



# **Renaturing upland vegetation and hydrology – excluding livestock grazing**

**Mark Fisher & Richard Hart,  
November 2013  
Wildland Research Institute**

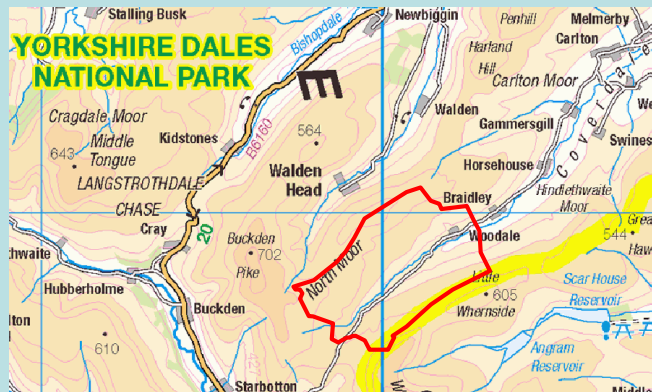
# River Cover – potential ecological improvements



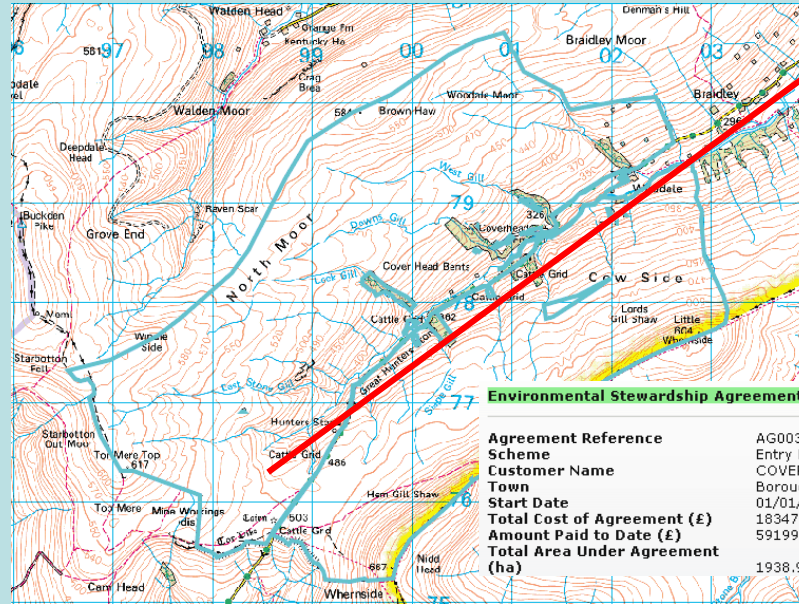
Advisory Visit for James Mawle and Stephen Mawle  
Coverhead Farm  
River Cover  
August 2013



Gareth Pedley, WTT



Coverhead Farm



To River Ure

## Environmental Stewardship Agreements (England)

Agreement Reference	AG00332889
Scheme	Entry Level plus Higher Level Stewardship
Customer Name	COVERHEAD FARMS
Town	Boroughbridge
Start Date	01/01/2010
Total Cost of Agreement (£)	1834759.2
Amount Paid to Date (£)	591990.08
Total Area Under Agreement (ha)	1938.97

Upper water catchment for River Cover

- Coverhead Farm is primarily a **grouse moor**
- Countryside Stewardship Scheme in 1999 - **stock grazing decreased** from 3000 ewes and 70 cattle, down to 350 ewes and 90 highland cattle. HLS followed on CSS
- 80-90% moorland grips now blocked
- moorland rejuvenating, with **scrub and heathland regeneration** creating habitat for a **black grouse** relocation program
- reduced stock density and grip blocking has **attenuated peak river flows** through **better water storage** on the moors
- river still impacted by sections of **channel straightening**, leading to **bed scouring and bank erosion**.

# Long history of moorland grazing – bad for trout habitat

- significant lack of marginal trees and herbaceous vegetation along river's banks
- reduces availability of **aerial and trailing cover** along the river bank
- creates **bank instability** by reducing the diversity of root structure within the bank that would naturally protect
- reduces potential for creation and maintenance of **deeper pools**
- **adult trout** habitat needs **deep water** and **aerial cover**



simplified landscape -lack of trees and herbaceous vegetation from grazing



rocky outcrops restrict access to grazing livestock  
- diversity of shrubs and herbaceous vegetation

Where **grazing stock is excluded** along the river bank, there are **numerous species of tree/shrub** including willows, rowan, hazel, ash, alder, hawthorn, dog rose, along with ferns, meadow sweet, common knapweed and a wide range of other plants and grasses



# Channel straightening (“cannalising”) reduces salmonid spawning areas



- section of straightened channel showing the coarse boulder bed and lack of deeper water
- river channels were often moved or constrained (cannalised) to increase grazing areas

- straightening increases gradient and flow velocities, reducing **sediment deposition**, and retention of **gravel and smaller cobble** substrates required for **salmonid spawning**
- reduces **pool formation** around bends and thus habitat diversity
- prevents high flows from **spilling out onto the floodplain** to relieve extreme erosive forces
- shortens the length of river**, leaving a channel dominated by large cobbles and boulders, and a lack of deep water

# Recommendations from the Wild Trout Trust

## Erect buffer fencing for stock exclusion

- fence along a naturally **sinuous section**, with much **habitat diversity**
  - deep and shallow sites downstream of existing **well treed and vegetated** areas, which form a seed and propagules bank
- don't fence where **realignment** is possible

