



Cumulus Consultants Ltd

**High Nature Value farmland in
Rural Development policy**

Dartmoor Case Study

Report for

**European Forum on Nature Conservation
and Pastoralism**

Issue: 4.0
Report No: CC-P-504.4
Date of Issue: 2 August 2011



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Report Prepared for

European Forum on Nature Conservation and Pastoralism

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Acknowledgements

We would like to thank all those who have contributed to this case study in particular Guy Beaufoy (EFNCP), John Waldon and Kevin Rylands (RSPB). We would also like to thank all those farmers who kindly agreed to be interviewed and provided valuable insight into the management of HNVF on farms across the Dartmoor Case Study Area. Thanks are also due to those stakeholders who contributed to the research through telephone interviews.

Glossary

AE	Agri-Environment
AES	Agri-Environment Scheme
BAP	Biodiversity Action Plan
BSE	Bovine Spongiform Encephalopathy
CAP	Common Agricultural Policy
CWS	County Wildlife Site
DA	Disadvantaged Area
DEFRA	Department for Environment, Food and Rural Affairs
DNP	Dartmoor National Park
DNPA	Dartmoor National Park Authority
ELS	Entry Level Stewardship
ESA	Environmentally Sensitive Area
EU	European Union
FBI	Farm Business Income
FBS	Farm Business Survey
HAT	Holding Assessment Toolkit
HFA	Hill Farm Allowance
HLS	Higher Level Stewardship
HNV	High Nature Value
HNVF	High Nature Value Farmland
LCT	Landscape Character Type
LFA	Less Favoured Area
LU	Livestock Unit
NE	Natural England
NNR	National Nature Reserve
OELS	Organic Entry Level Stewardship
RDPE	Rural Development Programme for England
RLR	Rural Land Register
RPA	Rural Payments Agency
SAC	Special Area of Conservation
SDA	Severely Disadvantaged Area
SM	Scheduled Monument
SNA	Strategic Nature Area
SPS	Single Payment Scheme
SSSI	Site of Special Scientific Interest
SWUF	South West Uplands Federation
UELS	Uplands Entry Level Stewardship
UTP	Uplands Transitional Payment

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Introduction

This case study is part of Phase 2 of the Devon High Nature Value (HNV) farming project. It is one of four case studies¹ that build on the work carried out in Phase 1 (see main report).

In Phase 1 the project aimed to clarify what is HNV farmland, where it is, and how much there is, in the case study areas. The project explored what data and methods can be used to identify this farmland, and its approximate location and extent, in the case study areas.

This was not intended to be a precise scientific exercise. Rather it was a process of trial and error, to see what can be done to identify broad areas of HNV farmland initially using nationally available data sources. Local data were to be used only where necessary. However, a strong input of local knowledge is needed for ground-truthing the assumptions used and the data available at national level.

The Phase 1 work considered different approaches to identifying HNV farmland, based on experience at national and EU levels and on the guidance produced by the European Evaluation Network for Rural Development Help Desk. These can be summarised as:

- The land-cover approach (identifying types and patterns of land cover that can be expected to support HNV).
- The habitats and species approach (mapping the location of concentrations of habitats and/or species of conservation concern).
- The farming systems approach (identifying and mapping farm types than have characteristics normally associated with HNV, such as low livestock densities).

The project partners concluded that these approaches, using existing databases, do not allow a sufficiently robust identification of HNV farmland in the Devon case study areas, for various reasons:

- Landcover UK 2000 is not produced at sufficiently high resolution; the 2007 version is much higher resolution but was not available at the time of the project.
- Habitat inventories include only Biodiversity Action Plan (BAP) priority habitats (there is a consensus among the project partners that such inventories do not represent the total extent of semi-natural farmland in its wider sense), and the data are often quite old.
- Species data are not sufficiently consistent either geographically or across taxa, and the spatial resolution is also too crude in most cases.
- Data on farming characteristics are not readily available at a sufficient spatial resolution and would need to be tested against an initial interpretation of which areas of farmland can be considered HNV on ecological grounds.

The project therefore turned to aerial photos to see if these would allow the identification of a wider spectrum of semi-natural farmland. The answer seems to be that they do, as

¹Blackdown Hills, South Devon, Culm, Dartmoor

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the unimproved and semi-improved farmland has a distinct “rough” appearance on the photos. Local knowledge confirmed that the areas apparent from this visual interpretation of the photos correspond with farmland areas considered of most nature value. It was noted also that these semi-improved habitats linked many of the BAP priority habitat areas and/or were located in the same landscape units.

The project partners decided to produce indicative maps of HNV farmland for the case study areas on the basis of visual interpretation of aerial photos. These indicative maps aim to capture a contiguous area of HNV farmland for each case study area. More details on the characteristics for the case study area are presented in this report.

Phase 1 was successful in establishing for the case study areas a “baseline” of HNV farmland, as intended under the EU indicator for monitoring rural development programmes.

Under the Phase 2 case studies, the project analysed the characteristics of farming on the HNV “baseline” area, the tendencies and needs of this farming from the perspective of maintaining nature values, and the effectiveness of current policies.

Thus the aim of Phase 2 was to address the following questions in each case study area:

- Can we characterise the different farming systems or farm types that currently support HNV farmland (e.g. in terms of production sector, production systems, management practices, farm size, ownership, etc.)?
- How are these farming systems or types likely to evolve in future e.g. intensification, abandonment, change of land use?
- What are the main factors influential in maintaining HNV farmland e.g. policy and socio-economic trends but also e.g. hobby farmers, tourism, personal motivation of certain farmers?
- What are the key issues that need to be addressed on the ground, in order for HNV farmland to be maintained? This includes social and economic questions, but also practical issues such as the availability of livestock to graze small, awkward fields, and how such activities can be organised and continued.
- To what extent does the current package of policy measures ensure the maintenance of HNV farmland e.g. Pillars 1 and 2 of CAP, BAP, NI197 etc.?
- Are current measures effective in maintaining the relevant farming types and practices and their associated nature values? Are the design, coverage, delivery and resources of measures sufficient?

In the final stage (Phase 3 – see main report) the project considered how current policies (especially RDPE) can be improved to ensure that nature values are maintained on farmland within the HNV baseline areas.

1 Farming and Environment on Dartmoor

1.1 Description of the Dartmoor Landscape and Environment

Situated in the centre of Devon the Dartmoor National Park covers an area of 954 square km (95,400ha), the largest and wildest area of open country in the South of England. One of 15 National Parks in the UK, Dartmoor was one of the first areas to be designated in 1951 along with four other important areas, The Peak District, The Lake District and Snowdonia.

Dartmoor National Park contains a wide range of important habitats. There are two core areas of blanket bog on the highest parts of the moor - the larger northern plateau and the smaller and lower southern plateau. A mixture of heath and grassland surrounds them. Enclosed farmland is found around the margins of Dartmoor's granite core; broadleaf woodlands flourish in the more sheltered valleys.

This varied landscape supports a wide variety of habitat and features. The Dartmoor National Park Management Plan 2007 – 2012 highlights the importance of this area: "Overall, over 40% of Dartmoor is afforded international recognition as a Special Area of Conservation (SAC) under the European Habitats and Species Directive, representing some of the finest examples in the UK of habitats and species that are rare or threatened in Europe. The upland blanket bogs and upland heathlands of the open moor and the upland oak-woods of the river valleys are three habitats of international importance on Dartmoor. Areas of blanket bog are the most southerly in England and support some of the best areas of this habitat in the UK covering no less than a third of the open moorland (some 8,500 hectares). They also support the world's most southerly populations of breeding dunlin. Surrounding the blanket bogs are areas of upland heathland and valley mires. The upland heathland, covering 7,300 hectares, is dominated by heather and western gorse with plant communities that are extremely rare outside of Britain. The valley mires – areas of water-logged peat with characteristic acid wetland plant communities – are found wherever drainage is impeded within the river valleys. Dartmoor SAC has also been designated for southern damselfly, Atlantic salmon and otter."

Much of the area has been studied and designated for its unique biodiversity, landscape, geology and heritage features. The key landscape features include:

- Open, windswept moors with wide views;
- Central high moorland with a wild landscape of tors, clitters, bogs, grassland, heather and bracken;
- Sheltered landscapes of valleys and fringes;
- Small, irregular pasture fields with dry stone walls and banks;
- Large, terraced, wooded valleys which shelter farmsteads and hamlets;
- Steep-sided valleys with fast-flowing streams.

The topography, geology, soils and hydrology have shaped much of the unique landscape and biodiversity seen in the National Park.

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The topology and upland character of Dartmoor is reflected by its classification as a Less Favoured Area, with almost all of the land designated as a Severely Disadvantaged Area. Disadvantaged Area land is restricted to the NW corner of Dartmoor. The highest point on Dartmoor is High Willhays at 621m (2,039ft) above sea level (asl), 51% of the National Park is over 300m, with 13% over 460m asl. The high moorlands of the north west and southern central areas where the altitude exceeds 450m (1,500ft) have the most severe climatic conditions, with rainfall in Princetown averaging 2150mm (83in), and snow-lie on the summits for an average of 30 days. Generally the climate of Dartmoor is cool and wet, dominated by South-Westerly winds.

Geologically, Dartmoor is the largest expanse of unglaciated upland in Great Britain, and the largest granite surface in England: 65% of the area made up of granite. This granite core is surrounded by sedimentary rocks including limestones, shales and sandstones belonging to the Carboniferous and Devonian periods.

The geology and landforms of Dartmoor have been much studied, with 22 sites recognised as being of national importance through their inclusion in the Geological Conservation Review.

Dartmoor is renowned for its cultural heritage, shaped by farming traditions going back to evidence of prehistoric occupation on Dartmoor, including ceremonial stone rows and circles, house foundations, burial chambers, cairns, cattle pounds and field systems. Neolithic man continued the clearance of the Dartmoor woodlands begun in the Mesolithic and, by the Early Bronze Age, there was substantial occupation and many of the stone circles and stone rows, up to 2.5 miles long, have been ascribed to this period. In the ensuing centuries, Dartmoor became extensively settled. However, the deterioration of the climate and, perhaps, the exhaustion of soils led to a retreat from the moor and there is little evidence of occupation after the mid-Iron Age. Dartmoor's landscape has over 17,500 entries on the Historic Environment Record, with over 1,200 Scheduled Ancient Monuments (6% of the national total).

