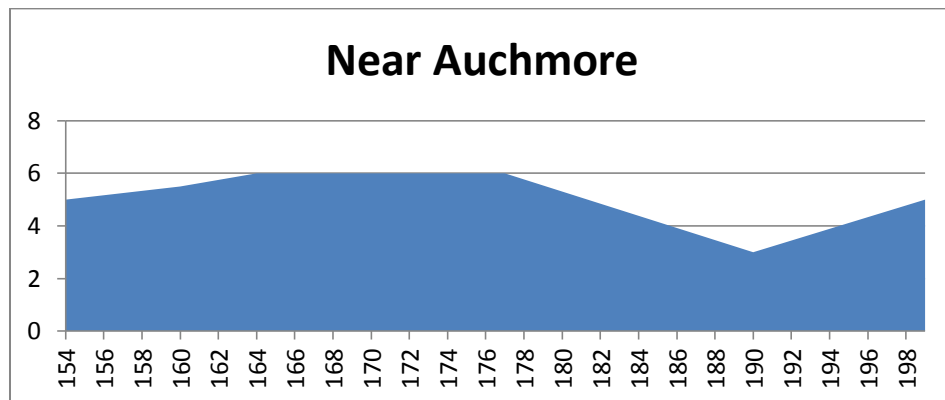


Figure 92 Near Auchmore

9) (93) Biallaidbeg cairn 57° N 03' 04.1" 004° W 09' 06.5" elevation 254m.

See Figure 93. There is a non-Clava cairn in the hills above here, Biallaidbeg but it was surrounded by trees, so I did not attempt it. The hut circles in the field just below were visible. The low point on the horizon is River Truim, which connects southwards and the modern A9 travels along Glen Truim, as does General Wade's military road. The cairn was on a contour which will have altered the angle. Here with an altitude of 3.5° due south the moon would be invisible. There are two old townships in the area.

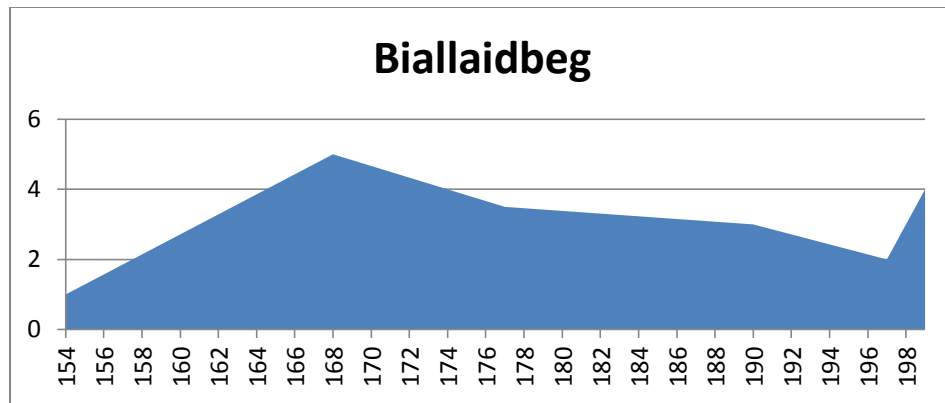


Figure 93 Biallaidbeg

10) (94) Newtonmore cairn 57° N 03' 32.0" 004° W 07' 52.0" elevation 249.

See Figure 94. While the cairn's existence is obvious it is almost impossible to discern any cairn detail. A cairn in the neighbouring valley Glen Banchor was visited by Henshall who found 'no structural features' so she suggested it was a long cairn - it was also close to ancient townships.³⁶¹ This cairn lies close to where the River Calder joins the Spey. Canmore note it as Newtonmore cairn, saying it was visited on 23 November 1995, with a diameter of 13m and was 1.2m high.³⁶² Trees have grown on the mound and it was very ruinous. Clearance stones have been added on the north side. It appears to be the size of a passage grave, but there is no real evidence of this, it could equally have been the remains of a long cairn and unlikely to be Clava. The mound is quite distinctive rising from flat fields. Large trees dominate the site. Clouds obscured the horizon between 185° and 190°. Only one third of the MLL moon appears, it moves due south and sets. This is partial moon site.

³⁶¹ Henshall, CT Vol. II, p. 380.

³⁶² <https://canmore.org.uk/site/138258/newtownmore> [Accessed on 11 November 2016].

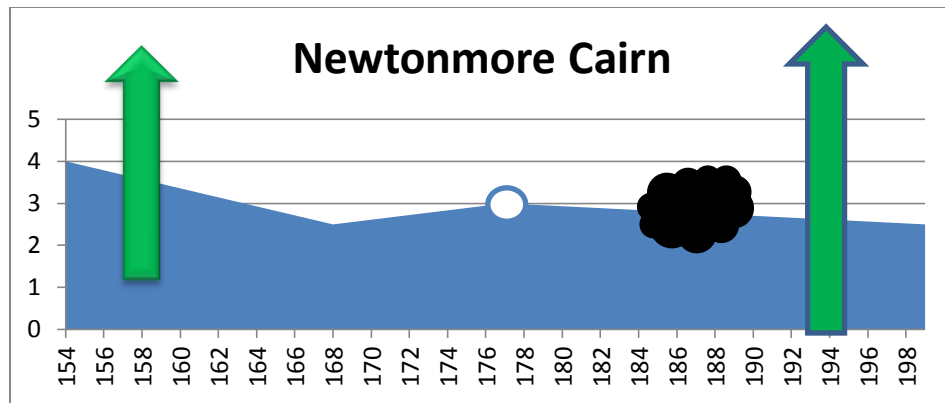


Figure 94 Newtonmore Cairn

11) (95) Altlarie Cairn Ring-cairn 57° N 04' 09.2" 004° W 06' 07.8" elevation 241m.

See Figure 95 and 95A. Altlarie is in the grounds of the Highland Folk Museum, although those I spoke to were unaware of it. As the name suggests it is near the Allt Laraidh tributary. It is also known as Tom a Chladha which probably means disinterred hillock. 1870's Digimap noted 'Stone cists urns and human remains found here in A.D. 1860'.³⁶³ General Wade's military road is nearby. The Museum moved from Kingussie some years ago. It is an open air museum with buildings dating from various periods, including the reconstructed village of 1700 Jacobite turf houses. The archaeology excavated site is within five miles and the comparisons between these and Hebridean Black Houses are quite striking. There were many red squirrels in the woods. The cairn mound is prominent next to the railway. Henshall visited in 1958, commenting it was much robbed probably 'from the time the railway was built'.³⁶⁴ Her description of 'Kerbstones hardly protruding through the turf' met my experience.³⁶⁵ I could not estimate the diameter but Henshall gives 13.7m., lists it as Clava and noted the '6 inch OS map' reference given above.³⁶⁶ Trees did obscure small sections of the horizon. The MLL Moon would appear to skim along the hill, perhaps partially obscured by trees, go behind the hill, but emerge whole again before setting. The moon visits and reappears from the underworld; it is an emergent moon site.

³⁶³ <http://digimap.edina.ac.uk/roam/historic> [Accessed on 17 December 2016].

³⁶⁴ Henshall, CT, Vol. II, p.358.

³⁶⁵ Henshall, CT, Vol. II, p.358.

³⁶⁶ Henshall, CT, Vol. II, p.358.

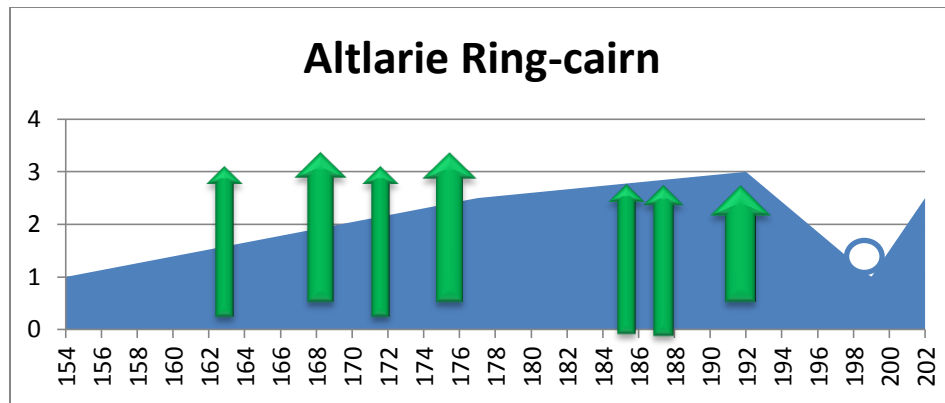


Figure 95 Altlarie Ring-cairn

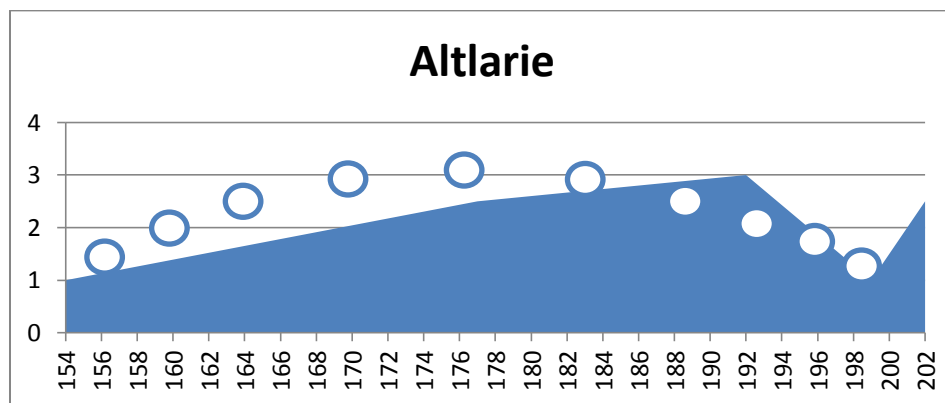


Figure 95A Altlarie with lunar rising and setting on 23/24 June 2015 BCE where the Moon reaches $3^{\circ} 19' 0.8''$ due south at 1 hr 14m 31s, so it appears to skim along the hill, disappear and then reappear before setting into a hollow. Lunar data is from Stellarium.

12) (96) Tigh-na-Gaoth Cairn $57^{\circ} \text{ N } 04' 33.1'' 004^{\circ} \text{ W } 04' 43.5''$ elevation 246m.

See Figure 96. The Caochan a' Mhanaich joins the Spey close by. This cairn is marked on the map and I asked the landowner if I could visit it, he seemed unaware that he had a cairn until I described it as a mound of stones with a depression. He recognised that as the place where the children had built their den and it still had the, now partly collapsed, wooden roof. It had a huge spoil heap of stones (field clearance) to the north, from where I took measurements, as the wooden structure looked too precarious to stand on. Tigh-na-Gaoth possibly means lord of the wind. The hills are low enough for lunar events - the moon would rise sufficiently to sit on the horizon on MLL years.

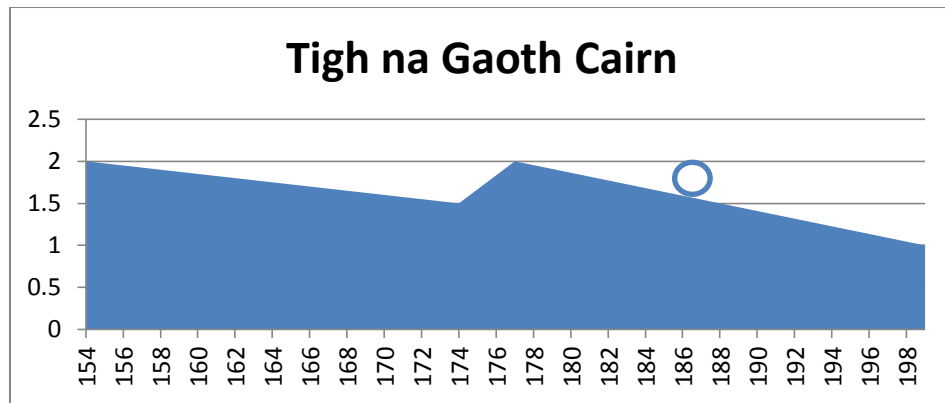


Figure 96 Tigh na Gaoth cairn

13) (97) Cemetery outside Kingussie 57° N 05' 07.9" 004° W 01' 32.8" elevation 226m.

See Figure 97. The valley is reasonably wide, but it felt more closed in at this point, also I was much closer to the river. The A9 road to Inverness crosses the river Spey at Kingussie, although the town grew because of the railway. The traditional crossing had been nearer Newtonmore where the townships and cairns are. While being much the same height above sea-level, the river is marshier hereabouts and closer to me, whereas it had been over the other side of the strath at the last location. The very flat area to the SW is the tributary coming in from Glen Tromie. The moon goes briefly behind the hill, appearing to disappear and emerge, although some years it never completely vanishes.

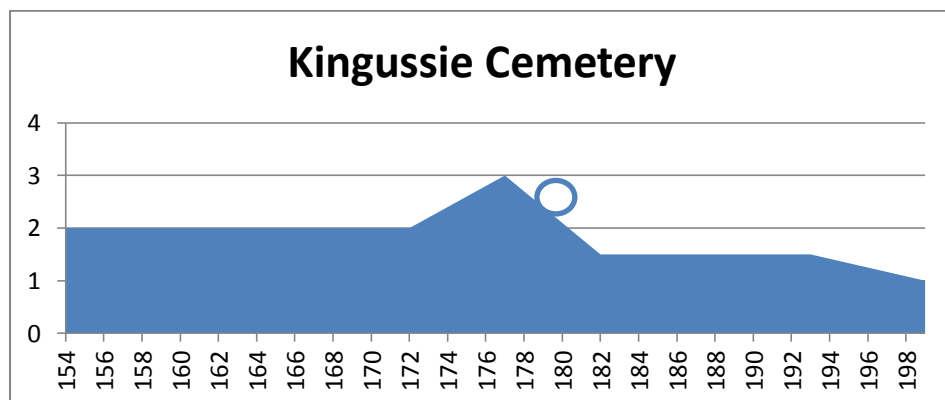


Figure 97 Kingussie Cemetery

14) (98) Leaping cat house 57° N 06' 56.7" 003° W 56' 47.8" elevation 224m.