## Tree planting once buffer fencing installed

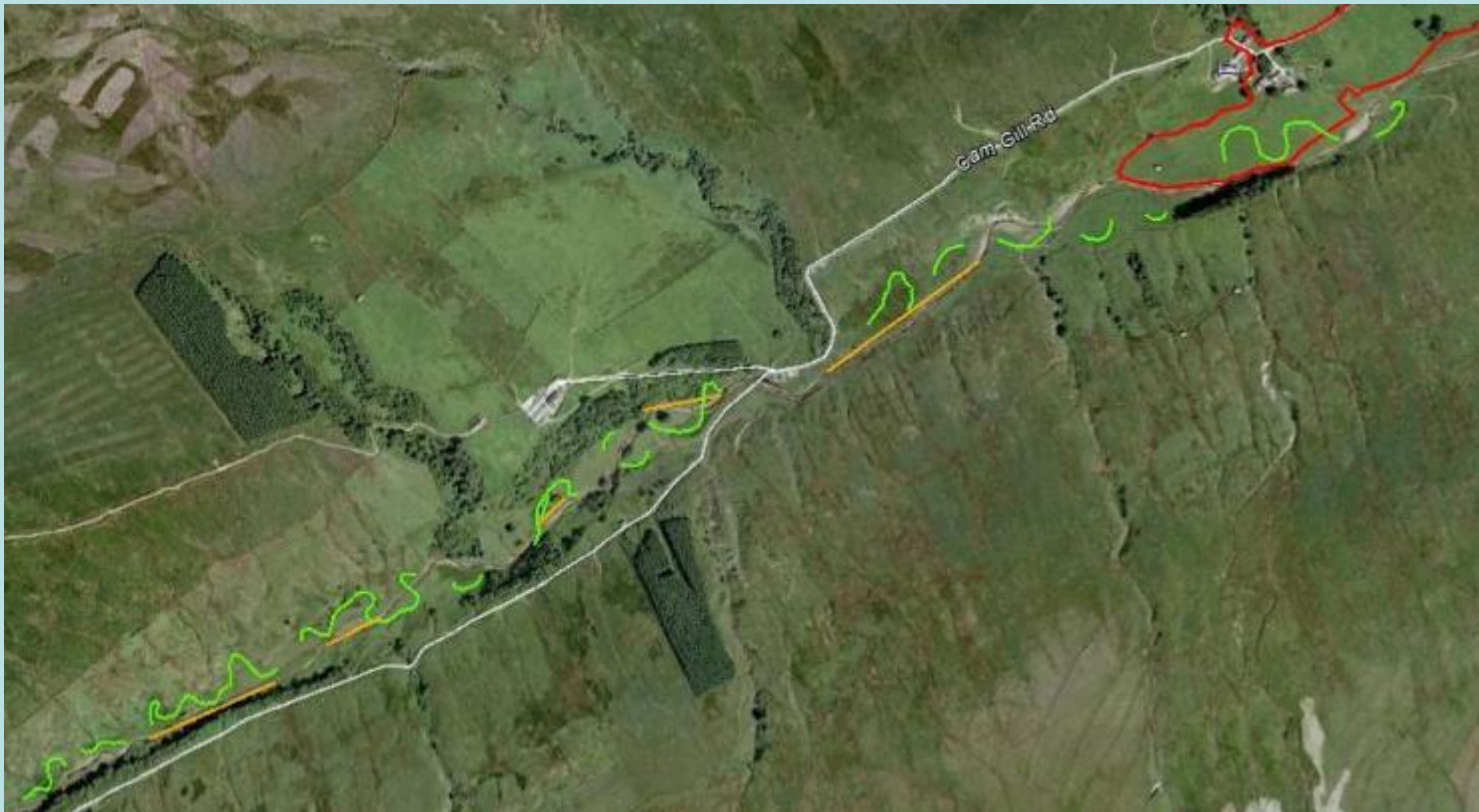
- plant in patches along the river bank and adjacent areas of the floodplain avoiding areas with potential for channel realignment
- targeted tree planting to provide **important cover** around the riffles and discrete pools that already exist
- **redirect flows** by planting discrete clusters on the waterline along straighter sections

## Benefits of trees once established

- bankside trees provide **shade**, and low, **trailing cover**
- leaves provide a natural **input of nutrients** to the river, increasing productivity through additional food for **detritivorous invertebrates** that are eaten by other invertebrates and fish – **TROPHIC CASCADE**

# Channel realignment – return the river to a natural, sinuous course

- realignment will reinstate **natural erosional** and **depositional** features, creation of **pools** and **riffles**
- simple **trenching** , **berming**, and **vegetation banking** could achieve gradual reinstatement



Natural course (light green) straightened channel (orange) farm boundary (red)

# Vegetational renewal and hydrological improvements - examples of livestock exclusion in the uplands of Cumbria and Yorks

Livestock exclusions monitored by applications to the **Planning Inspectorate** to fence areas in **upland commons**

## Improving native diversity and hydrology, mitigating downstream erosion and flooding

Caldbeck Common (Burblethwaite, Charlton Gill, Roughton Gill), Cumbria - January 2008

Rishworth Moor Common, West Yorkshire - May 2008

Saddleback Common, Cumbria - July 2008

Mungrisdale Common, Cumbria - July 2008

Hartley Fell, Cumbria – March 2010

West Stonesdale Moor, Muker, North Yorkshire - February 2011

*“conserve the common as gill woodland planting which would help reduce soil erosion and water run off downstream, resulting in the reduction of erosion/deposition and flood alleviation at the River Swale near Muker”*

Bampton Common, Cumbria - February 2011

Brackenthwaite Fell, Cumbria March 2011

Skirwith Fell, Cumbria - September 2011

Langstrath & Coombe Fells, Cumbria June 2012

## Protect woodland regeneration or planting

Milburn & Blencarn Commons, Cumbria – June 2005

Baugh Fell Common, Sedbergh, Cumbria – June 2006

Wherside Great Allotment, Cumbria – November 2007

Bowscale Common, Cumbria - July 2008

Ivelet Moor and Pasture, North Yorkshire- February 2011

Blencarn Fell Common and Kirkland Fell Common, Cumbria – September 2011

*“the fences were necessary to protect three separate blocks of woodland (largely newly planted) from damage by grazing stock”*

Skirwith Fell, Cumbria - September 2011

Glenridding Common, Cumbria – November 2011

## Overgrazing

Westernhope Common, Durham – December 2009

Whelpside, Cumbria - August 2011

Abbotside Common, Richmondshire April 2011

Armboth Fell, Cumbria - August 2011

*“exclude stock from a particularly degraded area of heathland and improve the condition of that part of the SSSI”*

Blencarn Fell Common and Kirkland Fell Common, Cumbria – September 2011



# Langstrath and Coombe Fells, Cumbria



The Planning  
Inspectorate

## Application Decision

by Richard Holland

Appointed by the Secretary of State for Environment, Food and Rural Affairs

Decision date: 21 June 2012

Application Ref: COM 333

Langstrath and Coombe Fells, Cumbria

Register Unit No: CL 167

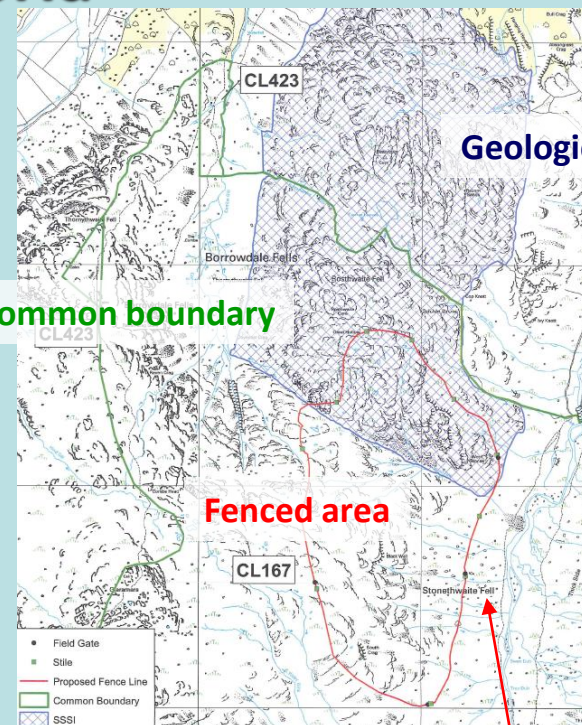
Commons Registration Authority: Cumbria County Council

- Common owned by **National Trust**
- seven grazing rights holders registered over the common
- HLS requires creation of areas of **sparse woodland** to enhance biodiversity
- fencing is to **exclude sheep** from 74ha so that new woodland is protected

### Nature Conservation

14. The purpose of the fencing is to protect scattered newly planted trees and naturally regenerating trees from grazing stock. The primary reason for the tree planting is to prevent future soil erosion and downstream flooding by reducing the rate of water run-off into Borrowdale (a valley prone to flooding) and reducing the quantity of sediment reaching Bassenthwaite Lake. However, the applicant has advised that woodlands made of scattered trees also provide habitats for many different bird species along with food shelter and nesting materials. The trees will be a major contrast to the surrounding landscape, which will contribute to the biodiversity of the site.