For over 5,000 years farming has been the main land use on Dartmoor. Agriculture and forestry are still shaping the moor today, with rough grazing, farmland and forestry making up the major land uses of the National Park.

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The key features of the Dartmoor National Park, including Biodiversity Action (BAP) habitats, are set out in Table 1-1 below.

Habitat	Environmental Conditions	Associated Plant Community	Associated Animal Community
Blanket bogs (BAP habitat)	Higher rainfall, poor drainage and accumulation of un-rotted plant matter create a waterlogged and nutrient-poor bog on hill tops.	The plants which characterise Dartmoor's blanket and raised bog are deer grass, hare's tail cotton-grass, cross-leaved heath, round-leaved sundew and bog asphodel, as well as numerous bog mosses.	Dunlin nest on high blanket bogs.
Upland heathland (BAP habitat)	Steeper slopes surround the blanket bog giving rise to the better drained drier soils supporting heather moorland	The plants are dominated by ling, but also include bell heather, bilberry and western gorse in drier areas. Cross-leaved heath and purple moor grass grow in wetter areas.	Meadow pipits, stonechats, and skylarks as well as adders, lizards and the distinctive emperor moth caterpillar. Also supports red grouse and ring ouzel.
Grass Moor (and bracken)	As for upland heathland, but more intensively grazed.	The main grasses include bents and Fescues which often form a close cropped mat dotted with tormentil, bedstraw and milkwort flowers. These areas often contain gorse and are invaded by bracken on the drier slopes.	This habitat supports voles, wheatears, whinchats and the small heath butterfly. Some areas of bracken are important for high brown and pearl bordered fritillary butterflies.
Valley Mire	Regions of waterlogged deep peat with characteristic acid wetland plants. They follow the rivers and streams that drain the moor.	Cotton grass, cross-leaved heath, bog bean, pale butterwort along with many sedges and numerous bog mosses.	Valley bogs are rich in dragonflies, and nesting birds include snipe and curlew.
Upland Oak Woodlands (BAP habitat)	Sheltered steep and stony valleys especially on the east side of the moor above 250m.	Dominated by oak with occasional birch, hazel, holly and rowan. A wide variety of flowers on richer soils. Abundant ferns, mosses and lichens grow on the rocks and tree branches.	An important area for insect eating birds such as the pied flycatcher, wood warbler and redstart. Woodland mammals include wood-mice, dormice, grey squirrels and badgers. Important insects include red wood ants and blue ground beetle.
Plantation Woodlands	Large plantations planted on former moorland areas often around reservoirs and sometimes replacing ancient woodlands.	Mainly of exotic conifer, Sitka spruce or Norway spruce and beech. The trees allow little light through the canopy for other plants.	The trees provide a habitat for specific birds not found commonly on the moor such as the crossbill and nightjar. Other birds include goldcrest, coal tit and siskin.

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Rhos Pastures	Wet valley bottoms and shallow slopes with impeded drainage.	A wide variety of wetland plants such as devil's bit scabious, heath spotted orchid and ivy-leaved bellflower growing within grasslands dominated by either purple moor grass or rushes. Wet woodland and scrub is often associated with the pasture.	Important for insects such as the marsh fritillary butterfly and narrow-bordered bee hawkmoth. Characteristic birds include snipe, reed bunting and grasshopper warbler. Foxes and roe deer often use these areas as cover for lying up during the day.
Hay meadows and other enclosed dry species rich grasslands (BAP habitat)	Moderately well drained fields within enclosed farmland which have not been disturbed by modern agricultural practices such as reseeding and fertilising.	A rich variety of flowers including ox-eye daisy, red clover, yellow rattle and knapweed. This habitat has an abundance of rare greater butterfly orchids.	Important feeding ground for the greater horseshoe bats near Buckfastleigh as well as the large blue butterfly.
Hedge banks and stone walls	These make up an essential part of the enclosed landscape.	Often very old, supporting many species of trees (hawthorn, blackthorn, hazel, oak, ash) plants and flowers (red campion, greater stitchwort, navelwort and many ferns) within a short distance.	Food and nesting places are provided for small birds e.g. song thrush, yellowhammers, whitethroats, and buzzards in the hedgerow trees.
Tors, rocky outcrops, clitter, slopes and quarries	Very exposed to extremes of temperature, humidity and wind and severe cold. Different conditions on warmer and colder sides of outcrop.	A typical Dartmoor tor has as many as 60 different species of lichen, some more commonly found in the Arctic. They also support a range of ferns.	Provides nesting sites for birds such as ravens and ring ouzels, peregrine falcons and wheatears.
Torrent rivers and streams	Turbulent and with rapid changes in volume, the water is well oxygenated, acidic, but relatively unpolluted.	Mosses, liverworts, algae and floating weeds grow on or between rocks where the current allows. The banks support ferns such as royal fern and lemon scented fern.	A variety of insect larvae form part of a food chain that includes fish (trout and salmon), dippers, herons, goosander and otter.
Reservoirs	Large areas of open water mostly in former moorland valleys.	Rushes, reeds and water plants on the fringes support species that can stand frequent flooding and drying.	Fish often introduced. Frogs, toads, newts and leeches breed. Cormorants and wintering wild ducks come inland to the reservoirs.

Table 1-1: Landscape Character Types and Key Characteristics

The climate and diversity of habitats across Dartmoor give rise to a great diversity of species. Dartmoor is an important reserve for species which are able to withstand harsher conditions including some very rare plants and animals. Dartmoor is particularly noted for rare lichens, butterflies and other insects.

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Twenty-eight key species have been selected for particular conservation in Action for Wildlife: Biodiversity Action Plan for Dartmoor including some which are globally threatened and some which are popular and still widespread such as Dormouse, Buzzard and Wild Daffodil.

Dartmoor is home to over 50% of Britain's population of several globally threatened species including Greater Horseshoe Bat, Blue Ground Beetle, Bog Hoverfly and Flax-leaved St John's-Wort.

There are nationally important populations of Otter, Dormouse, Cirl Bunting, High Brown Fritillary, Pearl-bordered Fritillary, Marsh Fritillary, Freshwater Shrimp and Deptford Pink within the National Park.



Figure 1-1: Blue Ground Beetle and High Brown Fritillary Butterfly

The Dartmoor National Park includes the following designations and sites:

- Over 40 Sites of Special Scientific Interest (SSSIs) covering 26,169 hectares. The two main sites of North Dartmoor and South Dartmoor total over 20,000 hectares.
- A Special Area of Conservation (SAC) covering 23,165ha
- Four National Nature Reserves (NNR): East Dartmoor Woods & Heath – 366ha; Dendles Wood – 29ha; Black Tor Copse – 29ha; and Wistman's Wood & Longaford Newtake – 170ha.
- Six Devon Wildlife Trust Reserves: Dart Valley - 290ha; Lady's Wood – 3ha; Dunsford Wood – 57ha; Mill Bottom – 6ha; Blackadon – 37ha; and Lower East Lounston - 2.5ha



Figure 1-2: Wistman's Wood – Upland Oakwood BAP habitat, designated NNR, SSSI and part of Dartmoor SAC (photo courtesy of DNPA)



Figure 1-3: North Dartmoor – Blanket Bog and Upland Heathland BAP habitats, designated SSSI and SAC (photo courtesy of DNPA)

1.2 *High Nature Value Farmland in the Dartmoor National Park*

HNV farmland (HNVF) on Dartmoor is widespread throughout the National Park. Large open expanses of semi-natural blanket bog and upland heathland are continuous across the high moor, intersected by valley mires with springs and flushes feeding rivers leading off the higher slopes. The high moor is connected with the lowland farmland by both unimproved acid grasslands and enclosed semi-improved pastoral farmland. Some of the higher semi-improved enclosures are bordered by stone walls, with others surrounded by windswept hedges. Within the lowland areas of the National Park, HNVF is typically limited to occasional unimproved hay meadows and Rhos pastures in the river valleys. Otherwise the lowland farmland is predominantly improved pasture with a limited amount of arable cropping and does not have significant wildlife value. However, many of the valleys are well wooded, with HNV broadleaved woodland, and thick hedges with hedgerows trees which provide valuable wildlife habitats and connectivity.

In the context of this case study, HNVF area and its relationship to designated sites has been identified within the four sample parishes of **Chagford, Throwleigh, Gidleigh and North Bovey**, not across the whole of the Dartmoor National Park. The combined area of the sample parishes – the case study area – is 7,903ha, or 8.3% of the total National Park area. The sample parishes were chosen to reflect a range of farmland and habitats including the high moor, the transitional edge between moorland and lowland and the rolling landscape of the lowland valleys adjacent to the moor.

The moorland included in the study area comprises parts of the North Dartmoor SSSI, the East Dartmoor SSSI and the Dartmoor SAC. It ranges from blanket bog and tors at higher altitudes, through heather and gorse areas, acid grasslands with bracken stands, with valley mires on the lower slopes. The area holds the typical widespread moorland bird species such as Meadow Pipit, Skylark and Stonechat, along with a number of rarer birds including Red Grouse and Snipe. A valley mire site near Gidleigh holds one of the three Southern Damselfly populations of Dartmoor along with Small Red Damselfly and Bog Hoverfly (a UK BAP species now confined to Dartmoor). A few northern plant species occur in small numbers, most notably Bog Orchid and Crowberry.

Several of the valleys in the study area hold Rhos pastures with strong populations of Marsh Fritillary, Small Pearl-bordered Fritillary, Narrow-bordered Bee Hawkmoth and Willow Tit. These sites are not notified as SSSIs as they were only surveyed after the notification of new sites ceased in the early nineties. However, most are now confirmed as County Wildlife Sites. A number of unimproved dry grasslands are found, especially in the area to the west of Chagford and include several fields managed as hay-meadows. These sites are loosely described as crested dog's tail – black knapweed grasslands and most are permanently grazed pastures.

