

## Change processes at scale – are they natural?

- Oostvaardersplassen - two and four legs
- The black bears of Ennerdale
- Regeneration in Hardknott Forest



**Mark Fisher**  
**Wildland Research Institute**

# Oostvaardesplassen - land reclaimed for 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 and was only **partially drained**:

- dry area used as a nursery for willow trees
- wet areas attract waterfowl

- Trees start to spread, so **herbivores introduced** to maintain **grass areas** for geese – 36 Heck cattle in 1983, followed by 20 Konik horses in 1984
- Designated as a State Natural Monument in 1986, Special Protection Area and RAMSAR wetland 1989
- 56 Red deer released in 1992



# The 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 over the years behind **dykes** to suit **management objectives**
- The 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 would have found grass in farmland elsewhere

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

# Nature Development – a Dutch approach to nature reserves

Essay

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

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**Abstract:** Nature conservation in densely populated areas, as in western Europe, faces the continuous loss and fragmentation of suitable habitats for wild species. Current conservation measures have not been successful in countering this threat to biological diversity, so 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. Moreover, they require large tracts of land and can be considered an umbrella species group for the preservation of other plants and animals. I review the present status of nature reserves in the European Union concerning size distribution and the occurrence of large herbivores and their predators. I argue that habitat fragmentation and the increased management costs of maintaining seminatural areas necessitate an enlargement of existing reserves, a process-oriented management approach, and a minimization of human influence for the long-term preservation of biological diversity.

“...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”

**Natuurgebieden**  
Ontdek Nederland

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Home > Natuurgebieden > Oostvaardersplassen > Flora en fauna

**Buitencentrum**

**Oostvaardersplassen**

Duizenden jaren geleden zag ons hele land er zo uit. Nu zijn het riet, water, de tulpe grasvlaktes en de wilde dieren van de Oostvaardersplassen niet alleen uniek voor Nederland, maar voor heel Europa.

Gebruik: Oostvaardersveld | Flora en fauna | Volg de vos | Nieuwe Wildernis

**Vogelparadijs**

De Oostvaardersplassen is een internationaal bekend vogelparadijs. Bijna de helft van de Noordwest-Europese populatie grauwe ganzen komt er om te ruilen. Het is een van de grootste aalscholverkolonies. Het gebied is ook rijk aan roofvogels. Vrijwel nergens kunnen op één dag zoveel soorten worden gezien. Maar de Oostvaardersplassen is vooral bekend om de zwanen, die er sinds 2005 broedt. Zie dossier zwanen.

**Grote grazers**

Kenmerkend voor het gebied zijn de grote grazers, die van oorsprong in ons land thuishoren. Edelherten, konikpaarden en Heckrunderen leven op een natuurlijke manier in wilde kuddes. Zij spelen een sleutelrol in de natuurlijke dynamiek. Heckrunderen houden met hun graasactiviteiten het grasland in de Oostvaardersplassen open. De grote kuddes koelen en hun jongen zijn niet te missen op een wandeling naar de vlaktes. De stieren zijn vaak alleen of in kleinere groepjes te vinden, in afwachting van de bronsttijd, wanneer tochtige koelen langkomen om gedekt te worden.

**Eerder bezocht**

**Natuurgebieden**

Oostvaardersplassen

**Nieuws**

Jaarlijkse helikoptertelling grote grazers Oostvaardersplassen Op maandagmiddag 3 en dinsdag 4 november 2014 telt Staatsbosbeheer voor de vierde keer de grote zoogdieren van de Oostvaardersplassen vanuit een helikopter.

→ Lees verder

**Winkel**

Wegwijzer langs de mooiste plekken in de Oostvaardersplassen.