- **prevention of quick run off, reducing flooding further downstream**
- **creation of habitat for birds**



Geological SSSI

Common boundary

Fenced area

Stonethwaite Fell



Blea Rock with South Wall and Black Wall in background



# Brackenthwaite Fell, Cumbria



The Planning  
Inspectorate

## Application Decision

by Gina Warman

Appointed by the Secretary of State

Decision date: 10 March 2011

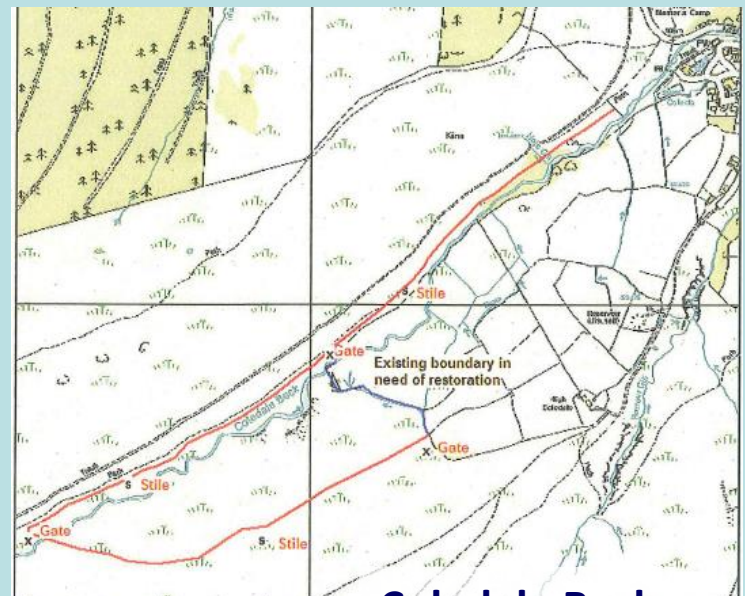
Application Ref: COM 187

Brackenthwaite Fell, Cumbria

Register Unit: No.CL 11

Registration Authority: Cumbria County Council

- National Trust owned common **heavily grazed by sheep**
- Coledale Beck severely eroded - several major landslips
- large amounts of **sediment** washed into Bassenthwaite Lake resulting in **high levels of phosphates**
- **sediment risk map** identified highest sediment supply risk rating for Coledale
- restoration of **mire vegetation** on the upper slopes and **woodland regeneration** on the lower slopes would help to **reduce water run-off**
- woodland restoration would increase diversity and **provide habitat for breeding birds**, merlin and ring ouzel
- **sheep excluded by fencing off 29ha**
- **4,000 trees - aspen, willow and alder - planted in drifts along two miles of the Beck**



Coledale Beck



Students helping to plant trees along the beck

University of  
Cumbria 

# Glenridding Common, Cumbria



The Planning  
Inspectorate

## Application Decision

by Richard Holland

Appointed by the Secretary of State

Decision date: 7 November 2011

Application Ref: COM 250

Glenridding Common, Cumbria

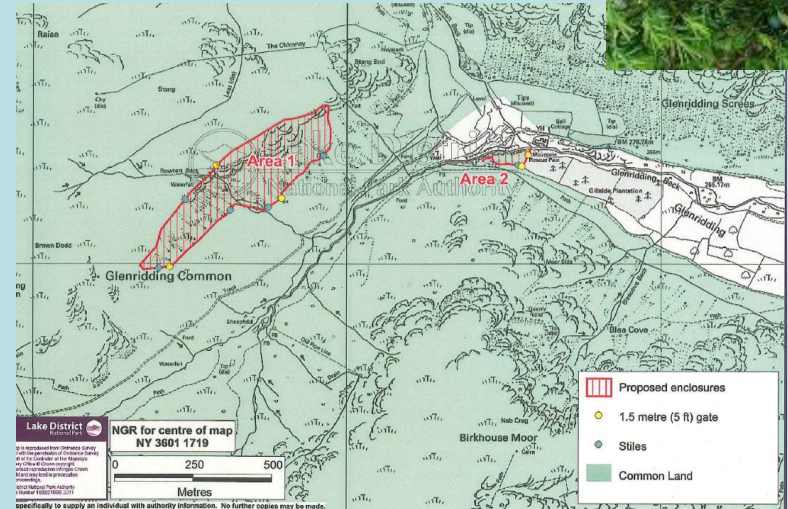
Register Unit: No. CL 101

Registration Authority: Cumbria County Council

- two graziers with registered rights on common owned by Lake District National Park
- one of the largest areas of **juniper** in the Lake District, dominated by bushes suffering **dieback** from **old age**
- juniper could be lost from the common as very few young vigorous bushes - **regeneration** often **grazed off by sheep**

**Area 1** – 14ha fenced off to **exclude sheep** so that juniper seedlings survive. Juniper also be planted with varying density

**Area 2** – fenced off and planted with juniper and native woodland, extending a **habitat corridor** and **improving connectivity of woodlands**