The woodlands include a small number of ancient sites which tend to follow the valley of the river Teign through a central band of the study area. Good populations of Salmon and Otter are found throughout the main river systems.

HNVF, as defined and identified in this study, is estimated to cover **3,936ha** or **49%** of the sample parishes. See **Note 1** for the methodology used to identify HNVF. This total comprises **3,715 ha of HNV farmland** (47% of the case study area) and **221ha HNV woodland** (2% of the case study area), see Figure 1-4.

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Of this HNV farmland and woodland 2,141 ha (54% of HNVF) is designated SSSI, 178ha (5% of HNVF) is designated as County Wildlife Site (CWS) and 2,124ha (54% of HNVF) is designated SAC see Table 1-2. Note, all SACs are designated as SSSIs. See Figure 1-5.

Dartmoor	Total	SSSI	CWS	SAC
HNV farmland	3,715ha	2,125ha	133ha	2,124ha
HNV woodland	221ha	16ha	45ha	0ha
HNV total	3,936ha	2,141ha	178ha	2,124ha

Source: Natural England 2011

Table 1-2: HNVF in the Dartmoor Study Area

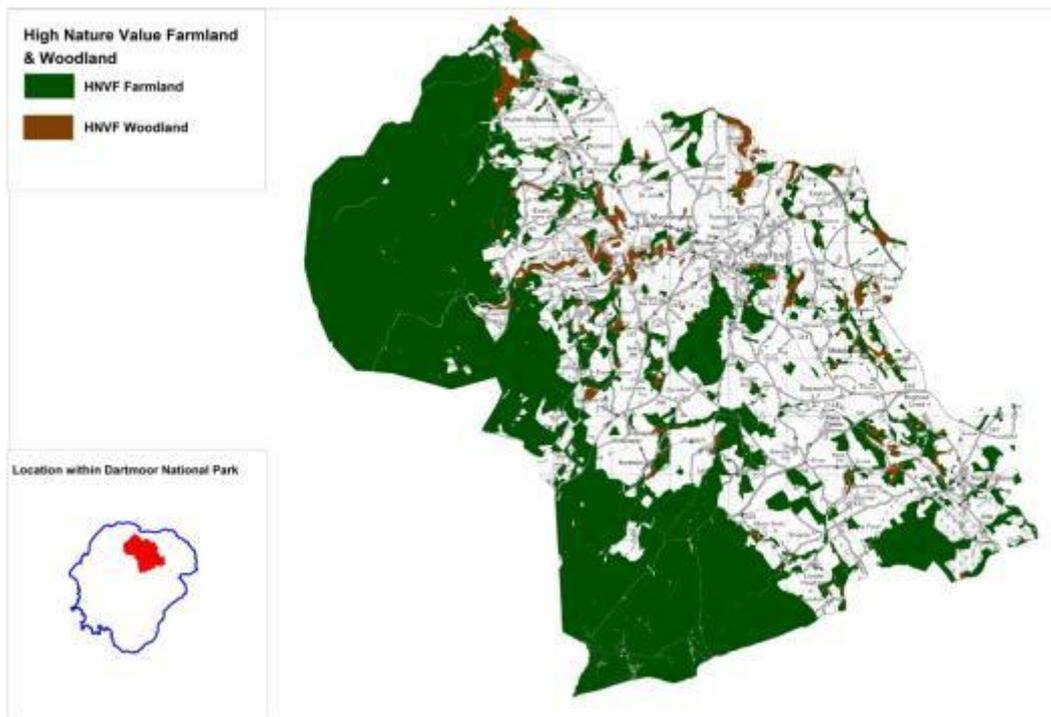


Figure 1-4: HNV Farmland and Woodland in the Dartmoor Study Area

Strategic Nature Areas (SNA) have been identified across the SW of England. These represent biodiversity 'hotspots' and are priority areas for the management and restoration of wildlife habitats. The study area has a number of SNAs. A large proportion of HNV farmland and woodland in the study areas falls within these SNAs (see Figure 1-5).

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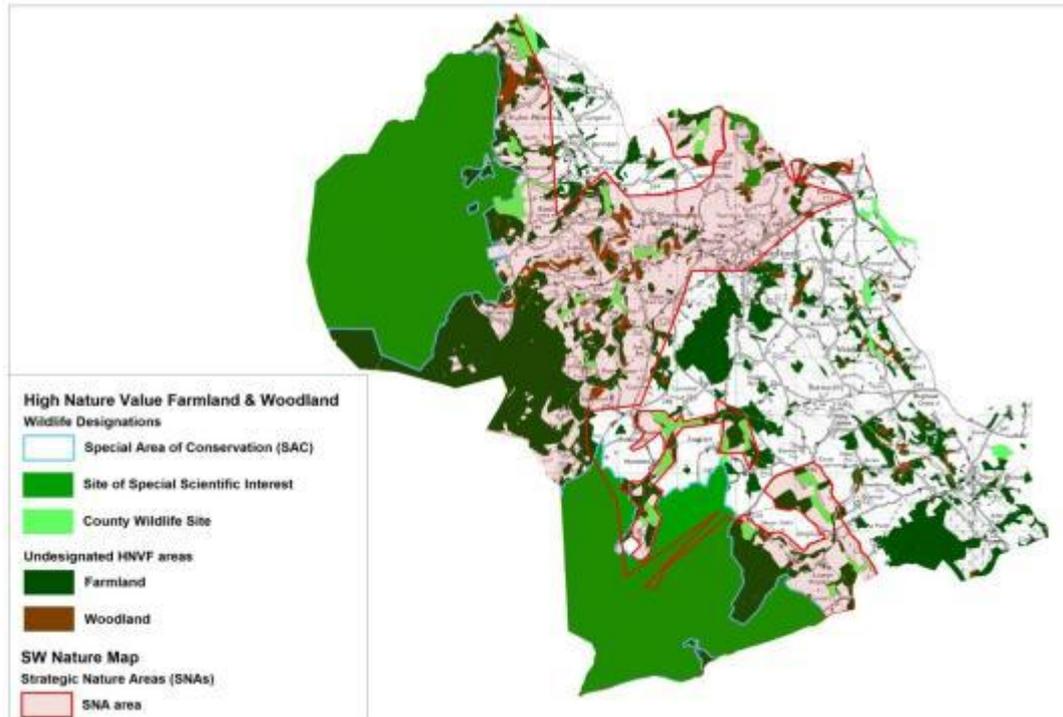


Figure 1-5: HNV Farmland and Woodland together with SNA, SAC, SSSI and CWS designations in the Dartmoor Study Area

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The following aerial photos illustrate typical patterns of habitats and landscapes where HNMF may occur across Dartmoor.

Figure 1-6: HNMF:

This aerial shows the large open expanses of **blanket bog** and **upland heath** (1) HNMF, contrasting sharply with substantial blocks of coniferous plantations (2) and the open water of Fernworthy Reservoir.



Figure 1-7: HNMF:

The intersection between **open moorland** (3) habitats and **unimproved, semi-improved** and improved farmland is clearly illustrated. Lower moor slopes comprise an unenclosed patchwork of bracken stand, gorse and unimproved acid grassland (4). Farmland enclosures of semi-improved pasture are bounded by stone walls (5) on the higher ground, and well treed hedgerows enclose more productive pasture at lower altitudes (6).



Figure 1-8: HNMF:

The intricate **mosaic of lowland farmland** around Dartmoor is distinguished by thick, well treed hedgerows around small, irregular fields (7), dissected by steep-sided wooded valleys (8). Much of the farmland is improved pasture, with occasional arable use. Isolated sites of unimproved Rhos pastures (9) and hay meadows can be found in the valley bottoms where woodland is absent.



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A typical open moorland expanse of blanket bog (1) and upland heath is illustrated in Figure 1-9 below, showing the large blocks of continuous HNMF. Figure 1-10 shows the contrast of large coniferous plantations (2) adjacent to open moorland (3) HNMF habitats.



Figure 1-9: Scorhill Stone circle on Gidleigh Common



Figure 1-10: Thornworthy Tor with Fernworthy Forest behind

The lower rolling valley landscapes within the National Park are in sharp contrast to the open moor, with a tight patchwork of mainly small and medium sized fields (1) of semi-improved pasture (2). The landscape is linked by a network of tall, treed hedges (3) with well wooded river valleys (4). See Figure 1-11.



Figure 1-11: Meldon Hill, South-West of Chagford

1.3 Farming characteristics and trends in Dartmoor

This section is based on the best available farming data for the Dartmoor National Park (DNP) at the time of writing; see **Note 2** for a description of sources used. The current state and trends relating to farming in the DNP – and the case study area in particular – are outlined and the impacts on farms with HNVF explored.

For over 5,000 years farming has been the main land use on Dartmoor. Agriculture and forestry are still shaping the moor today, with rough grazing, farmland and forestry making up the major land uses of the National Park (see Table 1-3).

Land Use	Area (ha)	% of National Park
Moorland (inc rough grazing)	48,450	47
Farmland	33,041	38
Forestry/ Woodland	11,152	11
Reservoirs	209	1
Other (inc villages)	2577	3

Table 1-3: Land use in the Dartmoor National Park

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Dartmoor's harsh climate and poor soils means that farming has always been an economically marginal activity, and as such falls within the Less Favoured Area (LFA) designation. This EC Designation provides special measures to assist farming in mainly upland areas where the natural characteristics (geology, altitude, climate, etc.) make it difficult for farmers to compete. The LFAs in England consist of Severely Disadvantaged Areas (SDA) and Disadvantaged Areas (DA). The case study area of this report is entirely SDA.

The vast majority of the agricultural land in the National Park is classed as Grade 5 (of little agricultural value, with severe limitations - it is rough grazing with scope for improved pasture on limited areas), with areas of Grade 4 and Grade 3 to the East of the Park's boundary. Grade 4 land has severe limitations, and in spite of some potential for fodder crops is basically used for pasture. Grade 3 land has moderate limitations due to soil, relief or climate - it has no potential for horticulture but can produce 'good' crops of cereals, roots and grass.

