Sheetlines

The journal of
THE CHARLES CLOSE SOCIETY
for the Study of Ordnance Survey Maps

The Charles Close Society was founded in 1980 to bring together all those with an interest in the maps and history of the Ordnance Survey of Great Britain and its counterparts in the island of Ireland. The Society takes its name from Colonel Sir Charles Arden-Close, OS Director General from 1911 to 1922, and initiator of many of the maps now sought after by collectors.

The Society publishes a wide range of books and booklets on historic OS map series and its journal, *Sheetlines*, is recognised internationally for its specialist articles on Ordnance Survey-related topics.

OS maps and the ecology of extinct British animals

Stephen JG Hall

How extinct animals lived has long been a source of fascination. The ancestor of our domesticated cattle, the aurochs *Bos primigenius* died out in Britain around 1500 BC, probably as a result of hunting and loss of its habitat to farming, but lingered on, amazingly, to AD 1627 in a forest reserve in Poland.[1] Julius Caesar described it as a woodland animal, but some stratigraphic and palynological (pollen analysis) characterisations of archaeological finds have suggested it inhabited riverine and estuarine flatlands. However, no formal review has been made. Recent studies [2] have provided evidence that it specialised on the lush pastures associated with river plains and other fertile flat lands. This work capitalised on the fact that stable (ie non-radioactive) isotopes of elements, notably carbon, nitrogen and strontium, are not evenly distributed throughout nature and, when found in archaeological bone and tooth specimens, can often indicate the probable diet and habitat of an animal.

So, the evidence base for the actual habitat preferences of the aurochs is becoming stronger, and readers of *Sheetlines* might like to know how an enthusiasm for OS maps played a supporting role in an earlier generation of research in this apparently abstruse area[3]. But before telling that story, I should point out that there is a definite present use for this research. Rewilding projects are generally accepted to need large-bodied herbivores to maintain vegetation and landscape diversity, so an understanding of the ecology of aurochs is necessary if an adequate substitute or proxy for that species is to be identified.

The "Urus of Caesar". From HN Hutchinson, 'Creatures of other days'. 1894.

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[1] Cis Van Vuure, '*Retracing the aurochs. History, morphology and ecology of an extinct wild ox'.* Sofia and Moscow, Pensoft, 2005.

[2] For example Diana Pushkina, Juha Saarinen, Reinhard Ziegler, Hervé Bocherens,'Stable isotopic and mesowear reconstructions of paleodiet and habitat of the Middle and Late Pleistocene mammals in south-western Germany'. Quaternary Science Reviews, 227 (2020), 106026.

[3] Stephen JG Hall, 'A comparative analysis of the habitat of the extinct aurochs and other prehistoric mammals in Britain', *Ecography* 31(2008), 187-190.

The late **Dr Derek Yalden** included, in his splendid account of mammalian history and prehistory [4], OS map references (termed here "find squares") for archaeological records in Britain of aurochs, beaver, brown bear, elk (*Alces alces*, or moose) and wolf, and he kindly provided me with extra data on red deer and roe deer. A high proportion of the finds were undated. The present-day ecologies of all these species, apart from the aurochs, are of course well known and it occurred to me that if the ecologies of the extant species could be accurately inferred from characteristics, then it was reasonable that valid inferences could be derived for the extinct species, ie the aurochs.