See Figure 98. I travelled along the old A9, which hugs the riverside, the new A9 is far too fast to allow me to stop and take measurements and it had roadworks at this section. I had been looking to turn left uphill to find Delfour Cairn, but all the side roads were closed due to roadworks on the A9. I stopped at this closed road next to a house with a carved leaping cat and the railway, which runs between me and the river, had a small bridge. I could take a hill sighting as the cloud had finally cleared from the hilltops. The moon would emerge from the hill.

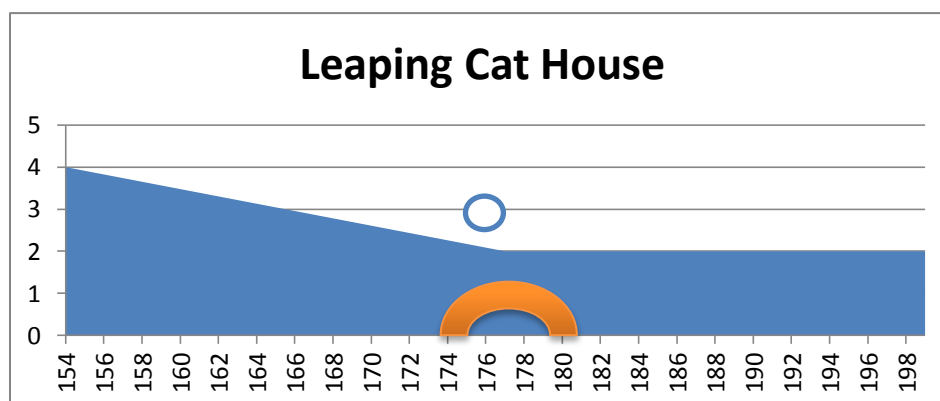


Figure 98 Leaping Cat House

15) (99) Layby on the A9 57° N 05' 30.9" 004° W 00' 54.8" elevation 240m.

See Figure 99. Travelling along the A9 found that there were nine miles of roadworks, so access to Delfour will be difficult. In case I did not manage I took a roadside measurement from layby 116. Hills too tall for midsummer moon events.

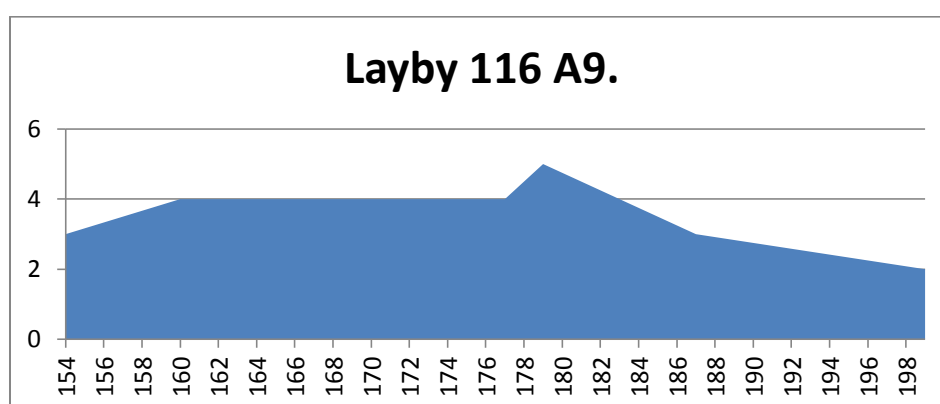


Figure 99 Layby 116 A9

16) (100) Delfour ring-cairn 57° N 09' 12.6" 003° W 54' 43.3" elevation 244m.

See Figure 100. I eventually made it to this cairn on my way home on the 17th October. It required finding the correct turnoff permitted by the roadworks. It is near

a ford of the Allt an Fheàna, which flows into Loch Alvie not the Spey, although the Feshie River is on the other bank. Access to the cairn itself is by a stile (the only one I encountered) and a small well-maintained wooden gate. This has a substantial inner ring which is mostly intact. Much of the cairn rubble material is gone but some rubble remains. The outer ring kerb is also mostly intact. It looked as though some clearance stones may have been added in the north east corner. There is one substantial monolith to the SW, which is all that is left of the outer ring. The centre of the ring has a small group of loose stones 0.48m tall, 0.35m wide, but too unstable to stand on, so exceptionally I took measurements from in front of this. Trees obscured part of the horizon. The MLL moon would sit in the hollow created by the hills then slide out of sight - emerging, sitting and then disappearing. This drop in height is created by Glen Feshie as that river joins the Spey from the south. The cairn is built opposite that Glen. The main monolith, measured from the near centre of the cairn provided declinations -20.31° to -22.31° (azimuths $218-223^{\circ}$) not indicating anything, probably due to me not being at the centre. When measured from the kerb-stones, as at other sites, it is orientated towards the midwinter sunset -14.94° to -26.40° (Azimuths $206-235^{\circ}$). Burl found the stone at 'azimuth 219° ', exactly central on the monolith.³⁶⁷ Scott provided HER with an excellent photograph of the 1995 midwinter sun setting into the circle orthostat.³⁶⁸

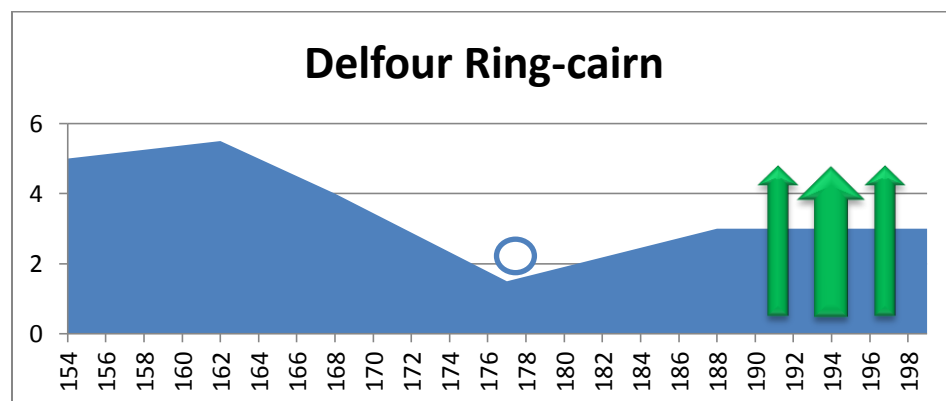


Figure 100 Delfour Ring-cairn

17) (101) Aviemore Waterworks 57° N $10' 30.6''$ 003° W $50' 21.0''$ elevation 210m.

³⁶⁷ Burl, Guide, p. 132.

³⁶⁸ Douglas Scott, <http://her.highland.gov.uk/FullImage.aspx?imageid=219987&uid=MHG4428> [Accessed on 29 November 2016].

See Figure 101. The weather was closing in and I had to wait a long time before being able to see the horizon. I also travelled towards Rothimurcus looking for a better sighting, but trees obscured all southerly views. The hills rise steeply to the north at this point. The moon emerges from the southern hills before setting.

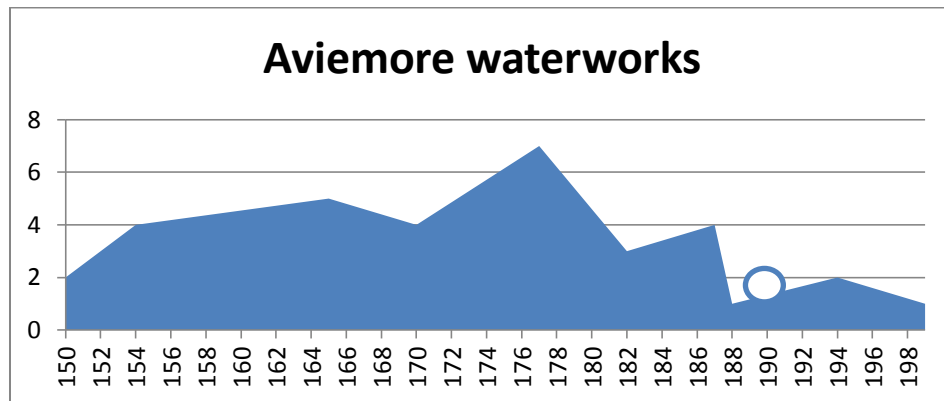


Figure 101 Aviemore Waterworks

18) (102) Aviemore Ring-cairn 57° N 11' 55.5" 003° W 49' 38.6" elevation 204m.

See Figure 102. This cairn is in the middle of town, surrounded by houses. River Druie joins the Spey just upriver if this cairn. There is a plaque placed by Badenoch and Strathspey district council, informing people that the 'ceremonial gathering place' had been covered with soil for its protection and the inner kerb was now not visible.³⁶⁹ Four circle stones survive, none particularly high and none proud of the horizon, Henshall noted that it had seven when 'visited by Angus Grant in 1877' and Burl noted 'five remain one fallen'.³⁷⁰ I measured the largest stone and found that it was aligned with MLL moonset. Trees obscured the horizon above the right hand side of the stone, so this is only a possibility, although the left-hand side of the stone and the low horizon behind it were clear. Declinations are -25.49° to -30.11° azimuths 200-207° major limit moonset. Trees and house roofs also obscured the skyline at 157° azimuth. The MLL moon appears to go into the hill and emerge again before disappearing into the next hill or setting into the stone.

³⁶⁹ Badenoch and Strathspey district council on-site plaque.

³⁷⁰ Henshall, CT Vol. I, pp.360.14: Burl, Guide, p.127.

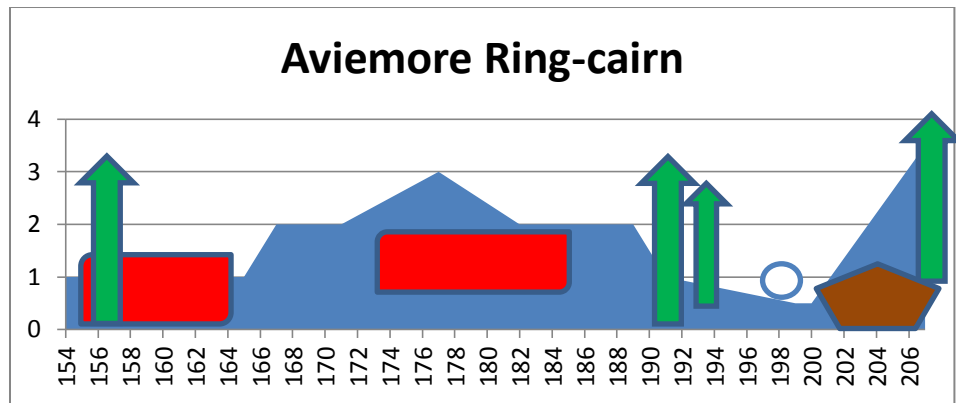


Figure 102 Aviemore Ring-cairn

19) (103) Near Avielochan passage-grave 57° N 13' 37.1" 003° W 48' 31.9" elevation 236m.

See Figure 103. This cairn overlooks Avielochan. I was unable to access the cairn. A young woman warned me that a bull had been placed in the field to service the cows earlier that day. It was therefore too risky to enter the field, so I took measurements from the side of the field. This was only one of two Clava passage-graves listed as being on the Spey. Aubrey Burl said it was aligned on the MLL moonrise; he gave a declination of '-29.1°'.³⁷¹ Henshall commented that it probably never had a stone circle, and that bone fragments found there were 'almost certainly secondary' and 'not certainly human', also found in the passage was a 'fragment of jet armlet'.³⁷² Henshall also described the other cairn within 11m to the SW of Avielochan, as 'much robbed'.³⁷³ The cairn itself is on a knoll and there are many trees. A slightly higher altitude to where I was standing might generate a moon sitting on the horizon due south (here it only shows the upper rim). The moon here is an emergent moon.

³⁷¹ Burl, Prehistoric Astronomy, p. 28.

³⁷² Henshall, CT, Vol. I, pp.29.39.360.

³⁷³ Henshall, CT, Vol. I p. 360.

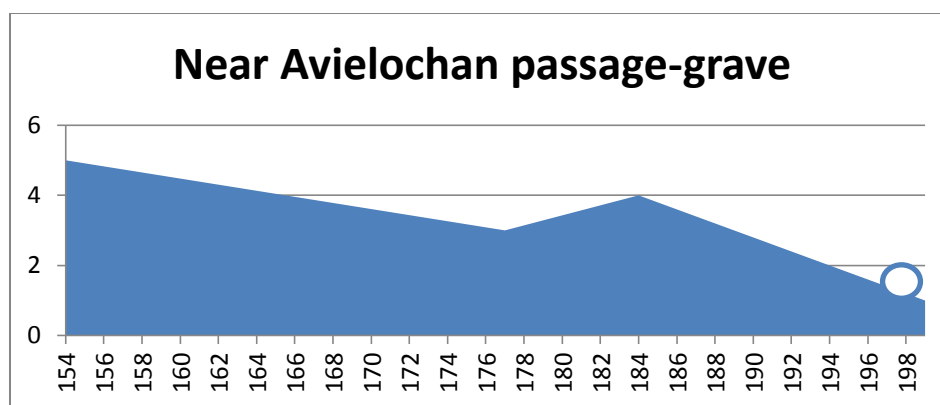


Figure 103 Near Avelochan passage-grave

20) (104) Near Loch Vaa 57° N 13' 55.3" 003° W 48' 36.1" elevation 250m.