There are three main types of farmland on Dartmoor: moorland, newtakes and inbye land; in addition to the land on the edges of Dartmoor which is typically enclosed. The majority of Dartmoor is moorland; exposed rough grassland used for extensive grazing of cattle, sheep and ponies; with only sheep and ponies surviving harsh winters without additional feeding. Many of the open moors are divided into commons, with associated rights. The newtakes are mainly enclosed areas of moorland, adjacent to the commons belonging to individual farms. Some of these have been agriculturally 'improved' but remain marginal in terms of production. The inbye land comprises a patchwork of improved and enclosed fields, suitable for forage production or grazing lambing sheep or cattle with calves.

Typically, most farms on Dartmoor would have a combination of these different types of farmland. DNPA suggest three types of farm on Dartmoor (DNPA 2005):

- High moorland farms (mostly owned by the Duchy of Cornwall) have newtakes and relatively poor inbye fields, and there are common rights attached to each farm. The land usually has thinner, poorer soils and colder weather than at lower altitude. These farms are divided by stone walls.
- Mid moor farms have common rights but no newtakes. Their inbye land is more productive.
- Farms on the fringes of the National Park usually do not have common rights and they have no newtakes. Their inbye land is even more productive, being at lower altitude and having better soils. These farms are divided mainly by hedges.

Many farms comprise a 'home farm' and common rights and/or newtake on moorland. Livestock farming is the predominant farming activity. The home farm is used for calving, lambing and forage production. The moorland is used for summer grazing of cattle, sheep and ponies. Historically, some livestock have also been overwintered on the moorland. Due to the short grass growing season on Dartmoor, farmers often now buy in additional forage, move their stock to lower areas of their holdings and/or sell stock to lowland farms for fattening (due to high costs of forage and transporting forage).

These farms are defined as 'hill farms', being livestock farms within the SDA². (a subset of grazing livestock farms in the LFA more broadly). They tend to have land both above

² Hill farms are a sub-set of LFA grazing livestock farms which includes those in both the SDA and DA.

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and below the 'Moorland Line', an important designated boundary given the lower payment rates under the Single Payment Scheme (SPS) and agri-environment schemes (AES) for land above the Moorland Line compared to the land below. Some 'extreme' hill farms have more than half their land above the Moorland Line. Moorland and newtakes are generally located above the Moorland Line, with inbye and other enclosed land situated below this.

There is a large area designated as common land on Dartmoor. The 36,000 ha of common land represents 37% of the National Park and more than 75% of the moorland. In general terms, common land is land owned by one person over which another person is entitled to exercise rights of common (such as grazing animals or cutting bracken for livestock bedding), and these rights are generally exercisable in common with others. The Commons Registration Act of 1965 required the registration of common land nationally, its ownership, and the extent and nature of the rights held. Today, on Dartmoor, there are 92 separate common land units coming under some 54 different owners and there are about 850 registered commoners. Although only about one quarter of the registered commoners are active graziers on the moorland

Land ownership within the National Park is by individual private owners; however there are some large, significant landowners especially the Duchy of Cornwall. See Table 1-4.

Owner	Land Area (ha)
Duchy of Cornwall	28,328 (of which 20,000 is common land)
South West Water	4,421 (including 8 reservoirs)
National Trust	2,355
Dartmoor National Park Authority	1,451
Forestry Commission	1,359 leasehold (plus 381 freehold)
Ministry of Defence	13,340 (owned and leased)

Table 1-4: Land ownership and management in the National Park

In recent years there has been a substantial growth in the number of smallholdings (<5ha) and a modest increase in larger farms (>50ha). This has been at the expense of medium sized holdings which have reduced in numbers by around half in the last fifty years.

Current farm survey data (primarily based on the Defra June 2008 survey) and trend data for the period 2000-2008 (based on Defra June Survey for 2000-2008) indicates the state of farming in the **case study area**, see Table 1-5.

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<p>Summary: The survey data indicates that holdings in the case study area are on average small to medium sized, and likely to be owned rather than rented. By number, holdings are most likely to be categorised as 'other' (holdings which either do not fit well with mainstream agriculture, such as specialist horses, or which are of limited economic importance, such as specialist grass and forage (no livestock) and non classifiable holdings) or LFA grazing livestock (together these farm types comprise 94% of land area). The predominant land use is permanent grass, followed by rough grazing, temporary grass and woodland. Grazing pressure exerted by cattle and sheep, in terms of grazing livestock units, is broadly similar. It is important to note that the whole of the case study area is in the SDA.</p>	
<p>Agricultural land</p>	<p><i>Farm Survey June 2008:</i> Agricultural land in the case study area comprises 5,269 ha (66.7% of the total area of the four sample parishes).</p> <p><i>Trends 2000-2008:</i> 2% decrease in the total area of agricultural land, from 5,372ha to 5,269ha.</p>
<p>Farm holding number and size</p>	<p><i>Farm Survey June 2008:</i> There are 214 farm holdings in the case study area with an average area of 24.6ha.</p> <p><i>Trends 2000-2008:</i> 26% increase in the number of farm holdings from 170 to 214 holdings. Average holding size reduced from 31.6ha to 24.6ha.</p> <p><i>Note:</i> Commercial holdings are those which exceed the threshold for the census. This includes holdings with one or more of the following: >5ha; >10 bovines; >20 sheep.</p>
<p>Farm tenure</p>	<p><i>Farm Survey June 2008:</i> The tenure of farmland in the case study area is around 58% owned and 42% rented (based on 2008 data). This compares with 75% owned in Devon and 68% owned in the South West region.</p> <p><i>Trends 2000-2008:</i> The proportion of land owned and rented has remained broadly constant over the period.</p>
<p>Farm categorisation</p>	<p><i>Farm Survey June 2008:</i> 62% of holdings are categorised as 'other' and 29% of holdings are categorised as LFA grazing livestock in the case study area. 3% of holdings are categorised as horticulture and 2% are specialist poultry units. 'Other' holdings account for 15% of total agricultural area, and LFA grazing livestock holdings account for 79% of area. Average farm sizes are 6ha for 'other' holdings (see note) and 66ha for as LFA grazing livestock holdings.</p> <p><i>Trends 2000-2008:</i> There has been a 17% decrease in the number of LFA grazing livestock holdings from 76 to 63 holdings although the total area covered by these farms has decreased by only 3%. The average area of LFA grazing livestock holdings has increased from 56ha to 66ha. There has been a 78% increase in the number of 'other' holdings and a similar percentage increase in the area covered by these holdings.</p> <p><i>Note:</i> Farms are categorised according to whether a particular enterprise accounts for two thirds or more of Standard Gross Margin (SGM). For example, cereal farms are those where cereals accounts for more than two thirds of the total SGM. 'Other' holdings are those which either do not fit well with mainstream agriculture, such as specialist horses, or which are of limited economic importance, such as specialist grass and forage (no livestock) and non-classifiable holdings. The holdings categorised as 'other' and under 5ha in size are likely to be closely associated with one another. At least a proportion of these will fall in the category of 'non-farming' landowners, lifestyle farmers or similar.</p>

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<p>Farm size distribution</p>	<p><i>Farm Survey June 2008:</i> Holdings over 50ha account for 8% by number and 65% by area in the case study area. At the other end of the scale, holdings under 20ha account for 74% by number and 12% by area.</p> <p><i>Trends 2000-2008:</i> The number of farms has increased in the very smallest (<5ha) and very largest (>100ha) farm size categories. The latter have increased by 63% by number and 170% by area (the 13 farms over 100ha now account for 3,110ha or 59% of the case study area). All other farm sizes have decreased in number, especially those in the 50<100ha size category.</p>
<p>Land uses</p>	<p><i>Farm Survey June 2008:</i> The main agricultural land uses in the case study area are permanent grass (58%), rough grazing (32%), temporary grass (5%) and woodland (2%).</p> <p><i>Trends 2000-2008:</i> The area of permanent grass has increased by 8%, and temporary grass has increased by 2%. However rough grazing has decreased by 14%, and woodland has decreased by 6% (although the latter comprises a small proportion of total agricultural land in the case study area). There is likely to have been reclassification of some land from rough grazing to permanent grass during the period.</p> <p><i>Note: 'Permanent grassland' is defined as grassland more than 5 years old, 'temporary grassland' is grassland sown within the last 5 years; 'rough grazing' includes heathland, moors, mountain or hills where a farmer owns or has sole grazing rights (this measure excludes common grazing).</i></p>
<p>Livestock numbers</p>	<p><i>Farm Survey June 2008:</i> There are around 4,213 cattle, 18,452 sheep, 47 pigs, 964 poultry and 352 horses in the case study area.</p> <p><i>Trends 2000-2008:</i> Livestock numbers have decreased: cattle numbers by 29%, sheep by 16%; poultry by 17%; pigs by 84%; and horses by 8%. The number of holdings with cattle has decreased by 44%, and the number of holdings with sheep has decreased by 3%.</p>
<p>Farm labour</p>	<p><i>Farm Survey June 2008:</i> The agricultural workforce in the case study area totals 228. Of these, 80 are full-time employees including farmers and farm workers. The remainder are part-time or casual.</p> <p><i>Trends 2000-2008:</i> The total agricultural workforce in the case study area has decreased by 12% from 258 to 228. The total number of full-time workers (farmers, managers, male and female workers) has decreased by 15%.</p>

Source: Defra/Natural England 23.3.2011 & 18.5.2011

Table 1-5: Farm Survey Data for the Dartmoor Study Area

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ROBUST FARM TYPES	Number of holdings	%	Area (ha)	%
Cereals	#	#	#	#
General Cropping	#	#	#	#
Horticulture	7	3%	25	0%
Specialist Pigs	-	0%	-	0%
Specialist Poultry	5	2%	37	1%
Dairy	#	#	#	#
Grazing Livestock (LFA)	63	29%	4,143	79%
Grazing Livestock (lowland)	-	0%	-	0%
Mixed	#	#	#	#
Other ¹	132	62%	805	15%

FARM SIZE	Number of holdings	%	Area (ha)	%
<5ha	111	52%	154	3%
5<20ha	47	22%	453	9%
20<50ha	38	18%	1,217	23%
50<100ha	5	2%	336	6%
>=100ha	13	6%	3,110	59%