→ bestel kaart

“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?**

## Question

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



**Nature  
development  
– green to  
brown!!!!**



# Destruction of trees from bark ringing



New tree seeding completely disappeared



Eating bark on this scale is a symptom of **scarce food**

# Ever rising herbivore population - STARVATION and MANY DEATHS



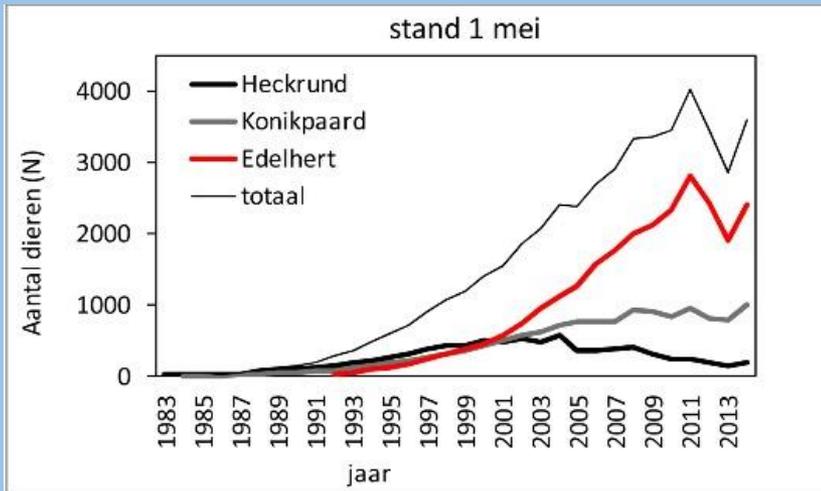
**TRUE NATURE!!**

The fence around OVP means there is

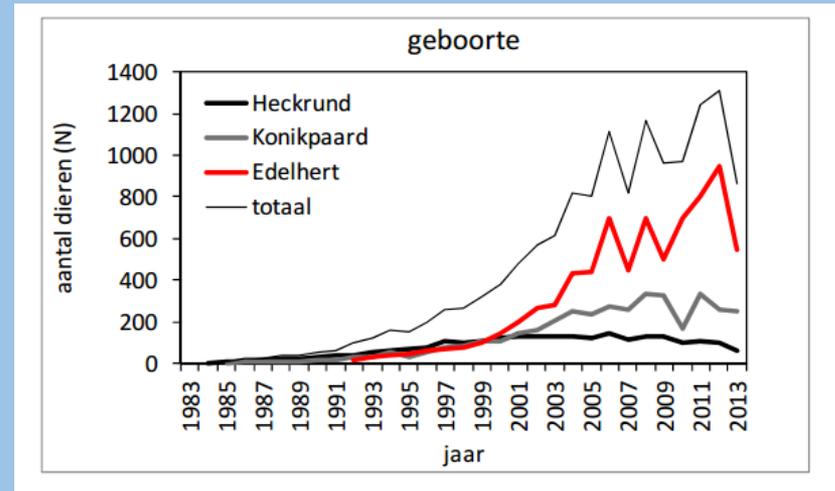
**NO WAY OUT!!**

Deer carcasses removed with heavy machinery

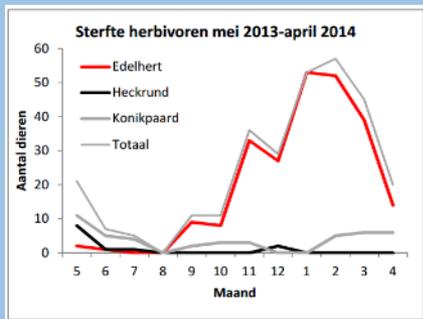
# Rising herbivore population and mortality



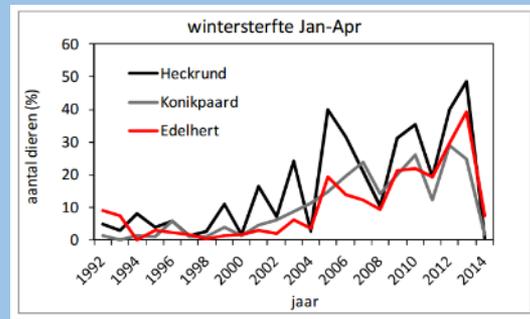
Large herbivores on 1 May, excluding calves



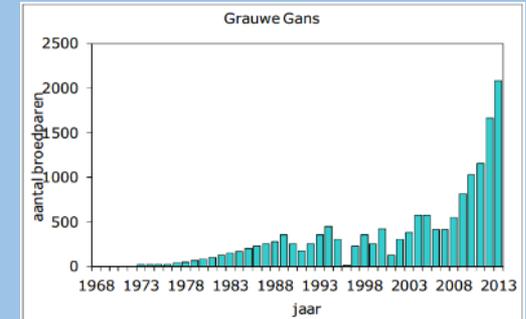
Number of calves and foals for the period Jan-Dec



