Critique of herbivore-driven *"rewilding"*

Mark Fisher, 26 November 2015
Wildland Research Institute

GEOG 3180

Return of natural vegetation

What drives ecological restoration……

- **public** or **beneficial ownership** (or control)
- removal of non-native **grazing animals**
- recruitment of **woody species** and the reinstatement of the **structural complexity of vegetation**
- reinstatement of **natural processes** such as nutrient cycling, decomposition, trophic cascades etc

……and what holds it back?

- **sheep**, **cattle** or **horses** **unrestrained, domesticated herbivory!**
- designation based on **broad habitats**
- **Common Standards Monitoring**
- dependency on **agri-environment schemes**: don't rely on it as a **business model**!
- managerialism and short-termism
- **inflexibility** within current system
- lack of **strict protection category** (non-intervention) in protected area designation

Oostvaardesplassen *"experiment"* - reclaimed land of Flevoland

Zuiderzee closed 1932 forming Ijssel & Marker meer
- four areas of polder created by draining behind dykes, S Flevoland was the last in 1968
~6,000ha of polder did not get developed for industry and was only **partially drained**:
- **wet areas** attract **waterfowl** such as greylag geese, spoon bill
Trees seeding from nearby willows start to spread over reclaimed land
- Public Authority for Southern Ijsselmeerpolders introduce **herbivores** to maintain **grass areas** for geese
- 36 Heck **cattle** in 1983, 20 Konik **horses** in 1984, claimed by **Frans Vera** as an **experiment with large herbivores**
- designated State Natural Monument in 1986, Special Protection Area and RAMSAR wetland 1989
- 56 Red **deer** released in 1992
- management transferred to **Staatsbosbeheer** (State Forestry Service) in 1996

Lure for wild birds - artificial wetland/marshland/grazing pasture

- 1,600ha open water, 2,000ha reed and 2,400ha grass and trees
- **water level** varied **manually** over years behind **dykes** to suit **management objectives**
- reserve area is **below sea level**

Large population of **greylag geese** use pasture as a **rough grazing area**
- other water fowl include spoonbill, cormorant, large and little egret, ducks and bittern
- grassland birds and reed dwellers occupy other niches
- white-tailed (sea) **eagle** has bred there since 2006

Two new predator – prey interactions

Fox taking a greylag goose

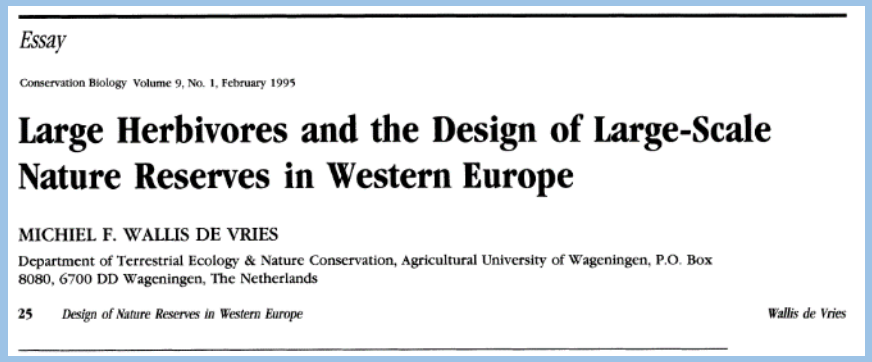
White-tailed (sea) eagle fishing

Wetland was the key to these new predator – prey interactions

- geese and spoonbills would have found grass in farmland elsewhere – **and did!**

So – why do we mostly hear about the large grazers at OVP?

Nature Development – Dutch approach to nature reserves



Essay

Conservation Biology Volume 9, No. 1, February 1995

Large Herbivores and the Design of Large-Scale Nature Reserves in Western Europe

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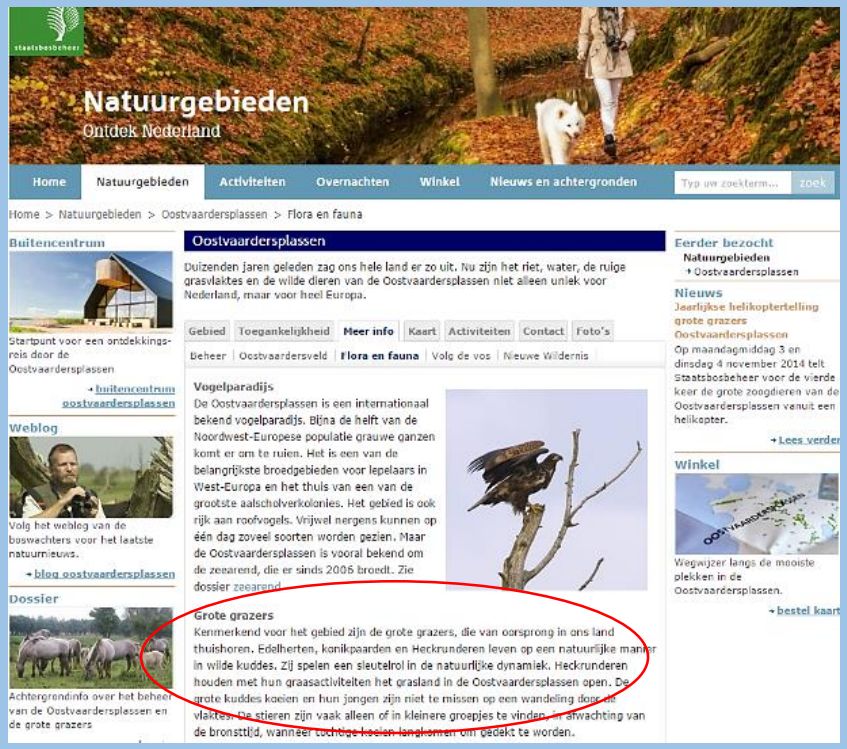
"….a **new concept** for nature conservation is required. I propose using the habitat requirements of **large herbivores** as a key to the **design** of **large-scale nature reserves.** Large herbivores can have a significant influence on **vegetation composition** and thus act as keystone species"



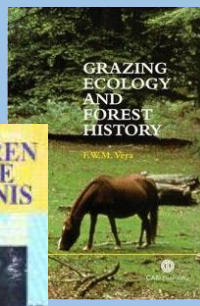
"Large herbivores

Typical of the area are the large herbivores, which **originally belong in our country**. Red deer, Konik horses and Heck cattle **live naturally** in **wild herds**. They play a key role in the **natural dynamics**"

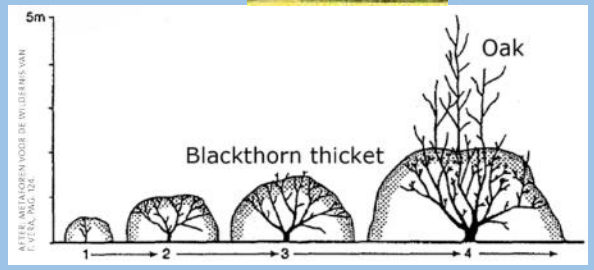
Staatsbosbeheer (Dutch state forestry service)

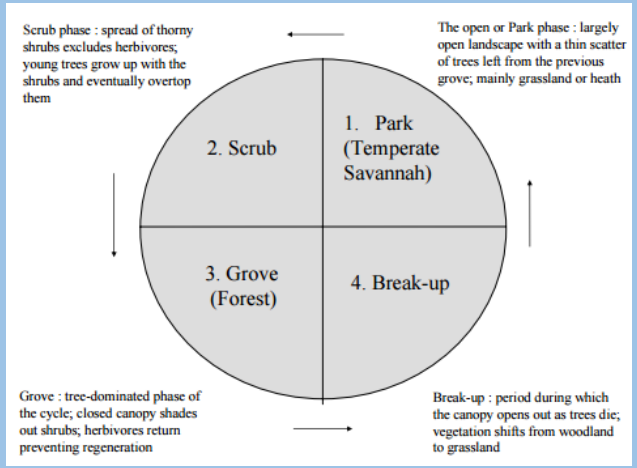
This is **NATURAL?**

VERA Hypothesis – large herbivores and woodland creation



Frans Vera's published doctoral thesis (2000) **based on experiences at OVP** claiming **large herbivores** not only created **open conditions**, but **drove forest regeneration cycle**
- herds of aurochs, bison and wild horses grazed large, open areas that eventually went through **scrub and woodland phases** before **breaking down at old age** to form **open areas**
- **tree establishment** occurred only through **protection from grazing** from **spikey mantle shrubs** like blackthorn
- no **direct replacement** of woodland by regeneration where existing woodland had been
- implies woodland was only found as **shifting islands** through landscape and with a universal source of tree seed available (?!)





Woodland ecologist Keith Kirby modelled Vera theory for Britain
- unlikely that **savannah landscape** with very low density of trees would have been widespread < 30%
- **closed canopy wooded landscapes** in range 40-60%
- balance would be developing scrub or breakdown phase
- modelling results consistent with **pollen analysis** and **invertebrate records**
- low proportion of beech compared to continental Europe and natural **absence of bison and wild horse** make it less likely that woodland was a herbivore-driven system in Britain

The literature 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 rarely based on sound scientific research. Site management [illegible] species. The interpretation of this data is made difficult because other management measures are [illegible] 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"
Kuiters AT, 2002. Hoofed animals in nature areas: theory and practice versus research. Vakblad Natuurbeheer 41.