TOTAL HOLDINGS	214	100%	5,269.1	100%
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LAND USE	Number of holdings	%	Area (ha)	%
Crops and bare fallow (A99)	13	6%	73	1%
Vegetables and salad for human consumption (B99)	#	#	#	#
Fruit (C99)	#	#	#	#
Temporary grass (G1)	29	14%	259	5%
Permanent grass (G2)	146	68%	3,076	58%
Rough grazing - sole rights (G5)	39	18%	1,672	32%
Woodland (G14)	46	21%	117	2%
All other land (G17)	39	18%	67	1%

LIVESTOCK	Number of holdings	%	Number of livestock	%
Cattle (K299)	42	20%	4,213	na
Pigs (L98)	8	4%	47	na
Sheep (M98)	61	29%	18,452	na
Poultry (N98)	41	19%	964	na
Horses (P90)	58	27%	352	na

Source: Defra / Natural England 22.3.11

Table 1-6: Farm Survey Data for the Dartmoor Study Area - June 2008

The potential impacts of these farm characteristics and recent trends on HNMF and HNMF management in the Dartmoor Case Study Area are outlined below:

- There is an increasing number of smaller holdings (up to 5ha) and 'other' holdings. These holdings will include some HNMF, which suggests an increasing proportion of HNMF on holdings owned by non-farming landowners. Stakeholder experience suggests these new landowners often lack the knowledge, skills or stock to manage HNMF.

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- The fragmentation of some farms into smaller units imposes greater challenges when trying to create contiguous or linked habitats, such as those important for butterflies, as there are more owners to bring on board.
- Relatively few, large holdings, those over 100ha, account for 59% of total area, with medium units (20<50ha) accounting for a further 23%. These larger commercial units are particularly important to influence in order to assure beneficial HNVF management.
- Commercial units are often specialising in direct marketing or producing niche market products such as rare breed beef.
- LFA grazing livestock farms and 'other' farm (farms with unknown activity on Defra holdings register) predominate in terms of land area; these farm types account for 79% and 15% of total agricultural land respectively. There is a trend towards fewer LFA grazing livestock farms, with larger average size. Farming systems associated with grazing livestock will continue to have a major influence on the way in which HNVF is managed.
- Permanent and rough grassland accounts for the largest area of land use at 3,076ha (58% of land area) and 1,672ha (32%) respectively. In recent years, permanent grassland has increased at the expense of rough grassland. Permanent grassland – semi-improved and unimproved – and rough grazing will continue to be the main land uses underpinning HNVF.
- Cattle numbers have decreased significantly in recent years. Sheep have also decreased but not to the same extent. The reduction in cattle numbers stems from a number of factors including: the introduction of cross compliance to address damage to moorland from feeding of cattle and outwintering of sheep on the commons (it imposed maximum stocking rates for subsidy payment purposes); the introduction of the Dartmoor Environmentally Sensitive Area (ESA) scheme (with lower stocking rates still); the incidences of BSE (bovine spongiform encephalopathy) and Foot and Mouth Disease, the destocking from which effectively created the conditions for many Dartmoor commons to come into the ESA; and the decoupling of subsidies with the introduction of SPS.
- The shift in balance of cattle and sheep numbers has created problems in terms of delivering the right kind of grazing to benefit certain HNVF habitats such as Rhos pastures, where cattle grazing are beneficial for creating optimum conditions for Marsh Fritillary butterflies. Cattle or mixed grazing is also beneficial on moorland for controlling certain species such as *Molinia* (purple moor grass) and the mosaic of habitats.
- There has been a significant reduction in pony numbers on Dartmoor due to a dramatic fall in market prices and increased regulation. This is having an impact in terms of grazing pressure and grazing patterns on the moor.
- That said, more recently, there is pressure from some farmers to increase stock numbers on the moor, in both the summer and the winter, according to stakeholders. It makes economic sense to use the moor for grazing, keeping inbye land for forage or other stock, and reducing forage and housing costs. Economies of scale can also be generated, with reduced labour and other costs per animal, with more stock on the hill. This may redress the lack of suitable grazing in places but risks inappropriate grazing elsewhere.
- Other farmers are buying more commercial stock, as hill animals are considered to be slow to mature and costly, and focusing on and acquiring more productive inbye land 'downslope'.
- There is not the general sense, amongst stakeholders, that Dartmoor is being abandoned (although this may be the case in some specific localities).

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- The decrease in labour, particularly full time labour, suggests that there may be less farm labour available for HNMF management, in particular shepherding and swaling (burning) now compared to previously. Shepherding is key to the successful grazing of habitats, with different grazing requirements, on open common land. This trend is likely to continue.

The specific impacts of agri-environment schemes are explored in more detail in Section 1.5.

Data on HNMF by farm type and farm size and the percentage of HNF farmland and woodland registered on RLR were not available from Natural England at the time of reporting.

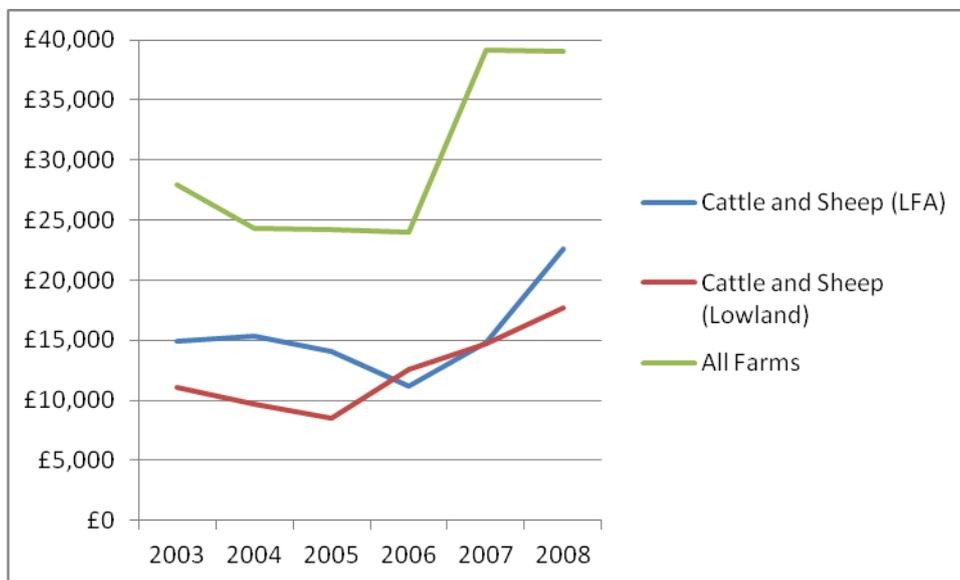
1.4 Farm Business Income

There are no specific farm business income figures available for the Dartmoor National Park or the sample parishes. However data can be drawn from the Farm Business Survey (FBS) and relevant reports. Farm Business Income (FBI) is the key measure used. See **Note 3** for background on FBI and data sources.

Figure 1-12 indicates the Farm Business Income (FBI) for LFA cattle and sheep farms and for purposes of comparison lowland cattle and sheep farms and all farms in SW England; the graph shows how FBI has changed since 2003/4. The FBI for LFA cattle and sheep farms is considerably lower than the average for all farms but generally greater than that for lowland cattle and sheep farms (the exception being 2006/7). There has been an increase in FBI for all farm types. LFA cattle and sheep farms have experienced an increase of 51% from £14,926 to £22,601 over the period 2003/4 to 2008/9, less than lowland cattle and sheep farms (59%) but greater than the average for all farms (40%). The recovery in FBI for LFA cattle and sheep farms after 2006/7 is related to increased output relative to costs, including beef and sheep prices and increased SPS returns (this was due to a weak £:€ exchange rate as opposed to the SPS model used, which is resulting in a reduction in SPS returns up to 2012, see below).

Detailed analysis of hill farm incomes, as a subset of LFA farm incomes, in the South West was carried out in 2008 (Turner, M et al). This showed that the FBI for hill farms in the SDA was £9,207 in 2006/7, compared to £11,238 for LFA farms as a whole in that year. The report states that “the region’s hill farming systems in 2006/7 failed to produce a fair return for the labour of the farm family ...and no return for their own capital invested in the business”. In other words, hill farms are in an even more extreme position than that shown by the FBS for LFA cattle and sheep farms as a whole.

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Source: Farm Business Survey 2008. Adapted from Lobley et al (2009)

Figure 1-12: Farm Business Income – SW England – Trends

Table 1-7 shows the breakdown of FBI in 2008 for different farm types in SW England. LFA cattle and sheep farms obtain a significant 73% of FBI from Single Payment Scheme (SPS), in addition they obtain 33% from agri-environment and other payments (including Hill Farm Allowance (HFA)), 5% from diversification and -11% from agriculture. By comparison, lowland cattle and sheep farms obtain 73% of FBI from SPS, 20% from diversification, 18% from agri-environment schemes and -10% from agriculture. The proportion of FBI from SPS and agri-environment schemes is lower for all farms (53% and 13% respectively).

	Sources of Income									
	Agriculture	%	Agri-environment payments	%	Diversification	%	Single Payment Scheme	%	Farm Business Income	%
Cattle and Sheep (LFA)	-£2,387	-11%	£7,377	33%	£1,063	5%	£16,548	73%	£22,601	100%
Cattle and Sheep (Lowland)	-£1,832	-10%	£3,174	18%	£3,502	20%	£12,823	73%	£17,668	100%
All Farms	£8,146	21%	£4,953	13%	£5,364	14%	£20,696	53%	£39,082	100%

Source: Farm Business Survey 2008. Adapted from Lobley et al (2009).

Table 1-7: Farm Business Income – SW England - Sources of Income

Hill farms, like LFA cattle and sheep farms generally, are dependent on public funding; in 2006/7 public payments accounted for 44% of total output on these farms (26% from SPS and 18% from agri-environment payments and HFA) and, before deducting costs, these payments represented 289% of FBI (Turner, M et al, 2008).