Area 1 – juniper bushes suffering age-related dieback across the stand

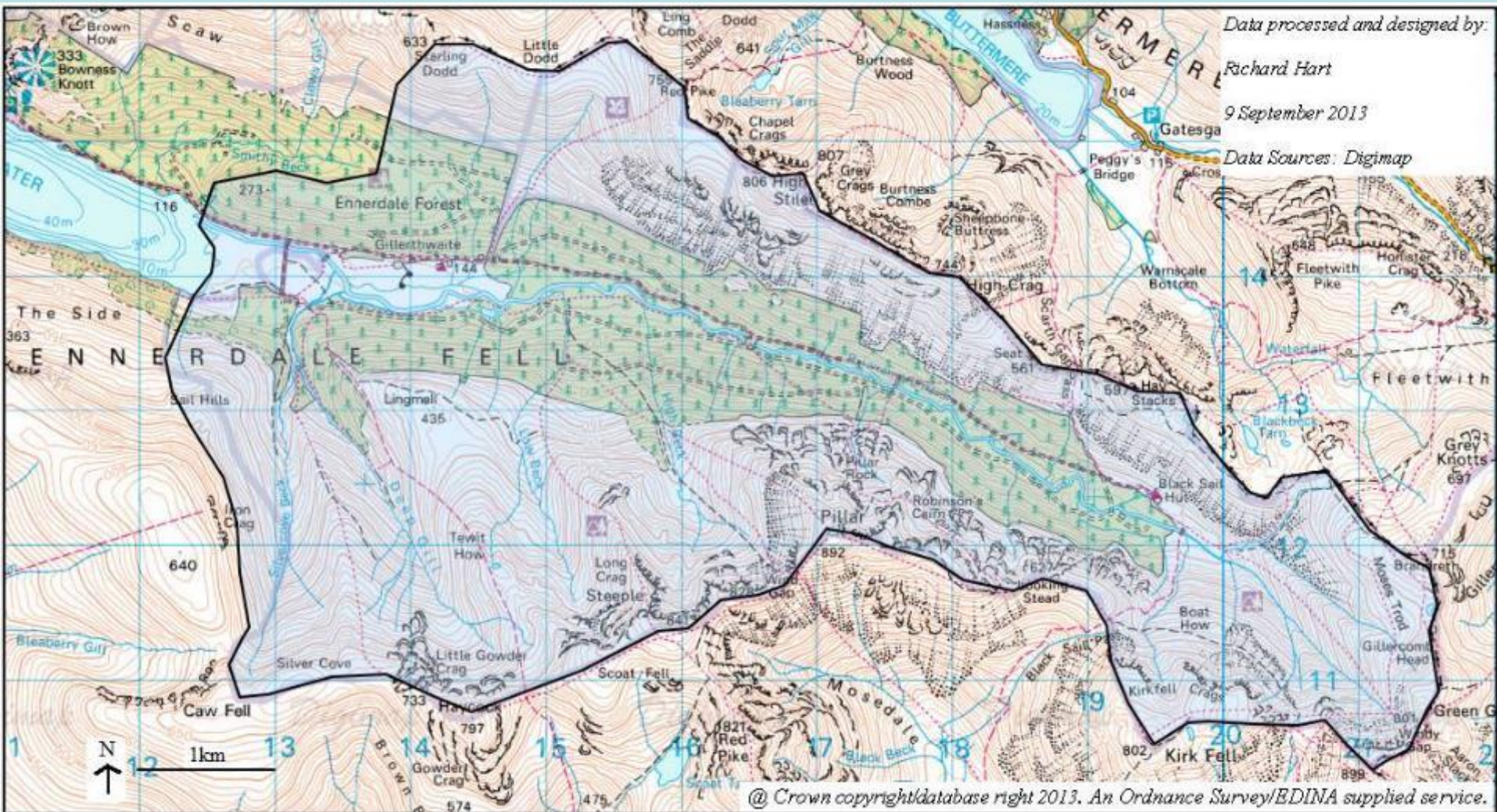


A scenic landscape photograph showing a high mountain ridge in the foreground with rocky terrain and patches of green grass. In the background, a deep valley opens up, revealing a river (the River Liza) winding through a lush green forest. The sky is filled with heavy, grey clouds, creating a dramatic and somewhat somber atmosphere. The overall scene is a typical representation of a wild, mountainous region.

## **The River Liza, Ennerdale**



# The River Liza





# Channel Straightening

**“...with the river channel often moved to the side of the valley to increase the size and continuity of grazing areas along the narrow valley bottom.” (Wild Trout Trust, 2013)**



# Where?





# Management

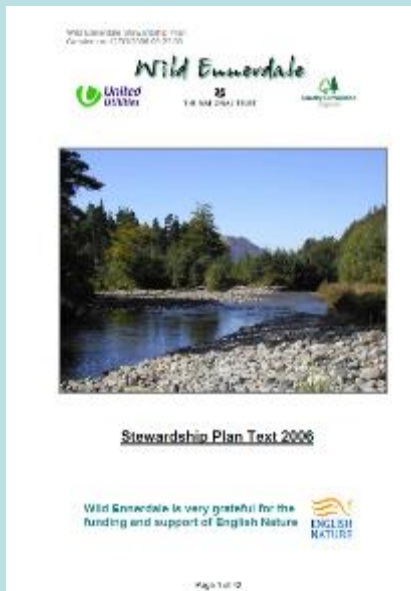
- Channel Realignment
- Non intervention management



Wandering Channel (left) is 1km from the straight channel (right). Note the wall on right side

# Wild Ennerdale

The natural evolution of a wild valley



***"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;

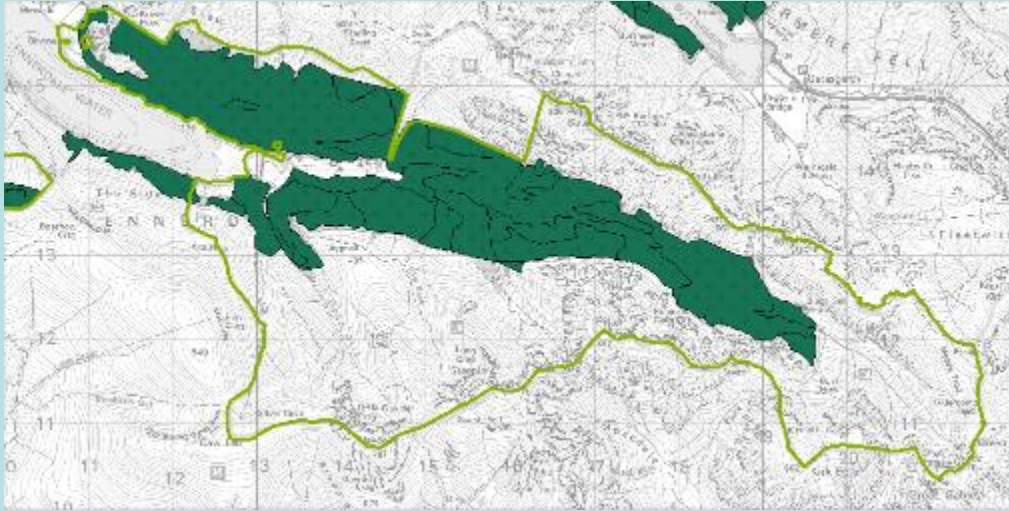
## Wild Ennerdale Stewardship Plan

**"greater freedom to develop under natural processes"**

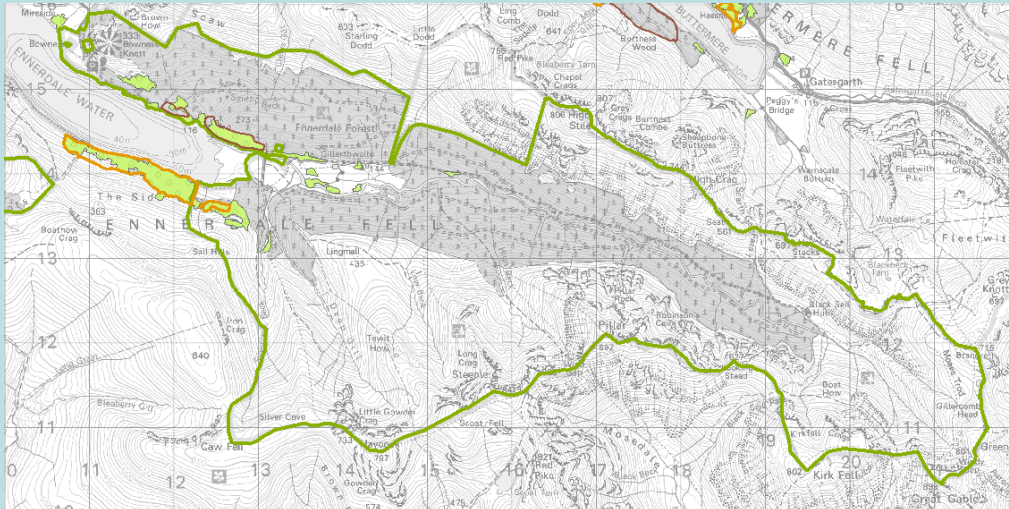




# Ennerdale Forest – a Forestry Commission plantation



National Inventory of Woodland - all woodland



Deciduous (light green) ancient woodland (orange, brown)