WINTER KILLS - total deaths/m



Proportional mortality Dec-Apr



Number of breeding pairs Greylag Goose

The 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

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

**...which is good news for the scavengers**

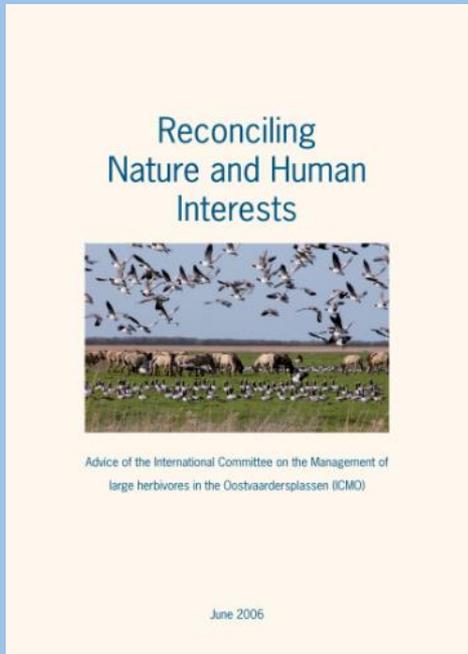


## Question

WHAT IS MISSING THAT COULD HAVE **PROTECTED THE TREES?**



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

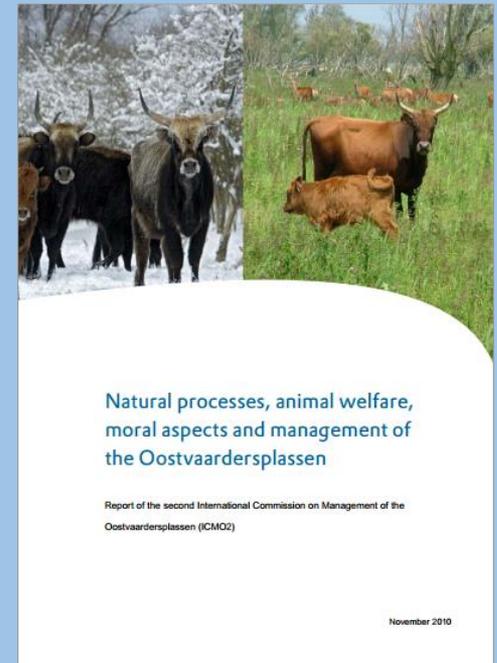


*Rising mortality* led to establishment of an international committee in 2005 to assess management of the OVP:

- Access to shelter should be improved
- Program of research and monitoring of herbivore populations should be developed
- **ecological corridor** to the Horsterwold is established to provide additional habitat
- Animals in **terminally poor condition** in late winter should be **culled** and not allowed to die naturally



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 was installed to evaluate:

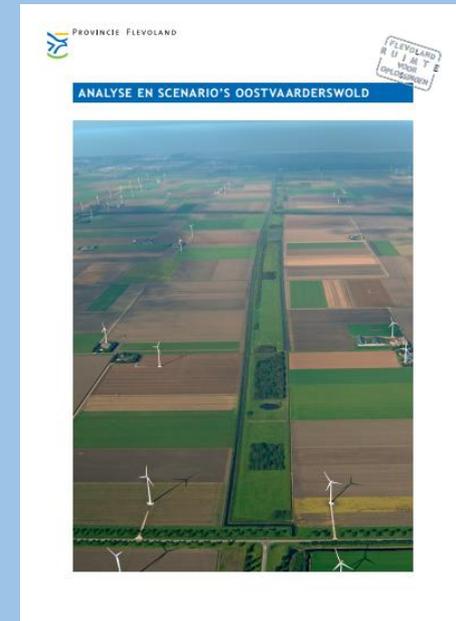
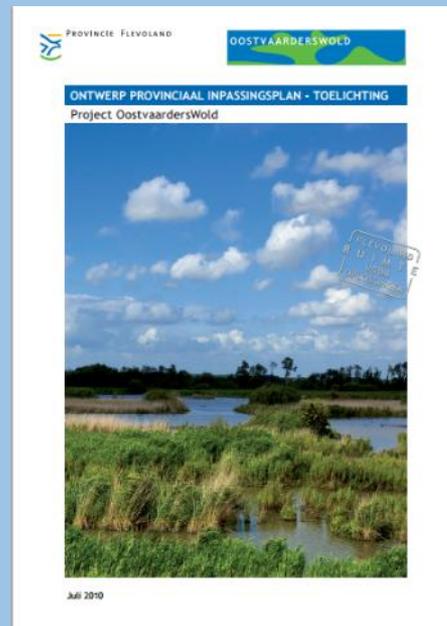
- Progress in responding to first report
- Ecological aspects of management
- Welfare issues under current management
- Future management

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



# 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.

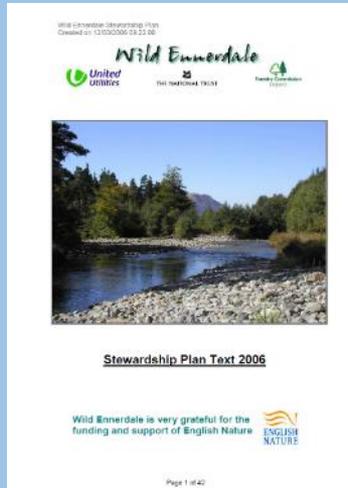
How much difference will it make?

- Larger area still **enclosed with fencing**
- Konik horses already in Horsterwold