A recent FBS study of hill farms in England (Harvey, D and Scott, C, 2010) indicates that higher performing hill farms (those in the top quartile based on FBI per farm) manage to realise a positive income from agriculture (Agricultural Business Income) although others do not. The two medium quartiles manage to offset these agricultural losses by the incomes earned through SPS, agri-environment payments and diversification. The lowest quartile returns a negative FBI. It is also worth noting that the

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better performing farms make greater incomes from their non agricultural farm business activities and receipts.

LFA farms have experienced a reduction in SPS payments (leaving aside exchange rate impacts) over the period since 2005. This is a reflection of the 'dynamic hybrid' mechanism used in England which includes a shift in the basis of payments from historic receipts to flat area payments over the period 2005-2012, with different regional area payment rates for lowland, SDA (non moorland) and SDA moorland, and increasing modulation. The impact has varied depending on the nature on the farm. SDA mixed grazing livestock farms are expected to experience the steepest reduction in SPS payments over the period 2005-2012 (27% decrease), followed by SDA specialist sheep (19%) and SDA specialist beef (6%). Anecdotal evidence suggests cuts in SPS payments of up to 40% are possible on 'extreme' hill farms. These are expected to include those with a significant proportion of land above the Moorland Line, given the low regional area payment rate for SDA moorland.

The decoupling of subsidies with the introduction of SPS is regarded as having been a 'turning point' for hill farming. With no headage payment to support livestock production per se, and a lack of commercial viability of some beef enterprises, cattle numbers on Dartmoor have declined substantially. The South West Uplands Federation considered that the introduction of the SPS removed "the incentive to farm the moorland" (EFRA, 2011). This is true, however it is important to note that cattle numbers started decreasing well before the introduction of SPS, with the introduction of cross compliance and the ESA scheme in the early 1990s, and the arrival of BSE and then Foot and Mouth Disease (see Section 1.3).

The shift in the LFA support from the HFA to Upland Entry Level Stewardship (UELS) is not considered by most stakeholders to be having a significant impact in terms of FBI. However it is early days to predict the impacts and the interaction with other agri-environment schemes (e.g. eligibility to enter Higher Level Stewardship (HLS) in addition) will be important at an individual holding level. The potentially adverse effects on short term tenants/licensees, who had been eligible for HFA but are now ineligible for UELS, are being corrected via changes in rental levels.

The impacts of agri-environment schemes, including the shift from the ESA to UELS/HLS are considered in Sections 1.5 and 2.6.

The nature of farming in the Dartmoor Case Study Area will have some impact on FBI. To illustrate this, the physical and financial figures for the average LFA grazing livestock farm (which typically may have HNMF) used in the FBS in 2008 have been adapted to reflect the farming characteristics of an average LFA grazing livestock farm in the case study area, see Table 1-8. This shows a reduced 'average' FBI or net profit of £14,586. SPS accounts for 73% of this net profit. Those (hill) farms with a greater proportion of moorland are expected to have lower returns.

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	South West		Dartmoor		Notes
	£/ha	£/Farm	£/ha	£/Farm	
Physical data					
Farm size	102.4ha		66 ha est.		
Total area farmed	108.2ha		66 ha est.		
Perm. grass + rough grazing (% of UAA)	93%		90%		
Stocking	96.1 LU				
Stocking density	0.89 LU/ha		0.9 LU/ha		
Financial data					
Agriculture	-£23	-£2,387	-£23	-£1,518	Similar productive land (100%)
Agri-environment payments	£72	£7,377	£72	£4,752	Similar agri-environment scheme income (100%)
Diversification	£10	£1,063	£10	£660	Diversification income (100%)
Single Payment Scheme	£162	£16,548	£162	£10,692	Similar SPS income (100% regional area payment by 2012)
Farm Business Income	£221	£22,601	£221	£14,586	

Source: base data from Farm Business Survey 2008.

Table 1-8: Farm Business Income – LFA Cattle and Sheep Farm – Dartmoor

1.5 Agri-environment scheme participation

A total of 6,604ha of land in the Dartmoor Study Area is in some form of agri-environment (AE) scheme. This is equivalent to 83% of the study area. Environmental Stewardship (ELS/HLS) accounts for 79% of total agri-environment agreement area, with Classic Scheme (ESA) participation accounting for the other 21%.

3,170ha of HNV farmland in the study area is under some form of agri-environment scheme agreement; this equates to 86% of the total area of HNV farmland. Environmental Stewardship (ES) accounts for 91% of this, with Classic schemes (ESA) accounting for the remaining 9%. Of this 91% (2,884 ha) in ES, 89% is in some form of HLS agreement and 2% is in ELS or OELS only. It is worth noting that 76% of HNV farmland in the study area is in some form of HLS agreement.

A breakdown of agri-environment scheme participation is shown in Table 1-9 and the maps shown in Figure 1-13.

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Dartmoor (total HNMF farmland 3,715ha)	Area of land under agreement in study area (ha)	HNMF under agreement (ha)	HNMF under agreement (%)	% of total HNMF
HLS only	599	589	19%	16%
ELS+HLS	4,065	2,221	70%	60%
OELS+OHLS	26	4	0.1%	0.1%
ELS only	392	52	1.6%	1.4
OELS only	138	18	0.6	0.5
Env. Stewardship sub-total	5,220	2,884	91%	78%
ESA	1,384	286	9%	8%
CSS	n/a	n/a	n/a	n/a
Classic schemes sub-total	1,384	286	9%	8%
Total	6,604	3,170	100%	86%

Source: Natural England 2011.

Table 1-9: Agri-environment scheme participation in the Dartmoor Study Area

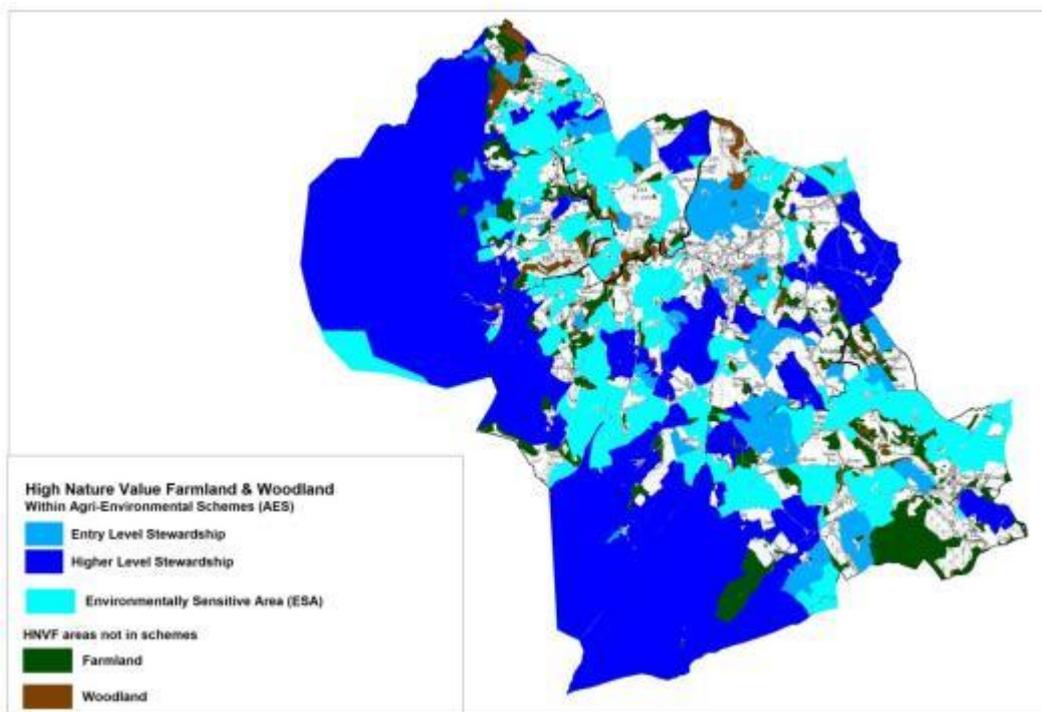


Figure 1-13: HNMF in Agri-Environment Schemes in the Dartmoor Study Area

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The Natural England Holding Assessment Toolkit (HAT) scores - which indicate the extent to which individual holdings address or have the potential to address particular environmental priorities under HLS were not available for the Dartmoor study area at the time of reporting (with the exception of HAT data for farms surveyed, see Section 2.3). It can be assumed however that farms offering high quality agreements would be of high priority as Dartmoor forms one of Natural England's HLS Target Areas (SW05). "The Dartmoor Target Area includes a nationally important, protected landscape within the Dartmoor National Park with its upland mosaic of heather and grass moorlands, the outer commons and the fringe of enclosed farmland that falls steadily to the surrounding lowland. The area also contains substantial swathes of open access land of national importance for informal public recreation. Within this target area nationally important areas for biodiversity occur including blanket bog, upland heathland, fens (such as valley mires), purple moor grass and rush pasture and lowland meadows. Important areas of ancient semi-natural woodlands and wood pasture with veteran trees are also present. The area contains historic buildings and a wealth of historic features both scheduled and undesignated associated with prehistoric or medieval settlements, such as standing stones, hut circles and field systems, together with the later remains of mining sites."

Data on the effect of agri-environment schemes on HNVF is not available at the time of writing, but anecdotal and individual case experience suggests the following:

- There were two main management options available within the Dartmoor ESA: Tier one included basic requirements applying to all land, such as provisions for the maintenance of stock-proof hedges, walls and banks, weather-proof traditional farm buildings, water courses and wetlands and the management of scrub. Features of historical interest were not to be destroyed. There were restrictions on cultivation, under-drainage, stocking levels and the use of fertilisers, lime, pesticides and herbicides for permanent grassland, unimproved pasture, enclosed rough land and moorland. Tier two related to the management of species-rich hay meadows and heather moorland as well as providing for moorland recreation.
- The ESA scheme helped with the task of bringing common land SSSIs into appropriate management after periods of over-grazing and unsuitable supplementary feeding cases in the latter part of the 1990s and early 2000s. The ESA which ran for new entrants up until 2004 enabled close working between the commoners, the Dartmoor National Park Authority and Natural England has gradually brought these commons into improved management.
- Stock numbers have been reduced since 90% of the moorland came under ESA or HLS agreements (although other factors such as Foot and Mouth Disease and the decoupling of subsidies with the introduction of the SPS have also been influential). In 2007 a survey of hill farmers on Dartmoor found that over 40% of farmers had reduced the number of their suckler cows and breeding ewes. Natural England have estimated that within all the agri-environment schemes (ESA and HLS) there is about a 30% shortfall in the total LU (Livestock Units) permitted on the moor in summer, the peak grazing season. (DNPA). Stakeholders indicate that the issue is now not so much the overall numbers of stock but the type, distribution and timing of grazing. More recently stakeholders are reporting pressure from commoners and owners to increase stock numbers on the moor, both in summer and winter, for a variety of predominantly economic reasons (see Section 1.3).