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

"So [illegible] European bison (Bison bonasus) would [illegible] which would result in a [illegible] and solitary trees, in which some herds of herbivores roamed (Vera, 2000; Bunting et al. 1994). [illegible] it is likely that [illegible] landscape, but a landscape covered with extensive, close forests, intermingled with fens and bogs, lakes and [illegible] 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 [illegible] (Bos taurus primigenius) [illegible]

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)"

"In the past, the feeding behaviour required to glean nutrients from browse and grass has [illegible] 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"
Kirby, K.J. (2003). What might a British forest-landscape driven by large herbivores look like? English Nature Research Report 530

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

"The [illegible] Mitchell [illegible] using palaeoecological data? 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 andin 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

"Pollen data from pre-Neolithic levels in Wales support a high-forest model of vegetation structure as proposed by Peterken (1996) and Mitchell (2005). Large sites w[illegible] woodland at around 6000 cal. yr BC, and there is little evidence to support a wood-p[illegible]
Fyfe, R. (2007) The importance of local-scale openness within regions dominated by closed woodland. Journal of Quaternary Science 22(6) 571–578

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

"Very [illegible] created by grazi[illegible] land where [illegible] Smith and Whitehouse 2005). The evidence presented here from the Lower Submerged Fore[illegible] does not support his view of low-branched parkland or woodland. [illegible] there are two signi[illegible] assumption that [illegible] will have been [illegible] landscape. [illegible] climatically, [illegible] 1990). [illegible] would have been con[illegible] on the upland and [illegible] movi[illegible] water [illegible] signi[illegible] more grazing is fore-grounded as the main relevant disturbance factor. However, it is but one [illegible] 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

"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"

"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"
Peter A. Thomas, P.A. & Packham, J.R. (2007). Ecology of Woodlands and Forests: Description, Dynamics and Diversity. Cambridge University Press

"The [illegible] depletion in [illegible] cattle. In the bo[illegible] cattle, a wetland habitat for aurochs is arguably more probable than a forested ho[illegible] Neolithic farming groups exploited environmentally-different areas for their cattle from [illegible] and cattle in England. Antiquity, 82, 1025-1039

"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"

"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, windthrow, fire) small openings in closed beech forests were more likely to have produced the observed pollen assemblage at Lobsigensee 6000 years ago"
Soepboer and Lotter (2009) Estimating past vegetation openness using pollen–veg[illegible] Palaeology 153, 102–107

"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

"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 species could equally plausibly have survived the mid Holocene in open areas, without the need to invoke grazed semi-parkland (Vera 2000), or have colonised in the recent anthropogenic era"
Thomas, C. (2009). A speculative history of open-country species in Britain and north[illegible] *"The [illegible] Forest [illegible] proven is that this material Vera presented appears to be irrelevant to the hypothesis. W[illegible] describe woodland with more open vegetation than today's closed forests, this says ve[illegible] Szabó, P. (2009) Open woodland in European lowlands in the Mesolithic and in the Middle Ages: Ca[illegible] there be a connection? Forest Ecology and Management 257 (2009) 2327–2330*

"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"
Grange, S. Duncan, P. and Gaillard, J-M (2009). Poor horse traders: large mammals trade survival for reproduction during the process of feralization. Proc. R. Soc. B 276: 1911-1919

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"

"So [illegible] can cer[illegible] mental set [illegible] have main [illegible] rewi[illegible] on sub[illegible] many of the [illegible] its lost predators, such as bears or wolves, yet other reintroduction experiments have shown that they can alter the entire ecosystem"
Marris, E. (2009) Reflecting 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 herbivore populations"
Christian Smit, C., Bakker, E.S., Apol, E.M.F. and Olff, H (2010) Effects of cattle and rabbit grazing on clonal expansion of spiny shrubs in wood-pastures. Basic and Applied Ecol[illegible]

"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"

"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 incorporated into landscape and wildlife management, we found an actual increase in cattle numbers. Those cattle numbers were negatively related to the presence of an endangered, distinctive population of capercaillie, a bird considered an umbrella [illegible] and biodiversity conservation should be replaced by hard data and consideration of ecosystem [illegible] scape 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

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

"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 Europe (Kalis et al.2003; Kreuz 2008; Bleicher and Herbig 2010; Gardner 2002; Magyari et al.2012) Holocene anthropogenic landscapes in the Balkans: the palaeobotanical evidence from southwestern Bulgaria"
Ma[illegible] Balkans: the palaeobotanical evidence from southwestern Bulgaria. Vegetation History and A[illegible]

"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"

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Question

WHAT WOULD YOU PREDICT WOULD HAPPEN WITH FENCED-IN HERBIVORES?

Nature development – green to brown!!!!

Original 30% woodland cover virtually destroyed through de-barking!!

Destruction of trees from bark ringing

New tree seeding completely disappeared

Eating bark on this scale is a symptom of chronic food scarcity

Ever rising herbivore population - STARVATION and MANY DEATHS

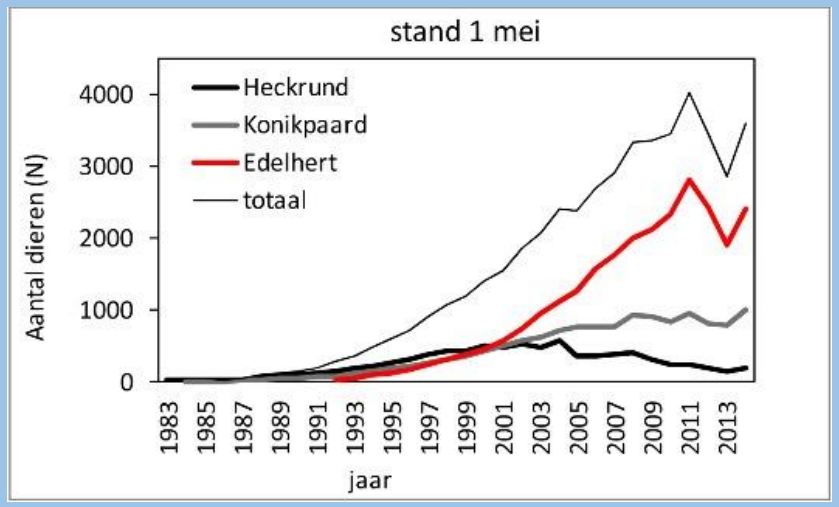
Deer carcasses removed with heavy machinery

TRUE NATURE!!

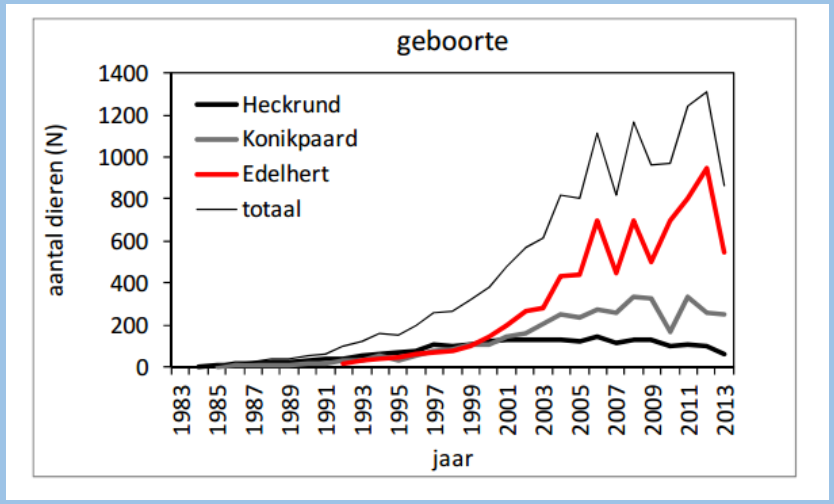
The fence around OVP means there is

NO WAY OUT!!

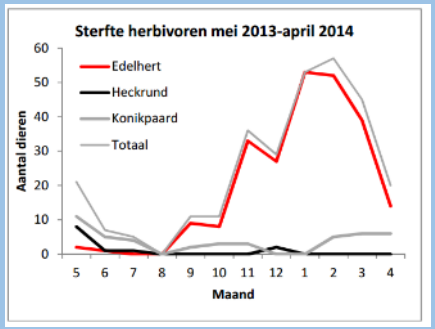
Rising herbivore population and mortality



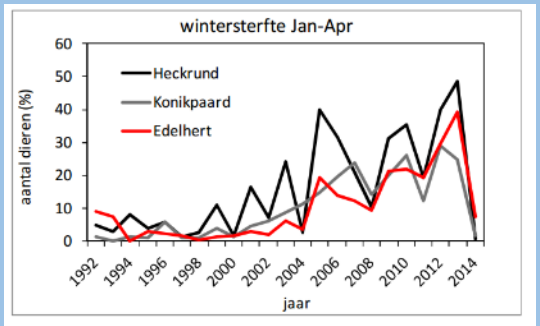
Large herbivores on 1 May, excluding calves



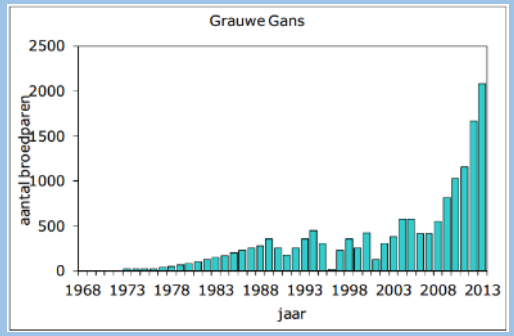
Number of calves and foals for the period Jan-Dec



WINTER KILLS - total deaths/m



Proportional mortality Dec-Apr



Number of breeding pairs Greylag Goose

Relative winter **mortality** increased from <10% in the 1990s to **>40% in 2013**

Increase in total herbivores 2005-2013 = **~1,000**

Total herbivore births 2005-2013 = **~9,000**

Total deaths from starvation 2005-2013 = ~ 8,000 **- they are not dieing of old age!**