# Wild Ennerdale

The natural evolution of a wild valley

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



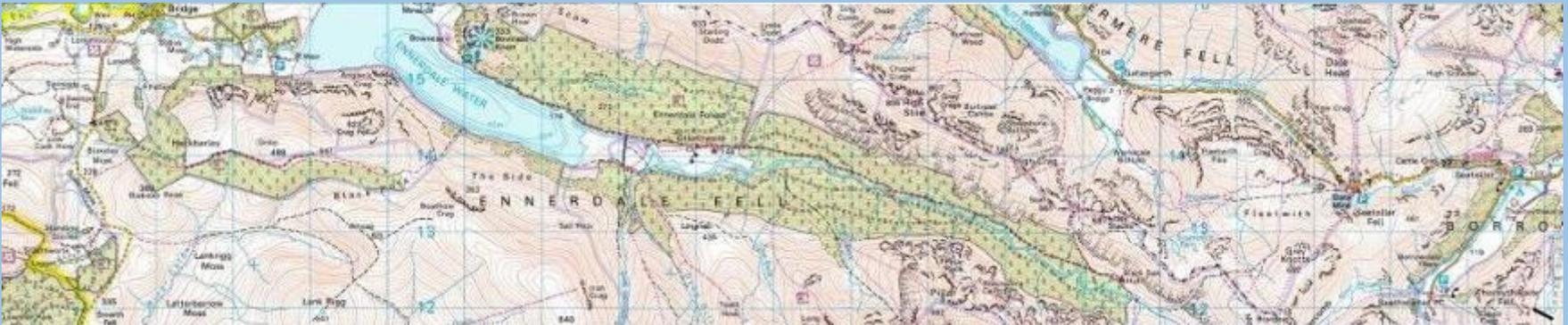
*“to allow the evolution of Ennerdale as a wild valley for the benefit of people, relying more on natural processes to shape its landscape and ecology”*

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,

### Wild Ennerdale Stewardship Plan

**“greater freedom to develop under natural processes”**



# Dynamic natural forces acting in the valley



River Liza – high energy



Roe deer (70-110) – 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 Cattle

- A key missing natural process



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

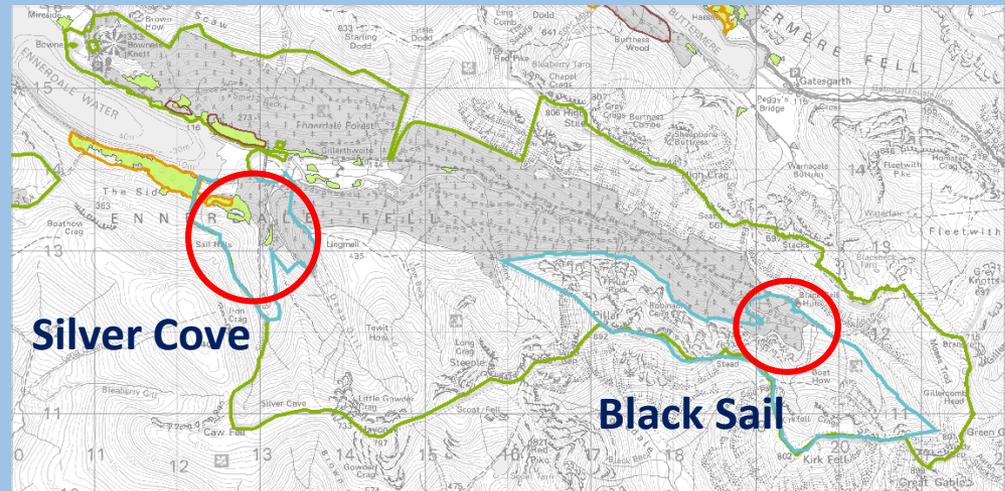
**No fossil evidence of aurochs in valley!**

## Cattle grazing with Galloways from 2006

Shaping the landscape naturally



“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.