See Figure 104. I attempted to get to Grenish, which by all accounts has two ring-cairns in wonderful condition. Hayman stated that the use of stones in the ritual inauguration of Scottish Kings originated from the tradition of 'Pictish Kings' being inaugurated at Grenish.³⁷⁴ It started to rain heavily and I tried various track-routes, but these all turned out to be unpassable. A long walk in heavy rain, with clouds obscuring everything, defeated me. The next roadside measurement was near Loch Vaa, which has a crannog and where the disappearing moon would be visible.

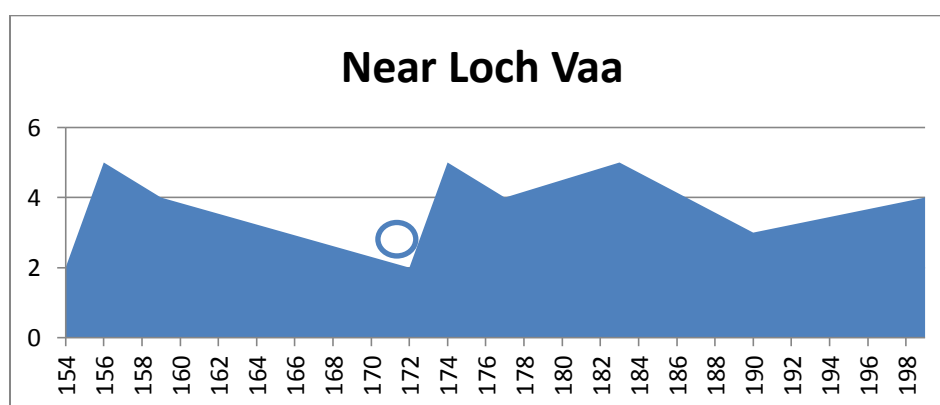


Figure 104 Near Loch Vaa

21) (105) Near Deishar cairn 57° N 15' 17.1" 003° W 46' 15.6" elevation 232m.

See Figure 105. Deishar round cairn is surrounded by thick woodland so I took a roadside measurement nearby. The dip in the centre is the Spey but the dip to the SW in the diagram is the modern road and rail cuttings through the hills, not there in

³⁷⁴ Hayman, p. 11.

prehistory. It is difficult to say what height that hill had before being altered by the railway. This is probably an emergent and disappearing moon.

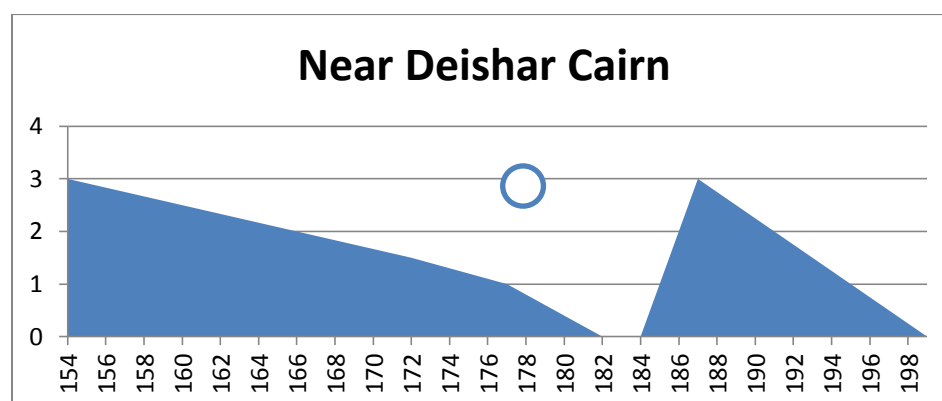


Figure 105 near Deishar Cairn

22) (106) Toum-Tyleich cairn 57° N 16' 28.2" 003° W 43' 34.1" elevation 280m.

See Figure 106. River Neith joins the Spey from the south just downriver. The cairn was accessed by going up a steep farm track; hundreds of crows mobbed me as I went up the hill, which felt really dark and oppressive. They desisted after I went through the trees. I approached the house to talk to the landowner, but there was nobody around. Access to the cairn was through very long wet grass. It was apparently surrounded by a barbed wire fence and climbing over it cut my hand. It resembled nothing I have seen so far, it looked like a beehive. The base was surrounded by whin bushes so I had to climb the cairn in order to take measurements. The stones were covered in moss and many were unstable. As I was climbing I recalled what Browne had said about the 'risk to limbs' when climbing on cairns at Balnuaran in the 1920's.³⁷⁵ I disapprove of climbing on monuments, so everything about this cairn was agitating and difficult. Childe and Graham gave a height of eleven feet (3.35m) and roughly ninety six feet (29.26m) N-S by 88 feet (26.82m) E-W.³⁷⁶ It looked like an undisturbed cairn, but there was no discernible passage. It was too precarious to stand on the top, which has a small indentation, but placing the ranging pole flat I estimated it was about three metres across at the top. The gathering stormy clouds took a long time to move off the horizon, so I made this the last measurement of that day, fog and heavy winds prevented further recording. HER lists this as an undisturbed burial cairn and wrote that it was 'the finest Bronze

³⁷⁵ Browne, *Antiquities*, p. 98.

³⁷⁶ Childe and Graham, *RCAHMS*, p. 89.

Age cairn in Strathspey'.³⁷⁷ The 1870's Digimaps note a single stone to the South west (no longer visible) and nearby 'Wooden pulpit, sermons preached here occasionally' about six metres to the north; this suggests roving preachers utilised a well-known landmark to gather their flock.³⁷⁸ From the top I found a route back which did not require climbing over any barbed wire fence. The hills would have been a bit higher from ground level, where people would have stood, so the MLL moon could disappear and may also emerge.

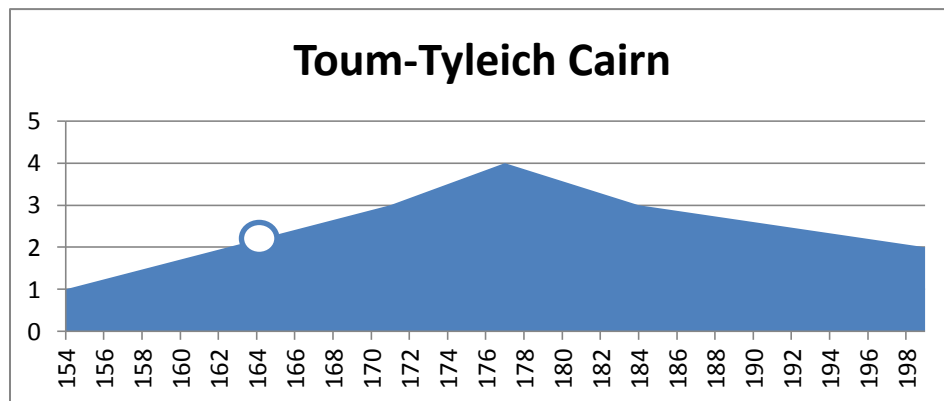


Figure 106 Toum-Tyleich Cairn

23) (107) Tullochgorum Ring-cairn 57° N 16' 14.5" 003° W 43' 05.9" elevation 216m.

See Figure 107. River Neith joins the Spey just downriver. This is a delightful, if overgrown, Clava ring-cairn. Most authors refer to it as Tullochgorm (which may be the pronunciation) but the farm notice, maps and steam railway notice all spell it Tullochgorum. Childe and Graham referred to this as 'Lagyie Chambered cairn', and Oram called it 'Lackie cairn' after a nearby farm.³⁷⁹ The antiquarian John Aubrey (1626-1697) referred to this cairn, having received a letter from Rev. Dr. James Garden, Professor of Theology at King's College Aberdeen, on 6th March 1693, who wrote of a monument with two circles of stones, called 'chapell-Piklag, and Carrachan Piklag' supposedly after a boy named Piklag who went there to pray before a church was built locally, which sounds like a colourful tale to tell an inquisitive strange minister, with just a seed of truth in that the stones were respected and rather more credibly, that a nearby grove was considered sufficiently sacred 'that

³⁷⁷ <http://her.hIGHLAND.gov.uk/SingleResult.aspx?uid=MHG4608> [Accessed on 23 November 2016].

³⁷⁸ <http://digimap.edina.ac.uk/roam/historic> [Accessed on 17 December 2016].

³⁷⁹ Childe and Graham, RCAHMS, p. 91; Oram, Moray, p. 13.

no body will cutt a branch out of it'.³⁸⁰ A young man at the house directed me to a simple route by the railway with access across the tracks via gates in good condition. Toum-Tyleich is just over six hundred metres to the NE of Tullochgorum and there are two standing stones, (named by Childe and Graham as 'Lagye' Standing Stones) less than four hundred metres closer to the river, probably the remains of another cairn.³⁸¹ There were bullocks in the field. The cairn is separated from them by a barbed wire fence but many people seemed to dip under it by the rabbit warren. The largest circle-stone is aligned with midwinter sunset declination -23.46° to -25.05° (true azimuths $210-215^{\circ}$). This is similar to Càrn Gask and Delfour. The hills to the south are not very high, but block vision of the moon at MLL, so it has a disappearing moon and an emergent moon.

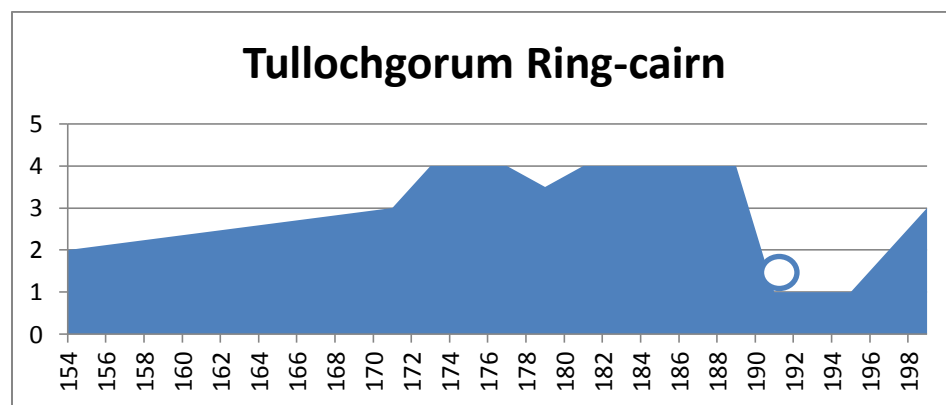


Figure 107 Tullochgorum Ring-cairn

24) (108) Near Curr Woods cairn 57° N 17° $15.9''$ 003° W $40'$ $01.6''$ elevation 233m.

See Figure 108. Oram referred to this cairn as Curr Woods, while Childe and Graham called it Midd Cirr (also as Auchendean).³⁸² I had hoped to find my way into Auchendean Lodge Hotel, behind which, this cairn lies in the woods. HER lists it as 'Neolithic', but with cists undated; 'opened in 1866 with two stone cists'.³⁸³ It lies just north of where the Allt Mòr joins the Spey. I missed the hotel and stopped nearby to take this roadside measurement. The Moon disappears and emerges. Strathnethy creates the striking drop in height SW.

³⁸⁰ Aubrey, 1695, p. 211.

³⁸¹ Childe and Graham, RCAHMS, p. 88.

³⁸² Oram, Moray, p.28; Childe and Graham, RCAHMS, p.90.

³⁸³ <http://her.hIGHLAND.gov.uk/SingleResult.aspx?uid=MHG4606>, [Accessed on 23 November 2016].

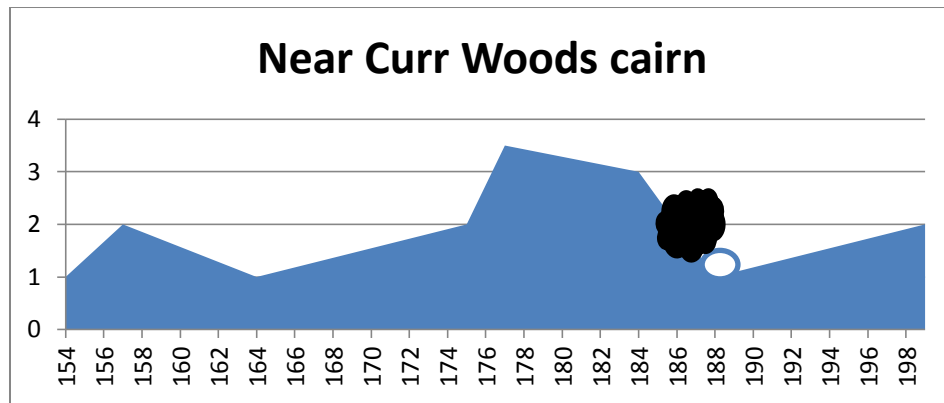


Figure 108 Near Curr Woods cairn

25) (109) Ballintomb 57° 18' 15.1" 003° W 39' 19.5" elevation 221m.

See Figure 109. There are three standing stones (Tom Nan Carragh) near the river, suggesting a circle had once been present, or a stone row existed. The 1870's Digimaps note 'human remains found here in 1836' by one of the stones.³⁸⁴ The circle is opposite where the River Dulnain joins the Spey. Oram states it is where courts were held and was the favoured gathering-place of the 'Grants of Feuchie'.³⁸⁵ The Dulnain being short and largely east/west was deselected at the beginning, but has two non-surveyed non-Clava cairns near Easter Gallovie, just over the hill from Toun-Tyleich and Tullochgorum. I took roadside measurements at the entrance to Ballintomb, which has a Pictish Symbol Stone. Only the rim of the moon would be visible.