> 25% OF THE HERBIVORE POPULATION IS DIEING FROM STARVATION EACH YEAR

…which is good news for the scavengers

…but is bad news for tree establishment

Vera hypothesis asserts **tree development** and **natural woodland formation** in Europe relies on **protection from grazing** by spikey saum and mantle vegetation

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Rewilding with large herbivores: The importance of grazing refuges for sapling establishment and wood-pasture formation

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ABSTRACT

Rewilding is a novel nature management type that aims at restoring natural processes with minimal human intervention. It is increasingly employed on abandoned agricultural lands in Europe, but empirical studies are scarce. Rewilding may lead to formation of wood-pastures, arguably the primeval landscape in parts of Europe before Neolithic times. We investigated sapling establishment, a key process for wood-pasture formation, in the Oostvaardersplassen: Europe's oldest large-scale rewilding area, with high densities of free-roaming large herbivores. We transplanted saplings of pioneers, spiny shrubs, and hardwood

Sapling establishment investigated in the OVP by transplanting saplings of pioneers, **spiny shrubs**, and hardwood species inside and outside of **grazing refuges** (exclosures)

- No single sapling survived in grazed controls

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Effects of large herbivores on wood pasture dynamics in a European wetland system

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Abstract

Whether self-regulating large herbivores play a key role in the development of wood-pasture landscapes remains a crucial unanswered question for both ecological theory and nature conservation. We describe and analyse how a 'partly self-regulating' population of cattle, horses and red deer affected the development of the woody vegetation in the Oostvaardersplassen nature reserve (Netherlands). Using aerial photographs from 1980 to 2011, we analysed the development of shrubs and trees. Before

Used **aerial photographs** from eight different years over the period 1980 to 2011, to measure development of willows and elderberry,
- regeneration of woody species occurred while herbivore densities were still low (<0.5 N/ha)
- **no new establishments** were visible after 1996 when densities of large herbivores increased
- seedlings of various woody species found in an **ungrazed control site**

Vera is not even supported by his *"experiment"* of the OVP

Question

WHAT IS MISSING THAT COULD HAVE PROTECTED THE TREES?

Predator model implemented in face of increasing deaths at OVP

Ministerie van Landbouw, Natuurbeheer en Visserij

De Voorzitter van de Tweede Kamer der Staten-Generaal Postbus 20018
2500 EA Den Haag
uw brief van
N/2000/274
datum
19-01-2000

onderwerp
Leidraad Grote Grazers doorkiesnummer

Concern at **animal welfare** at OVP in late 1990s led to guidelines for **large herbivores** used in **Nature Development** in **Netherlands** being drawn up by Deputy Minister of Agriculture
- care of animal species, taking into account different management objectives of reserves
- **intervention** in suffering, illness or injury
- well-being in relation to the carrying capacity of nature reserves
- supplementary feeding
- control of animal diseases
- disposal of dead animals

Guidelines made a **distinction** in treatment between herbivores in **OVP** compared to **smaller reserves**
- **greatest possible opportunity was to be given to nature in regulating whether animals lived or died**
- animal at OVP would **not have welfare care** given routinely to **domestic livestock**, such as vaccinations against diseases, intestinal worms
- preventive measures would be **culling for population control** and supplementary feeding in bad weather
- culling would also be required if an animal **suffers** or threatens to get in a **hopeless situation**
- carcasses left to rot
- recognised **limits to carrying capacity** at OVP because it did not allow **natural migratory behaviour** on a **large scale**
- population model predicted for OVP that increase in grazers would ***level off*** when capacity of land is approached


Nieuwsbrief

Oostvaardersplassen

Speciale editie
november 2004

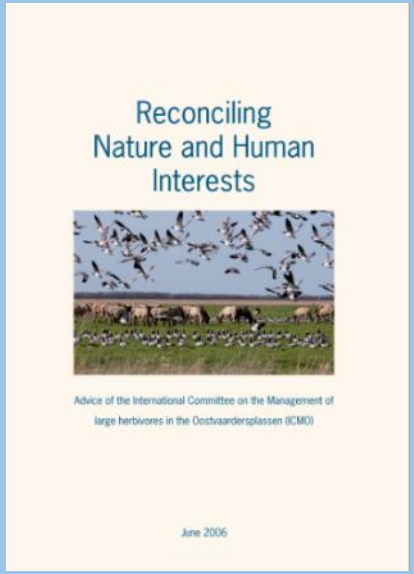
Beheer grote grazers via verbeterd predatormodel wordt voortgezet

Op 5 november 2004 heeft de directie Staatsbosbeheer besloten het beheer grote grazers volgens het predatormodel zoals dat is aanbevolen door de wetenschappelijke advies-commissie grote grazers Oostvaardersplassen voort te zetten. Op deze wijze wordt het selectieproces aan de natuur gelaten en wordt tevens onnodig dierenleed voorkomen.

Inhoud
- Beheer grote grazers via verbeterd predatormodel wordt voortgezet
- De Oostvaardersplassen als boegbeeld voor 'Natuur op eigen benen'

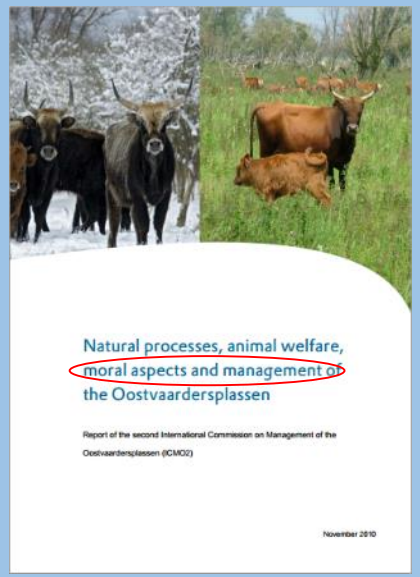
Advice from Scientific Advisory Committee of State forestry service for a strategy to **cull animals in poor condition** at the end of winter in a regime that was intended to **simulate predation**
- began on a trial basis in December 2003
- cold spell in March 2004 showed inadequacy of approach
- revised (enhanced) **"predator model"** implemented in November 2004 with earlier culling of animals exhibiting **hopeless suffering**

To cull or not to cull? Humans a poor predator!



Increasing mortality in bad winter 2004/5 led to establishment of international committee in 2005 to assess management of the OVP:
- culling did not realistically simulate predation, and **should not be referred to as a predator model**
- access to shelter should be improved
- program of research and monitoring of herbivore populations should be developed
- **ecological corridor** to the Horsterwold to be established to provide additional habitat
- animals in **terminally poor condition** in late winter should be **culled** and not allowed to die by starvation

Substantial numbers had to be culled in the prolonged cold winter of 2010
Images of **starving animals** appeared on the **national television** generating criticism of the management regime and initiating a **debate in the Parliament**



A second commission installed 2010 to evaluate:
- Progress in responding to first report
- Ecological aspects of management
- Welfare issues under current management
- Future management

Noted that 60% of land needed for **ecological corridor** had been purchased

Public backlash at the *"experiment"* continues

Unnecessary suffering of animals in ostvaardersplassen unacceptable

"Last winter 1,250 animals were culled. This is not a Dutch Serengeti, but a ***polder version of the killing fields****"*

Oostvaardersplassen: new wilderness or **killing fields?**

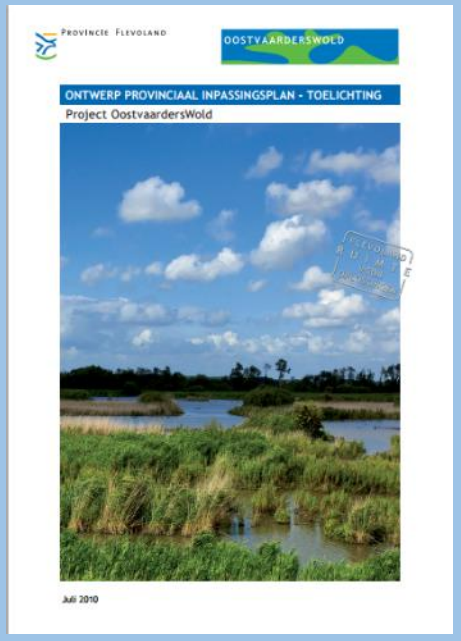
Natural experiment Oostvaardersplassen a **big failure**

"Animals die like rats in Oostvaardersplassen … This is the ***new nature*** *to them"*

What about the nature of the Oostvaardersplassen?

Increasing available habitat – the ecological corridor

OostvaardersWold - ecological corridor between OVP and Horsterwold



NOT HAPPENED – regional parliament resignations, withdrawal of Government funding, change to simpler plans etc.

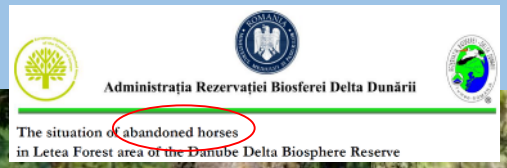
How much difference will it make?

- larger area still enclosed with fencing

- Konik horses already in Horsterwold

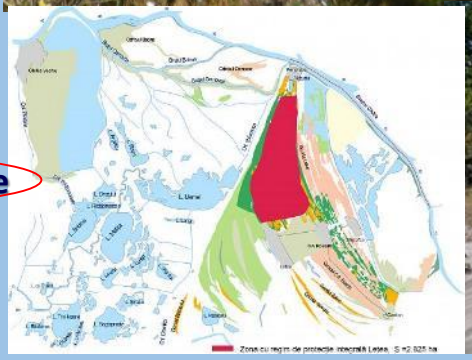
Forest of Letea, Romania, trashed by animal abandonment

together with Danube Delta Biosphere Reserve Authority in finding an acceptable solution for all parties in a controversial issue: **protection of the natural forest ecosystems of Letea (2825 ha)**, part of **UNESCO World Natural Heritage**, having the status of strictly protected area within the Reserve facing the **management /protection of abandoned horse populations** improperly called "wild horses" as a possible tourist attraction of the area.