- valley bottom filled with woodland that reaches someway up valley sides
- Ennerdale Forest is predominantly a **non-native** woodland of Sitka spruce and larch
- very little deciduous woodland
- two small areas of ancient woodland within FC boundary



# 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

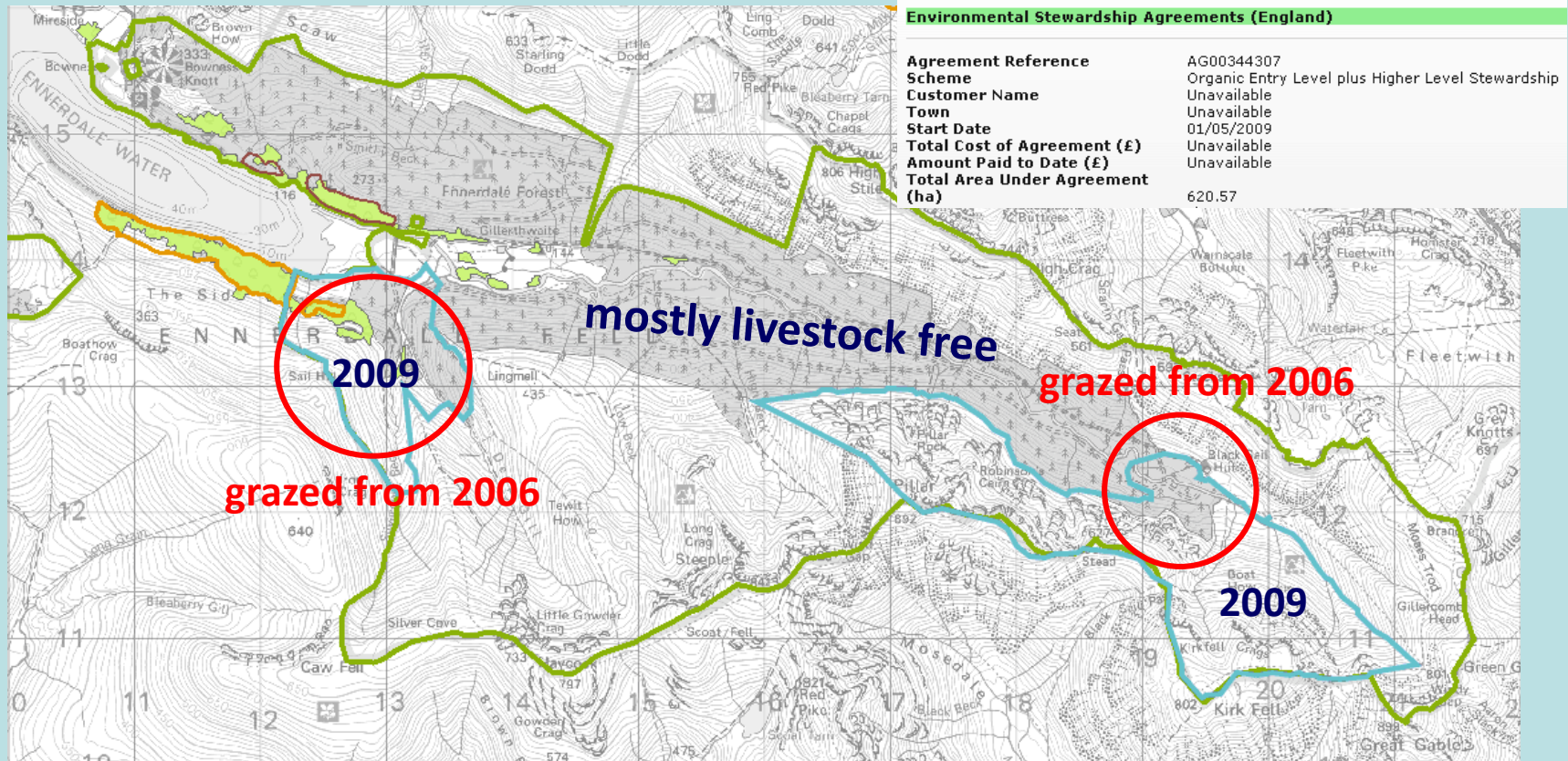


- Introduce cattle into the forest to restore a natural disturbance process.

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



# Grazing and agri-environment subsidy in Ennerdale Valley – Higher Level Stewardship in 2009



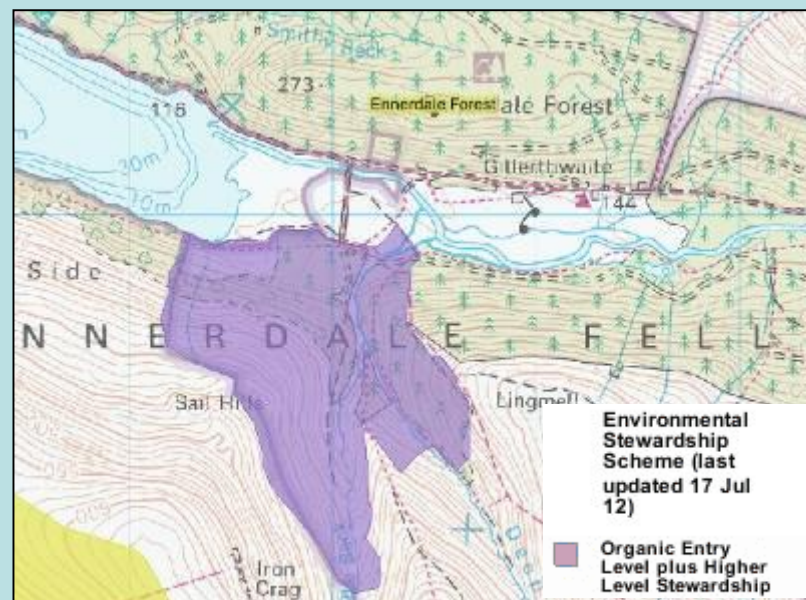
## Cattle

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.



