WILDLAND RESEARCH INSTITUTE

A review of naturalistic grazing versus natural processes

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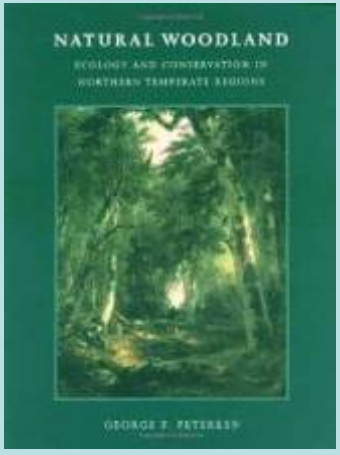
11th EUROPE'S WILDERNESS DAYS
26- 28 September 2012
Archipelago National Park
Nagu/Nauvo, Finland

Wood pasture has become linked to "naturalistic grazing"



The views now expressed by Vera have been taken up by British proponents of wood-pasture conservation, perhaps because they reinforce current enthusiasm for the conservation of saproxylic species, parklands and veteran trees. The danger is that these enthusiasms will be pushed too far.

Peterken, G.F. Postscript in *Natural Woodland: Ecology and Conservation in Northern Temperate Regions*. Cambridge University Press. Reprinted 2001

"a polemic, an advocate's statement that should be read with caution"

Peterken, G.F. British Wildlife, 12: 225-6

ECOS 25 (1) 2004

Wild follow up

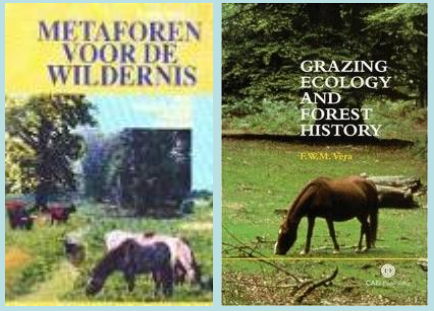
MARK FISHER

It was only a matter of time before the theories of Frans Vera in his *Metaphors for the Wilderness* would end up in a justification of agriculture in nature conservation

"naturalistic grazing" is JUST farming

The impact of Frans Vera in England

- Livestock grazing is cloaked in the rhetoric of "natural processes"
- Livestock grazing is "naturalistic grazing" when *grazing animals are assumed to drive the ecosystem!*
- "naturalistic grazing" is synonymous with "rewilding"



Livestock grazing is the "business model" of the conservation industry


Longhorn cow, Cumbria.

HR2 Native breeds at risk grazing supplement £70/€87.5/yr/ha

agri-environment subsidy is the driver for nature conservation

State forest lands have become the playground for Vera-like experiments in wood pasture creation

Four examples on the Public Forest Estate

- Neroche, Somerset
- Dunwich Forest, Suffolk
- Friston Forest, E. Sussex
- Ennerdale Forest, Cumbria

They all have in common:

- Tree clearance (deforestation) to create a hole in the forest
- Fencing enclosure
- Grazing with cattle or ponies
- The expectation that trees will regenerate in the presence of livestock grazing - creation of wood pasture
- Agri-environment funding i.e HC14 Creation of wood pasture - £180/€225/yr/ha

Remnant oak wood pasture, Hampshire

Can grazing "create" woodland?

They are not like the wood pasture in this photograph!

Neroche

Enhancing and celebrating the Blackdown Hills

Forestry Commission England

neroche
liberating the landscape

- **'Liberating the landscape'** by creating a more sustainable structure of open space and broadleaved woodland. This involved some forest clearance and the introduction of cattle grazing.

A hole in the forest!

FOREST BEEF
QUALITY PREMIUM

Below: Early stage of wood pasture restoration.

Forest Research

Enabling Positive Change

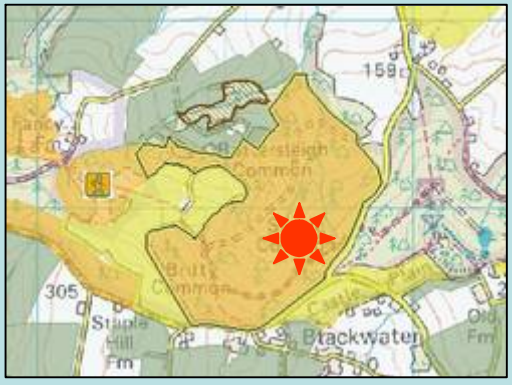
Evaluation of the Neroche Landscape Partnership Scheme

Impacts of the scheme

- Opening up the landscape through tree clearance and cattle grazing was an innovation, transforming areas into low intensity mixed wood pasture.
- However, concerns were expressed about the scale of the tree clearance and how the sites looked after felling.

"Timber harvesting work began in 2006 to clear the first grazing units in the Neroche Forest, and the resulting open space was prepared for grazing through raking and burning of brash, lowering of stumps and erection of new stock fencing"

Agri-environment scheme funding the grazing at Neroche



Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00386186	The Blackdown Hills Trust	Wellington	Higher Level Stewardship	205581.1	1035.00	90.02	No	More...

Staple &Ruttersleigh Common

Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00386189	The Blackdown Hills Trust	Wellington	Higher Level Stewardship	73465	715.00	24.57	No	More...

Wych Lodge

Buckland Wood

Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00386188	The Blackdown Hills Trust	Wellington	Higher Level Stewardship	43287.5	555.00	14.45	No	More...

- Forestry Commission own the cattle and the land
- Blackdown Hills Trust are tenants who contract two local farmers to manage the cattle
- The Blackdown Hills Trust will receive £322,333/ €402,916

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Dunwich Forest

Dunwich Rewilding Project

Dunwich Forest is currently undergoing a process of 'rewilding' with a long term plan to recreate and regenerate the natural landscape that existed prior to the conifer plantations. The managment of the forest is now a partnership between the Forestry Commission, Suffolk Wildlife Trust and RSBP. The more northern area being managed by SWT and grazed by a herd of Dartmoor ponies. The heathland habitat to the south is being managed by the RSPB. The area covered by heathland will increase as conifer crops are gradually harvested and areas of deciduous trees are allowed to revert to heather.

So what are the benefits?

Habitats

- **New, improved and expanded reserves for nationally important habitats.**
- **Wood pasture = less than 20,000 ha in the UK. Approximately 320 ha will be created in the Dunwich area.**
- **Heathland = 58,000 ha in the UK. 135 ha to created in Dunwich Forest.**

Dunwich Forest is Suffolk Wildlife Trust's newest Living Landscape. This is a large scale innovative partnership project with the Forestry Commission to create 260 ha (640 acres) of grazed woodland habitat from an existing block of conifer plantation. This will be the first time such an initiative has been undertaken on this scale in the UK.

Wild Walks
record your sightings

Forestry Commission England

Dunwich Forest

Suffolk Wildlife Trust

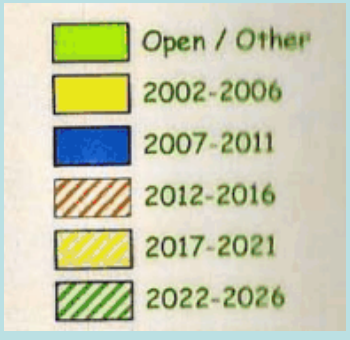
Wood pasture is traditionally maintained by grazing. Suffolk Wildlife Trust has pioneered the use of ponies for conservation grazing in Suffolk and hardy Dartmoor ponies, which will thrive on the scrubby woodland grazing, are ideal in Dunwich Forest. The herd of 30 ponies roam freely through the forest, grazing alongside the rabbits and deer.

The venture is being supported by the SITA Trust which is providing £85,000 towards the £163,000 project through its Landfill Communities Fund. The Tubney Charitable Trust is also supporting the initiative.

Fencing has been replaced around the perimeter of the area to secure stock. However the forest will remain freely accessible to the public and horse riders via kissing gates and bridle gates. The

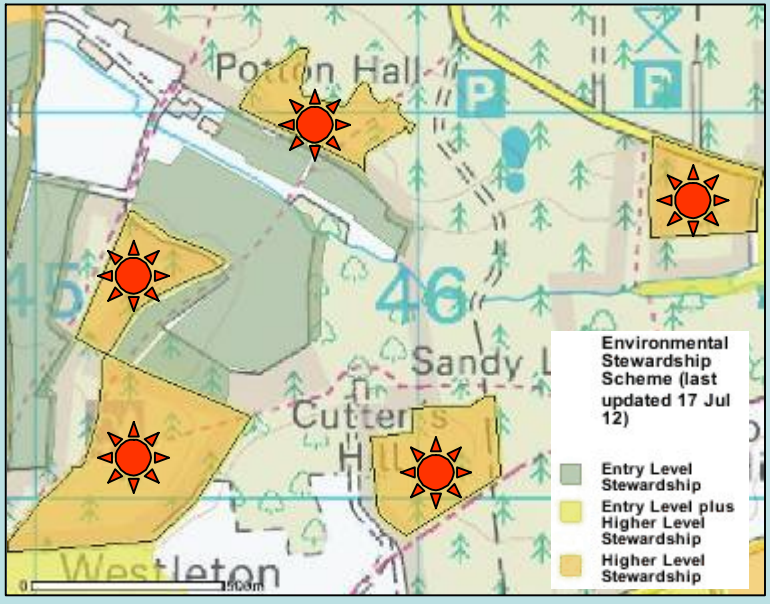
The transformation will be gentle. The conifer crop will be gradually harvested, creating space for natural vegetation to develop in its place.