Danube Delta Biosphere encompasses 250km2 unfenced **communal pasture** of 300,000 free-ranging livestock
- history of **abandonment of horses** when locals could not feed them, and which became worse during the 1980s when **infectious anaemia** was identified
- reproduction over several generations led to > 5,000 feral
- myth propagated that these were *wild horses*
- incursion of 1000-2000 feral horses in Letea Forest have **trashed** a designated **strict reserve** area (IUCN Cat. Ia) after large portions of **fence** protecting it were **destroyed**
- **local councils** repeatedly asked by BR to **improve management** of **domestic animals** owned by **local population**

"Rewilding" Europe targets area for **Taros programme** coat-tailing on back of myth of *"wild horses"*
*"the animals have started to play an essential role in **shaping** wetlands, grasslands, dune systems and the famous **Letea Forest**"**??!!!!***
- 12 cattle transported October 2015 from **Tauros breeding site** in **Netherlands** to enclosure before releasing into "*breeding site location*" on communal pasture
- a "*natural grazing pilot*" in Sfântu Gheorghe communal pasturelands



Is this Tauros breeding site a freeing of **natural processes?**

Bison world, Germany - wildlife comeback as tourist attraction

5 bison released into 20ha tourist *"wilderness area"* enclosure, 10 into larger, private forest area in 2013

"The wilderness area
The world upside down: Although the bison herd is separated by a fence from the visitors. Nevertheless, the illusion is rapidly created that it is the huge animals that move freely in the midst of their wild life area - and not man. These are the claims and aims of Bison Wilderness Rothaarsteig"

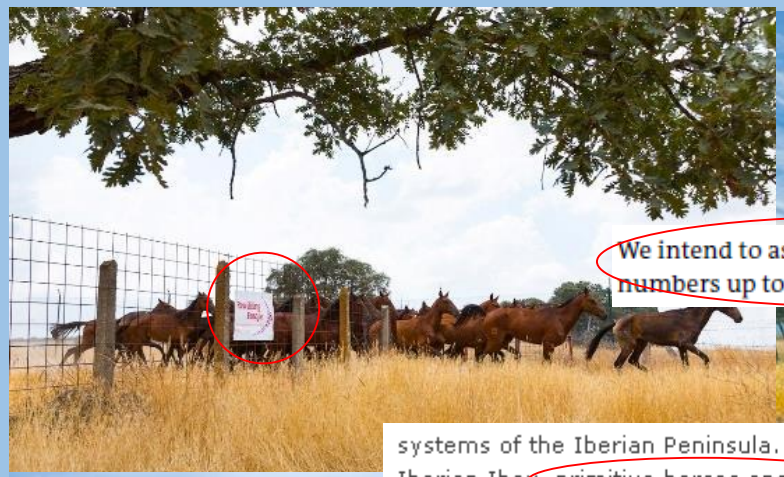
Scatophilia?
Bison Ranger diary 11-17 June 2012

Is this a freeing of **natural processes?**

Substitute species in Reserva Biológica Campanarios de Azaba, Spain

"Rewilding" Europe signs up **private** nature reserve in Spain for **Tauros breeding programme**

- 24 *Retuerta* horses and 6 *Sayaguesa* cattle released into fenced 522ha cork oak farm (*dehesas*) July 2012
- RE calls *dehesas* the *"natural Mediterranean mosaic landscapes"*



We intend to assist in bringing wildlife numbers up to more readily viewable levels,

systems of the Iberian Peninsula. For the natural grazing regimes, red deer, Iberian Ibex, primitive horses and cattle adapted to the local situation will be reintroduced. The Sayaguesa cattle breed will serve as founder together with some other Mediterranean races in a project to recreate the Aurochs - the

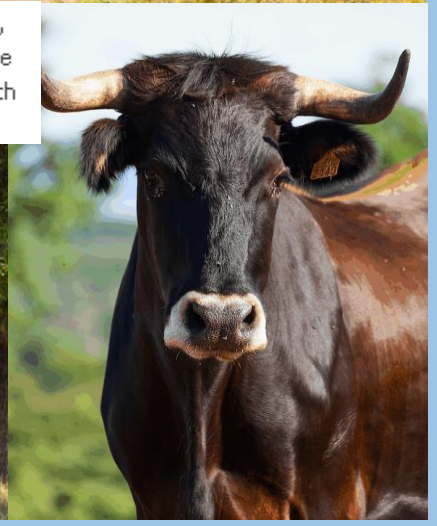
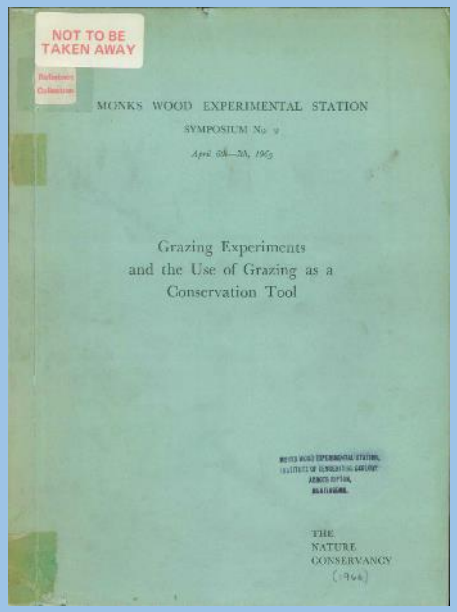


Table 1 List of the Habitat Directive Annex I habitats depending on agricultural practices

Code	Habitats name	D	P	M
6310	Dehesas with evergreen *Quercus* spp.	×		

Is this Tauros breeding site a freeing of ***natural processes?***

Nature conservancy symposium on grazing for nature conservation 1965



Symposium on use of **grazing** as a **conservation tool** held by **Nature Conservancy** at Monks Wood Experimental Station **April 1965**

- number of reports presented on **grazing experiments**
- wrestled with **legitimacy** of using livestock grazing, in particular sheep, in **National Nature Reserves** to maintain "*large areas of **unstable vegetation** in a **highly artificial** condition*"
- **overgrazing** by sheep in Wales, Scotland and Upland England had been responsible for **changes in vegetation** that many ecologists considered to be **deleterious**
- **heavy grazing** had **eradicated woodland** and **prevented regeneration** of trees and shrubs
- **species sensitive to grazing** (heather, cowberry, mountain avens) were **eradicated** as these **communities** were **converted to grassland**
- **loss of productivity**, especially on poorer soils, was associated with **policy of continued heavy grazing**

PROGRAMME AND SUMMARY

At the Annual Meeting of the Conservation Group in December, 1964, Mr. Skellam circulated a paper suggesting that a seminar might be convened to formulate and discuss such aspects of grazing experiments as "definition, design, measurement, recording, documentation, liaison, responsibility and finance". This suggestion was followed up by the Conservation Research Section who organised the Symposium at Monks Wood Experimental Station.

The objects of the Symposium were:

(i) To discuss the importance of grazing as a management technique on land of conservation interest.

1. Eradication of woodland

In many areas, forests have been destroyed to create pasture-land and the large herbivores may hasten the end of existing woodland, or more especially scrub, by 'barking the stems'. The much more common effect however, is to prevent regeneration by grazing down all the seedlings which appear. Over much of our uplands, heavy grazing is very effective in preventing tree regeneration. In sheep and deer country the woods to which these animals have access (and this means practically all the upland woods) are potentially moribund, and their life-span is that of the existing trees.

Mr. Collier thought that too much attention was being given to studies on the rarities of chalk grassland and that more work should be done on the common species. This was generally agreed to be desirable although it was noted that rare species were often of national importance and merited special attention.

- result of **heavy grazing** was that **soil erosion** and **scree formation** commonplace in Highland regions
- target species in lowland reserves like chalkland were more at threat from absence of grazing
- one attendee remarked that that **too much attention** was being given to studies on **rarities of chalk grassland** when more work should be done on **common species**
- referenced the **agricultural period** and associated **economic conditions** prevailing, which had similar land use under which a **species of interest** had thrived and **NOT THE NATURAL STATE**
- only reference to **predators** was in relation to their **threatened existence** in **uplands** "*as long as **grouse**, or even **Red Deer**, remain the chief interest*"

Livestock grazing became "*business model*" of the conservation industry

- nature conservation in England is **agro-ecology** by grazing to maintain open habitats
- **deforest** to **open habitat**, **fence** and **graze** with **domestic livestock** (cattle, sheep or ponies)
- ***"business model"*** funded by **Higher Level Stewardship** - **agri-environment subsidy** (EU Pillar 2 CAP)

Annual HLS payments in England

- 2007/2008 - £36.6m/€45.7m
- 2011/12 - £142m/€177.5m
- 2012/13 - £165m/€233.9m

Longhorn cow, Cumbria.