## Silver Cove Grazing Area 140ha - 2006

Shaping the landscape  
naturally



UL18 - Cattle grazing on upland grassland and moorland

**How have cattle affected tree regeneration in Silver Cove?**

# Felled areas in Silver Cove



**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!**

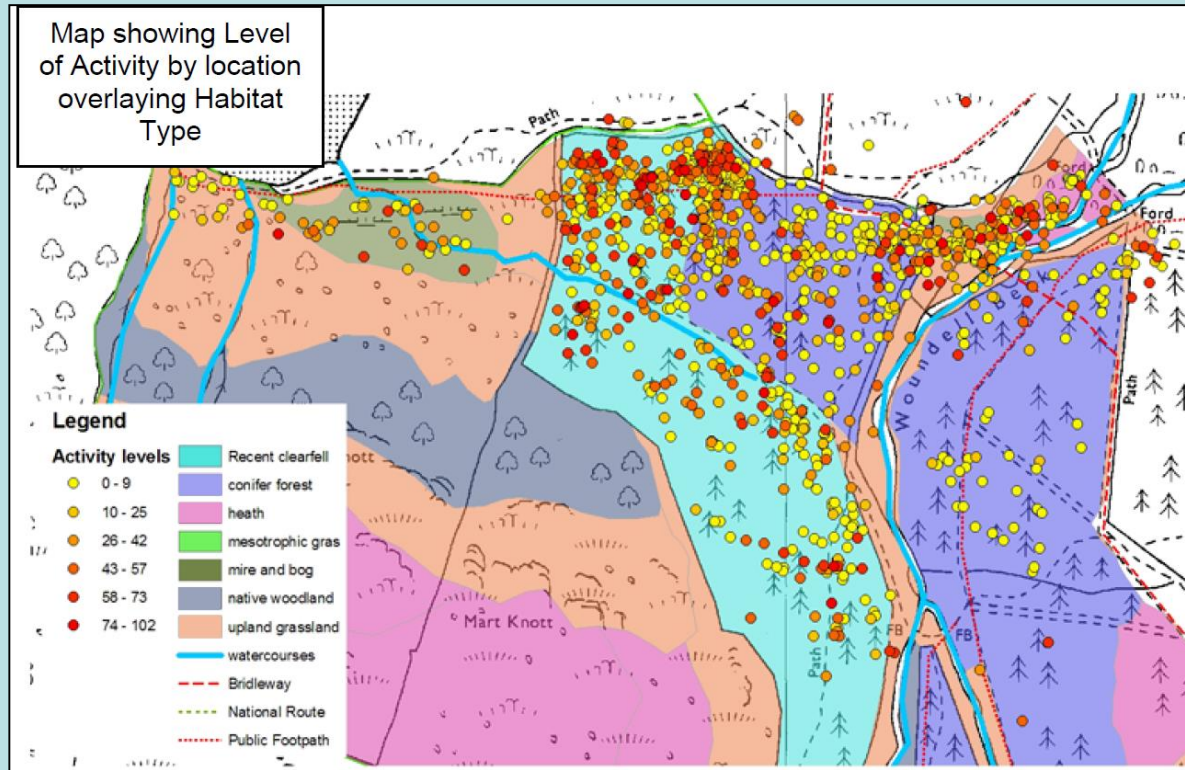


2010



Flat, plantation edge

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



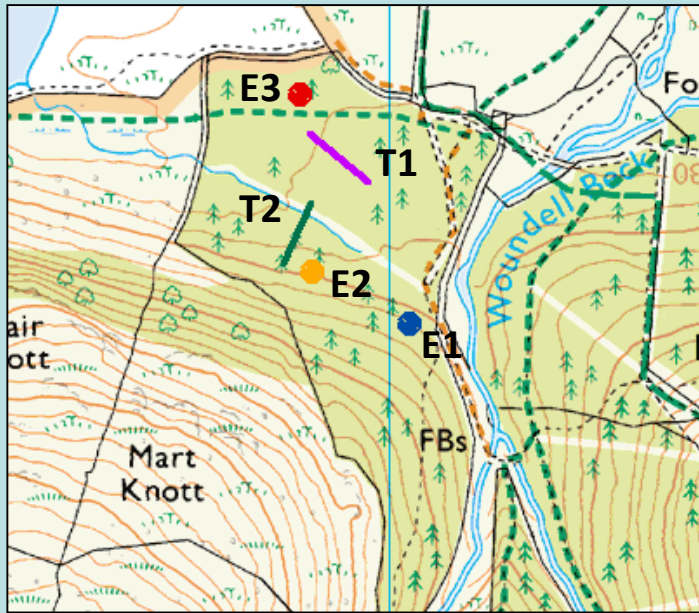
Location tracking for two 3-day periods: Summer and Autumn