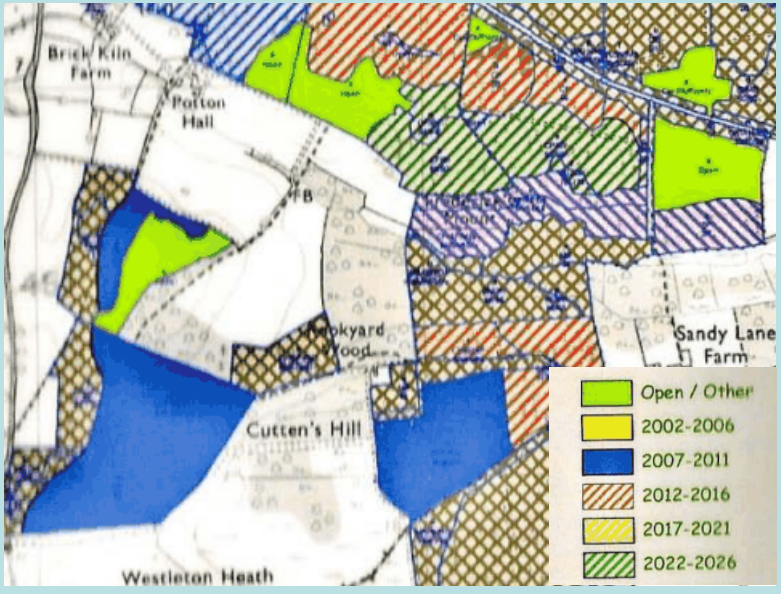
Is this rewilding?



nature's voice

The heathland habitat to the south is being managed by the RSPB. The area covered by heathland will increase as conifer crops are gradually harvested and areas of deciduous trees are allowed to revert to heather.





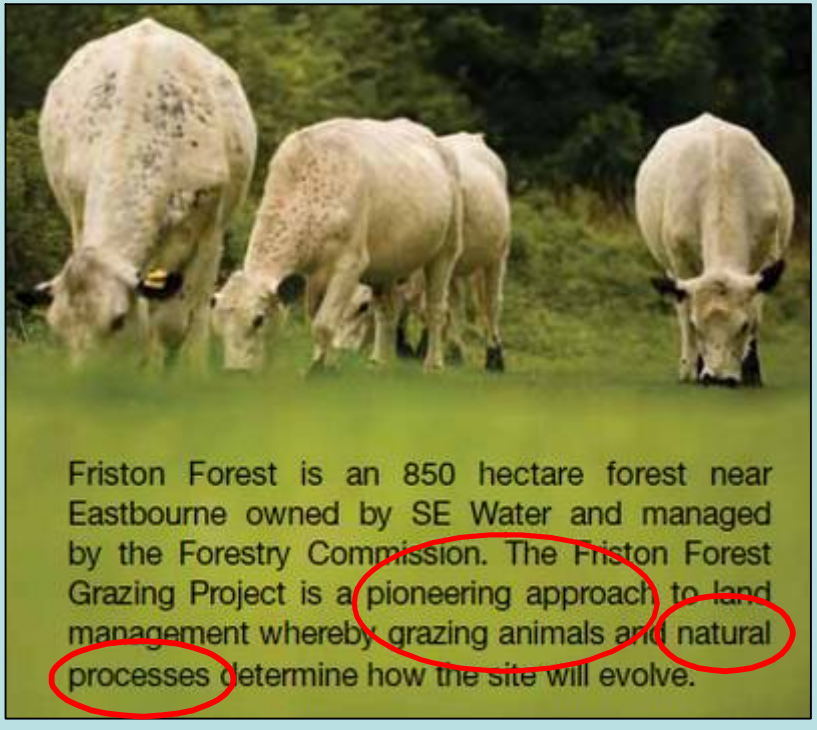
H02 Restoration of lowland heathland on neglected sites, H03 Restoration of forestry areas to lowland heathland
LHX Major preparatory work for heathland recreation, SA Scrub management – less than 25% cover
CLH Re-introduction of livestock - Livestock-handling facilities

Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00351950	*Unavailable	*Unavailable	Higher Level Stewardship	*Unavailable	*Unavailable	41.43	No	More...

Is this rewilding?

Friston Forest

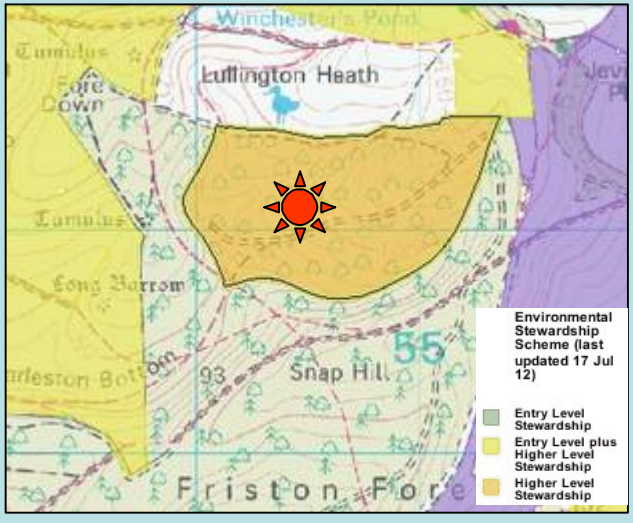
Friston Forest, near Eastbourne, East Sussex On the eastern tip of the National Park the Forestry Commission is working with the Sussex Wildlife Trust, South East Water and Natural England to protect England's largest surviving fragment of chalk heath at Friston Forest adjacent to Lullington National Nature Reserve. Traditional breeds of cattle have been introduced for naturalistic grazing as part of a programme of pasture woodland creation.

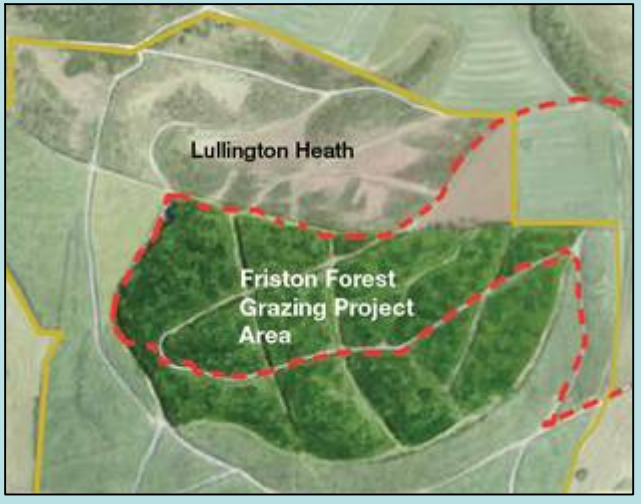


Friston Forest Grazing Project

TRACKING THE CATTLE

Understanding how the cattle move across the grazing area at different times of year and in the years ahead is going to be crucial to the success of the Friston Forest Grazing Project.





HC14 Creation of wood pasture

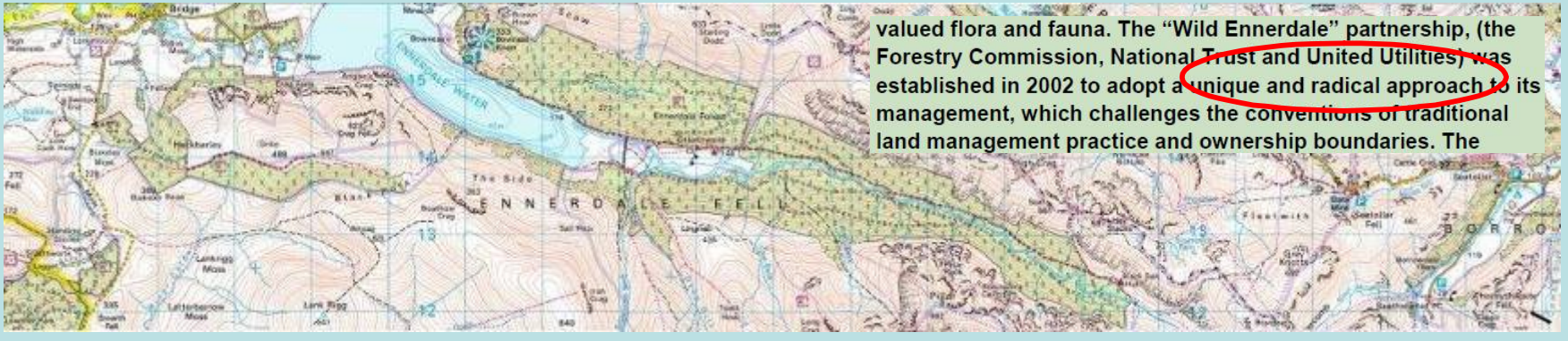
Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00264995	Sussex Wildlife Trust	Henfield	Higher Level Stewardship	149706	45151.20	81.73	No	More...