Outcome for 2011/2012

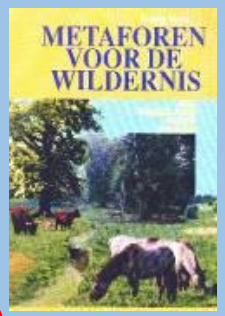
- 200,000ha in new agreements (2% of English farmland)
- 2,383 new HLS agreements
- £44m/€55m per year for the next 10 years
- 100,000th agreement reached December 2012

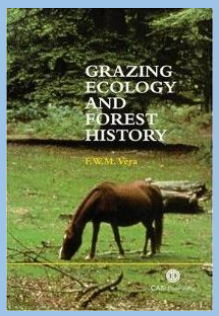
HR2 Native breeds at risk grazing supplement £70/€87.5/yr/ha

agri-environment subsidy is now **driver for nature conservation**

Impact of Frans Vera:

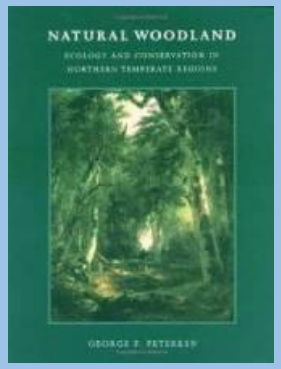
- livestock grazing cloaked in **rhetoric** of "***natural processes***"
- livestock grazing is "***naturalistic grazing***" when grazing animals are assumed to ***drive the ecosystem!!***





"naturalistic grazing" is now synonymous with ***"rewilding"***

Wood pasture became 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. (2001) Grazing ecology and forest history, F.W.M. Vera: Book review 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

ENGLISH NATURE

Report Number 648

Large herbivores in the wildwood and in modern naturalistic grazing systems

English Nature Research Reports

K H Hodder[1], J M Bullock[1], P C Buckland[2], & K J Kirby[3] © Copyright English Nature 2005

English Nature **commissioned report** on *"role of large herbivores in the post-glacial landscape of Britain and the potential for using **free-ranging grazing animals** to create and maintain diverse landscape mosaics in modern conditions"*

- reinforces **fakery** of assigning a **wilderness function** to *"free-ranging"* **domesticated grazing animals**
- gave credence to Vera in his **demand** that landscapes are *"restored by grazing"*

"naturalistic grazing" is **JUST FARMING**

State forest lands became 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** in a 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.

hole punched in forest by tree felling!

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**"*

Over-wintering cattle in woodchip corral – grass doesn't grow in winter!

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less green house emissions??

SHARE

30 JANUARY 2009

NEWS RELEASE No: 12212

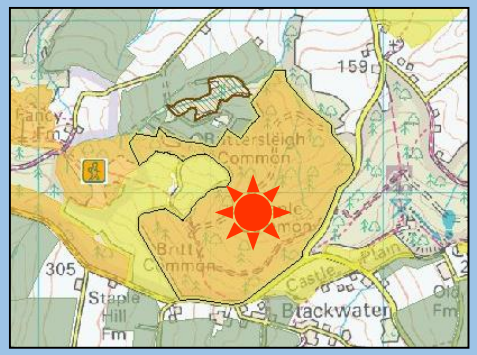
Neroche cows help in the fight against climate change

A herd of Longhorn cows, owned by the Neroche Scheme, are helping out with some important research looking at the environmental benefits of woodchip corrals.

The Neroche Scheme has built a new woodchip corral for out-wintering the cattle, which are grazing open land at various locations across the Forestry Commission estate on the Blackdown Hills on the Somerset/Devon border. The design of this innovative facility has been approved by the Environment Agency and will now be monitored as part of an international research project involving ADAS and North Wyke Research. This research is testing whether cattle housed on woodchip corrals produce less greenhouse gas emissions than those in more traditional roofed barns.

There was a delay in moving the cattle off the corral during the cold period, while indoor barn space was freed up. As a result there were some cattle fatalities on the corral

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
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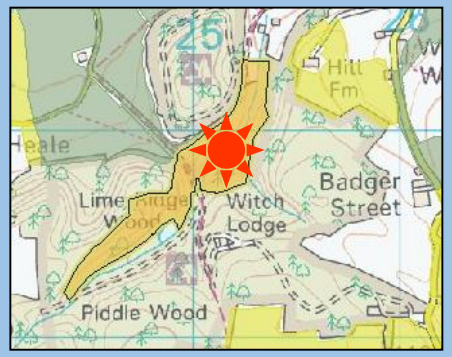
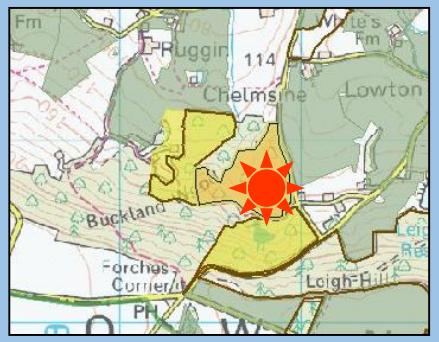


Wych Lodge



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
- Blackdown Hills Trust will receive £322,333/ €402,916

Forestry Commission plantation turned into a subsidised MEAT FACTORY

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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.

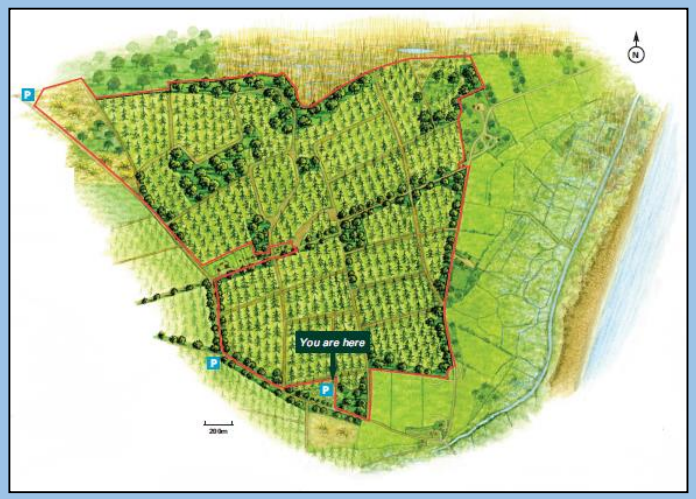
Wild Walks
record your sightings

Dunwich Forest

Forestry Commission England

Suffolk Wildlife Trust

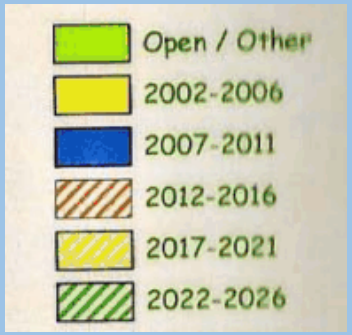
Wood pasture is traditionally maintained by grazing. Suffolk Wildlife Trust has pioneered the use of ponies for conservation grazing in Suffolk and hardy Dartmoor ponies, which will thrive on the scrubby woodland grazing, are ideal in Dunwich Forest. The herd of 30 ponies roam freely through the forest,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

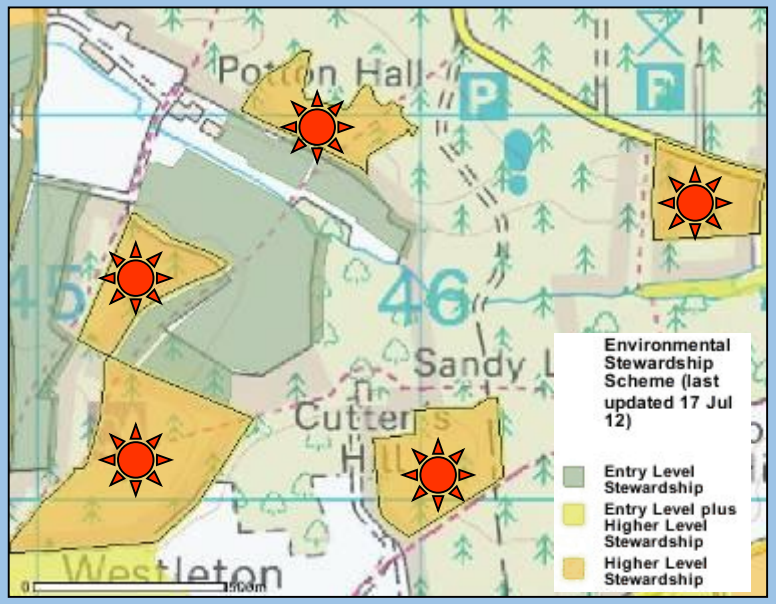
The transformation will be gentle. The conifer crop will be gradually harvested, creating space for natural vegetation to develop in its place.

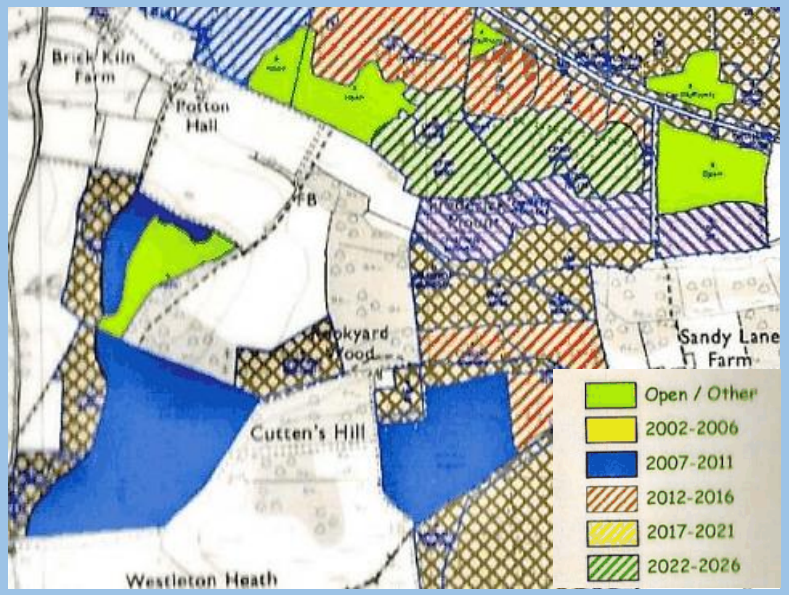


Is this ecological restoration?

RSPB 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 ecological restoration?