So many happy hours were spent with notebook, dividers, calculator and ruler in Lincoln City Central Library, and at home, studying 1:50,000 First Series and 1:63,360 New Popular and Seventh Series maps, to record for each 1 km^2 find square the following numerical features – height above sea level, number of contour lines and distance between highest and lowest contour lines ("available relief", indicating flatness), and landscape features – presence/absence of cliff, lake, woodland, marsh, heath. The same data were recorded for a randomly selected 1 km^2 square within 10 km. The 1:63,360 maps were preferred because print quality was better and there was not so much confusing modern detail; such as motorways. Three find squares are illustrated here.
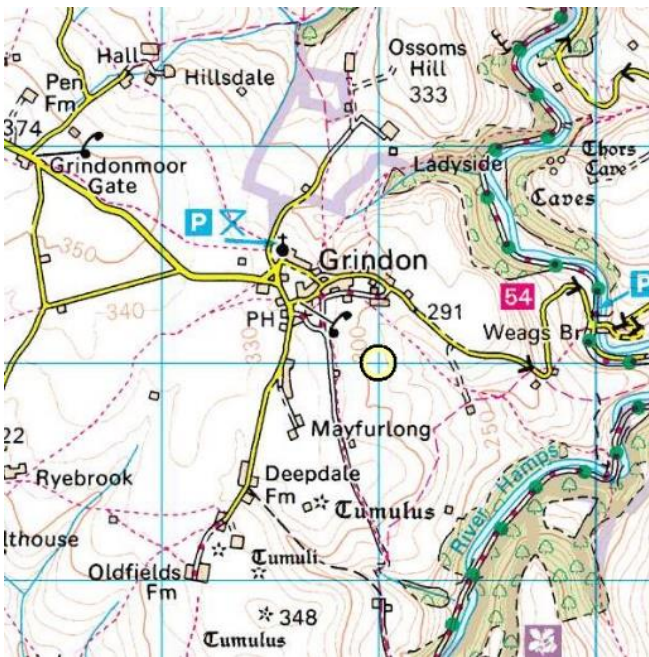
Find square SK 0954 is to NE of symbol
(near Dove Dale, Derbyshire)
*Species found - Brown bear & wolf*
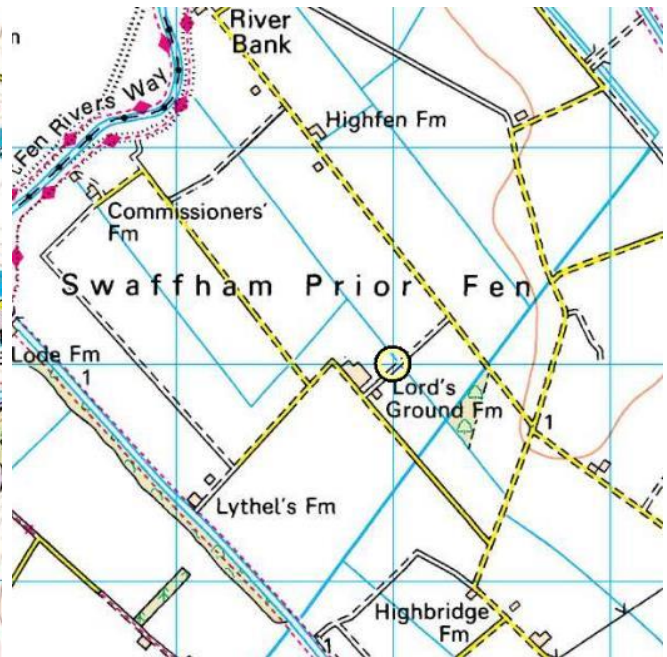
Find square TL 5467 is to NE of symbol
(Cambridgeshire fens)
Species found - Aurochs

[4] Derek W Yalden, *The history of British mammals*. London, T and AD Poyser, 1999.

Find square TA 1656 is to NE of symbol (S. of Bridlington). Species found - Beaver & wolf.

In the case of numerical features, when the find squares were compared between species, there were statistically significant effects of species on the height above sea level (metres) and the distance between highest and lowest contours (metres). Beaver and aurochs were both associated with low-lying, flat lands.
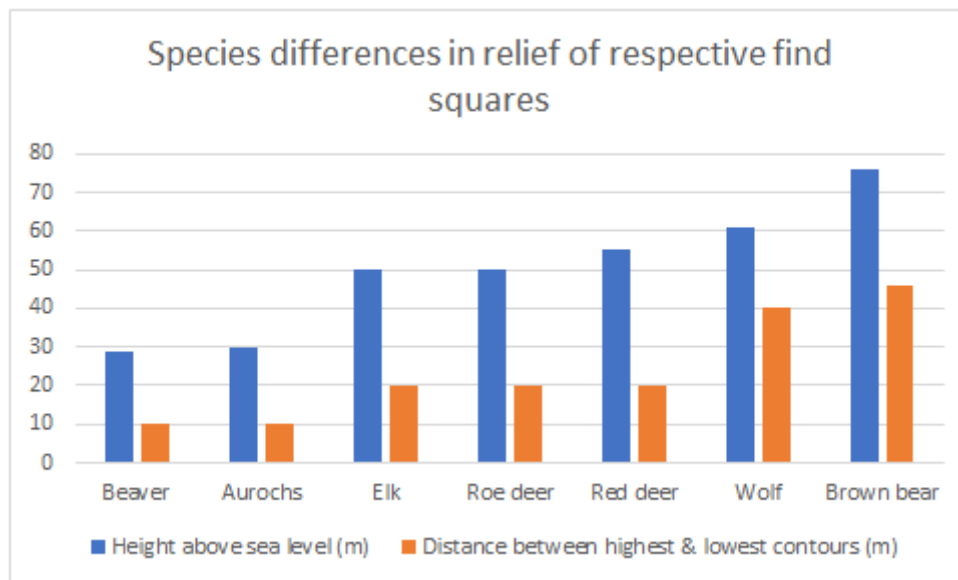
For some species and some landscape features, there were substantial differences between find squares and their respective control squares. The most striking examples are illustrated:

Comparisons between find and control squares (number in brackets) in proportions of squares with each landscape feature
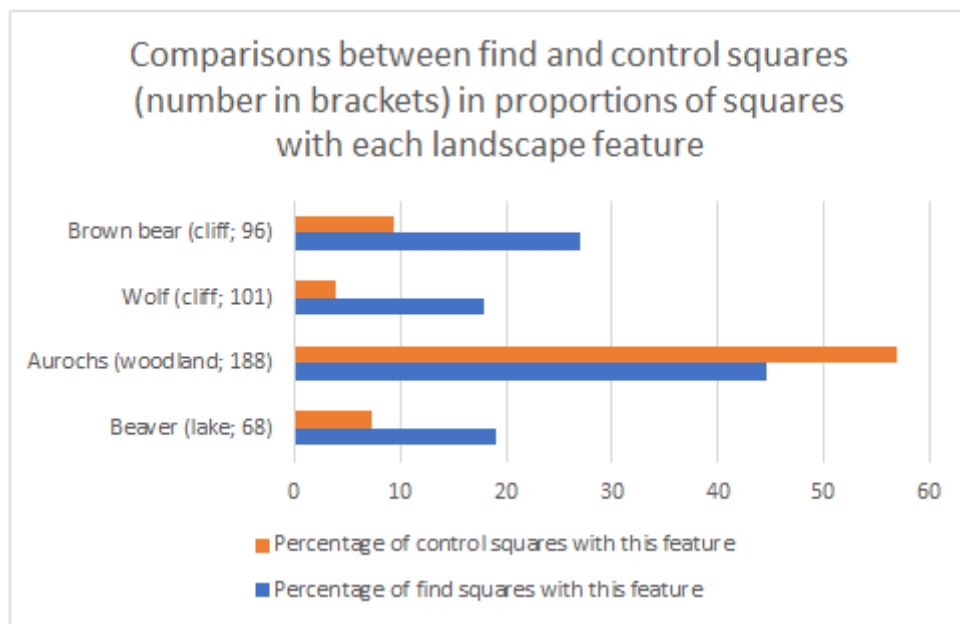
    Map squares with beaver finds are significantly more likely to have a lake today, than the control squares, and similar effects are seen for brown bear and wolf, in relation to presence of cliffs. In the light of what we know of these species, these findings are not surprising. In the case of the aurochs, while woodland was present in 45 per cent of find squares, a higher proportion (57 per cent) of control squares had this feature.[5] In Britain today, woodland tends to be on the more infertile ground, and this suggests the aurochs was a creature of the more fertile areas.

    Finally, comparing the altitude and available relief of aurochs find and control squares, median height above sea level of find squares (30 metres) was significantly lower than that of control squares (50 metres) and so, too, was available relief (10 and 20 metres respectively). It is abundantly clear the aurochs lived in landscapes that were relatively low-lying and flat. Of course, this large-bodied and highly successful animal, which at its peak was found across most of Europe, into north Africa, and across much of Asia and into China [6], may well have had migratory subpopulations and local adaptations, so this can only be a generalisation.

    To conclude, three separate approaches have been applied to aurochs landscape ecology. These are the stratigraphic and palynological characterisations of find sites, stable isotope studies – necessarily limited to a very small proportion of actual finds – and the map-based study described here. The novelty of the map-based study is that the methodology used for aurochs, of inferring ecology from landscape features, was tested and confirmed to be valid by applying it to species whose ecology is already known.
Whether there are any other ecological puzzles that can be examined by the pleasant activity of scouring Ordnance Survey maps in a calm and peaceful library I don't (yet) know!

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[5] Full statistics and tests of significance are in SJG Hall, *op cit*.
[6] Van Vuure, *op. cit.,* 41