Wild Ennerdale

The natural evolution of a wild valley

Forestry Commission England

Galloway cattle introduced in 2006 as a *"natural disturbance process"*

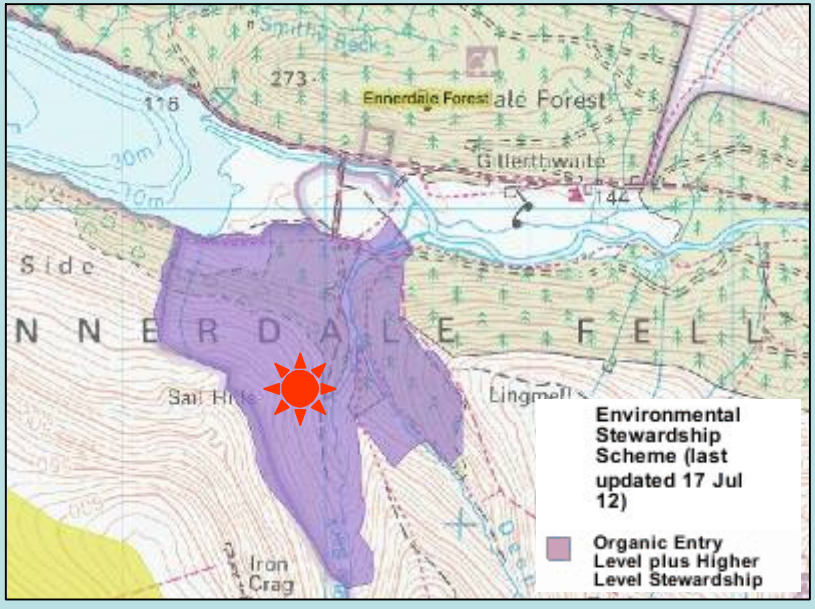


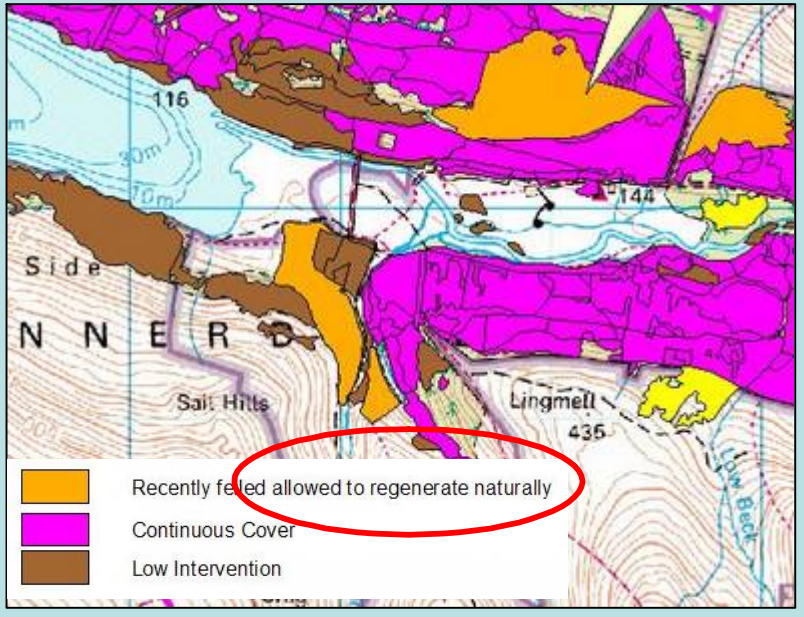
valued flora and fauna. The "Wild Ennerdale" partnership, (the Forestry Commission, National Trust and United Utilities) was established in 2002 to adopt a unique and radical approach to its management, which challenges the conventions of traditional land management practice and ownership boundaries. The

wild water forest mountains
ennerdale

Silver Cove Grazing Area 140ha - 2006

Shaping the landscape naturally





Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00344307	*Unavailable	*Unavailable	Organic Entry Level plus Higher Level Stewardship	*Unavailable	*Unavailable	620.57	No	More...

UL18 Cattle grazing on upland grassland and moorland UX3 Moorland requirements

Module and Programme Catalogue

UNIVERSITY OF LEEDS

2012/13 Undergraduate Module Catalogue

GEOG3320 Management of Wilderness Environments

20 credits

Module manager: Dr Steve Carver

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Objectives

On completion of this module, students should be able to:

1. define wilderness and describe current environmental pressures facing this important resource
2. demonstrate an understanding of the ethical and practical issues relating to wilderness and its management
3. evaluate environmental problems specific to wilderness environments and identify appropriate management strategies
4. relate these to a number of topical case studies
5. research, design, author and present a web page poster on a wilderness topic.

University of Leeds students on a field course in Ennerdale

Dynamic natural forces in the valley

River Liza – high energy

Wind throw

Roe deer (70-110) – Red deer arriving

"In Ennerdale the Forestry Commission employs a wildlife ranger to cull around 20 deer , mostly Roe, a year through shooting. By managing the deer population we ensure that important habitats such as Oak woodlands and wet meadows develop free from over grazing"

Why Cattle

- A key missing natural process

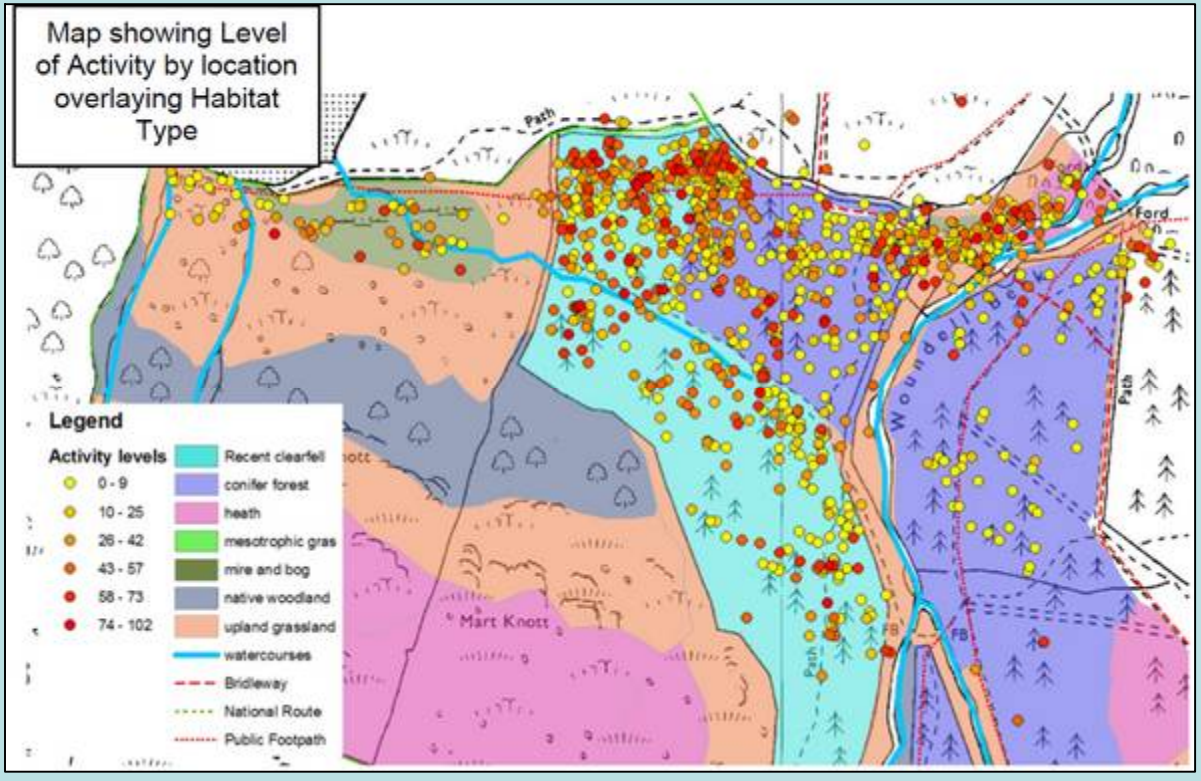
No evidence of aurochs in valley

Felled areas in Silver Cove

Exclosures in Silver Cove

Trampling by cattle not needed for tree establishment!