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**

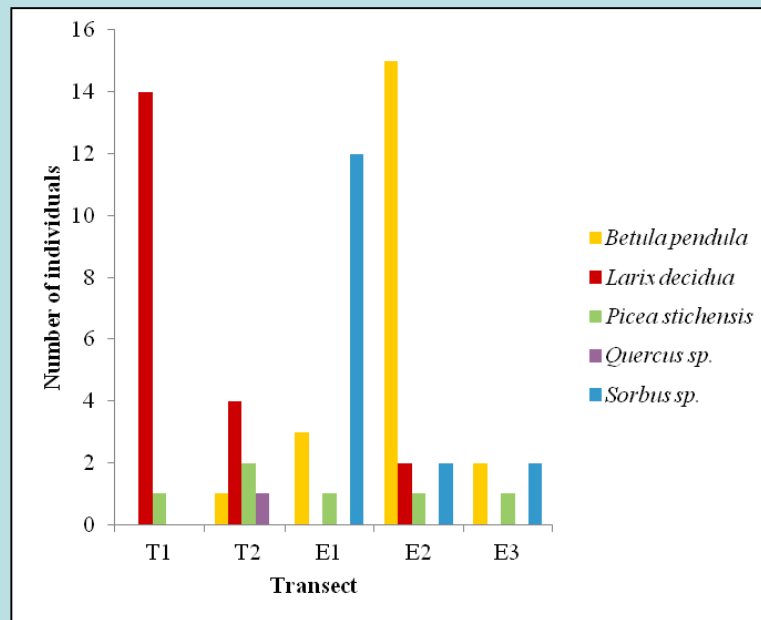


Fig. 1 Total number of tree seedlings found at each transect for each species

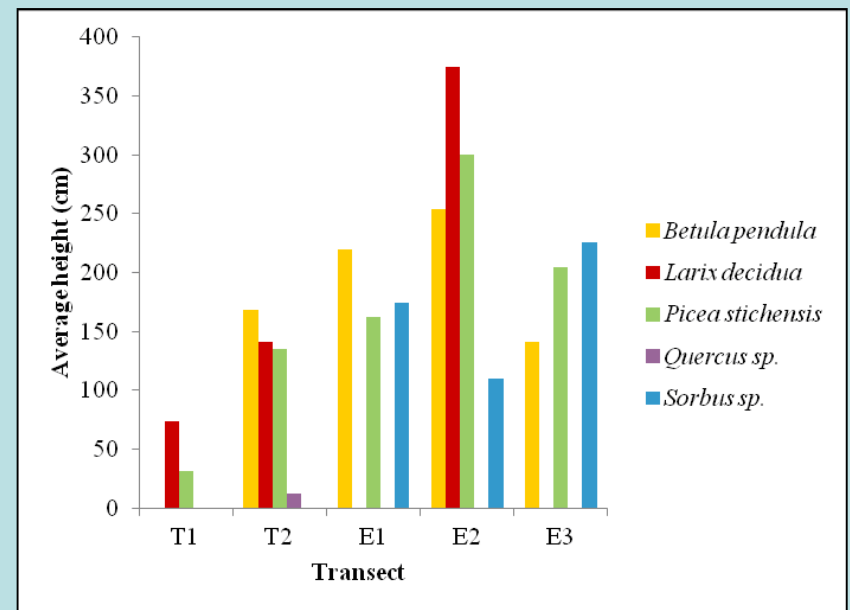


Fig. 2 Average height of tree seedling of each species at each transect

# 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?**





# Continuous Cover Forestry –regeneration without clearfelling



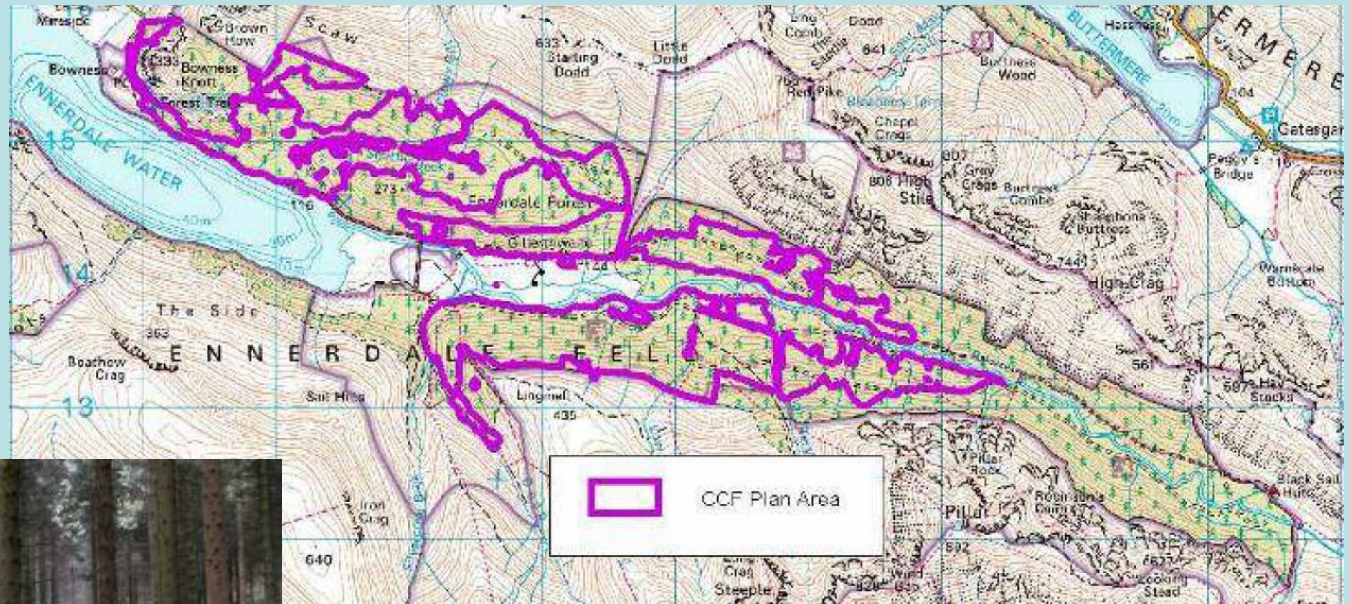
Ennerdale Valley  
Continuous Cover Management Plan

Prepared by Clarrish Browning  
Deaf Forester  
Final Plan Autumn 2008

## Ennerdale Valley Continuous Cover Management Plan 2008

Continuous Cover Management has been chosen as the principal method of managing the valleys forest as it is felt best suited to delivering the principals and actions listed above by:-

- Encouraging natural processes such as seeding, regeneration and windfall
  - Enable the dominance of spruce to be reduced.
  - Allow a more open woodland structure to develop.
  - Reduce the impact of mechanised operations by moving away from clear felling.
  - Allow for the future expansion of areas of extensive grazing cattle.
- 
- Look to thin areas of maturing forest to provide more open habitats for future herbivore grazing.

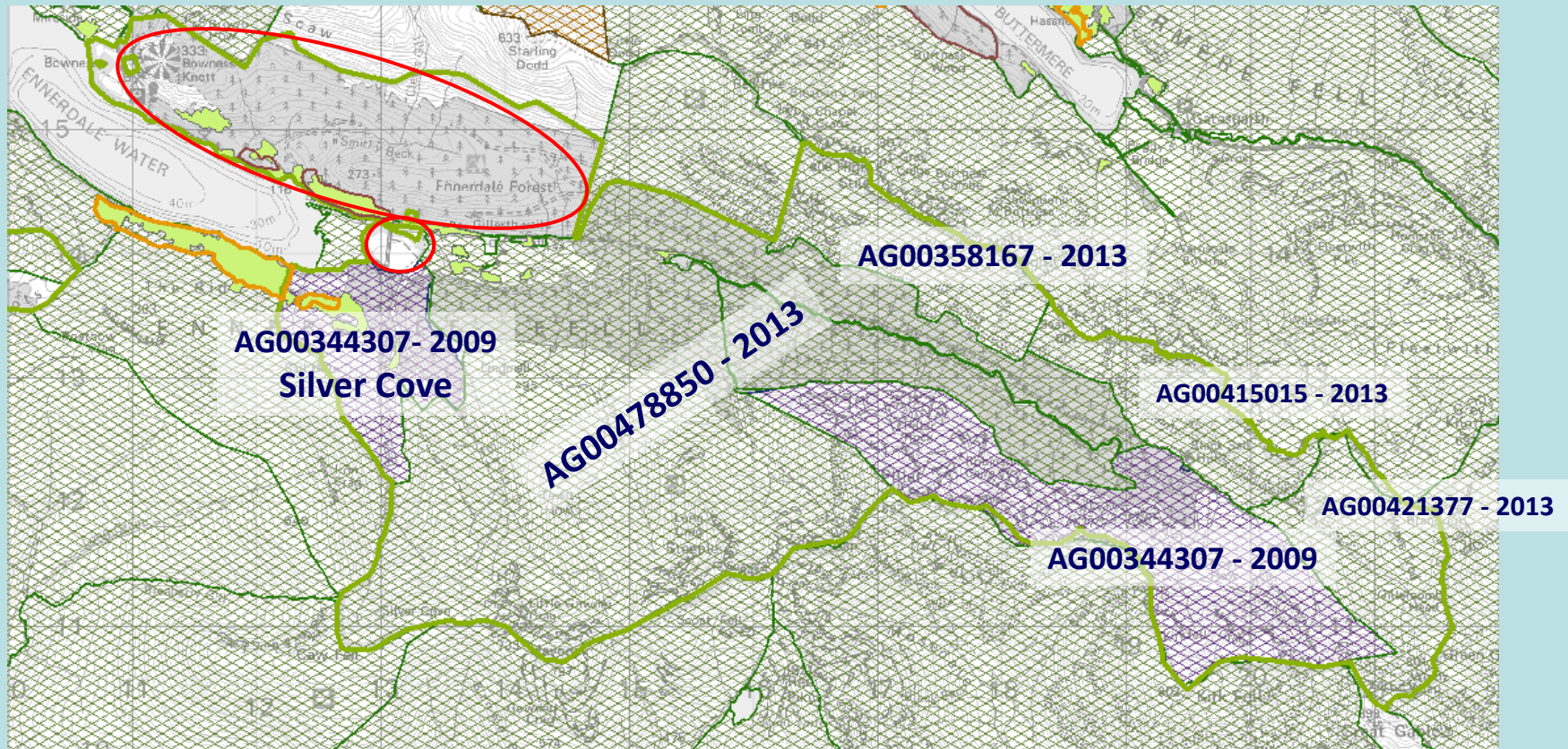


Design Plan in 2006. It proposes the management of approximately 430ha of the valley's forests under Continuous Cover with up to as much as 280 ha of areas felled and allowed to regenerate being added in the future.