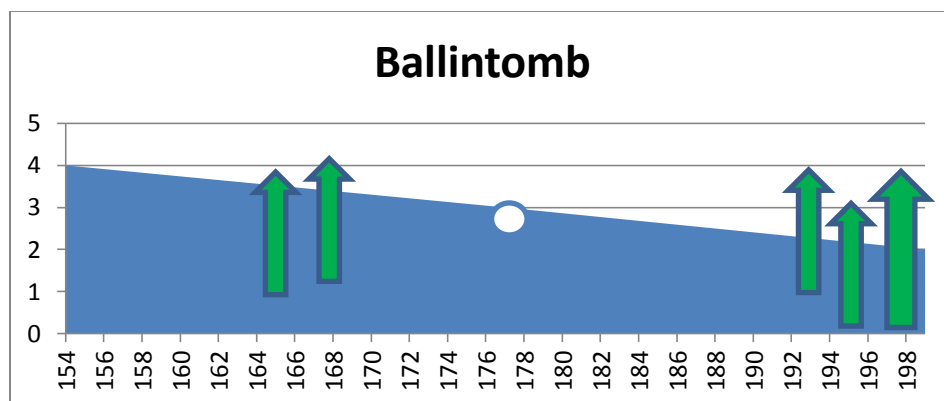


Figure 109 Ballintomb

26) (110) Spey River near Granton on Spey 57° N 19' 10.7" 003° W 36' 50.4" elevation 205m.

³⁸⁴ <http://digimap.edina.ac.uk/roam/historic> [Accessed on 17 December 2016].

³⁸⁵ Oram, Moray, p.33.

See Figure 110. This was just beside the river. A Highland Council plaque announced that it was home to various protected species, including lamprey, otters, Atlantic salmon and freshwater mussels. It also noted the 'muckle spate' - the flood of 1829 which brought down most of the bridges along the river. This is the same Findhorn flood described by Anderson and Anderson, who referred to the Spey as 'a fearful and desolating torrent'.³⁸⁶ It is surprising so many stone monuments have survived. The plaque also noted the arrival of the railway in 1863 and that the main industry of this area is *uisge beatha* (whiskey) there being over thirty distilleries along the Spey, springs being responsible for distinctive whiskey flavours.³⁸⁷ Generally only the rim of the moon would be visible due south.

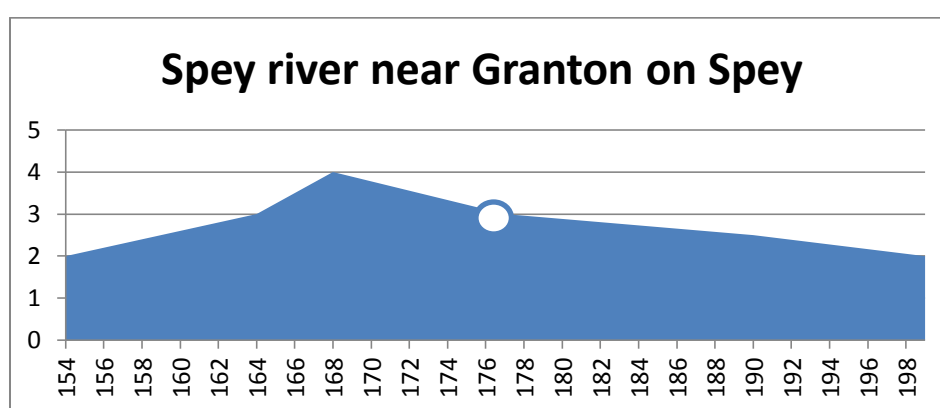


Figure 110 Spey river by Granton on Spey

27) (111) Inchbroke Cairn 57° 18' 44.6" 003° W 35' 03.6" elevation 239m.

See Figure 111. This is a small cairn situated south of the Spey on its tributary the Alt Choire Odhair. There is a Pictish Symbol Stone (Congash) in the hills above it. This tributary and cairn are at the start of the road to Tomintoul, which is on the river Avon to the east. It looks like a round cairn, resembling those seen on the Findhorn, probably Bronze Age. It had a distinctive several-metre-wide rectangular shape in front of it, (grass-covered walls about 0.45m high) which Oram stated was the 'foundations of an agricultural settlement'.³⁸⁸ The hills are too high, so this would be a dark cairn.

³⁸⁶ Anderson and Anderson, 1851 Guide, p. 339; Highland Council's on-site information.

³⁸⁷ Highland Council's on-site information.

³⁸⁸ Oram, Moray, p.29.

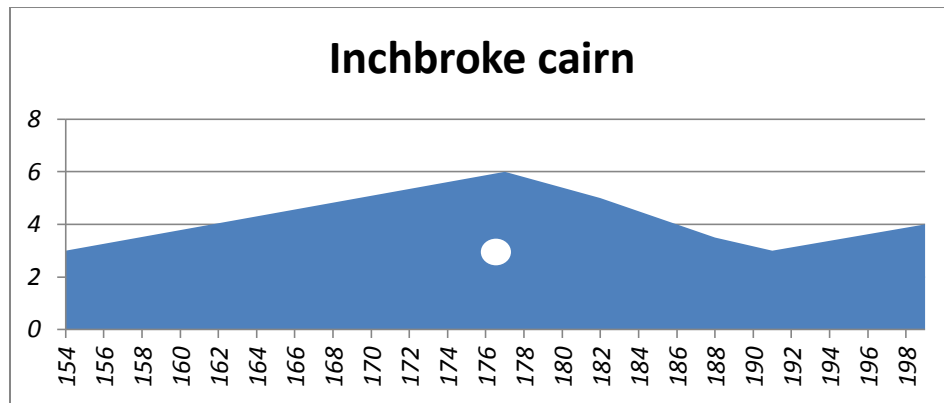


Figure 111 Inchbroke cairn

28) (112) Cromdale Bridge 57° N 20.3' 1.8" 003° W 33' 13.1" elevation 186m.

See Figure 112. There were trees blocking some of the view east and west, but I was able to see through them sufficiently to assess the height of the horizon. There was a tall radio tower. This was beside the Spey, which is not so very wide here. The hills were quite low because I was so close to the river. The MLL moon would emerge from the hills.

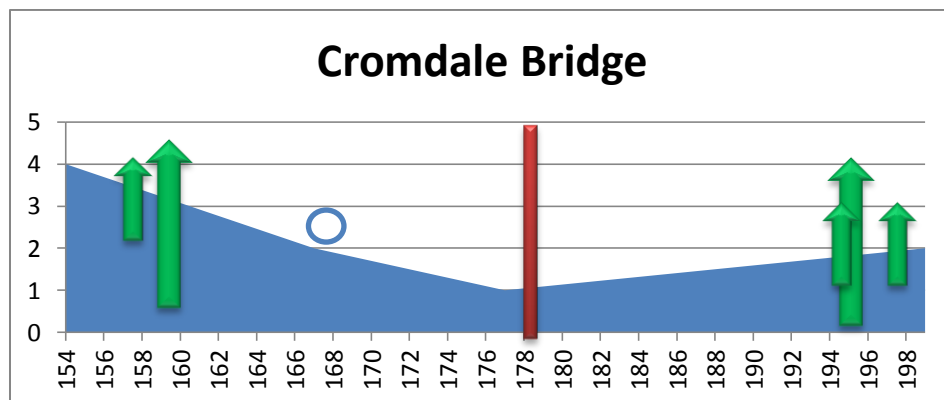


Figure 112 Cromdale Bridge

29) (113) Upper Port Standing Stones 57° N 20' 43.4" 003° W 34' 25.5" elevation 206m.

See Figure 113. There were standing stones in a field at Upper Port; I was passing so decided to measure from here, as they may have once been a circle. There was no answer at the farmhouse but access was straightforward. Only two stones remained and they were 68m apart. I measured the horizon from half way between the two stones lacking any other guideline. Later I checked this site on Digimaps and realised that a further two stones I did not see were about a hundred metres away in the next

field. This is too big for a Clava circle, but a separate cairn and circle would be a good possibility. Many small burns feed the Spey at this stage and it is near the Tobar na Danich Spring. The MLL moon would emerge and descend into the hills.

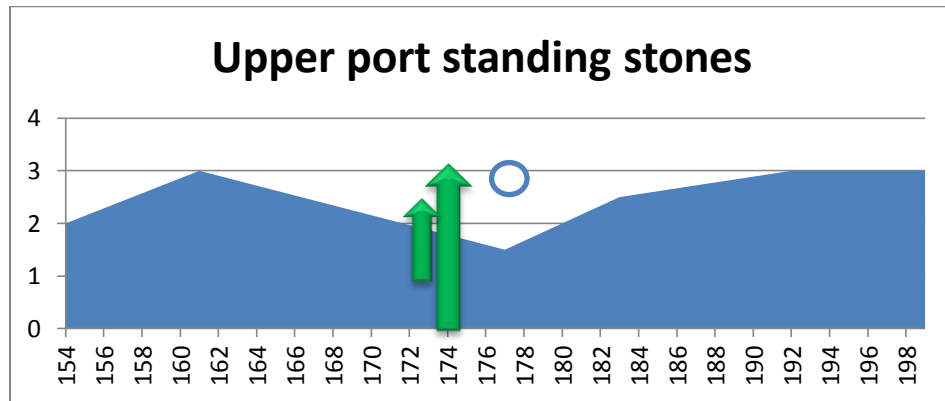


Figure 113 Upper port standing stones

30) (114) Near Dalriach 57 N 21' 37.1" 003 W 32' 05.7" elevation 199m.

See Figure 114. I found a suitable place to pull in off the B9102 road. The river comes close in to this side of the valley here. Only the very tip of the top rim of the moon would be visible due south.

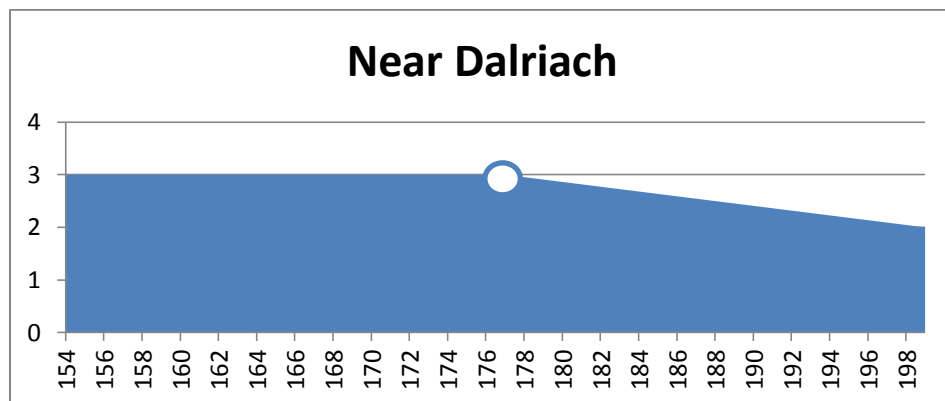


Figure 114 near Dalriach

31) (115) Near Deldow 57 N 23' 47.2" 003 W 27' 32.5" elevation 158m.

See Figure 115. This was near the bridge, having crossed over the Spey again in order to head northwards on the A95. It was raining and cloud cover on the hills made it difficult to be certain that there were no further hills behind the ones I could see. The low point on the horizon was the Spey. There would be no lunar phenomena.

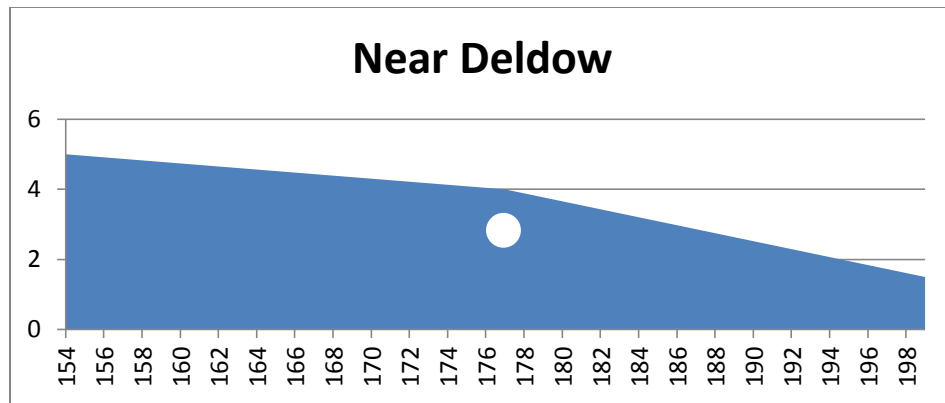


Figure 115 Near Deldow

32) (116) Auchvochkie 57° N 22' 18.4" 003° W 28' 24.7" elevation 167m.

See Figure 116. The A 95 roadside in a large layby, next to the signpost saying welcome to the Cairngorms National Park. It was near Auchvochkie and had a large deceased pheasant in the road. No lunar events, hills are too high.

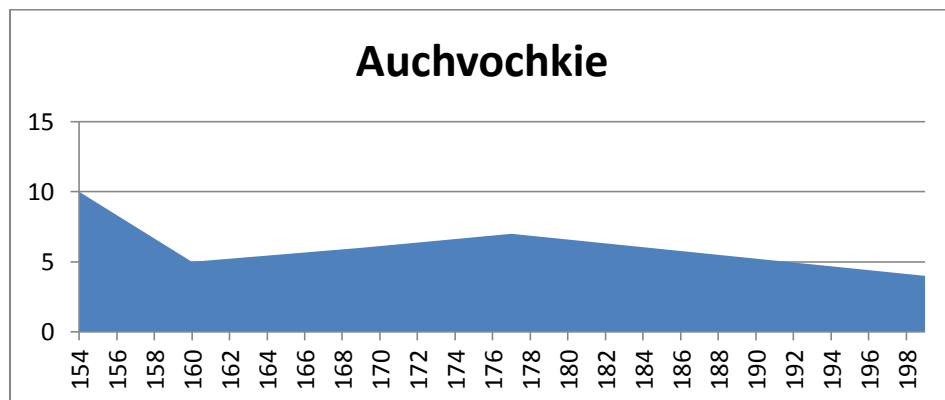


Figure 116 Auchvochkie

33) (117) Garline Farm 57° N 24' 33.4" 003° W 22' 47.2" elevation 192m.