Radio-collar tracking cattle in Silver Cove and tree regeneration



Location tracking for two 3-day periods: Summer and Autumn

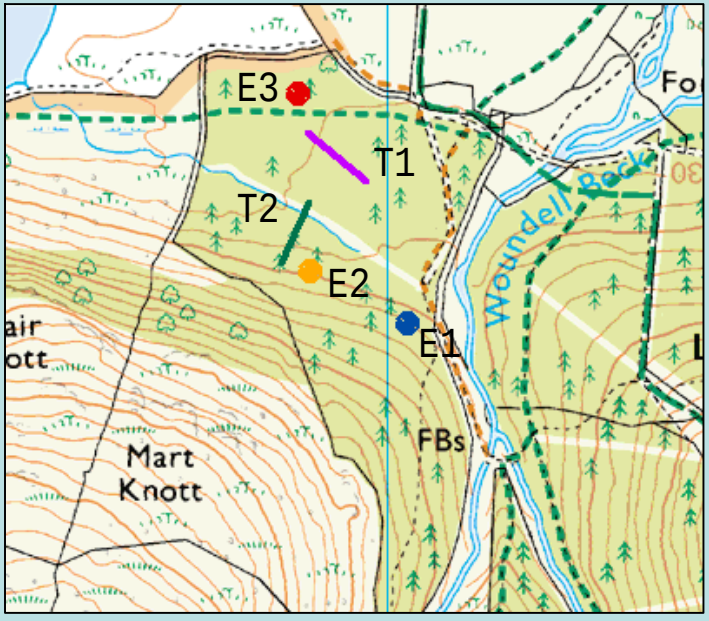
The greatest level of activity is on the clear fell where the cattle spend 40% of their time

Initial study in 2010 found the height of native tree regeneration outside of exclosures is related to slope and accessibility

- Cattle access upslope flat areas along easy routes with gradual incline, including existing footpaths (movement N to S)
- Young trees on sharp inclines are not browsed or browsed less (movement not E to W)

Effect of slope and exclusion in Silver Cove

Naomi Eleanor Matthews, 2012



- Diversity of tree species is affected by slope and by exclosure – Fig 1 (palatability is factor in the open)

- Average height of tree species affected by slope and exclosure

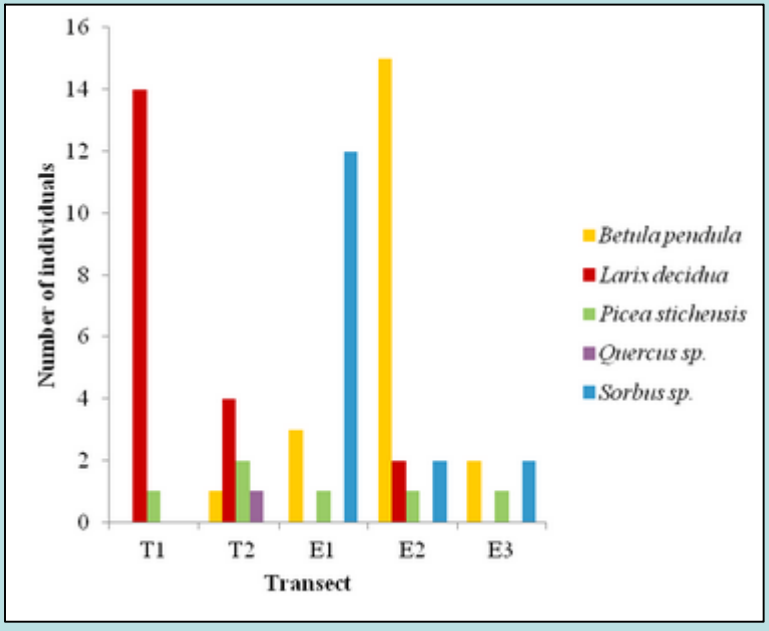


Fig. 1 Total number of tree seedlings found at each transect for each species

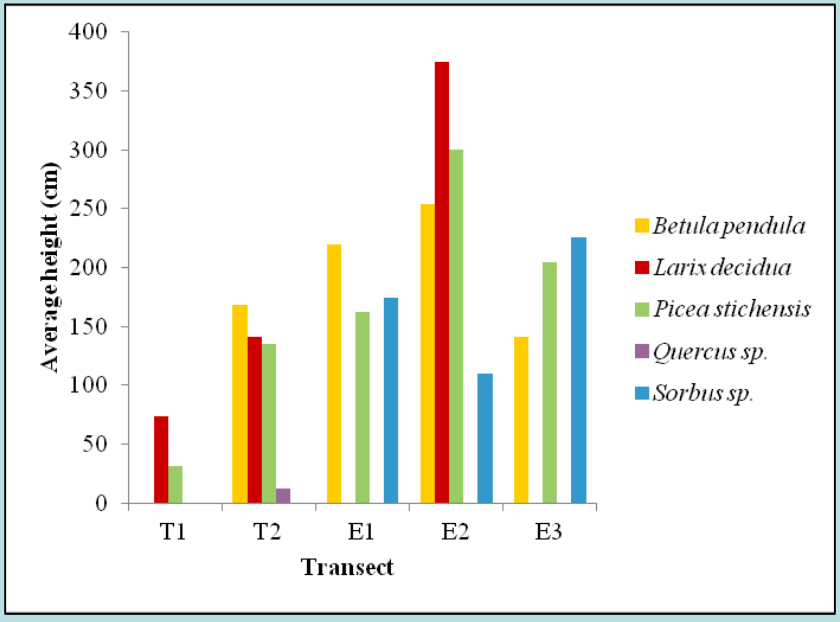


Fig. 2 Average height of tree seedling of each species at each transect

Lessons from cattle grazing in Silver Cove

In the flat areas:

- cattle producing a modified plagio-climax determined by palatability
- where protected through exclosure, native tree recruitment does not need cattle trampling

Cattle grazing will return the landscape back to the state before deforestation of conifers – this is not "rewilding"

Effect of slope:

- modifies cattle behaviour through access restriction
- analogous to exclosure in species recruitment

Native trees will flourish on slopes – this is not wood pasture

If slope = fence, does fence = wolves?

Ecological incompleteness and our missing top predators

There is no shortage of herbivores

	Mesolithic	Now
Elk	64,617	2
Aurochs	83,896	0
Wild Boar	954,378	500
Mountain hare	421,320	350,000
Red deer	1,253,613	350,000
Roe deer	832,793	800,000
Beaver	80,949	100
Cattle	0	9,675,000
Sheep	0	21,951,000
Horse	0	750,000
Pig	0	4,326,000
Rabbit	0	40,000,000
Brown hare	0	800,000
Other deer	0	395,000
Bison	0	0
	3,691,566	79,397,602

Maroo, S. & Yalden, D.W. (2000) The Mesolithic mammal fauna of Great Britain. Mammal Review 30: 243-248

And a shortage of beaver!

There is a shortage of carnivores!

	Mesolithic	Now
Wolf	7,000	0
Lynx	6,603	0
Bear	13,207	0
Wildcat	66,033	40
Otter	22,281	7,350
Pine Marten	147,474	3,650

Megafauna did not survive habitat change – humans only pushed them over the edge

MacDonald, G.M. et al.(2012) Pattern of extinction of the woolly mammoth in Beringia. Nature Communications. 3:893

Ripple, W.J., Van Valkenburgh, B., (2010) Linking top-down forces to the Pleistocene megafaunal extinctions. BioScience 60: 516–526.