### 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



**Regeneration on rocky slopes**



**Almost NO regeneration except in exclosures**

# Exclosures in Silver Cove – tree regeneration protected from grazing



2006



On the slope

**Trampling by cattle not needed for tree establishment!**

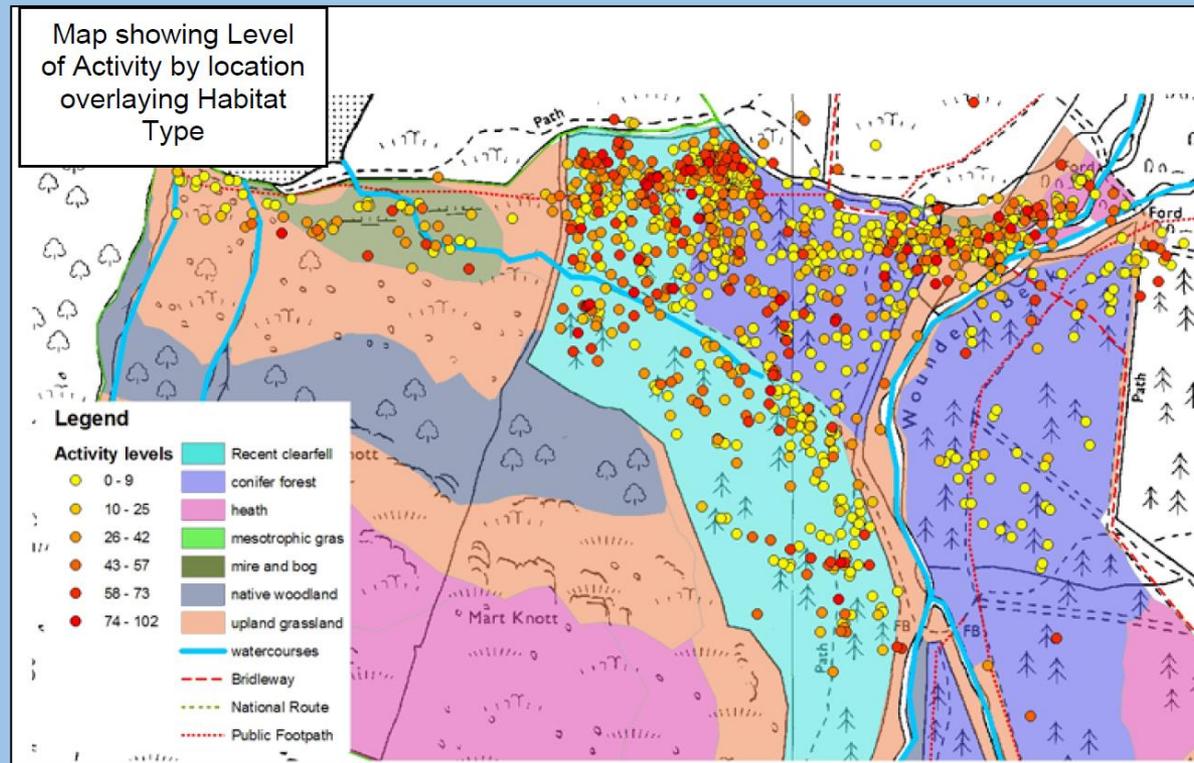


2010



Flat, plantation edge

# Radio-collar tracking cattle in Silver Cove and tree regeneration



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

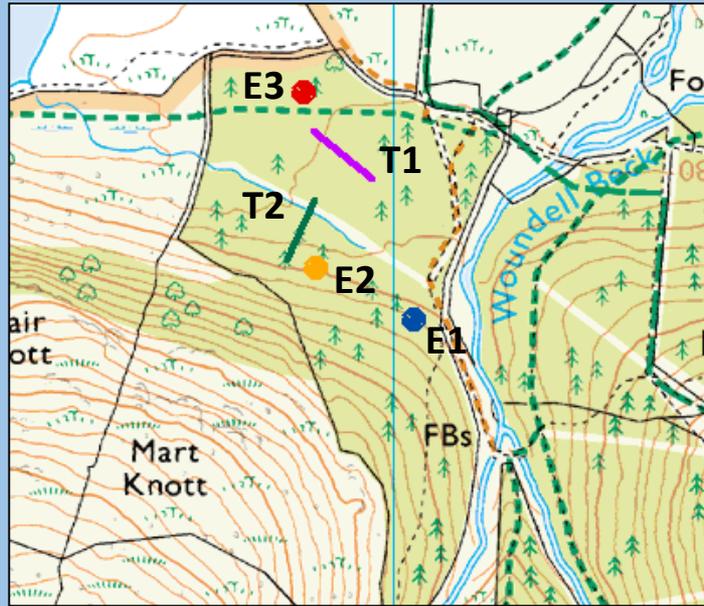
The greatest level of activity is on the **clear fell** where the cattle spend 40% of their time

Initial study in 2010 found the height of **native tree regeneration** outside of enclosures 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**