See Diagram 117. Intending to visit the farmer at Garline Farm, where Upper Lagmore Cairn was, I pulled into this layby and saw someone leave in a farm tractor, so took measurements from here in case I could not manage to find a way into the field. No sighting of the MLL moon would be possible.

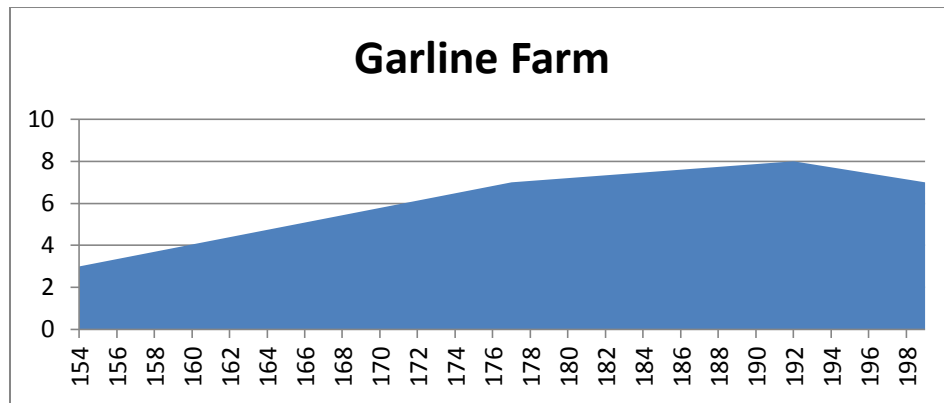


Figure 117 Garline Farm

34) (118) Upper Lagmore Passage-grave, also known as Lagmore West 57° N 24' 19.5" 003° W 22' 19.7" elevation 193m.

See Figure 118. This cairn is on the hill, overlooking the confluence of the Avon and Spey rivers, above the Ballindalloch Distillery and Lower Lagmore cairn which is visible. Although this site is not today obvious from Lower Lagmore, in antiquity bright stones would have made them intervisible. I had to rescue a sheep from a broken barbed wire fence before I could visit the cairn. Upper Lagmore is very overgrown and although the atmosphere of the hill is pleasant I was saddened by the jumble of stones, trying to unravel it in my mind. The centre had a hollow and I took measurements from as close as I could manage. I could not discern a passage although Henshall and Richie's diagram shows a SW orientation, they also noted it was 'difficult to decipher'.³⁸⁹ There appeared to be a jumble of field clearance stones to the north. Some kerb stones were substantial and on end. The largest menhir was much further west than most Clava circle stones. I measured it anyway; it did not align with the setting of Alnilam except around 2200 BCE (declinations -10.38° to -12.44°, azimuths 227-232°). A potential candidate might be setting of Antares, if it was built much later than the Clava tradition suggests, around 1900, see Appendix V, with no radio-carbon dates, it is impossible to be accurate. Henshall and Richie noted two fallen stones which are now missing 'last seen in 1881' so one probably would have been the significant SW stone.³⁹⁰ F. R. Coles visited before 1903 and his

³⁸⁹ Henshall and Ritchie, *Chambered Cairns*, pp. 237.236.

³⁹⁰ Henshall and Ritchie, *Chambered Cairns*, p. 237.

drawings are similar to Henshall's.³⁹¹ The MLL moon would be seen to rise up the hill then disappear.

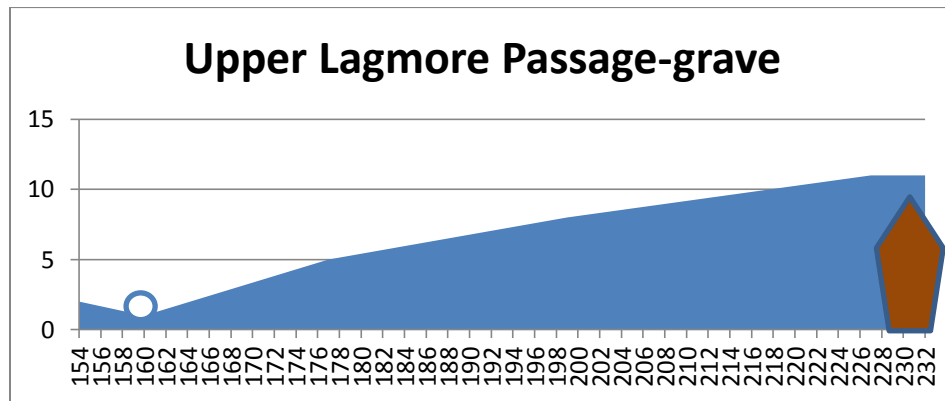


Figure 118 Upper Lagmore Passage-grave

35) (119) Lower Lagmore Cairn remains, also known as Lagmore East 57° N 24' 24.29" 003° W 21' 55.64" elevation 164.

See Figure 119. It is close to the joining of River Avon to the Spey River. This cairn is near Ballindalloch Distillery and has only 4 circles stones remaining. The largest menhir is badly cracked, but I took measurements of the orientation, despite it being more west than most Clava cairns - indeed these declinations did not produce any sol-lunar alignment, just like Upper Lagmore. The declinations were -11.77° to -13.52° (azimuths 231-235°) Alnilam will set into this stone declination $-13^\circ 12' 47.6$ in 2200 BCE, but there are no radio-carbon dates. Unlike many Clava locations the hills are a good height to the south west, but very low where the Avon River flows towards the south. The Midsummer Full Moon would rise and be just above the horizon due south then disappear behind the hill before setting.

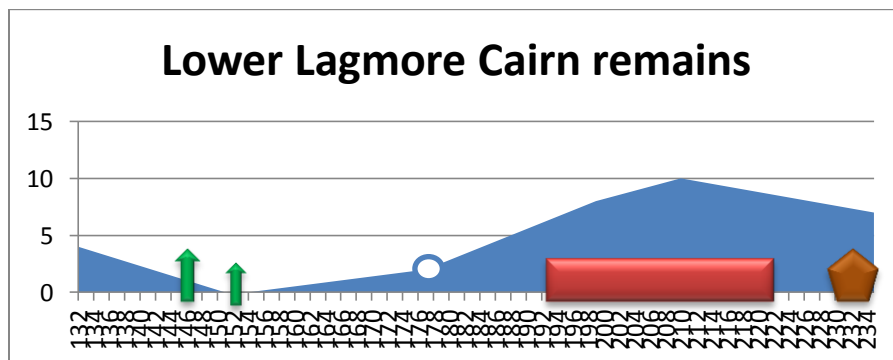


Figure 119 Lower Lagmore Cairn remains

³⁹¹ Coles, Report, p. 23.

36) (120) Near Doune of Dalmore ring-cairn 57° N 21' 51.6" 003° W 21' 12.6" elevation 191m.

See Figure 120. This is noted as a Clava ring-cairn, it lies along the Avon River which joins the Spey at Lagmore, where there is a group of cairns. There are two here, Doune of Dalmore is in the valley and there is a site of a non-Clava cairn on the southerly hill near Càrna Bhodaich, which I did not attempt to investigate, Digimaps marks it 'rems of cairn' but shows no evidence on the ground. I could not access this cairn either. There was a bull in the field with cows, so I took measurements from the adjoining field. Trees obscured any reading at azimuth 157°, only a partial rim would have been seen. Bradley lists Doune of Dalmore as a 'probable or certain' passage-grave' while Digimaps mark it as a ring-cairn.³⁹²

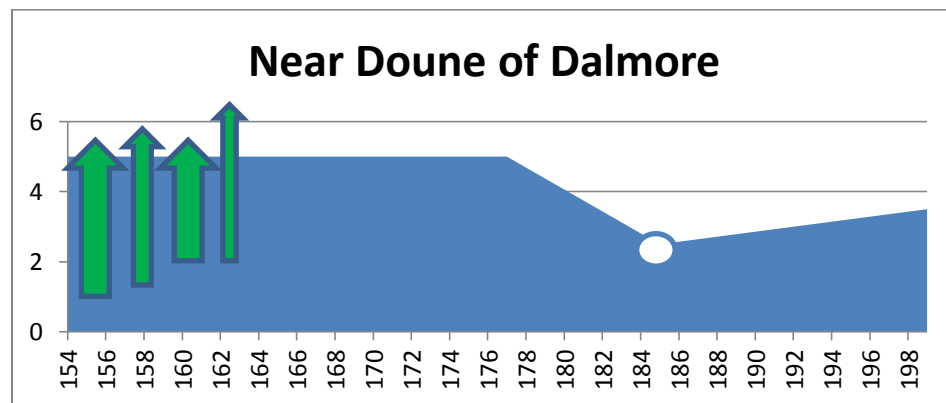


Figure 120 near Doune of Dalmore

37) (121) Marionburgh Ring-cairn 57° N 24' 38.7" 003° W 21' 41.2" elevation 195m.

See Figure 121. This cairn is in the grounds of Ballindalloch Castle, overlooking the Avon River; access is by an electric gate. The cairn is very impressive with seven stones remaining of the circle with a clearly defined peristalith. The central area of the cairn was sizable, Canmore records give '5 metres across' and state it was mistaken for a RSC, but is considered a 'heavily robbed' Clava ring-cairn, with the tallest stone being '2.7m high on the south-west'.³⁹³ Aberdeenshire county council list it as the only Clava Cairn in their territory, although Henshall noted a potential

³⁹² Bradley, *Good Stones*, p. 174.

³⁹³ <https://canmore.org.uk/site/16006/Marionburgh> [Accessed 29 August 2016].

second monument 'thirty feet' (9.14m) to the southeast.³⁹⁴ Bradley lists it as a 'probable or certain' Passage-grave, while Henshall refers to it as a 'Ring-cairn without a kerb'.³⁹⁵ This cairn has a lovely atmosphere, the central section was overgrown and there were a few trees but these did not impede as at Balnuaran of Clava. I took measurements of all the stones, but focused on the main menhir which had a height of 8° clinometer (azimuths 168-174°) this provides a declination window of -29.80 to -30.39 which is aligned with the southern major lunar limit. The low horizon suggests a particularly good location for viewing lunar phenomena. It was impossible to determine a passage, or passage orientation; I thought it was a ring-cairn because of its size and the remaining stones, despite the lack of inner kerb-stones. I classify this as a disappearing moon site.

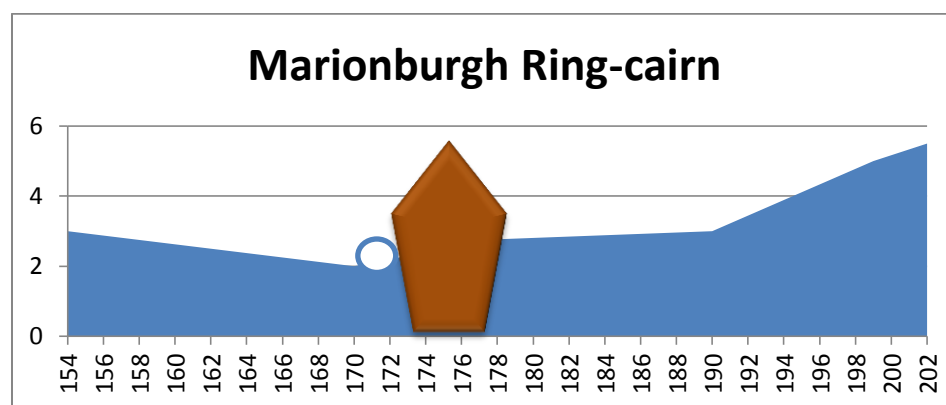


Figure 121 Marionburgh Ring-cairn

38) (122) A95 between Marypark and Bellehielash 57° N 26' 28.7" 003° W 21' 03.2" elevation 193m.

See Figure 122. First open outlook for a while. The hills are possibly too low to be of especial interest; although a normal midsummer full moon rising could then enter the hill, rather than set as normal. For prehistoric travellers it might indicate the way towards the cairn area.

³⁹⁴ Aberdeenshire County Council <https://www.aberdeenshire.gov.uk/leisure-sport-and-culture/archaeology/sites-to-visit/clava-cairns/> [Accessed on 05 September 2016]: Henshall, CT, Vol. I., p.391.

³⁹⁵ Bradley, Good Stones, p.174: Henshall, CT, Vol. II, p.275.

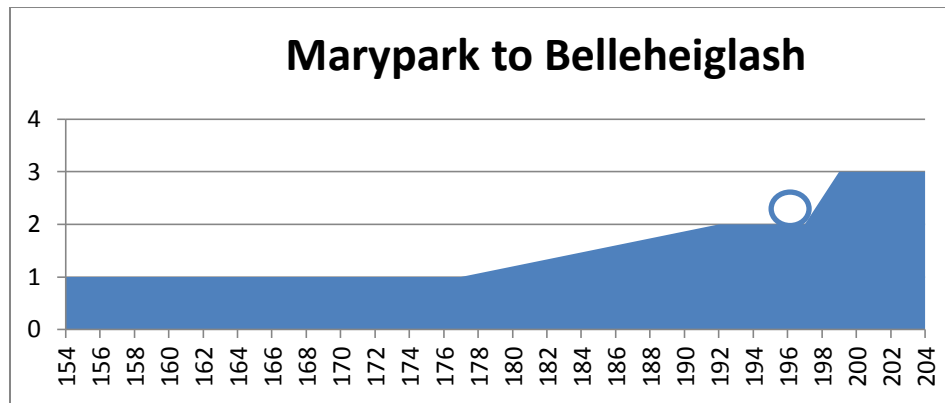


Figure 122 between Marypark and Belleheiglash

39) (123) Blackboat Bridge over the Spey 57° N 26' 02.4" 003° W 21' 37.2" elevation 131m.