Allen et al (2010) Last glacial vegetation of northern Eurasia, Quaternary Science Reviews 29: 2604-2618

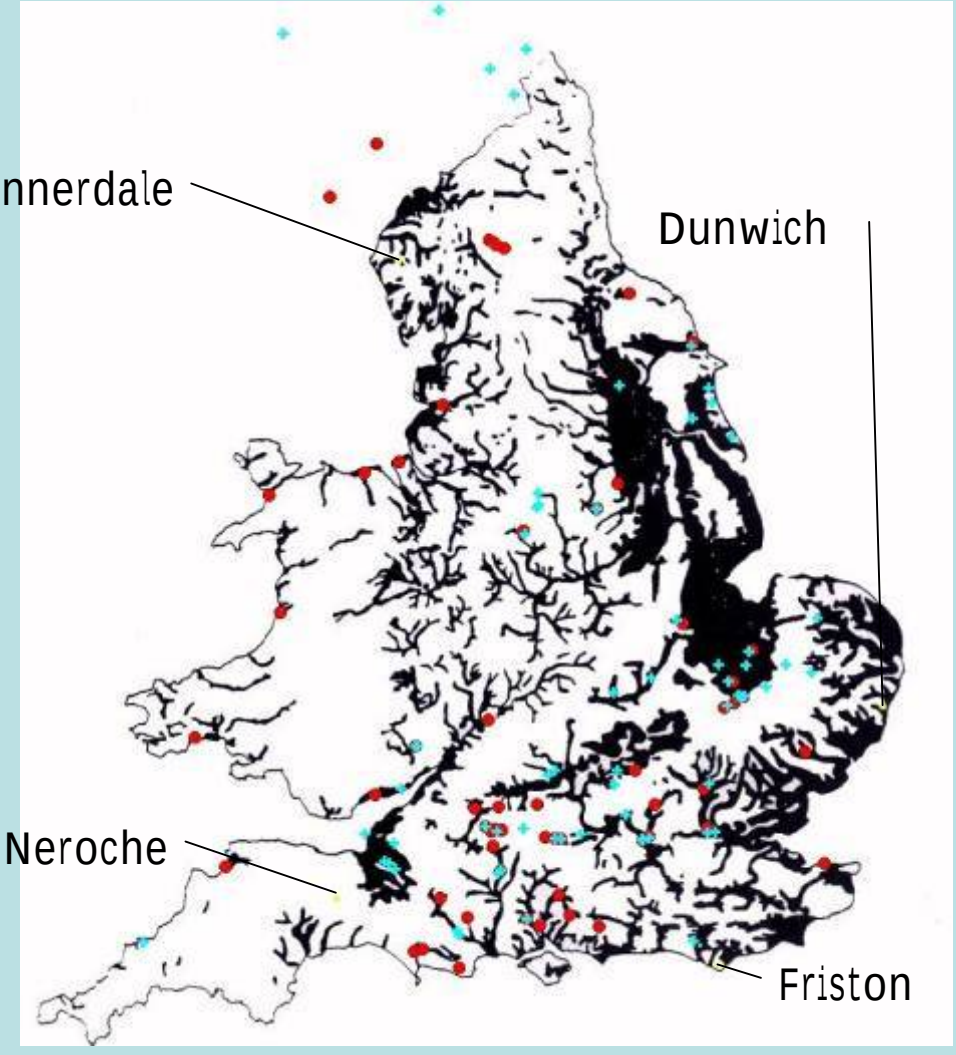
Nogués-Bravo D. et al (2008) Climate Change, Humans, and the Extinction of the Woolly Mammoth. PLoS Biol 6: e79

Stuart et al (2004) Pleistocene to Holocene extinction dynamics in giant deer and woolly mammoth. Nature 431: 684-689

is a first indication that in fact former large herbivores (including aurochs) were apparently not able to oppose or control forest growth. Only beavers (*Castor fiber*), from which there is prehistoric evidence of their clearing and flooding activities (Garrison 1967), locally were and are able to change forest growth along rivers (Johnston & Naiman 1990).

Van Vuure, C. T. 2002. History, morphology and ecology of the aurochs (Bos taurus primigenius). Lutra 45: 1-16

Aurochs and beaver lived in lowland floodplains



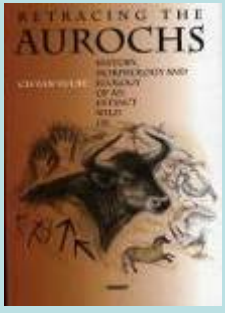
• aurochs + beaver

Beaver more significant than aurochs

Aurochs fossil bones associated with wet marshland and riverine flat-lands in the lowlands. Beaver associated with floodplains and lakes

Hall, S.J.G. (2008) A comparative analysis of the habitat of the extinct aurochs and other prehistoric mammals in Britain. Ecography - Pattern & Diversity in Ecology 31: 187-190

Lynch et al (2008) Where the wild things are: aurochs and cattle in England. Antiquity, 82, 1025-1039



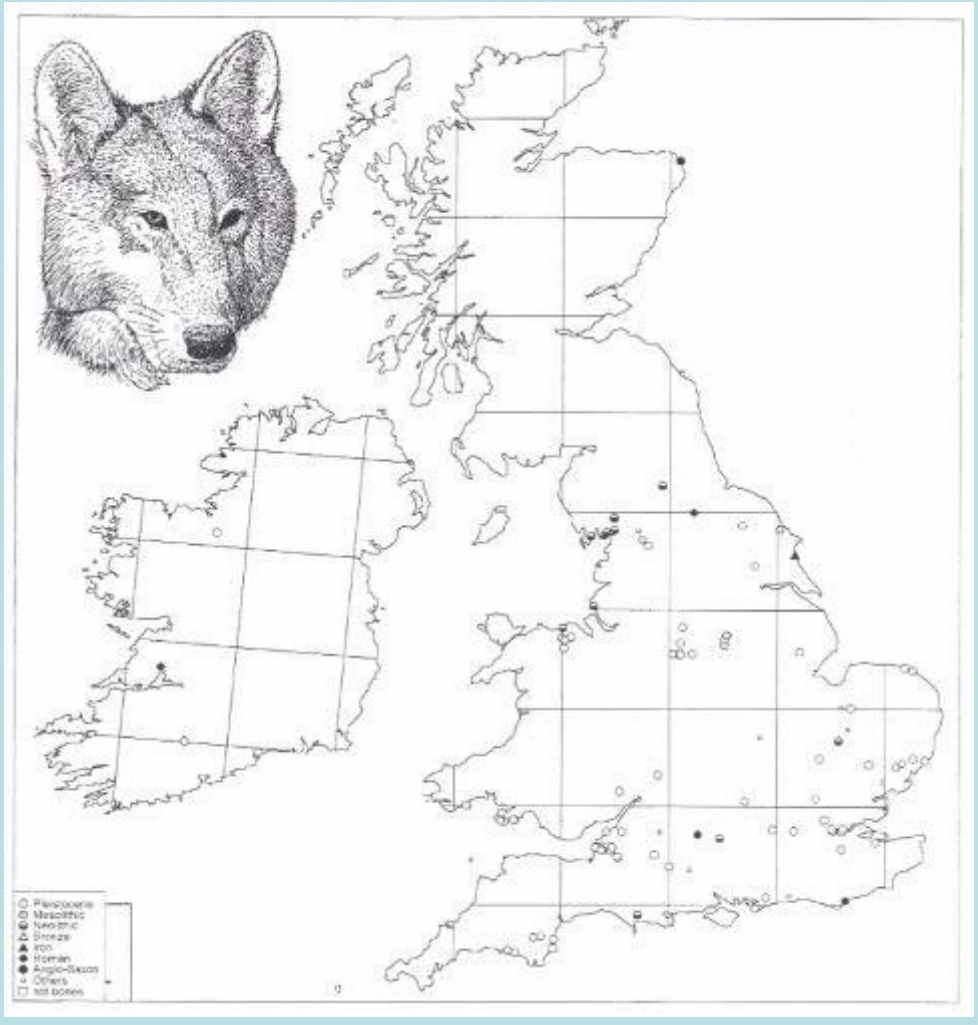
Cattle are not wild animals – phenotypic similarity to aurochs does not guarantee genetic or behavioural similarity

Van Vuure, C (2005) Retracing the Aurochs: History, Morphology and Ecology of an Extinct Wild Ox. Pensoft Publishers.

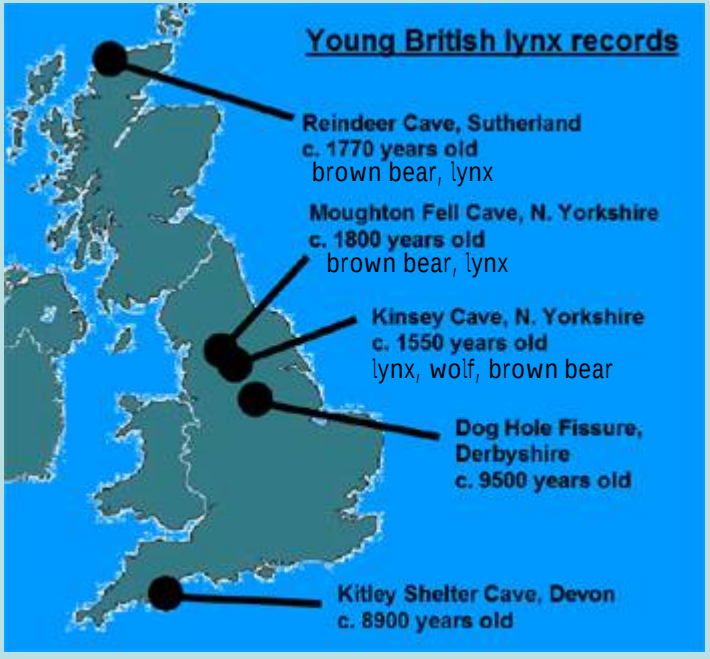
The second significant weakness of the Vera hypothesis in the present context is that herbivore grazing is fore-grounded as the main relevant disturbance factor. However, it is but one of a range of factors requiring consideration (Bell and Walker 2005, fig 6.1). It has been shown, for instance, that beavers were a significant environmental disturbance factor in river valleys and lowlands in prehistory (Coles and Orme 1983; Coles 2001; Coles 2006). More sig-