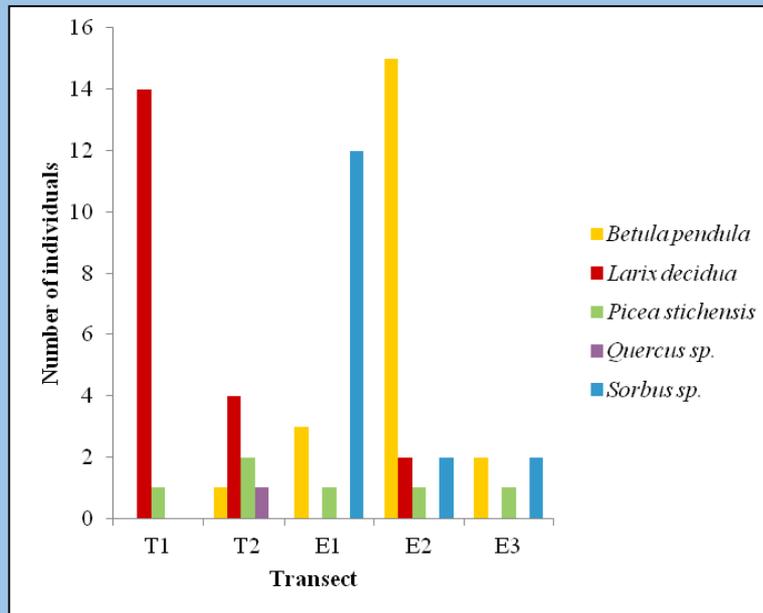


Fig. 1 Total number of tree seedlings found at each transect for each species

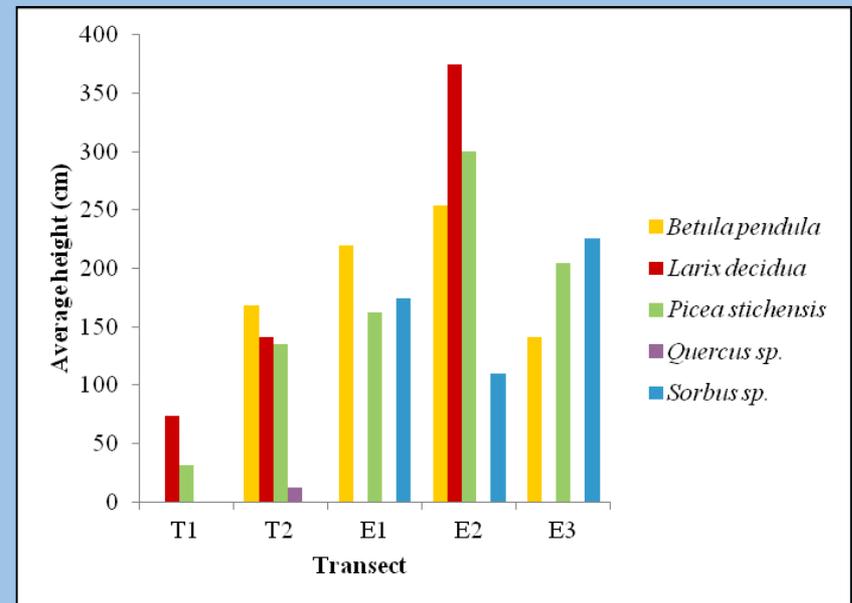


Fig. 2 Average height of tree seedling of each species at each transect

# 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**:

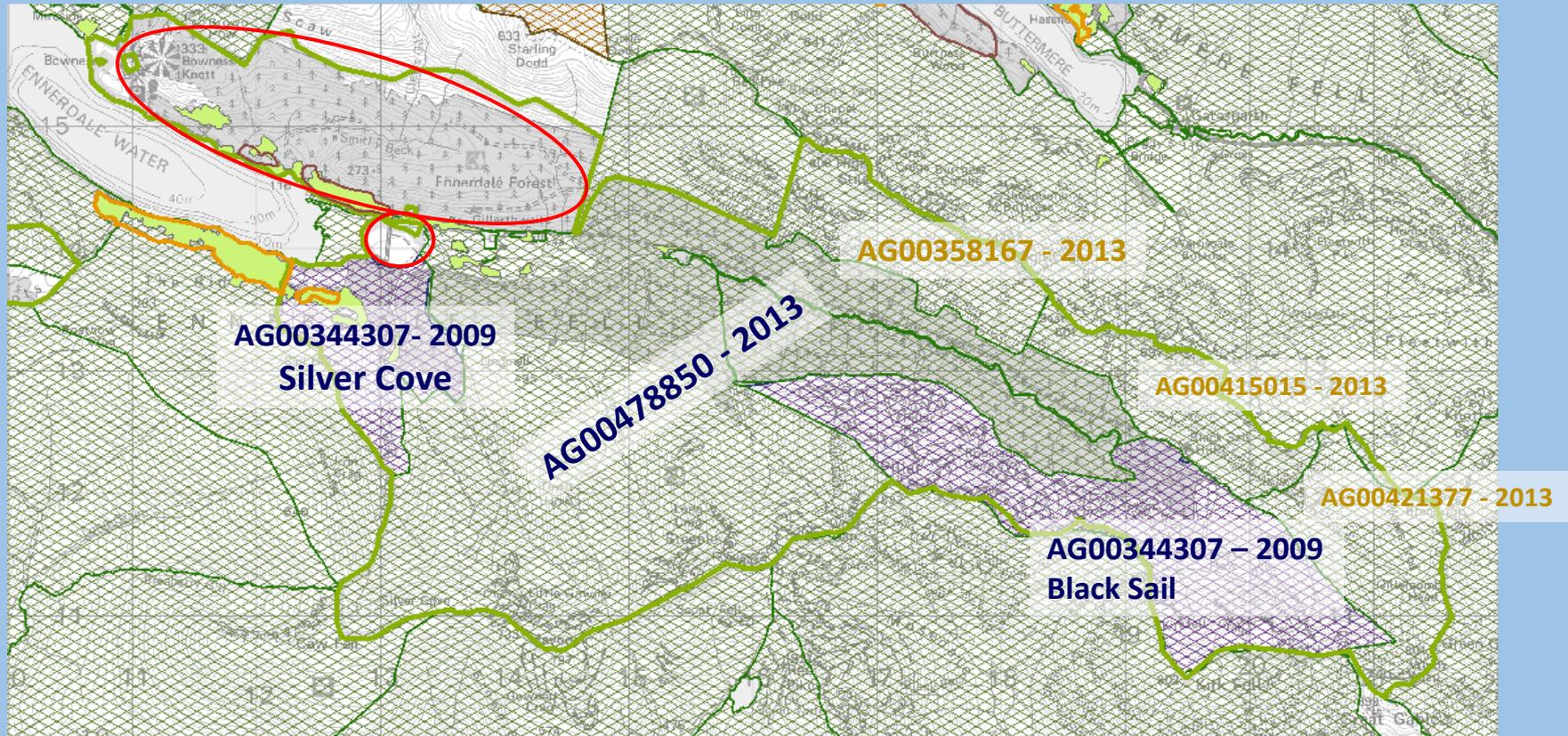
- modifies **cattle behaviour** through access restriction
- analogous to **exclosure** in species recruitment