See figure 123. Despite many trees this spot provided a horizon. Trees completely obscured from 210° westwards. Otherwise trees were nearby, one wide tree was proud of the horizon between 180° and 190° azimuths. The Moon rises then disappears behind the hill.

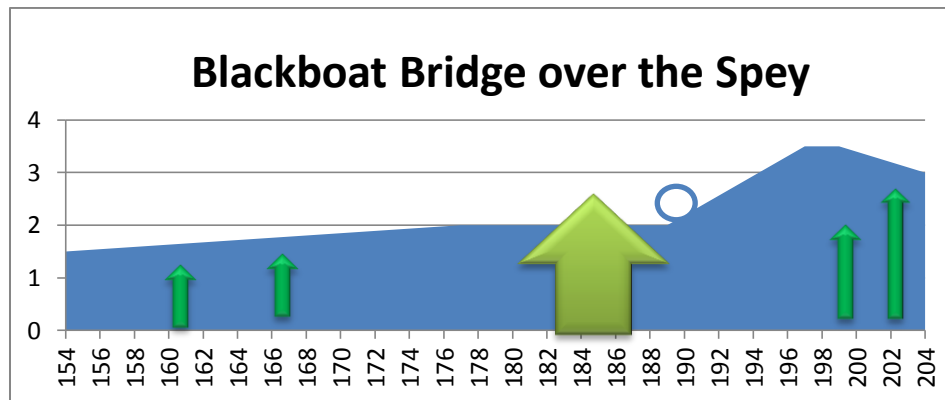


Figure 123 Blackboat Bridge over the Spey

40) (124) Near Bishop's Croft Cairn 57° N 26' 17.0" 003° W 22' 05.08" elevation 198m.

See Figure 124. This round cairn is also known as Mains of Kirdell and lies beside the Burn of Ketack. I was unable to gain access to the cairn which was in the middle of a field of unharvested wheat; therefore measurements were taken from the roadside, southwest beneath the cairn position. Trees covered every horizon, so treetop height was taken. The midsummer full moon would rise as normal and disappear into the hill.

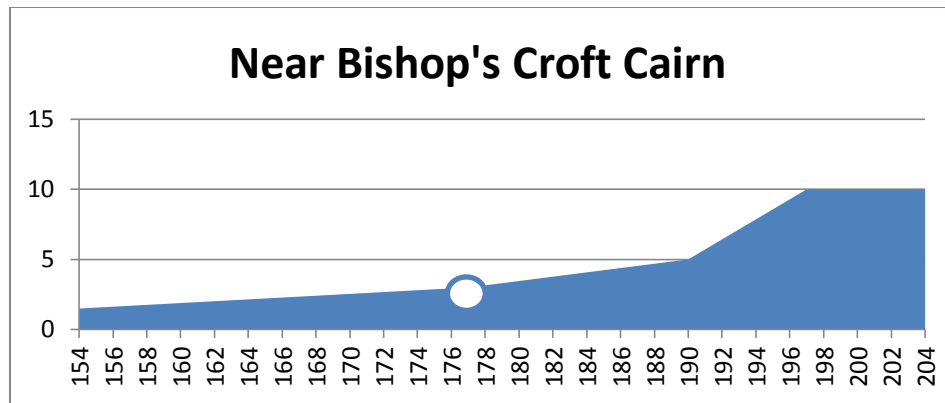


Figure 124 near Bishop's Croft Cairn

41) (125) Leakin Cairn 57° N 27' 40.4" 003° W 23' 39.7" elevation 240.

See Figure 125. This cairn is not marked on OS maps but the hill name Càrn na Leacainn suggested there might be one, overlooking the Allt Arder, a tributary of the Spey. Digimaps showed a cairn on Leakin Farm. This cairn is fenced off within a field by the farmer and I asked permission to view it, as I had been driving up their private road for some time. The farmer was very helpful; apparently there are remains of Pictish buildings behind the barn and rare orchids behind the house. It is very overgrown with grass, small in scale and unlikely to be a ring-cairn. Canmore describe it as a robbed round cairn with a stone having at least 20 cup-marks, last visited in 1971 and was considered locally as the 'remains of a chapel'.³⁹⁶ It has a fine rounded shape with no outlying circle stones. The cup-marked stone is suggestive of a lunar connection. That was the only thing which hinted at a Clava potential, plus this may have been a good spot to view the moon disappear behind the hill due south then occasionally reappear before setting. The diagram suggests a steepness which is not there in reality, the hills smoothly flow one behind another.

³⁹⁶ <https://canmore.org.uk/site/16049/leakin> [Accessed on 05 September 2016].

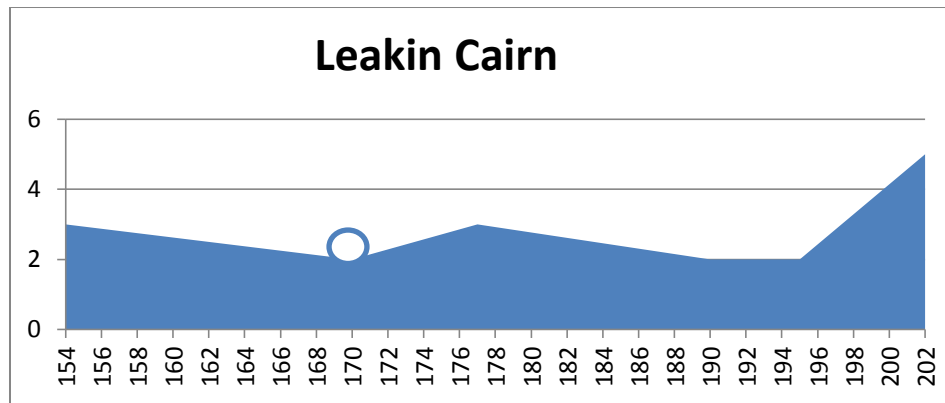


Figure 125 Leakin Cairn

42) (126) Above Knockando Mill 57° N 28' 0.05" 003° W 21' 16.6" elevation 156m.

See Figure 126. This was the best outlook I could find although trees obscured the south east sector, only thin trees allowed the south west sector hills to be measured, although they were treetop height measurements. A Pictish Symbol stone is nearby and a (now destroyed) stone circle named Drum Driven. Oram referred to an 'aligned pair of stones'.³⁹⁷ A slight rim of the moon could be visible.

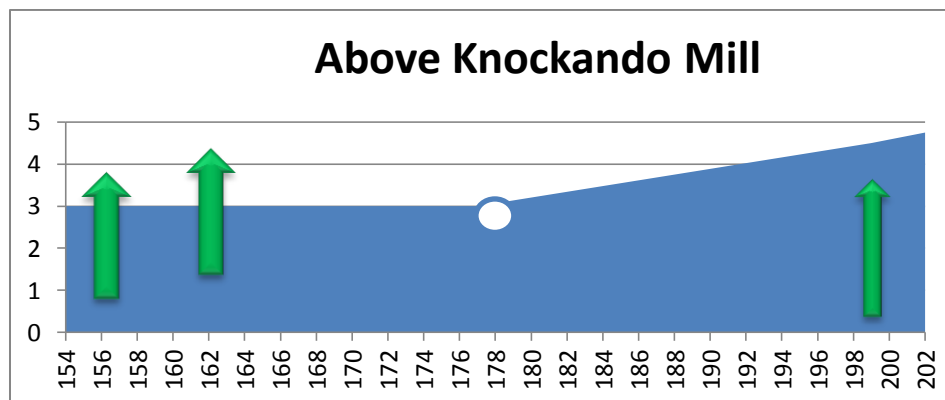


Figure 126 above Knockando Mill

43) (127) Near Hatton Cairn 57° N 27' 47.1" 003° W 13' 1.38" elevation 167m.

See Figure 127. Hatton Cairn is above Fairy Knowe in a part of Charlestown of Aberlour and overlooks the Burn of Aberlour, close to where it joins the Spey. The association of cairns with fairies is obvious from the name of this district. Fairy Knowe was noted by Aron Bowers as a severely overgrown man-made earthwork with some stones, possibly a cairn, on top.³⁹⁸ I looked for Hatton Cairn as it was a

³⁹⁷ Oram, Moray, p. 35.

³⁹⁸ <http://www.megalithic.co.uk/article.php?sid=18097> [Accessed on 05 September 2016].

stone circle, marked on the OS map as being behind the farmhouse, but nobody was available to seek permission, and access was through the farm, so I took road-side measurements, on the same contour. Trees slightly obscured due south. Hills are just too high to allow the midsummer moon to be viewed, so this could have been a dark cairn although on adjacent years to MLL, the moon would sit on the horizon.

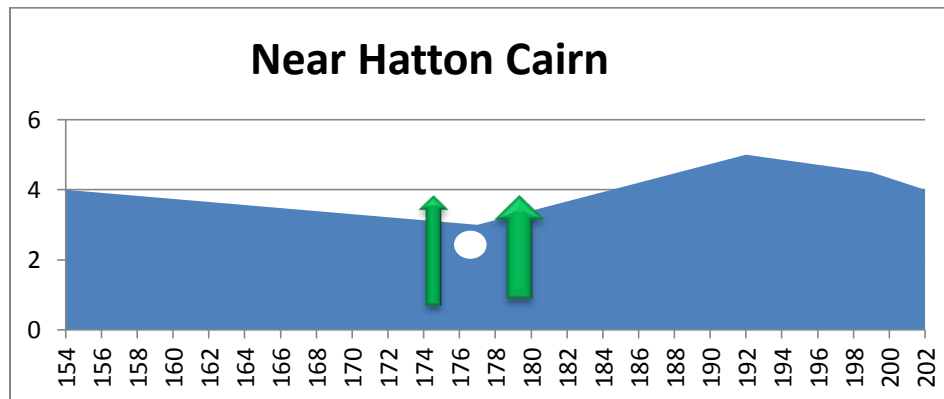


Figure 127 near Hatton Cairn

44) (128) Buchromb Ring-Cairn 57° N 28' 50.1" 003° W 09' 16.1" elevation 226m.

See Figure 128. This cairn overlooks the River Fiddich which is a tributary of the Spey. The cairn was on the top of a hill, but I was able to park without impeding traffic and met a lady, who gave permission to access the fields. The first had sheep the second two crops wheat and kale, the third field had cattle. I initially came across a very messy spoil heap of stones and slates, but uphill behind this is the ring-cairn. Although it is much infilled it is a substantial structure, clearly circular. It was too large for me to measure its size accurately on my own and everywhere was covered in grass. There were no outlying standing stones and no kerb-stones which could be used for alignments. This place has a spectacular open outlook, with excellent moon-viewing potential resembling the Findhorn cairn I had visited the day before. The hills suggest the midsummer full moon could be seen to travel along the horizon disappearing into the hill rather than setting.

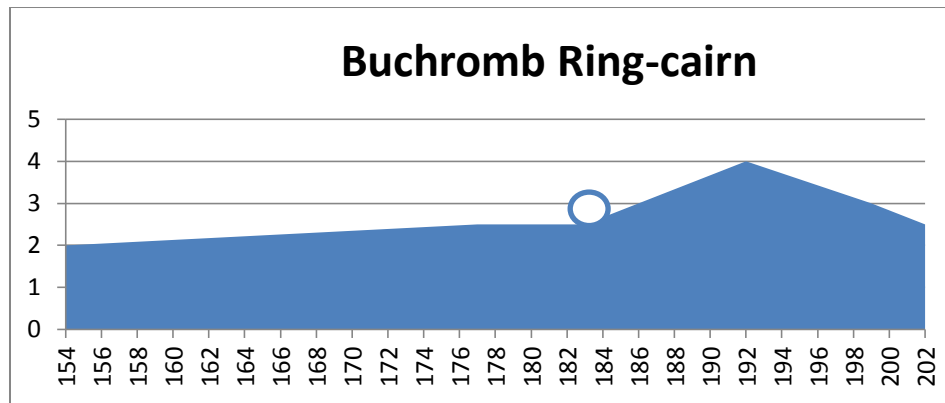


Figure 128 Buchromb Ring-cairn

45) A941 parking bay Between Telford Bridge and Graigellachie 57° N 30' 35.3" 003° W 12' 12.4" elevation 76m.

No diagram as trees obscured the much of the southern horizon, the hill height was three degrees at 137° azimuth.

46) (129) Near Crofts Farm and remains of Castle 57° N 32' 17.9" 003° W 12' 07.0" elevation 64m.

See Figure 129. B9015 open outlook, nearer hill to the south east had trees but the further hills were bare. The midsummer full moon would have been visible due south only, emerging and disappearing.

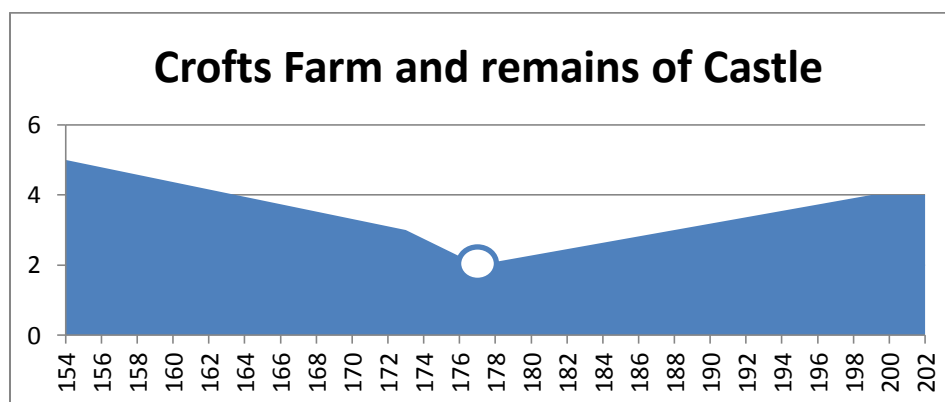


Figure 129 Near Crofts Farm and Remains of Castle

47) (130) Orton T Junction 57° N 33' 15.3" 003° W 09' 12.0" elevation 63m.