***“The thinning of the forest under Lingmell is creating a more open and gappy structure which should promote regeneration and a more diverse mixed species forest”***



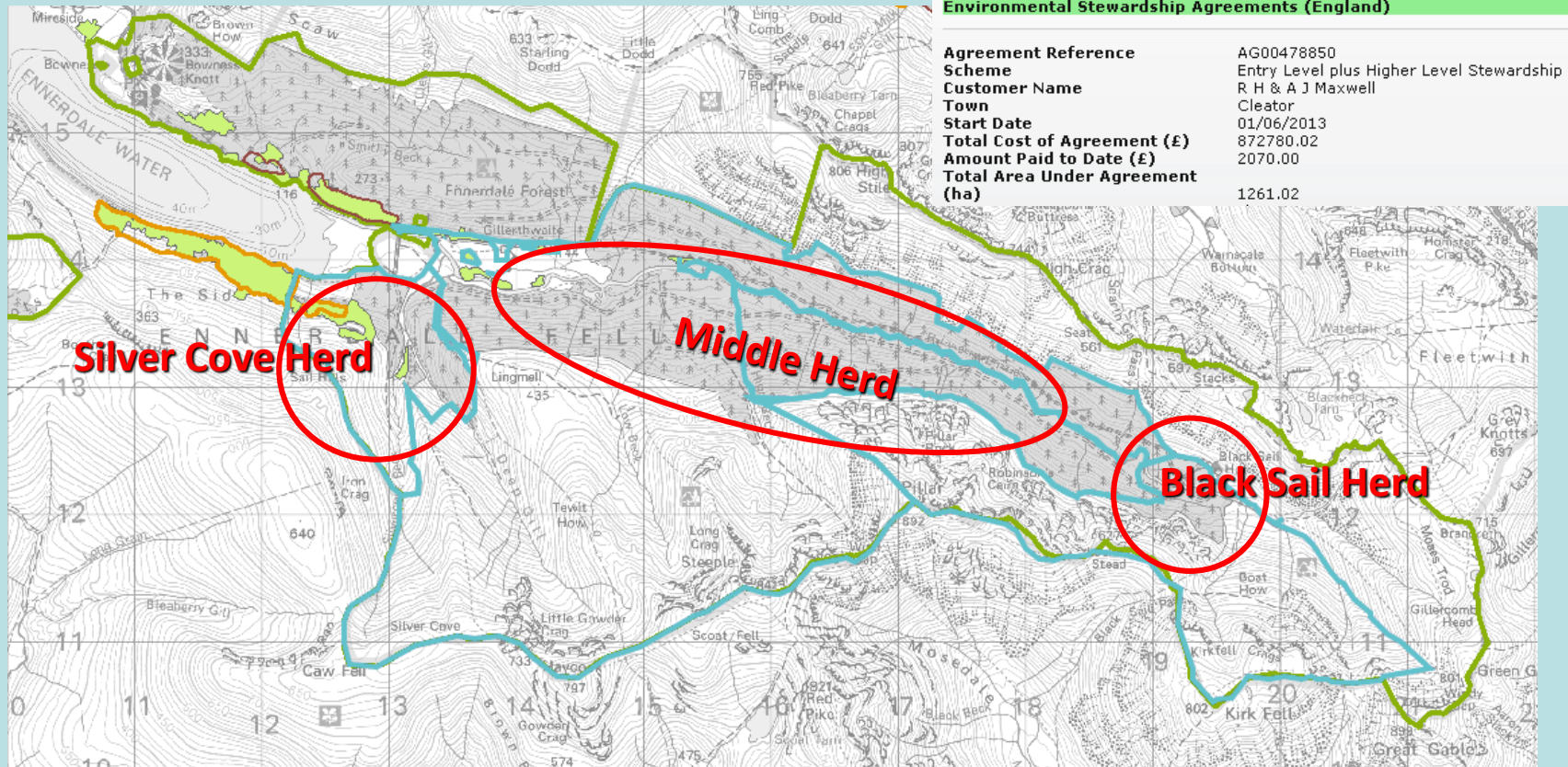
# Spread of agri-environment subsidy in Ennerdale Valley – Higher Level Stewardship in 2013



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



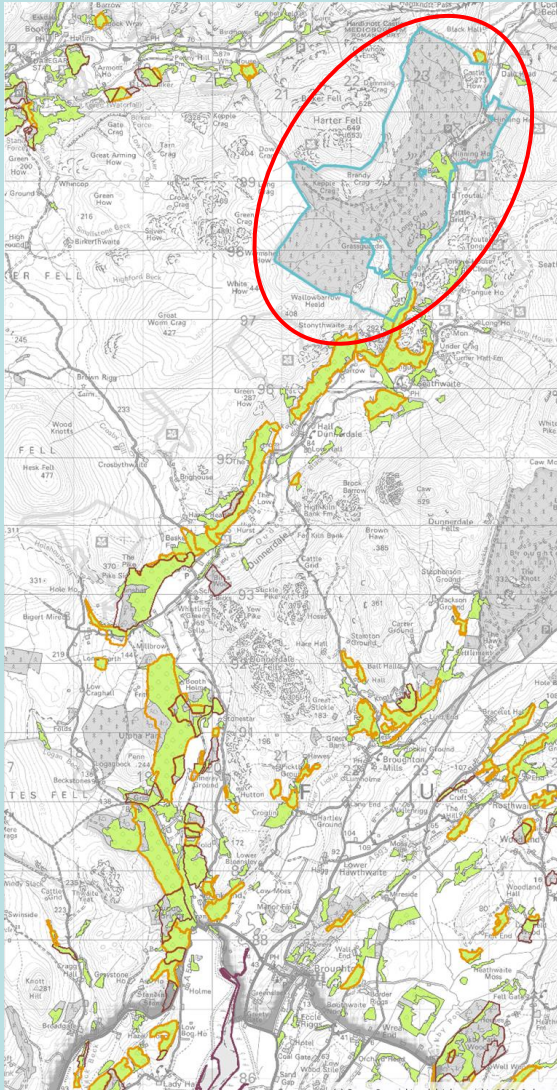
# Expansion of cattle grazing throughout the valley



- 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



Cutting Sitka spruce amongst birch 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)



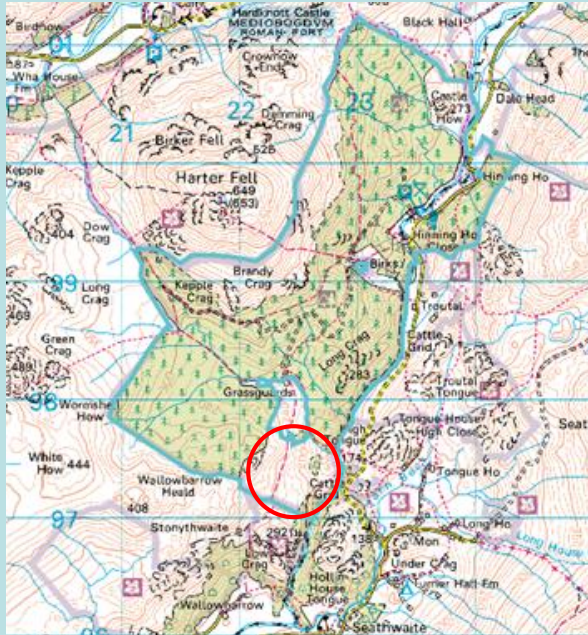
Planting juniper



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





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!**