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

**If slope = fence, does **fence = wolves?****

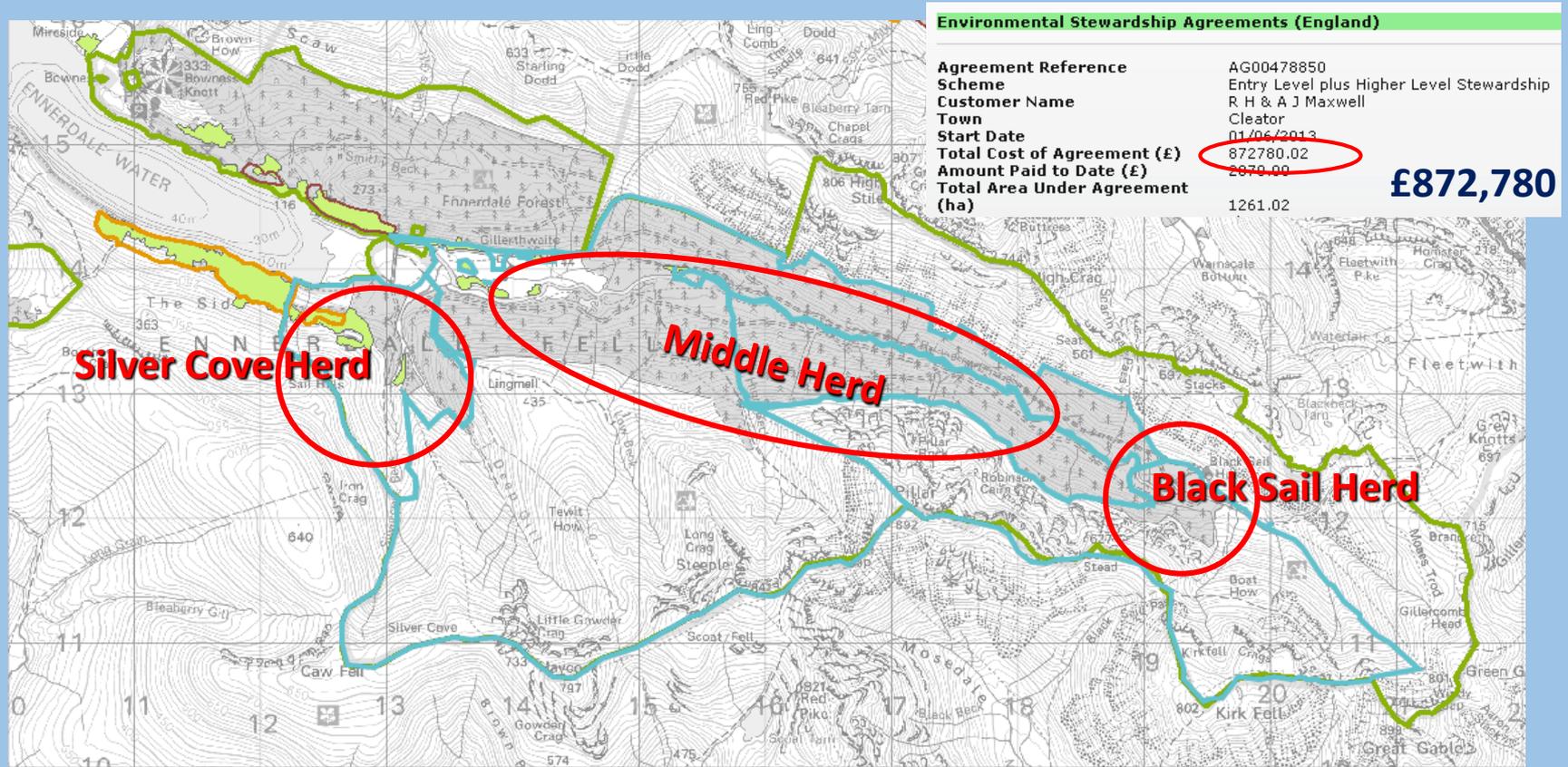


# Spread of agri-environment subsidy in Ennerdale Valley – Higher Level Stewardship in 2013



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

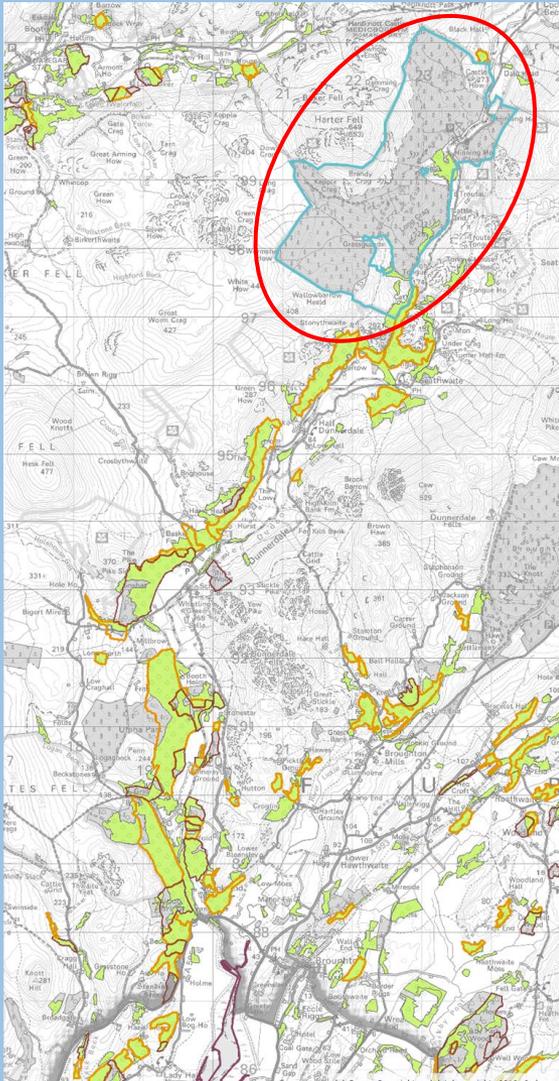
# Expansion of cattle grazing throughout the valley



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

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

# Hardknott Forest and the Duddon Valley woodland



- Hardknott forest is a 600 ha Forestry Commission conifer plantation in the upper Duddon valley
- planted in the 1930s and 1940s - now reaching the end of rotation (maturity)
- aim is to increase **natural** and **recreational** value through restoration into **native oak and birch** woodland
- opportunity to create the **largest semi-natural woodland in the Lake District**, linking Hardknott Forest with the existing a series of **ancient oak woodlands** that snake down the valley **all the way to the coast!**

# Student volunteers work with Forestry Commission during natural regeneration at Hardknott



Cutting Sitka spruce regeneration

- clear felling annually since the late 1990's has created a chronosequence of **natural regeneration** with ages of 0-13 years

- the management plan relies mainly on natural regeneration rather than planting, with some translocation of tree seedlings to areas of little regeneration