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- Some of the common land SSSIs on Dartmoor have progressed from ESA into UELS/HLS agreements to maintain the valuable work of suitable grazing practices, scrub clearance, and controlled burning (swaling). HLS has enabled greater flexibility in terms of tailoring prescriptions to suit each site, especially in the case of stocking rate where the ESA had a nationally set limit. It is greatly to the credit of all partners and stakeholders that 99.48% of SSSIs are now in favourable or recovering condition (DNPA).
- A reduction in subsidy payments received by hill farmers (from SPS changes, HFA and ESA) has resulted in some farmers turning away from farming the moorland, focusing on more productive land 'downslope', and utilising more commercial breeds which are quicker to mature. Farmers are also diversifying or earning income 'off-farm'. The introduction of the UELS helps to replace some income lost but is unlikely, on its own, to provide an overall solution.
- UELS/ELS is likely to be maintaining habitats on the lowland areas, particularly boundaries and low input grassland, where the majority of points can be gained at least cost; but generally does not go far enough to ensure the future management of HNMF due to the relatively short timescale (5 year agreements) in which it will be managed, and the low level of payments. There is also no provision for capital payments for works such as hedgelaying or stone walling in the UELS/ELS schemes (although farmers can select boundary restoration options under UELS).
- There is concern from some stakeholders that UELS may have a detrimental impact on the moor due to the lack of restriction on over-stocking, (UELS has a minimum stocking rate, but no maximum) and therefore the only deterrent is a percentage loss of SPS subsidy due to cross compliance breaches. However this deterrent may not be enough on common land or non SSSI sites, where breaches are hard to police or enforce.
- For some holdings already in ELS/HLS (and thus providing a higher level of environmental benefit) they are finding it difficult to enter the UELS scheme without decreasing the options in their HLS, and thus decreasing their HLS income.
- It is anticipated that due to budgetary restrictions, many ESA agreement holders are unlikely to be able to enter HLS, and UELS will not match the previous funding leading to potential intensification or abandonment of land. Stakeholders are particularly worried about this effect on common land, with many of the commons having expiring ESAs in 2013/14, where the budget under the new Rural Development Programme is uncertain. New HLS agreements on commons are notoriously lengthy processes, which could further impact scheme acceptance.
- HLS has been more targeted than either ESA or ELS in creating habitats or restoring larger areas of habitat, including upland heathland and blanket bog. There is evidence however that some areas of high moor are in poor condition, due to inappropriate grazing.
- Most stakeholders report inappropriate grazing as an issue on Dartmoor, some areas are overgrazed, whereas others are under grazed due to the practicalities of ensuring stock stay in the 'correct' areas, this is particularly difficult over large

open commons where they can roam over 100's of hectares, and shepherding is costly in terms of grazier's time.

1.6 Upland specific policy and future opportunities

The English Uplands have been subject to a number of policy strategies and visions over the last 18 months, with government, government agencies and relevant stakeholders setting out a vision for the future. At a national level, these include representations from the Commission for Rural Communities (CRC, 2010), investigation by the House of Commons Environment, Food and Rural Affairs (EFRA) Select Committee (EFRA, 2011) and Defra's Upland Policy Review (Defra, 2011).

In Dartmoor this process was initiated a number of years ago with the publication of The Dartmoor Vision in 2006. The Dartmoor Vision was created through a collaborative process intended to provide guidance to hill farmers on their contribution to managing natural and historic resources on the moorland.

It had its origins in a report setting out the issues facing hill farmers in 2002, shortly after the devastation caused by the outbreak of Foot and Mouth. The Dartmoor National Park Authority commissioned the report and then appointed an independent facilitator to take forward its recommendations. In the course of this process, a very wide range of interested parties has been involved, notably the Dartmoor Commoners' Council, Natural England (and its predecessors), Defence Estates, English Heritage, Environment Agency, Duchy of Cornwall, RSPB and South West Water.

Discussions with hill farmers, enabled by the Dartmoor Commoners' Council, endorsed the recommendations and identified two re-occurring themes:

- Farmers thought that potentially conflicting land management was demanded from different statutory agencies, especially from archaeologists and ecologists;
- Farmers wanted to have a role in securing a long term future for farming in the uplands.

A review of all the relevant statutory agencies found little evidence of conflicting advice or objectives, but there were variations in language, often leading to poor communication. The Vision process began by securing agreement between all the agencies on what they wanted the moorland to look like in 2030, while a separate process addressed the archaeological aspects which are so important on Dartmoor.

The results of both strands were mapped and brought together to create the Vision. Prior to its publication in 2006, in the form of a map, the Commoners' Council arranged for local farmers to test its credibility, as a result of which it was immediately endorsed by the farming community who claimed it was the first time that they understood the "bigger picture" of the multiple outcomes being asked of land management.

The Vision now helps to guide Environmental Stewardship applications in Dartmoor. The initiative continued as a partnership between the farmers and statutory agencies and, in 2010, evolved into Dartmoor Farming Futures.

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Work is now underway to see if the “vision process” can be applied to the other public benefits provided by Dartmoor’s moorland. Maps showing the areas of greatest value for public access, water catchments and carbon storage will be merged with the existing Vision to provide guidance to farmers on which ecosystem services they should prioritise when managing the land.

More recently there has been policy interest in the potential of ‘Ecosystem Services’ to be delivered by the English Uplands. Hill farmers and land managers in the uplands are potential ‘providers’ or suppliers of a range of ecosystem services, whose delivery can be enhanced through changes to land management practice. These services include:

- Improving water quality through reductions in diffuse pollution upstream
- Managing upstream land for flood mitigation
- Carbon storage (for example, on peat uplands)
- Biodiversity conservation
- Cultural ecosystem services which include recreational benefits

Natural England is currently taking forward pilot projects to test the ecosystem services approach in three upland pilots, one of which being the south west uplands (Dartmoor and Exmoor). There are a number of challenges in taking forward payment for ecosystem services. There is a need to understand better what rural communities, the public and business want from upland ecosystems.

2 Farming with High Nature Value Farmland on Dartmoor – Findings from Survey and Literature Review

2.1 Introduction

This section sets out the findings from interviews with farmers and other stakeholders including individuals from DNPA, Butterfly Conservation, RSPB, Dartmoor Commoners Association, Natural England and Devon Wildlife Trust. This feedback is complemented by a review of relevant literature, with the aim of better understanding how HNMF is farmed in Dartmoor and key issues now and in the future.

Farm interviews

The main element was a series of interviews with a selection of farmers owning or managing farms with HNMF in the sample parishes forming the study area. The purpose of the farm interviews was to gather information on the range of farming systems and practices which support HNMF, the farm socio-economic context and trends, use of HNMF, motivation, obstacles to managing HNMF and future trends and consequences. The farms were selected following identification of a representative sample of parishes across Dartmoor and the development of a HNMF farm typology for the area; see **Note 5** for more details and Figures 2-1 and 2-2 for the location of the farms surveyed.