Bell, M (2007) Mesolithic coastal communities in western Britain: conclusions. In *Prehistoric Coastal Communities: The Mesolithic in Western Britain*. Council for British Archaeology Research Report 149. 2007

Wolf and lynx fossil bone finds



Mesolithic was a "landscape of fear" – behavioural modification of herbivores



Kitchener A.C. & Bonsall C (1997) AMS radiocarbon dates for some extinct Scottish mammals Quaternary Newsletter 83: 1-11
Hetherington, D.A. et al (2006) New evidence for the occurrence of Eurasian lynx (Lynx lynx) in medieval Britain. Journal of Quaternary Science 21, 3–8

Article 22

In implementing the provisions of this Directive, Member States shall:

(a) study the desirability of re-introducing species in Annex IV that are native to their territory where this might contribute to their conservation, provided that an investigation, also taking into account experience in other Member States or elsewhere, has established that such re-introduction contributes effectively to re-establishing these species at a favourable conservation status and that it takes place only after proper consultation of the public concerned;

EU Habitats Directive

Wolves and lynx create woodland by behavioural modification

Aurochs will have avoided wolves - the main predator of young or debilitated animals

Paleo Art of Heinrich Harder c. 1916

Based both on the appearance of the former natural European landscape and recent research into the impact of large herbivores on forest growth, it is concluded that this impact is marginal. Only with the help of man large herbivores are able to create and maintain an open park-like landscape.

Van Vuure, C. T. 2002. History, morphology and ecology of the aurochs (*Bos taurus primigenius*). *Lutra* 45: 1-16

The literature (2001-2012) does not support Vera

"The views now expressed by Vera have been taken up by British proponents of wood pasture conservation, perhaps because they reinforce current enthusiasm for conservation of saproxylic species, parklands and veteran trees. The danger is that these enthusiasms will be pushed too far"
Peterken, G.F. (2001). Postscript in Natural Woodland: Ecology and Conservation in Northern Temperate Regions. Cambridge University Press. Reprinted 2001

"The introduction of grazing animals is rarly based on sound scientific research"

The interpretation of this data is made difficult because other management measures are often implemented at the same time, so that changes cannot be attributed exclusively to grazing. Often, there has been no inventory of the site before grazing is introduced. In addition, changes to grazing management are frequently made, making it difficult or even impossible to compare different series of measurements made over time. Other difficulties are posed by the absence of good controls and the short time span of many research projects. Conclusions regarding the effects of grazing therefore tend to be assumptions rather than the sum of substantiated factual evidence"

This is a first indication that in fact former large herbivores (including aurochs) were apparently not able to oppose or control forest growth. Only beavers (Castor fiber), from which there is prehistoric evidence of their clearing and flooding activities (Garrison 1967), locally were and are able to change forest growth along rivers (Johnston & Naiman 1990)"

has not received much attention. However, experimental studies do appear to demonstrate that browsers and grazers differ in their foraging behaviour. For example, the functional responses of browsers tend to be relatively flat, whereas those of grazers appear to be asymptotic. These differences in the interaction between ruminants from the different feeding categories and their food resource are likely to lead to differences in resource exploitation and impacts on vegetation"
Gordon, I.J. (2003). Browsing and grazing ruminants: are they different beasts? Forest Ecology and Management 181: 13–21

"The degree to which large herbivores were the main driver of landscape structure is still debateable. They would have been significant in some areas, but not in others: areas with very different large herbivore populations appear to have similar vegetation histories (R Bradshaw personal communication). The different make-up of our large mammal fauna (no bison or wild horse) and the lesser role for beech compared to continental woods may lessen the arguments for herbivore-driven systems in Britain"

"The available pollen data reported here forces the rejection of Vera's hypothesis"

Mitchell, F.J.G. (2005) How open were European primeval forests? Hypothesis testing using palaeoecological data. J. Ecol. 93, 168–177

"The absence of any crucial pollen–analytical evidence [8,18] to support the idea of open-canopy primeval forest as envisaged by Vera [5] has important implications for forest management policies that assume the wood-pasture hypothesis is appropriate and valid for natural European lowland forests"
Birks, H. John B (2005) Mind the gap: how open were European primeval forests?. Trends in ecology & evolution 20, 154-156

"Cyclical vegetation turnover, driven by grazing, seems less likely than more complex patterns. There is evidence that other disturbance factors were at least locally important. Most parts of the landscape were probably driven by more than one disturbance agent and the relative importance of these might vary over time. Parts of the Atlantic forest may have looked like a modern wood-pasture and there might have been some permanently open areas; but the majority seems likely to have been relatively closed high forest, with a component of temporary and permanent glades"
Kirby, K.J. (2005) Was the wildwood closed forest or savannah and does it matter for modern conservation – some conclusions. In Large herbivores in the wildwood and in modern naturalistic grazing systems, English Nature Research Report 648

"How can Vera's and Tansley's models be reconciled with the continued existence of woodland herbs, many of which do not survive grazing? Was there some form of compartmentation analogous to that in medieval parks and Forests? It is difficult to imagine a physical barrier, but were the depths of groves no-go areas for deer and wild cattle, either because there was not much to eat or because of danger from carnivores?"
Rackham, O. (2006). Collins New Naturalist Library (100) – Woodlands

"little evidence to support a wood-pasture model (sensu Vera, 2000)"

woodland at around 6000 cal. yr BC, and there is little evidence to support a wood-pasture model (sensu Vera, 2000)"
Fyfe, R. (2007) The importance of local-scale openness within regions dominated by

"The second significant weakness of the Vera hypothesis in the present context is that herbivore grazing is fore-grounded as the main relevant disturbance factor. However, it is but one of a range of factors requiring consideration (Bell and Walker 2005, fig 6.1). It has been shown, for instance, that beavers were a significant environmental disturbance factor in river valleys and lowlands in prehistory"

one of a range of factors requiring consideration (Bell and Walker 2005, fig 6.1). It has been shown, for instance, that beavers were a significant environmental disturbance factor in river valleys and lowlands in prehistory (Coles and Orme 1983; Coles 2001; Coles 2006)"
Bell, M (2007) Mesolithic coastal communities in western Britain: conclusions. In Prehistoric Coastal Communities: The Mesolithic in Western Britain. Council for British Archaeology Research Report 149. 2007

"Oak may not always behave as Vera supposes, indeed in some English woods from which deer were largely excluded, occasional thickets of sessile oak resulted from the great mast year of 1976 and similar events..... The difference between the closed forest hypothesis and Vera's alternative of cyclical dynamics may be a matter of degree. While there is general agreement that the original-natural forest [in the UK] may have been more open than was previously thought, this is not equivalent to saying that a wood-pasture landscape would necessarily dominate the landscape. The balance of opinion is towards predominance of closed forest with localised, longer lasting openings.....This would certainly help explain the persistence of plants restricted to old woodlands (the British Ancient Woodland Indicators) that are estimated to require many hundreds of years to invade isolated woodlands. These species and their dynamics do not fit a landscape made up of shifting, patchy groves in a sea of grass and scrub. To envisage genetically viable metapopulations of woodland plants in discontinuous, patchy landscapes would be almost impossible, particularly for species such as toothwort Lathraea squamaria"

"the separation of habitats for domestic cattle and aurochs suggests that Neolithic farming groups exploited environmentally-different areas for their cattle from those used naturally by aurochs"

Lynch et al (2008) Where the wild things are: aurochs and cattle in England. Antiquity, 82, 1025-1039

"It has been hypothesized that, under natural conditions, large herbivores were able to maintain large open areas in temperate forests leading to much more open landscapes than in the absence of grazers (Vera 2000). If so, they should truly be regarded as keystone species. This hypothesis, however, is not very well supported by evidence from pollen analysis (Mitchell 2005) and is difficult to test"
van Wieren, S.E and Bakker, J.P (2008) The Impact of Browsing and Grazing Herbivores on Biodiversity. In I.J. Gordon and H.H.T. Prins (eds.), The Ecology of Browsing and Grazing. Ecological Studies 195 263-295. Springer

"The contribution of this study to the current debate on the role of large herbivores in determining the structure of northwestern European woodlands (Vera 2000, Svenning 2002, Mitchell 2005) is to suggest that in Britain the aurochs may not have been a prime determinant of the structure of the more upland woodlands"
Hall, SJG (2008) A comparative analysis of the habitat of the extinct aurochs and other prehistoric mammals in Britain. Ecography 31, 187-190