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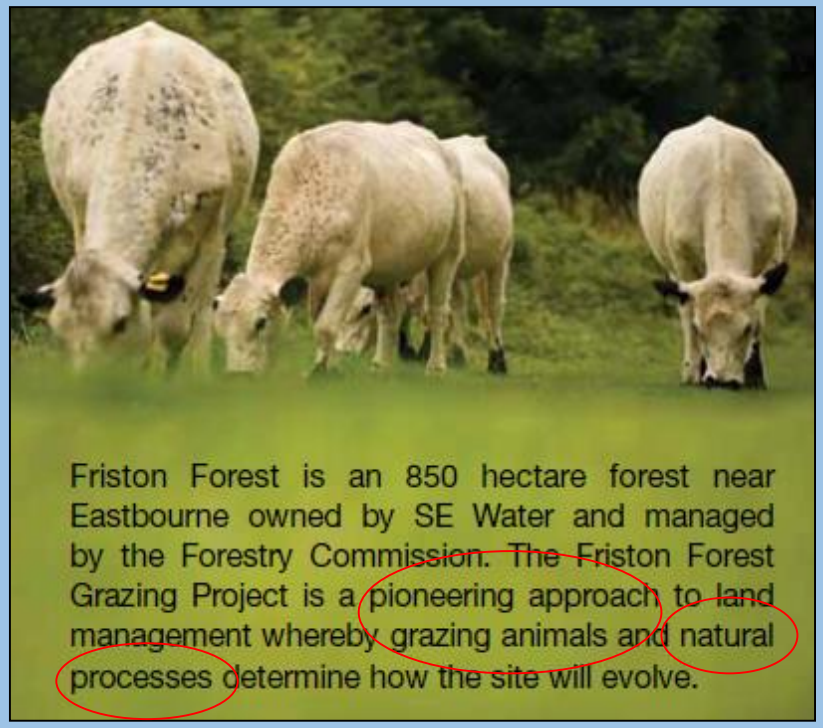
Places to go

Friston Forest

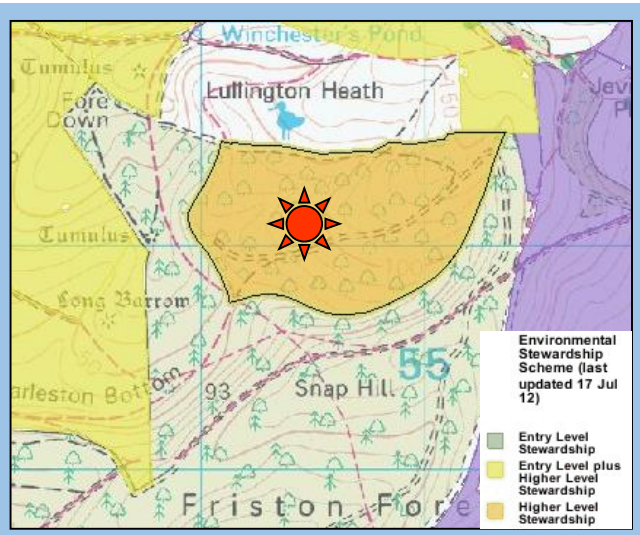
Friston Forest, near Eastbourne, East Sussex On the eastern tip of the National Park the Forestry Commission is working with the Sussex Wildlife Trust, South East Water and Natural England to protect England's largest surviving fragment of chalk heath at Friston Forest adjacent to Lullington National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

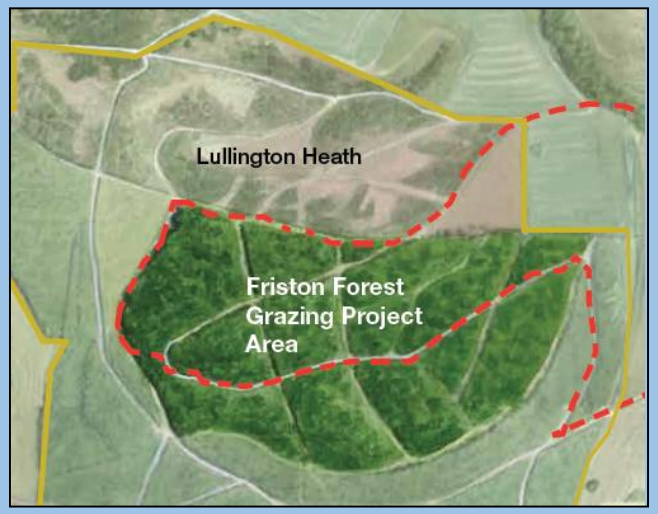


Friston Forest Grazing Project

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...

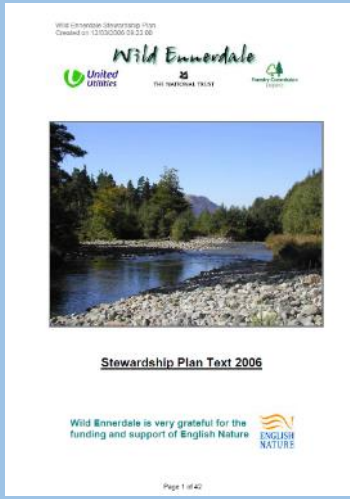
Does radio-tracking **domestic animals** in a **fenced enclose** tell us anything about **natural habitat selection**?

Wild Ennerdale

The natural evolution of a wild valley

Forestry Commission England

Forestry Commission plantation of a non-native Sitka spruce and larch


Wild Ennerdale

United Utilities

Stewardship Plan Text 2006

Wild Ennerdale is very grateful for the funding and support of English Nature

ENGLISH NATURE

Page 1 of 42

"to allow the evolution of Ennerdale as a wild valley for the benefit of people, relying more on natural processes to shape its landscape and ecology"

The eleven Guiding Principles are listed below.

- The sense of wildness experienced by people will be protected and enhanced;
- The valleys landscape and habitats will be given greater freedom to develop under natural processes, allowing robust and functioning ecosystems to develop on a landscape scale;

- Introduce extensive year round naturalistic grazing by large herbivores (cattle)

Wild Ennerdale Stewardship Plan 2006

"greater freedom to develop under natural processes"??

Dynamic natural forces acting in the valley

River Liza – high energy and variable course

Roe deer (80-10) – Red deer arriving

Wind throw

Deer
The valley is thought to be home to around 80 to 100 Roe Deer and a mobile herd of up to 12 Red Deer that move between the western Lake District valleys. Roe deer are controlled by a Wildlife Ranger employed by the Forestry Commission. Annually around 20 Roe Deer are shot in the valley and this practice will continue for the foreseeable future in order to maintain numbers at a level where they do not dominant the opportunities for vegetation development at the landscape (whole valley) scale accepting that localised grazing may prevent woodland development in some areas.

Why kill the roe deer?

Why Cattle

- A key missing natural process

No fossil bone evidence of aurochs in valley!

- Introduce cattle into the forest to restore a natural disturbance process.

Wild Ennerdale Stewardship Plan 2006

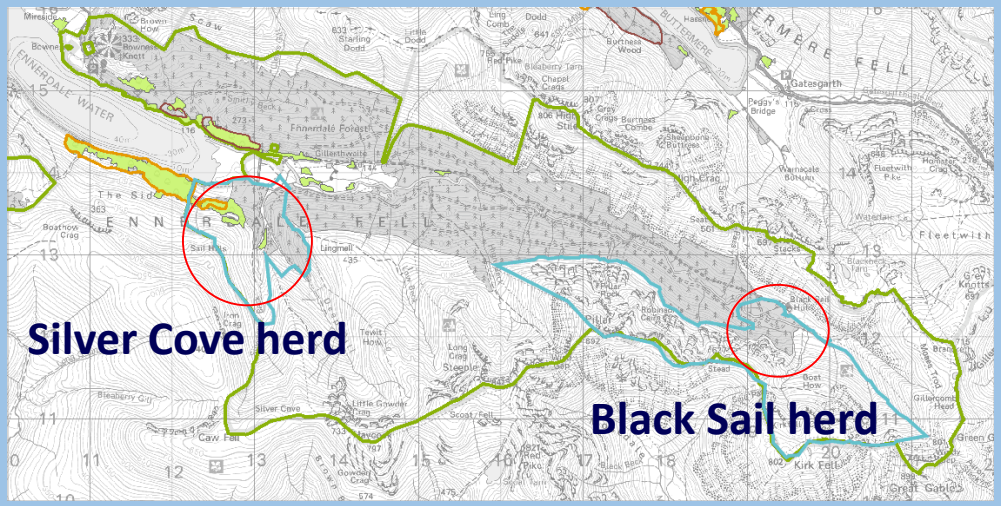
Which animal has a greater right to be in the valley?

wild water forest mountains ennerdale

Shaping the landscape naturally

Cattle grazing with Galloways from 2006

"Black bears" of Ennerdale – Galloway cattle



UL18 - Cattle grazing on upland grassland and moorland

Cattle

The Wild Ennerdale Partners have introduced extensive grazing cattle into the valley in the form of two herds which roam around 300ha of forest (including areas covered by this plan), fell and valley bottom. The cattle are managed by tenant farmers who are responsible for their welfare. Both herds are all female and maintained at around 8 to 12 adult animals.

Ennerdale Valley Continuous Cover Management Plan 2008

Environmental Stewardship Agreements (England)

Agreement Reference	AG00344307
Scheme	Organic Entry Level plus Higher Level Stewardship
Customer Name	Unavailable
Town	Unavailable
Start Date	01/05/2009
Total Cost of Agreement (£)	Unavailable
Amount Paid to Date (£)	Unavailable
Total Area Under Agreement (ha)	620.57

Agri-environment subsidy for grazing – **Higher Level Stewardship** in 2009

How have cattle affected tree regeneration in Silver Cove?