See Figure 130. The Spey valley cuts through hills too high to exhibit lunar phenomena.

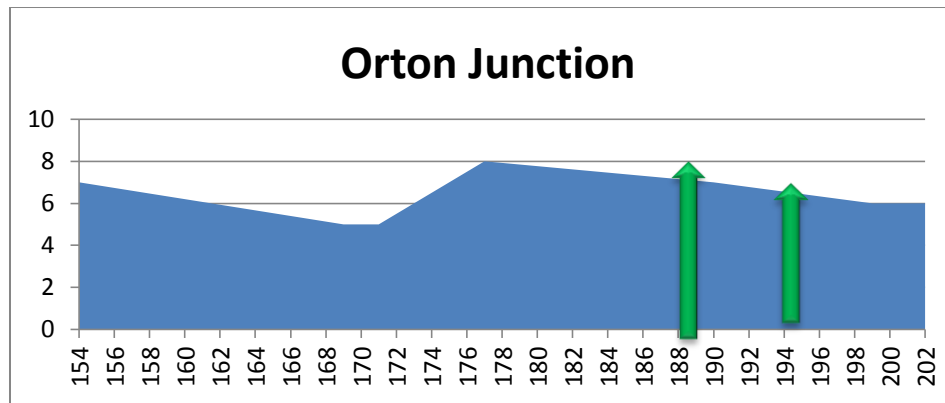


Figure 130 Orton Junction

48) (131) Near Cairn end, road going to the graveyard 57° N 36' 20.1" 003° W 08'31.6" elevation 44m.

See Figure 131. Open outlook southwards, pulled in at the graveyard road. The moon disappears into low hills.

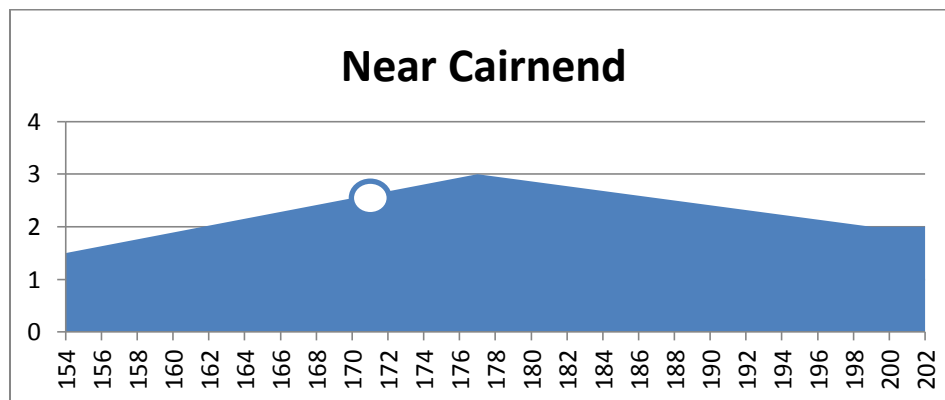


Figure 131 Near Cairnend

49) Cowiemuir Circle and Cairn 57° N 39' 12.3" 003° W 03' 21.2" elevation 27m.

This is next to the Dry Burn which flows into the sea, near the mouth of the Spey. The field had standing wheat. So I walked round the side to stand on the outer edge of the cairn. The cairn itself was so overgrown with gorse, thistles and nettles, taller than me, that nothing of stone was visible. The overgrowth was round in shape. I took measurements from the edge of the cairn, stones located by prodding with the ranging poles and despite the presence of trees the horizon appeared to be 0 degrees from 150° to 210° azimuth. I was surprised to find an extant cairn this close to the mouth of the Spey. It was unlikely to be Clava being quite small and circular and probably a Bronze Age round cairn, but it was difficult to be sure with no stones

visible. Oram stated this is Bronze Age (his dates cover '2500-700 BC') and suggested the superstructure was 'removed for road metaling'.³⁹⁹ No lunar phenomena. It is the closest cairn in this study to Buchan, the centre of EBA Bronze Axe production. Many RSC's are probably closer to Buchan.

50) (132) Spey Bay Dolphin Centre 57° N 40' 24.8" 003° W 05' 41.1" elevation 3m.

See Figure 132. The hills were distant and low, all below half a degree, but not invisible. Some bushes obscured small areas of the horizon. No lunar phenomena.

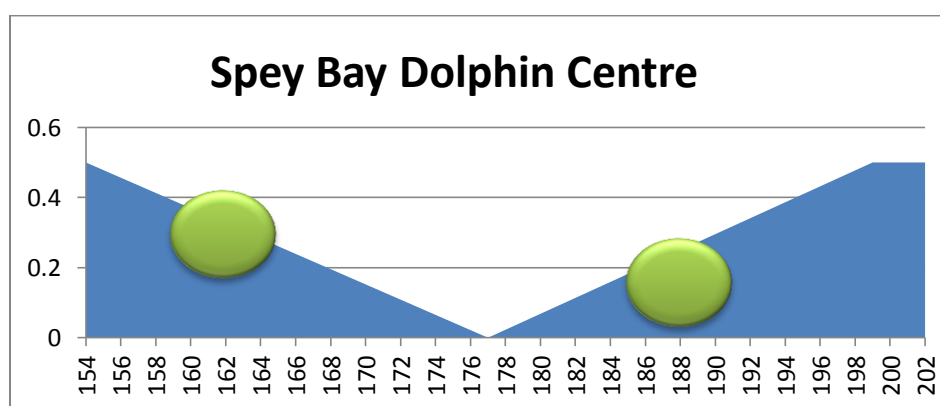


Figure 132 Spey Bay Dolphin Centre

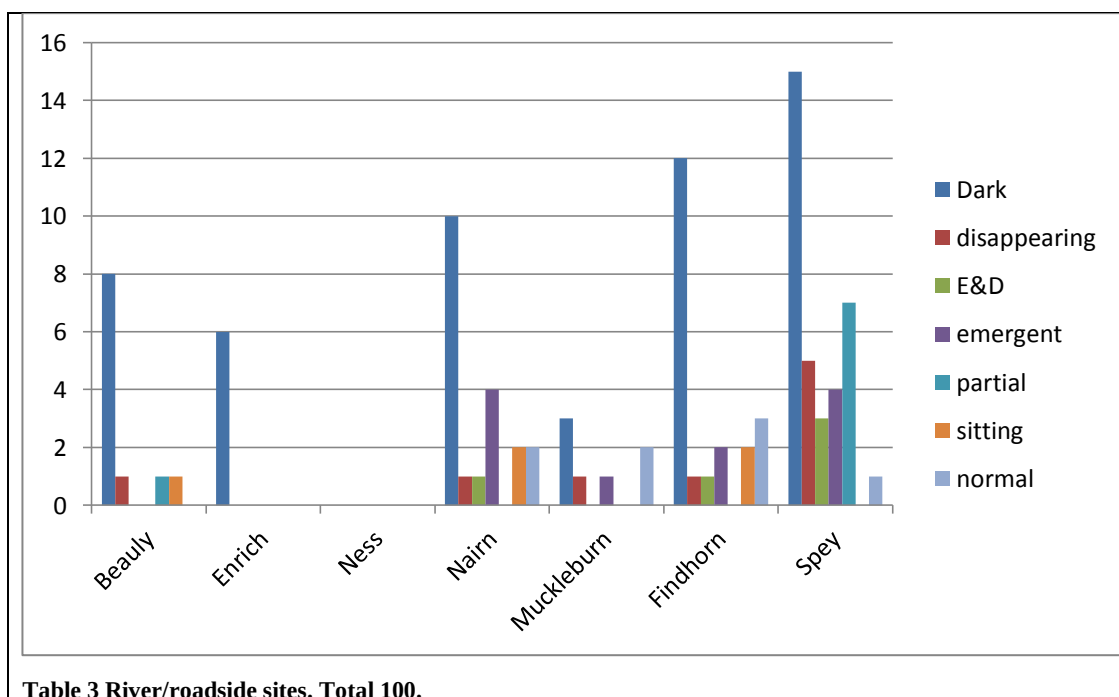
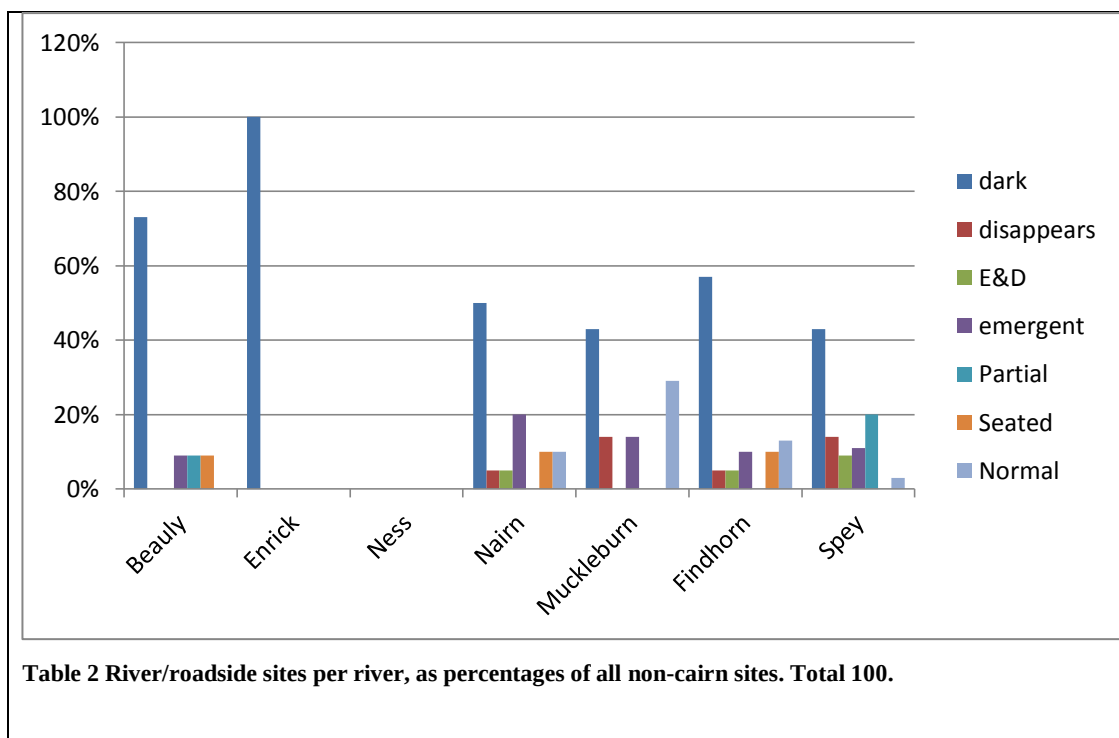
Appendix III Statistical Data

Dark means an invisible Moon

River	dark	disappearing	E&D	emergent	partial	seated	normal
Beaully	9	2	1		3	1	
Enrick	7						
Ness	2		1				
Nairn	18	1	1	6		3	2
Muckleburn	3	1	1	2			2
Findhorn	12	2	1	2		2	3
Spey	16	11	6	6	8	1	2
totals	67	17	11	16	11	7	9

Table 1 all rivers and all measurements. Total 138.

³⁹⁹ Oram, Moray, pp.21.28.



River	Dark	disappearing	E&D	Emergent	Partial	Seated	Normal
Beaully	8	1			1	1	
Enrick	6						
Ness	0						
Nairn	10	1	1	4		2	2
Muckleburn	3	1		1			2
Findhorn	12	1	1	2		2	3
Spey	15	5	3	4	7		1
Totals	54	9	5	11	8	5	8

Table 4 River/roadside sites. Total 100.

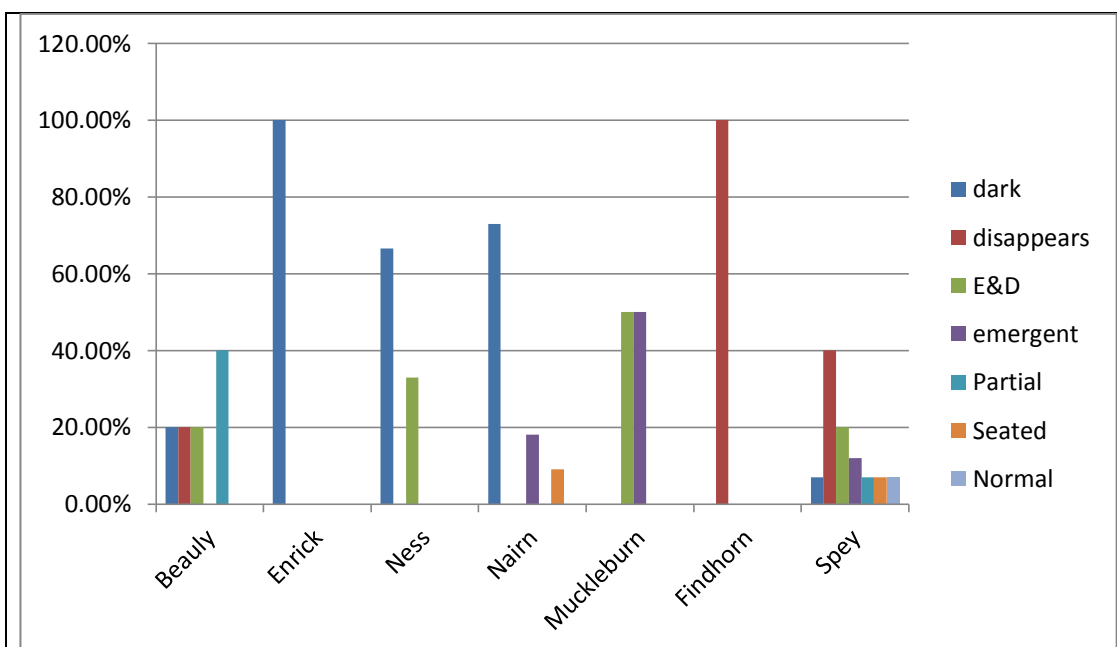


Table 5 Mixed cairn sites per river, as percentages of all cairn sites. Total 38.