"the extent of landscape openness as suggested by the Vera hypothesis is too high. Natural river plains, wetlands, poor soils) and disturbance-induced (floods,

"One problem is that this ignores possible impacts of predators. Vera (2000) simply assumes that 'Whatever the influence the large predators had, the densities [of large herbivores] that are required for the regeneration of oaks and Hazel must have been the result.' which illustrates the level of speculation affecting this debate

Holocene provide suitable models for rewilding the landscape in Britain? British Wildlife, 20:4-15

"On the basis of my incomplete observations of British butterflies, only a few of the resident species would have completely lacked habitat in Britain during the Holocene. Most could potentially have found suitable habitats on inland and sea cliffs, dunes, coast and lake shores, and possibly river-valley grasslands, fen, bog and mire, as well as above the tree-line, without the need to invoke major modification of the vegetation by large herbivores Open-country species of the uplands and western fringes are predominantly survivors from the early Holocene. Most of the remaining

"The evidence about more recent (ca. 500–1900 A.D.) periods in Grazing Ecology and Forest History does not support the Vera Hypothesis. The most important general problem is that the material Vera presented appears to be irrelevant to the hypothesis"

"As a consequence, the dynamics of feral populations may be profoundly different from that of their wild counterparts: the high reproductive rates of the feral ones will give them a greater potential to be invasive; but their maladaptive trade-off of survival against reproduction may make the feral populations more vulnerable to adverse environmental conditions (e.g. harsh climate, food limitation). Introduced feral populations may therefore oscillate more strongly and need more management, whether this is to prevent them from invading or to maintain them in difficult conditions when they are used as surrogates for extinct wild species, for instance in 're-wilding' programmes (Vera 2006). It is conceivable that the use of feral animals, less well adapted to the wild, may pose ethical problems, as well as ecological and behavioural ones, in such re-wilding programmes"

The Oostvaardersplassen, for example, contains none of its lost predators, such as bears or wolves, yet other reintroduction experiments have shown that they can alter the entire ecosystem"

Oostvaardersplassen, for example, contains none of its lost predators, such as bears or wolves, yet other reintroduction experiments have shown that they can alter the entire ecosystem"
Marris, E. (2009) Rewilding the past. Nature 462: 30-32

"Currently, the management of grazed nature areas in Western-Europe focuses on large herbivores; densities and types (mostly cattle, horses, sheep or deer) are frequently manipulated in order to steer the vegetation in a 'desired' direction..... we

show that temporary herbivore absence – due to a (mimicked) population crash or migrations – can lead to increased vegetation structure, with expected positive impact on associated biodiversity. Such fluctuations in herbivore populations presently rarely occur due to the fragmented distribution and limited size of nature areas that do not allow significant migrations, and due to the strict management of herbivore populations. We suggest that for increased dynamics, heterogeneity and diversity in grazed nature areas management should consider allowing such fluctuations in

"the open areas evident within the records were not driven by the activities of grazing animals, that herbivore density does not control natural forest structure, effectively nullifying the crux of the Vera hypothesis"

Science Reviews 29: 539–553

"Conservation policies of the European Nature 2,000 network reflect an overarching concern about alleged negative effects of abandonment of traditional uses. In particular, the abandonment of livestock herding is widely assumed to be responsible of biodiversity decreases through habitat homogenization. However, those negative effects of land abandonment on biodiversity are neither straightforward nor the repeatedly assumed land abandonment has been always supported by hard data. We analyzed the evolution of cattle densities in the Cantabrian Mountains (NW Spain) in the past 20 years, and its relation with the decline in the occupancy of capercaillie leks. Instead of the widely assumed decrease of livestock numbers, which has been already

"Thus our data do not support the alleged role of free-ranging livestock in the conservation of biodiversity"

naturalness..... Preserving traditional uses of the landscape and helping local human communities are legitimate policy options. The aesthetic and social values of these modified mountain landscapes, while subjective, are not discussed here. Instead, we argue that such goals should not be disguised under the term of nature conservation. Instead, they should be named according to their main objective, e.g. preservation of cultural landscapes or economic activities"
Blanco-Fontao B, Quevedo M, Obeso J. (2011). Abandonment of traditional uses in mountain areas - typological thinking vs. hard data in the Cantabrian Mountains (NW Spain). Biodiversity and Conservation 20: 1133-1140

"In the course of the Neolithic light-demanding trees and shrubs became more important in the oak woodlands. This change is related to the increased disturbance of the woodland by the local people, e.g. establishment of cultivating fields, grazing of animals, collecting fruits, fodder and firewood. This led to an increase of forest edge zones and secondary forests. Similar tendencies are also observed in the palynological records from Slovenia for the period of ca. 5500 cal.B.C, when no forest clearance occurred during the Neolithic period, but small-scale forest modifications,burning and coppicing were detected (Andric and Willis 2003). Moreover, the Neolithic land use strategies, involving coppicing and pollarding and forest pasture of small ruminants, favoured and enlarged such landscapes asis visible in the evidence from Central

"thorny and prickly shrub species may provide shelter for certain plants against large grazers in pastures (Rousset and Lepart, 2000; Vera, 2000; van Uytvanck et al., 2008). We found little evidence that prickly Rubus provided shelter for the oak seedlings by reducing browsing frequency and browsing intensity"

Jensen, A.M., Götmark, F. & Löf, M. (2012). Shrubs protect oak seedlings against ungulate browsing in temperate broadleaved forests of conservation interest: A field experiment. Forest Ecology and Management 266: 187–193

Trophic cascades and the Green World Hypothesis

Herbivore pressure is controlled by carnivores

Vol. XCIV, No. 879 The American Naturalist November–December, 1960

COMMUNITY STRUCTURE, POPULATION CONTROL, AND COMPETITION

NELSON G. HAIRSTON, FREDERICK E. SMITH, AND LAWRENCE B. SLOBODKIN

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herbivores would normally expand to the point of depletion of the vegetation, as they do in the absence of their normal predators and parasites.

"So far, the Oostvaardersplassen has shown that a high density of grazers can certainly affect the landscape: they have largely mowed it clean"

them. His is the minority view. Most scientists think a closed forest covered the continent. So far, the Oostvaardersplassen has shown that a high density of grazers can certainly affect the landscape: they have largely mowed it clean.

"The Oostvaardersplassen, for example, contains none of its lost predators, such as bears or wolves, yet other reintroduction experiments have shown that they can alter the entire ecosystem"

The Oostvaardersplassen, for example, contains none of its lost predators, such as bears or wolves, yet other reintroduction experiments have shown that they can alter the entire ecosystem. When wolves were

Marris, E. (2009) Reflecting the past. Nature 462:30-32

Ecological Meltdown in Predator-Free Forest Fragments

John Terborgh,[1*] Lawrence Lopez,[2] Percy Nuñez V.,[3]
Madhu Rao,[4,5] Ghazala Shahabuddin,[6] Gabriela Orihuela,[7]
Mailen Riveros,[8] Rafael Ascanio,[9] Greg H. Adler,[11]
Thomas D. Lambert,[10] Luis Balbas[12]

SCIENCE VOL 294 30 NOVEMBER 2001

Intact vegetation in unaltered area

Almost no plants left where herbivores overpopulated

Lago Guri, Venezuela
- predators present (top right)
- jaguar, cougar, and harpy eagles absent (bottom right)

Journal of Ecology 2006
94, 253–263

Vegetation dynamics of predator-free land-bridge islands

JOHN TERBORGH, KENNETH FEELEY*, MILES SILMAN†, PERCY NUÑEZ‡ and BRADLEY BALUKJIAN*

Summary

1 We tested the 'green world' hypothesis of Hairston, Smith and Slobodkin by monitoring vegetation change on recently created predator-free land-bridge islands in a huge hydroelectric impoundment, Lago Guri, in the State of Bolivar, Venezuela.

2 Our results affirm the green world hypothesis and expose the operation of a strong top-down trophic cascade that negatively impacted nearly every plant species present, implying that community stability is maintained through the action of predators.

Journal of Applied Ecology

British Ecological Society

Journal of Applied Ecology 2009, **46**, 73–81 doi: 10.1111/j.1365-2664.2008.01601.x

Indirect effects of invasive species removal devastate World Heritage Island

Dana M. Bergstrom[1]*, Arko Lucieer[2], Kate Kiefer[1], Jane Wasley[1], Lee Belbin[3], Tore K. Pedersen[1,2] and Steven L. Chown[4]

"management intervention to eradicate a mesopredator has inadvertently and rapidly precipitated landscape-wide change on sub-Antarctic Macquarie Island"

(a) 2001 (b) 2007 (c) 2001 (d) 2007

Fig. 4. Vegetation at a *Polystichum* fernbrake site in 2001 (a) and 2007 (b) in Green Gorge and herbfield around Finch Creek in 2001 (c) and 2007 (d). The large shield ferns (a) were completely grazed by rabbits leaving dead remnant bases which were colonized by small unpalatable species (b). The large megaherbs and tussock grasses (c) have been grazed and replaced with other species including *Poa annua* (d).