Felled areas in Silver Cove are grazed

Less accessible rocky slopes

Mixed regeneration on **inaccessible rocky slopes**

Accessible flat land

Native species regenerate **ONLY** in **exclosures**

Only **unpalatable conifers** develop outside exclosures

Exclosures in Silver Cove – tree regeneration protected from grazing


2006

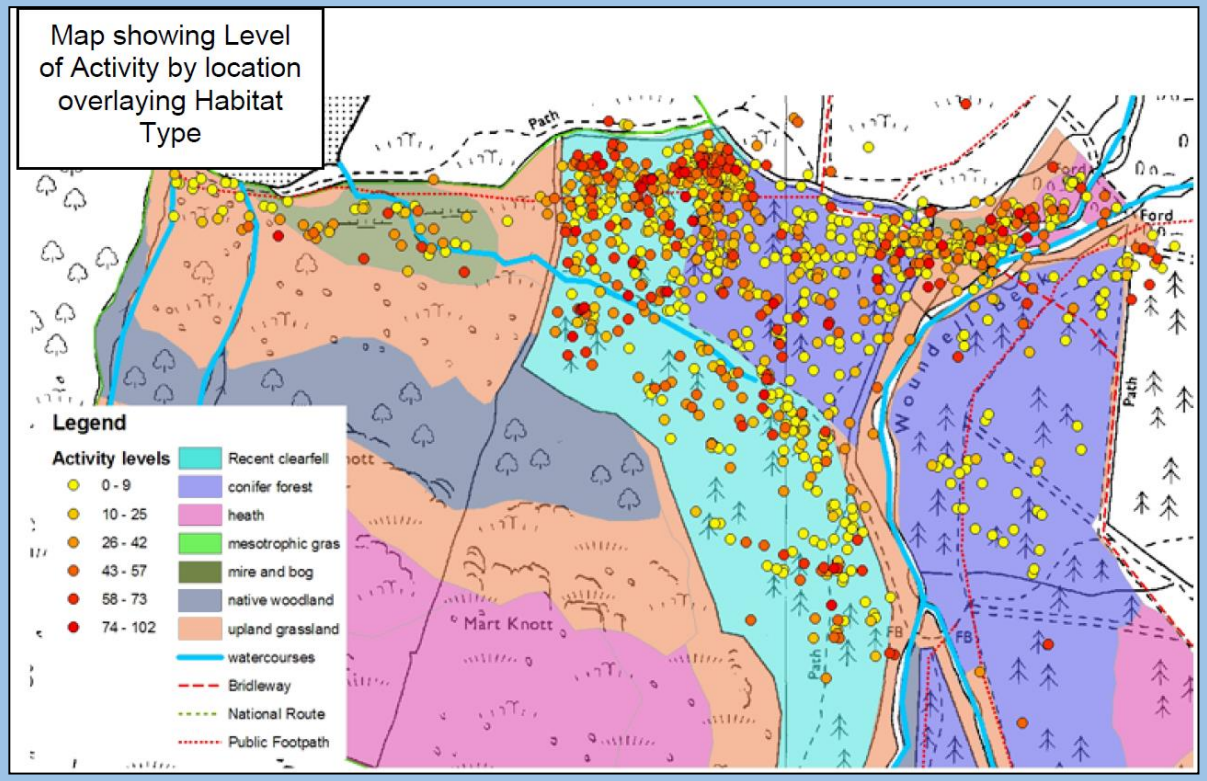

On the slope

Trampling by cattle **NOT NEEDED** for tree establishment!!


2010


Flat, plantation edge

Radio-collar tracking cattle in Silver Cove and tree regeneration



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

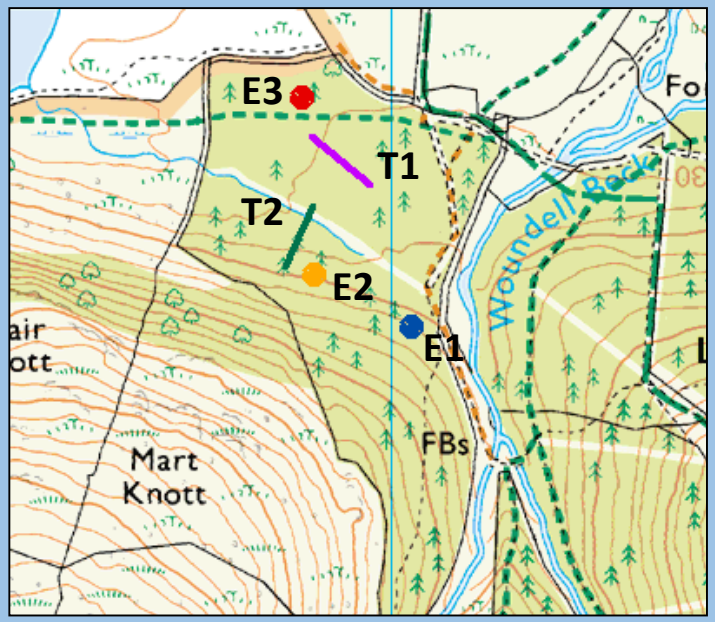
The greatest level of activity is on the **clear fell** where cattle spend 40% of their time

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, SoG 2012



Diversity of tree species is affected by **slope** and by **exclosure** (Fig 1 – transect T2 is on slope)
– **palatability** is factor in the open

Average **height** of tree species affected by **slope** and **exclosure** (Fig 2)

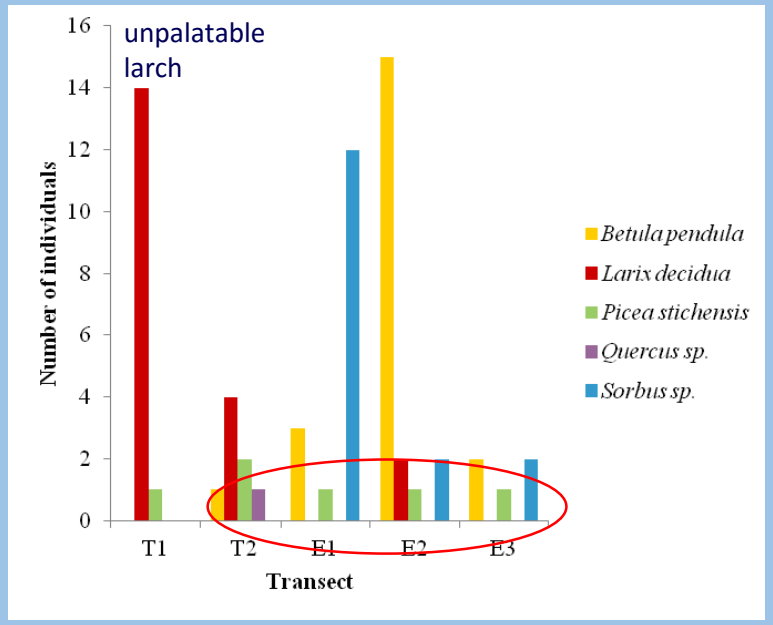


Fig. 1 Total number of tree seedlings found at each transect for each species

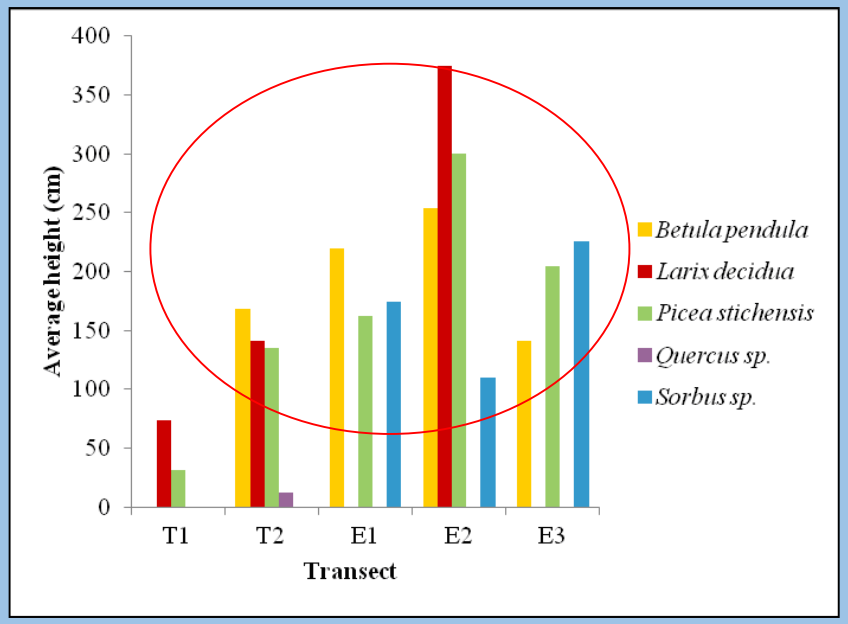


Fig. 2 Average height of tree seedling of each species at each transect

Lessons from cattle grazing in Silver Cove

FLAT, ACCESSIBLE 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 **ecological restoration!!**

EFFECT OF SLOPE

- **modifies cattle behaviour** through **restricting access**
- analogous to **exclosure** in terms of **species recruitment**