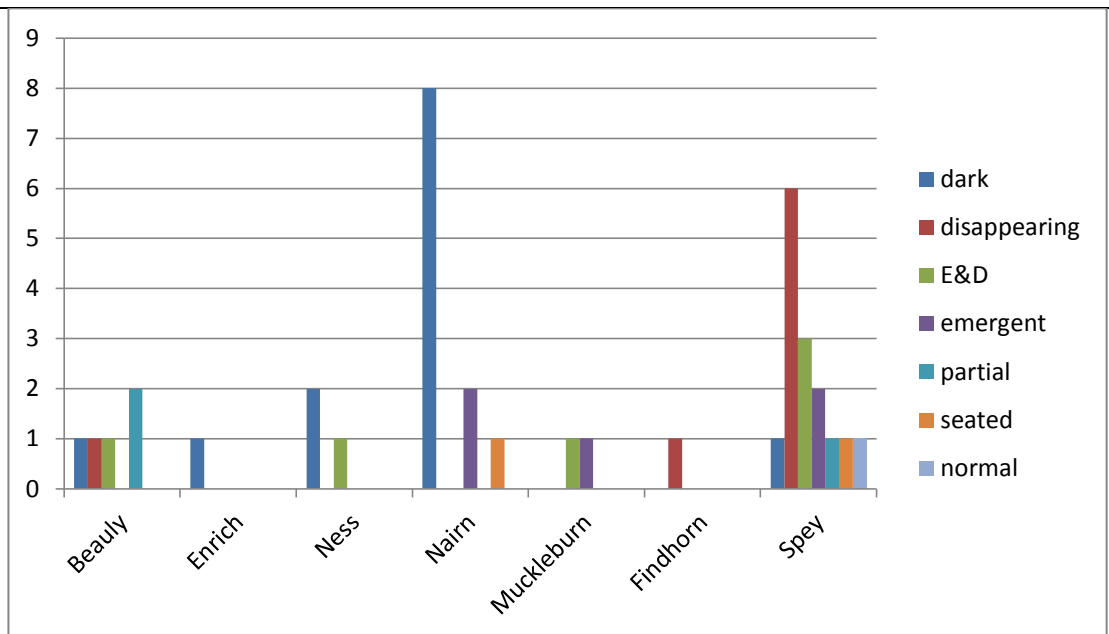
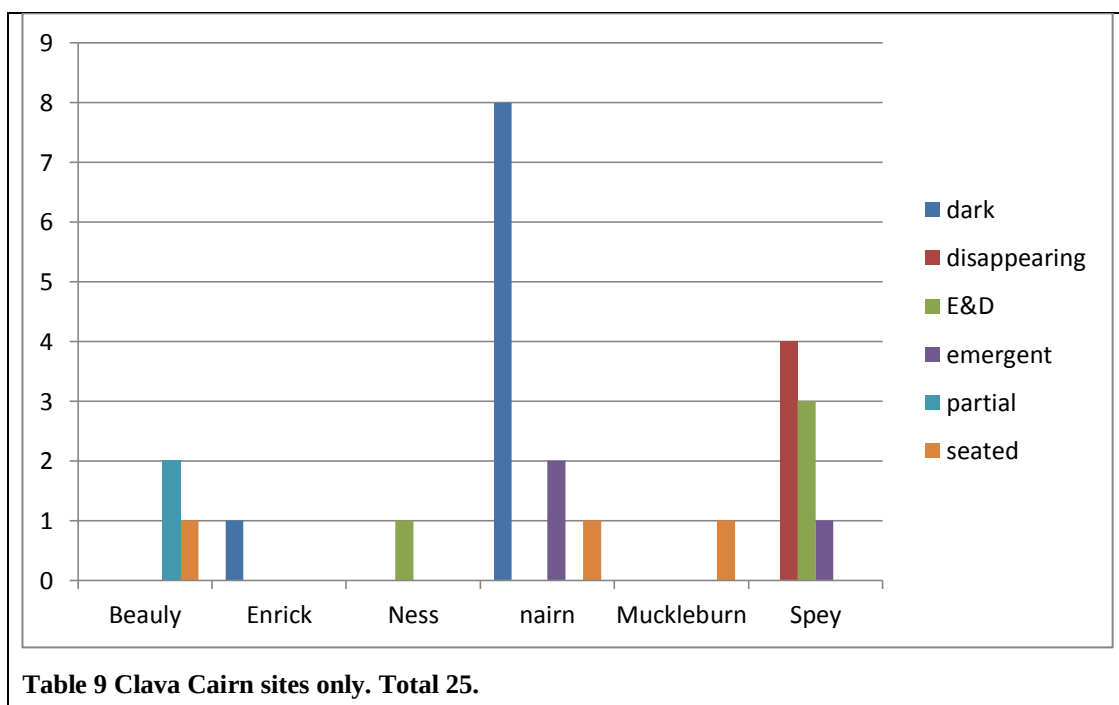
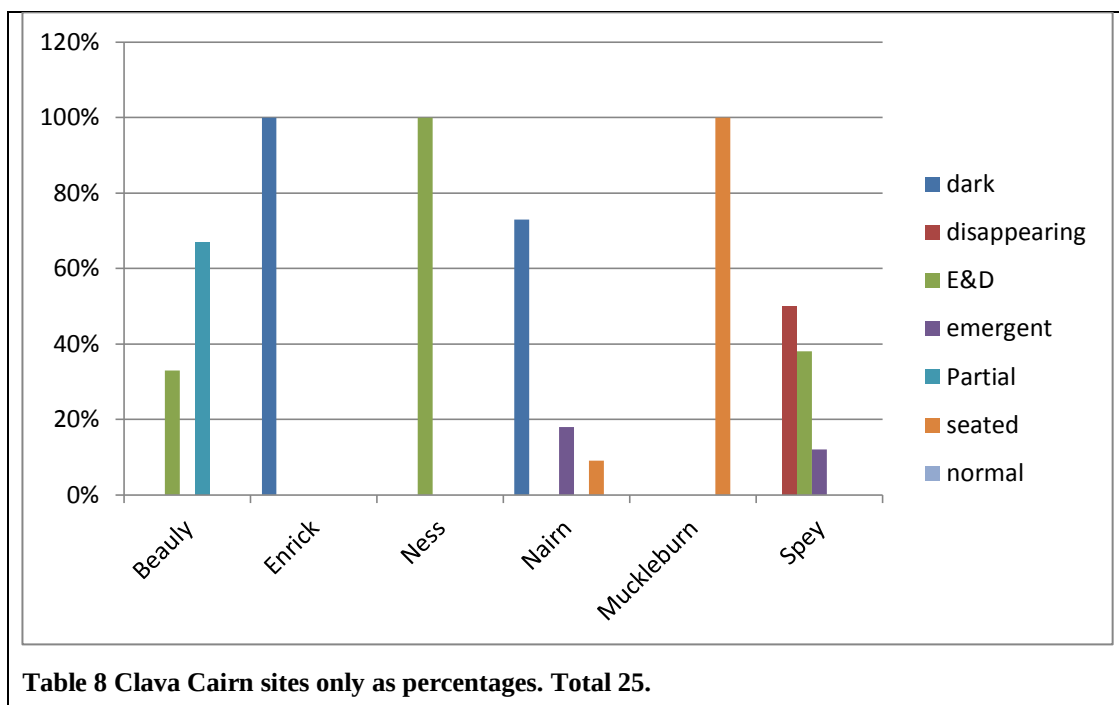


Table 6 Mixed cairn sites per river. Total 38.

River	Dark	disappearing	E&D	Emergent	Partial	Seated	Normal
Beaully	1	1	1		2		
Enrick	1						
Ness	2		1				
Nairn	8			2		1	
Muckleburn			1	1			
Findhorn		1					
Spey	1	6	3	2	1	1	1
Totals	13	8	6	5	3	2	1

Table 7 mixed cairn site data. Total 38.



River	Dark	Disappearing	E&D	Emergent	Partial	Seated	Normal
Beaully			1		2	0	
Enrick	1						
Ness			1				
Nairn	8			2		1	
Muckleburn				1			
Spey		4	3	1			
Totals	9	4	5	4	2	1	

Table 10 Clava Cairn sites only. Total 25.

Appendix IV Star orientations

Star positions are provided by Stellarium planetarium.⁴⁰⁰

Sirius

Bradley's radiocarbon dates for Balnuaran fall between 2340 and 2030 BCE.⁴⁰¹

Milton of Clava South and the three EBA monuments at Balnuaran have their largest orthostats at:

Balnuaran of Clava NE = Declination -19.33° to -22.75° (Az. 224°-232°)

Balnuaran of Clava Central = Declination -17.49° to -22.75° (Az. 224°-236°)

Balnuaran of Clava SW = Declination -12.21 to -22.75° (Az. 224°-247°)

Milton of Clava South = Declination -20.25° to -22.14° (Az. 215-220°)

(as stated in Appendix II).

Sirius positions, given by Stellarium planetarium, are listed below and the setting position for Balnuaran is where the clinometer provides a three degree hill southwest above the three main orthostats for all three EBA cairns.

⁴⁰⁰ <http://www.stellarium.org>, [Accessed 04 January 2017].

⁴⁰¹ Bradley, Good Stones, p.157.

Year BCE	Sirius declination	Azimuth at setting
2000	-19° 17' 06.3"	225°
2100	-19° 33' 13.4"	224°
2150	-19° 41' 29.0"	224°
2200	-19° 49' 52.6"	224°
2250	-19° 58' 23.1"	223°
2300	-20° 07' 03.4"	222°
2350	-20° 15' 50.5"	222°
Milton of Clava South		
2400	-20° 24' 45.4"	223°
2500	-20° 42' 58.1"	222°
3000	-22° 21' 26.6"	217°

Deneb Algedi

Little Urchany has the main menhir orientated on midwinter sunset, but as it is a dark site it could also be orientated on Deneb Algedi at midsummer, unfortunately no radiocarbon dates are available for this site, so any suggestions are very tentative.

Little Urchany = Declination -21.72° to -25.21° (azimuth 201° to 214°).

Dates for 21st June are close but not precise.

Year BCE	Deneb Algedi declination	Azimuth at setting
2000	-25° 37' 06.5"	198
2100	-25° 34' 26.7"	199
2200	-25° 30' 52.7"	199
2300	-25° 26' 24.7"	199
2400	-25° 21' 03.0"	200

Pleiades

Balnaran of Clava Central has the eastern radial aligned with the summer rising of the Pleiades = Declination -3.54° to +8.20° (Azimuth 81° to 103°)

Dates for 21st June.

Year BCE	Pleiades declination	Azimuth at rising
2000	+5° 52' 56.2"	85
2100	+4° 59' 36.9"	86
2200	+ 4° 26' 17.4"	88
2300	+3° 52' 58.4"	89
2400	+3° 19' 41.1"	90

Alnilam (central star in Orion's Belt)

Lower Lagmore = Declination -11.77 to -13.52 (azimuths 231-235)

Dates for 21st December, for example 21/12/2000 at 1 hr 20m 22s = -12° 17' 01.0"

Year BCE	Alnilam declination	Azimuth at setting
2000	-12° 17' 01.0"	234
2100	-12° 44' 42.7"	233
2200	-13° 12' 47.6"	231
2300	-13° 41' 14.9"	230
2400	-14° 1' 03.9"	229

Alnilam does briefly set into the similarly placed far-western stone at Upper Lagmore, but Antares was considered, which would set into this stone but much later around 1800. With no radio-carbon-dates these suggestions are very tentative indeed.

Antares

Upper Lagmore = Declination -10.38 to -12.44 (azimuths 227-232)

Dates for 21st December, for example 21/12/2000 at

Year BCE	Antares declination	Azimuth at setting
2000	-9° 40' 19.0"	230
1900	-10° 12' 59.5"	230
1800	-10° 45' 30.4"	229

Milton of Clava North = Declination -26.65° to -28.57° (azimuths 202-206°).

No sufficiently high magnitude star appears to set into this enigmatic stone.

Appendix V Preliminary Survey Cairns

The preliminary survey included the most prominent Clava cairns.

Balnuaran of Clava South West Passage-grave

Balnuaran of Clava Kerb cairn

Balnuaran of Clava Central Ring-cairn and Radials

Balnuaran of Clava North East Passage-grave

Càrn Gask Ring-cairn

Culdoich Passage-grave plus fallen Monolith

Corriemony Passage-grave

Druid Temple Passage-grave

Mains of Clava North-West (Menhir only, cairn site)

Milton of Clava South (remains of Chapel)

Milton of Clava North Passage-grave

All cairns were tested for magnetic anomalies. Azimuth and Altitude measurements were taken, converted into Declination after conversion to true azimuth. Passage-graves were measured crossover-fashion from the orthostat at the chamber entrance to the opposite orthostat at the passage entrance to assess sky-views and with Ring-cairns both sides of the most prominent circle orthostat was measured from both sides of the most prominent kerb-orthostat (SW oriented in all instances), plus where feasible and visible from the possible centre of the cairn (less accurate) to assess what part of the sky was delineated by the circle-monolith. The central Ring-cairn at Balnuaran has a number of radials and these were measured from both sides of the orthostats at the edge of the cairn to opposing sides of the circle-monolith to which the radial connected. This is described in the methodology chapter.