- work parties in **dormant season** clear regenerating Sitka spruce, plant juniper, and remove redundant **fences** (UoL, Park Lane College, Leeds, Leeds City College, Scottish Agricultural College, Scottish Rural University College)



Cutting Sitka spruce amongst birch regeneration

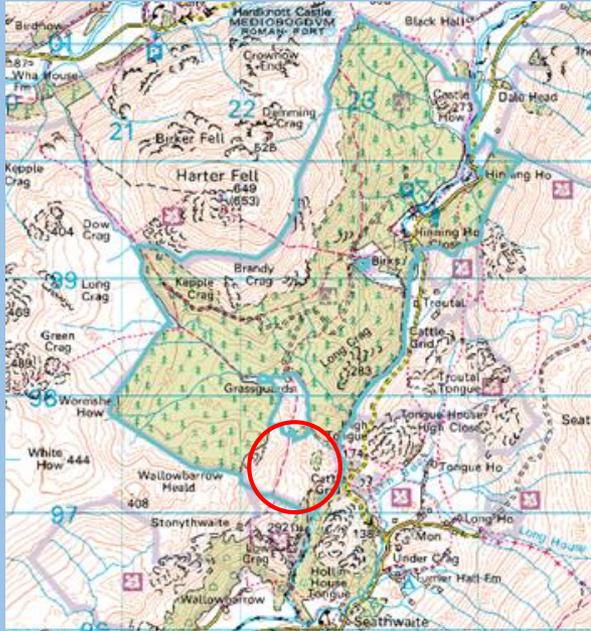


Planting juniper



UoL hostel at Dale Head in Duddon valley

# Grassguards Native Woodland – a linking woodland



- new Upland Oakwood planted by FC in 2005 to make the link between Hardknott Forest and the Duddon Valley ancient woodland **FOREST HABITAT NETWORKS**

- oak, rowan, birch, holly and juniper planted in five groups across landscape. Scattered holly, juniper and rowan in upper crags

- area enclosed by deer fencing to prevent browsing damage during woodland establishment



Duddon Valley Woodland

New Woodland

area clear felled in 2006



## Effects of browsing by deer

- NO grazing by livestock
- HOWEVER population of roe deer in valley woodlands
- deer browsing monitored across target areas
- exclosures dotted around as controls

regeneration by 2010 – moorland as well as tree species



**bilberry**



**heather**



**birch**

# Advanced natural regeneration at Hardknott Forest

clear felled 1998



2008



2010

Roe deer appear **NOT** to be a significant factor in natural regeneration!