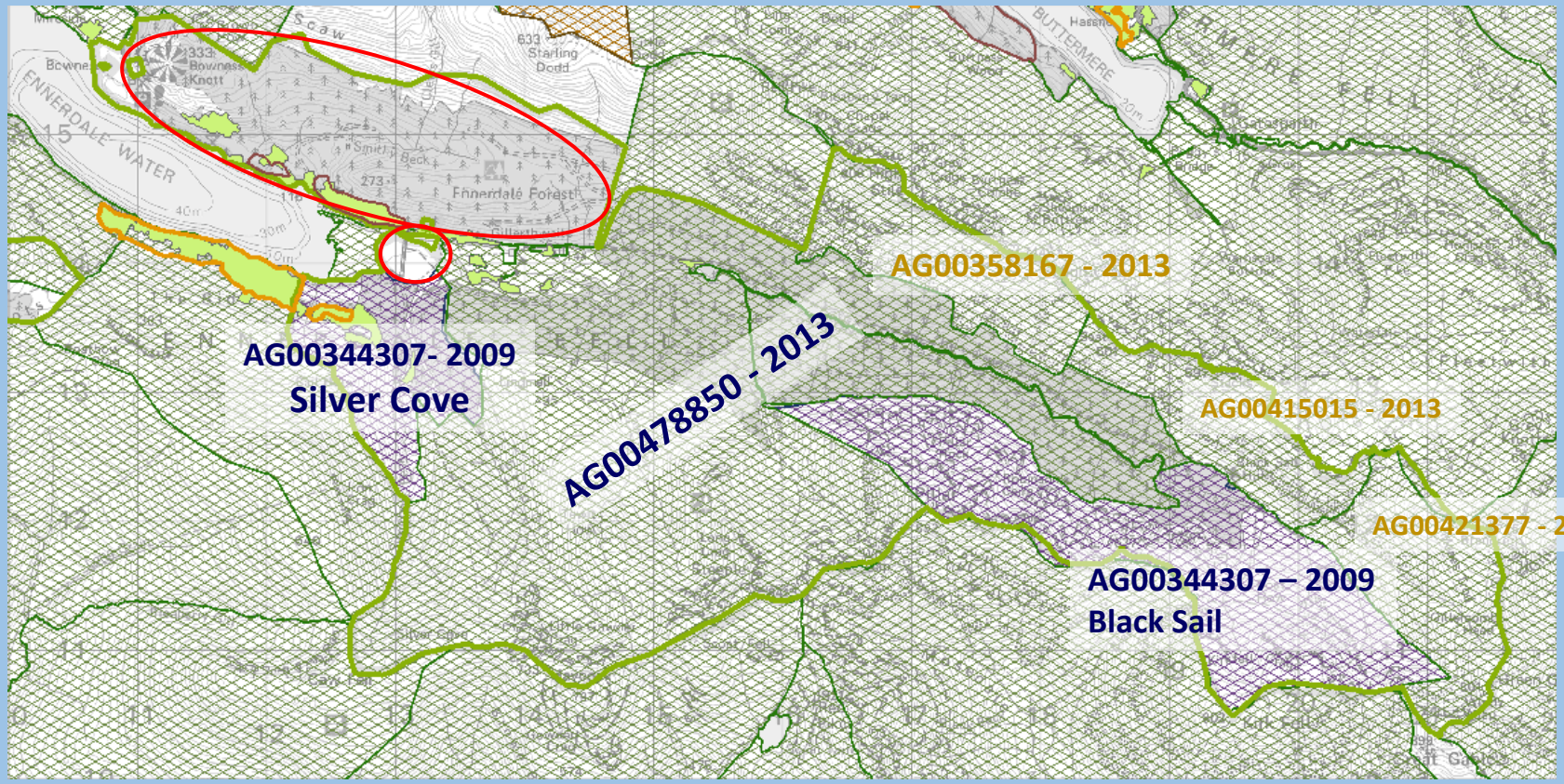
Native trees will flourish on **slopes** – this is not **wood pasture!!**

If **slope** = **fence**

……. does **fence** = **wolves?**

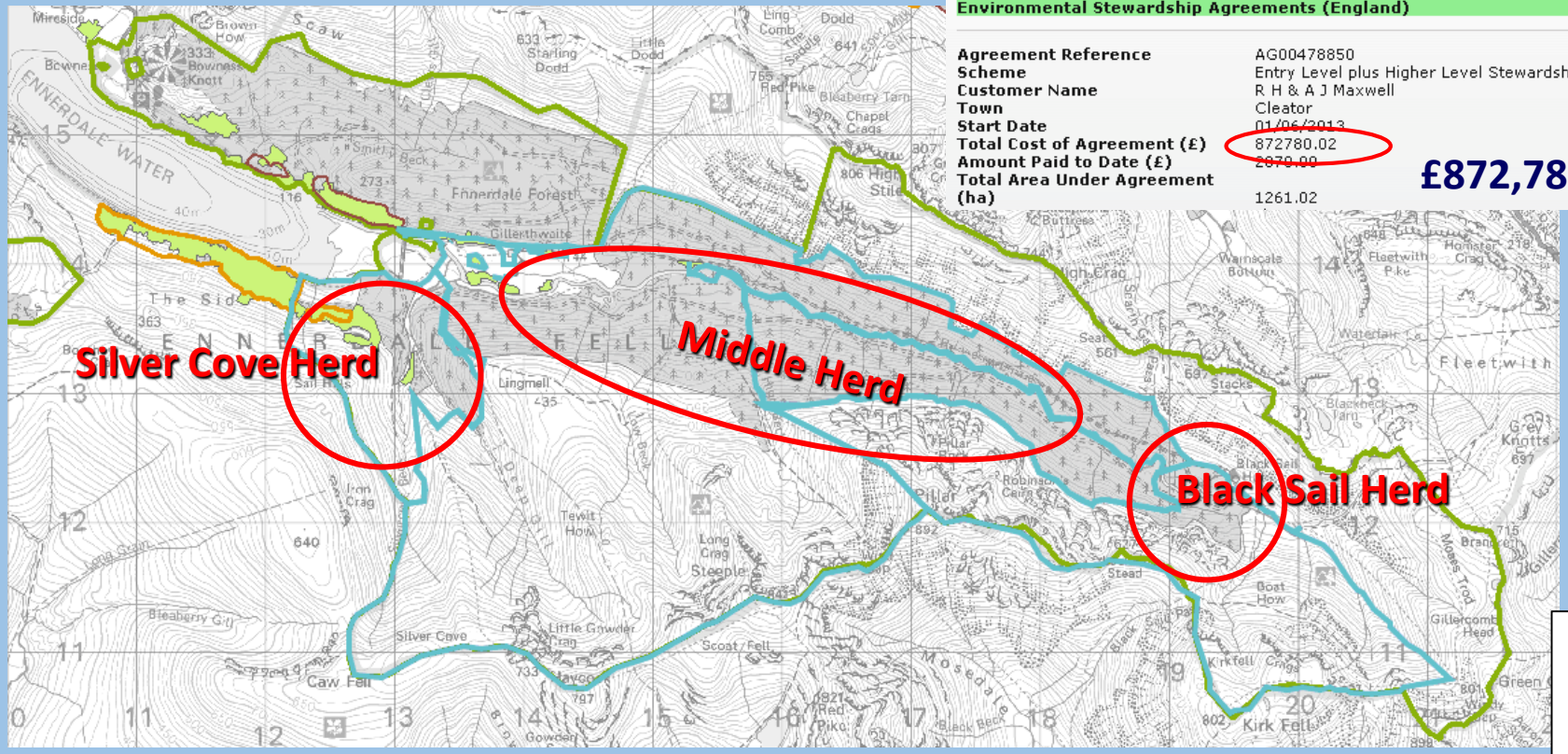
Spread of agri-environment subsidy in Ennerdale Valley

Higher Level Stewardship in 2013



Only two areas of Forestry Commission land NOT now covered by HLS!

Expansion of cattle grazing throughout the valley



Environmental Stewardship Agreements (England)

Agreement Reference	AG00478850
Scheme	Entry Level plus Higher Level Stewardship
Customer Name	R H & A J Maxwell
Town	Cleator
Start Date	01/06/2013
Total Cost of Agreement (£)	872780.02
Amount Paid to Date (£)	2879.99
Total Area Under Agreement (ha)	1261.02

£872,780

Higher Level Stewardship
Farm Environment Plan (FEP)

NATURAL ENGLAND

- **Part 3: FEP farm overview and opportunities**

3.1 **Farm Description**

(a) Farming Systems in use.

The farm is a beef and sheep enterprise

(d) What particular aspirations does the applicant have that has led them to apply for HLS?

to assist with the development of new natural habitats in the upper Ennerdale valley through extensive cattle grazing

- Species structure will be determined by natural regeneration. Understory thinning should favour non spruce species where they occur.

Ennerdale Valley Continuous Cover Management Plan 2008

Evidence from Silver Cove is that **natural tree regeneration** will **NOT** occur with **cattle**

Only **new habitat** developed will be **grassland**!!!

Publicly owned plantation forest turned into a subsidised MEAT FACTORY!!

Herbivore-driven *"rewilding"* – recent history repeating itself

we learn from the past so that our actions today do not spoil tomorrow!!

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An Allegory of Prudence, Titian (1550-1565)
- three ages of man
- triple headed beast: wolf, lion, dog

Tipping point for extent of **human exceptionalism** was arrival of **pastoralism** in the **Neolithic**, a **transformation** from hunter and berry-gatherer to shepherd and farmer (cf. Jean Dorst in "*Before nature dies*")

- millennia of **unrestrained grazing** by **domesticated herbivores**
- **persecution** of both plants and animals that were an **inconvenient threat** to that grazing
  - **extirpation** of wolf, bear, lynx, beaver, wild boar, moose, aurochs, sea eagle, kite, golden eagle
  - **range contraction** of pine marten, wildcat, otter, weasel, polecat, stoat, mountain hare
  - **deforestation** especially loss of upland, riparian, bog and wet woodland
  - **wetlands drained**

How is herbivore-driven *"rewilding"* **behind fences** a **break from that recent past?**

What is a ***"natural"*** level of grazing/browsing in the **absence of predators** and **inability to migrate**?

How do we ***square the circle*** of **herbivore impact** in the **absence of predators?**