Feral cats eradicated from Macquarie Island by 2000 – rabbit population increased rapidly

With the luxury of the wisdom of hindsight, we can suggest that the current situation arose as a consequence of inadequate recognition of top–down control of rabbits by a population of only 160 adult cats.

Ecological restoration - not “rewilding” with herbivores (farming)

Limestone pavements of the Yorkshire Dales

Southerscales - grazed

Scar Close - not grazed

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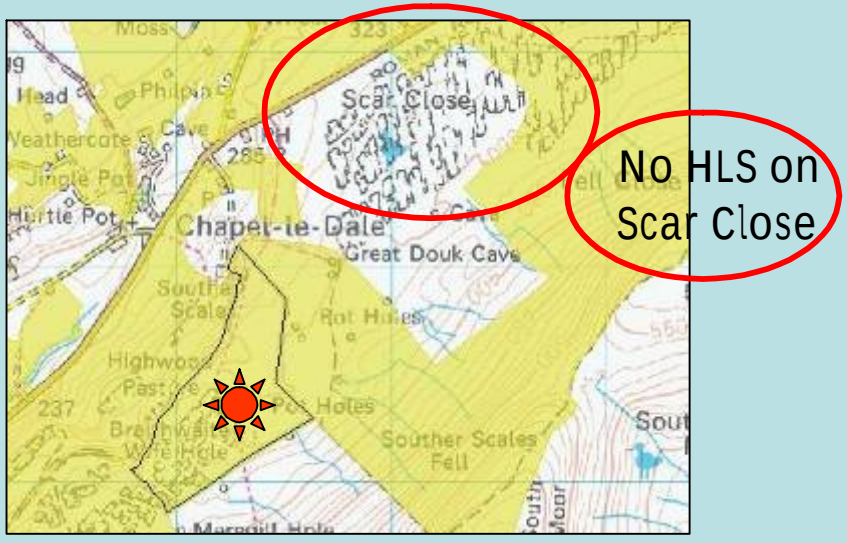
Yorkshire Wildlife Trust

Who we are | What we do | How you can help | Nature Reserves | Wildlife | Discover & Learn | What's on | Shop

Southerscales Nature Reserve

Join us
Protect local wildlife

"The Trust made Southerscales stockproof and in 1987 was able to re-introduce the traditional grazing regime"



UL18 Cattle grazing on upland grassland and moorland

Agreement Reference	Customer Name	Town	Scheme	Total Cost of Agreement (£)	Amount Paid to Date (£)	Total Area Under Agreement (ha)	Does Agreement Provide Access?	Detail
AG00334945	Yorkshire Wildlife Trust	York	Entry Level plus Higher Level Stewardship	131736.8	12514.60	61.61	No	More...

"8240 Limestone pavements - agricultural management blocks secondary succession"

Halada, L. at al (2011) Which habitats of European importance depend on agricultural practices? Biodiversity & Conservation 20:2365–2378

ENGLISH NATURE

Limestone walk

Ingleborough National Nature Reserve

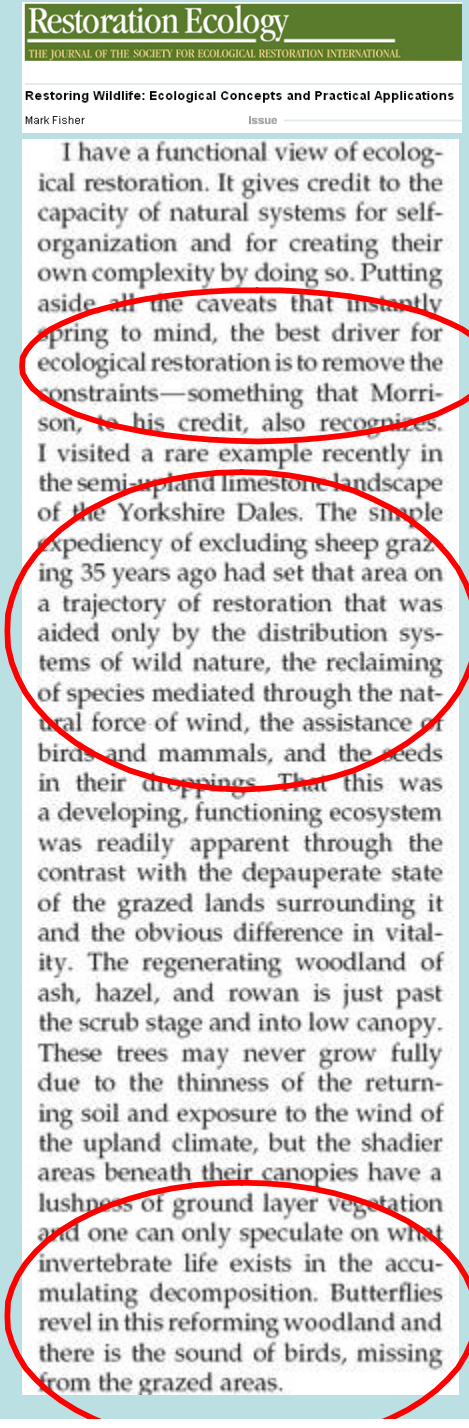
Ungrazed since 1974

Scar Close

Glance to your right to see wooded Scar Close. Grazing livestock have been excluded for many years allowing ash trees and hazel bushes to escape from the confines of the grikes.

This area now looks more like the landscape which existed prior to man's clearance of the upland woodlands that once covered the Yorkshire Dales. English Nature and other wildlife organisations are encouraging more land to move to a semi-wooded state, richer in plant, bird and insect life.

An ecological restoration



Restoration Ecology

THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION INTERNATIONAL

Restoring Wildlife: Ecological Concepts and Practical Applications

Mark Fisher Issue

I have a functional view of ecological restoration. It gives credit to the capacity of natural systems for self-organization and for creating their own complexity by doing so. Putting aside all the caveats that instantly spring to mind, the best driver for ecological restoration is to remove the constraints—something that Morrison, to his credit, also recognizes. I visited a rare example recently in the semi-upland limestone landscape of the Yorkshire Dales. The simple expediency of excluding sheep grazing 35 years ago had set that area on a trajectory of restoration that was aided only by the distribution systems of wild nature, the reclaiming of species mediated through the natural force of wind, the assistance of birds and mammals, and the seeds in their droppings. That this was a developing, functioning ecosystem was readily apparent through the contrast with the depauperate state of the grazed lands surrounding it and the obvious difference in vitality. The regenerating woodland of ash, hazel, and rowan is just past the scrub stage and into low canopy. These trees may never grow fully due to the thinness of the returning soil and exposure to the wind of the upland climate, but the shadier areas beneath their canopies have a lushness of ground layer vegetation and one can only speculate on what invertebrate life exists in the accumulating decomposition. Butterflies revel in this reforming woodland and there is the sound of birds, missing from the grazed areas.

Species of Scar Close and Southerscales

"a trajectory of restoration that was aided only by the distribution systems of wild nature, the reclaiming of species mediated through the natural force of wind, the assistance of birds and mammals, and the seeds in their droppings"

Angelica
Ash
Baneberry
Bilberry
Birch
Bird cherry
Birds eye primrose
Birds foot trefoil
Blackthorn
Bloody cranesbill
Bluebell
Bracken
Brittle bladder fern
Bugle
Butterwort
Cinquefoil
Cowberry
Climbing corydalis
Daffodil
Devil's bit scabious
Dog rose
Dog's mercury
Early purple orchid
Elder
Field scabious
Figwort
Globe flower
Greater burnet
Green spleenwort
Guelder rose
Hard head
Hawthorn
Hazel
Heart's tongue fern
Heather
Honeysuckle
Ivy
Juniper
Lesser meadow rue
Lily of the valley
Limestone oak fern
Meadow sweet
Melancholy thistle
Milkwort
Orpine
Primrose
Raspberry
Red currant
Rigid buckler fern
Rock rose
Rowan
Solomon's seal
St John's wort
Stone bramble
Strawberry
Sycamore
Valerian
Violet
Water avens
Welsh poppy
Willows x 3
Wood anemone
Wood cranesbill
Wood sage
Wood sorrel
Yarrow
Yew

Scar Close

Ash
Baneberry
Blackthorn
Dog's mercury
Figwort
Fragrant orchid
Gooseberry
Hawthorn
Hazel
Heart's tongue fern
Ivy
Lesser meadow rue
Limestone oak fern
Raspberry
Rigid buckler fern
Rowan
Sycamore
Violet
Welsh poppy
Wood anemone
Wood sage
Wood sorrel

Southerscales

Ecological restoration

- reclaiming soil, humus, wildlife, natural processes