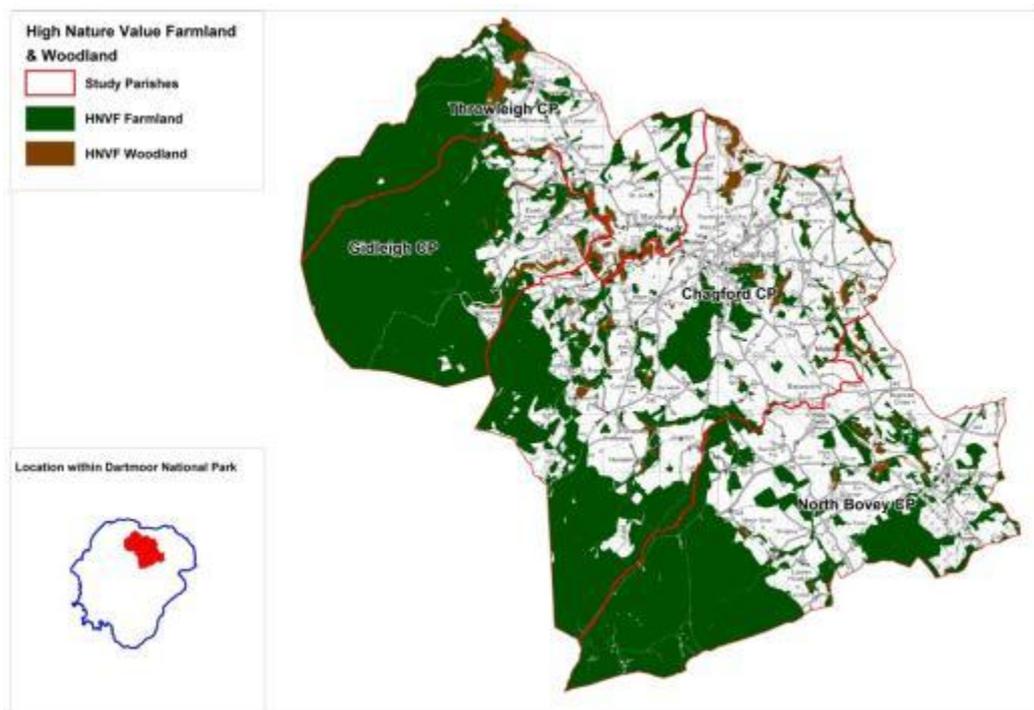


Figure 2-1: Sample Parishes in the Dartmoor National Park

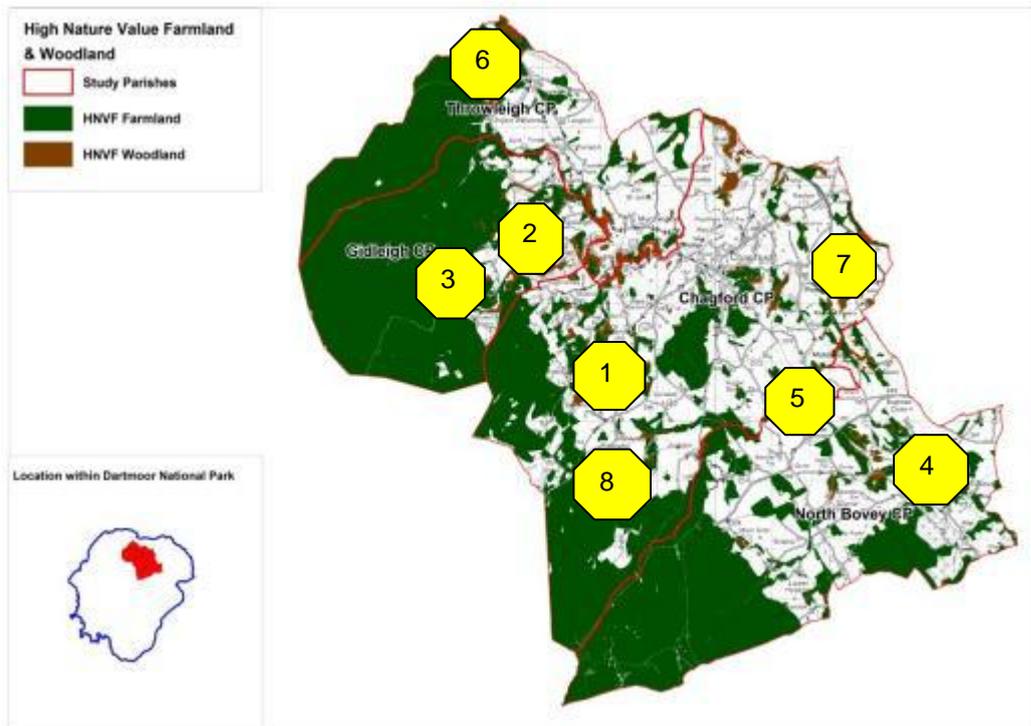


Figure 2-2: Location of farms surveyed.

Given the relatively short amount of time available for arranging and carrying out interviews, a pragmatic approach was taken which involved comparing the set of farm types derived in the farm typology with the map of estimated locations of HNVF, and looking for farms which fitted each of the types, and which were also already known to project steering group members. The existing relationships which were used for this purpose stemmed from professional interactions through the Dartmoor National Park Authority and the South West Uplands Federation. Please note the tables referred to in this section - Tables A1 to A5 - are located in Appendix 1 due to their size and format.

Stakeholder interviews and additional evidence

Feedback from interviews with a range of stakeholders and additional evidence from relevant reports and studies is included under the relevant headings below. A bibliography showing reports and studies referred to is shown in Appendix 3.

2.2 Farm descriptions

The eight farms are described in detail in Table A1 in Appendix 1. The farms cover a reasonably typical range of livestock farms with HNV farmland in Dartmoor. They include larger family farms and smallholdings with owners undertaking off-farm work. There are all conventionally managed holdings. Farm size ranges from 16ha to 572ha. There is a mix of designations (including SSSIs, CWS, SAC) and all farms have land in agri-environment schemes, both on home farms and on commons (UELS/HLS and ESA). A brief summary of each farm and its HNVF is set out in Table 2-1.

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<p>Farm 1 – A large (572 ha) mixed livestock farm. The livestock are used to manage a significant area of HNMF including moorland of considerable archaeological interest and grasslands.</p>	<p>The first generation farmer has targeted land notified as SSSI to rent in as part of the farm. Income from AE and turkeys is essential to profitability. He considers his cattle, sheep and ponies are principally for land management and that without sufficient financial support from AE and SPS the farm is unlikely to continue.</p>
<p>Farm 2 - A medium sized livestock farm (264 ha). Currently producing quality stores for finishing elsewhere. Extensive grazing on a grass system with few inputs, all within the SDA.</p>	<p>Now a single suckler enterprise having been a dairy farm in the past. Limited areas of HNMF on the enclosed land and he is not using common rights on nearby moorland due to inappropriate cattle (not acclimatised or suitable for rough grazing). Business focused on producing high quality calves and stores with limited income from AE, however support from SPS & AE are essential to profitability.</p>
<p>Farm 3 –A small livestock farm (16 ha) inextricably linked to moorland (HNMF & common). Now only sheep due to loss of labour and costs linked to cattle.</p>	<p>A flock of sheep is used to manage the adjacent common; however the number permitted on the common (HLS stocking rates) and lack of infrastructure on the home farm result in insufficient income. Off farm working and organic turkeys are essential to business. The future is fragile and will depend on a successor and financial support.</p>
<p>Farm 4 - A large mixed livestock farm, (464 ha) with a large number of rights on 3 commons, all areas of HNMF.</p>	<p>The farm has suckler herds comprising both hill and local traditional breeds and a large sheep flock that include animals suitable for grazing the moorland. One of very few farms allowed to out-winter cattle on the common land. A family enterprise, dating back to 1913 with two sons intending to continue the family farm. Grass unable to provide all feed and considerable feed and hay bought in.</p>
<p>Farm 5– A small farm (40 ha) adjacent to the common. The home farm has rich meadows and woodland and has recently become a working farm again after a gap of 20 years.</p>	<p>Previously the land was rented out but the farmer is beginning to establish a herd of pedigree Galloways. The owner also owns one third of Gidleigh Common and intends to provide grazing cattle on the moorland. A farm rich in biodiversity and common land with significant archaeological sites. AE is essential but probably insufficient to cover the investment needed in the necessary infrastructure and stock.</p>
<p>Farm 6–A medium sized livestock farm (121 ha) with rights on 4 commons. A traditional family run farm with summer grazing on extensive areas of common.</p>	<p>A single suckler herd comprises South Devons and Galloways. Both breeds are used for grazing on the moorland (common land). The farm is almost self-sufficient in hay and silage but to achieve this the enclosed land is fairly intensively managed. The sheep flock is heavily reliant on moorland grazing. Unlikely to change if support from SPS and AE remains.</p>
<p>Farm 7 - A medium sized mixed livestock farm (155ha) producing finished beef from a varied breed suckler herd and store/fat lambs. Extensive grazing and species rich valleys/banks, and improved forage ground. Tourism and livery diversification.</p>	<p>A single suckler herd of varied continental crossbred and aged cows producing finished beef at around 24 months (sold on a Waitrose contract). The mixed sheep flock lambs indoors in March and produce fat and store lambs for market. Cattle and sheep numbers have reduced over the years as a more extensive approach is taken supported by AE and SPS. Self sufficient in forage most years. An efficient business with good profit margins. Employs up to 4 part time locals who help with stock and conservation work. Farm will stay in the family.</p>

<p>Farm 8 – A small sized part time farm (45ha) with rights over adjacent common. Summer grazing over moor and semi improved pasture and all year round grazing on improved ground.</p>	<p>A reducing suckler herd and small sheep flock graze this area of SDA. Most stock are sold as stores as limited forage and buildings exist. HLS funding has encouraged the owner to graze more extensively and a move to native low input breeds (finished and value added) is proposed. AE is essential and now the main income stream but it is probably insufficient to cover the long term investment needed in the necessary infrastructure and stock to make the farm truly viable. Profit levels are small. The future is fragile and will depend on a successor, financial support and diversification.</p>
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Table 2-1: Description of Farms Surveyed

2.3 HNV farmland and features

For each farm, the nature, extent, density and context of HNVF habitats and landscape features is set out in Table A2 in Appendix 1.

The predominant open-ground HNVF habitats are likely to be associated with the moorland including blanket bog, upland heath and purple moor grass rough grassland. Valley mire or fen habitats were less commonly identified but nonetheless present. A number of farms have unimproved lowland hay meadows. Broadleaf woodland (including ancient upland oakwood) and wet woodland is also present within the farms' HNV habitats. Devon hedge banks and hedgerows form significant HNV corridors across much of the area. HNVF landscape features also include rivers, streams and ponds. Many of the farms were knowledgeable about the presence of a range of species on their holdings, including bats (particularly the greater horseshoe), otters, rare butterflies such as the high brown fritillary and breeding lapwings. In most instances on the home farms, the higher quality semi-natural habitats are sporadic, buffered by improved and semi-improved pasture, this is in contrast to the mosaic of habitats on common land which are large contiguous expanses.

There is no simple rule for judging when semi-improved land can be classed as HNVF, and an element of subjective judgement is necessary. Generally, where semi-improved land occurs as part of a continuum between fully improved land and semi-natural land, the semi-improved is logically regarded as being part of the HNVF whole. In these situations semi-improved land will be used and influenced by some of the wildlife present on adjacent semi-natural land, and helps to buffer that higher quality land. By contrast, where semi-improved land occurs as isolated tracts surrounded by improved land (for example as a small area of steeper land in an otherwise gently sloping field, or a small corner of a larger field) it is more logical not to regard it as HNVF.

Using this distinction, the proportions of HNVF on the eight farms ranges from 10% to 98%. Three of the farms have a high density of HNVF habitats. Three other farms have a medium density of HNVF habitats, and two farms have a low density of HNVF.

Natural England Holding Assessment Toolkit (HAT) data was available for all eight farms. See **Note 4** for more detail on HAT criteria and scoring. Six farms (Farms 1, 2, 3, 4, 5 and 8) scored A (highest), one farm (Farm 7) scored C and one farm (Farm 6) scored F (lowest). There is a mixed correlation between HAT scores and HNVF presence, the 3 farms with the most HNVF are all scored 'A', which is likely to be due to

the presence of SSSI designations. There appears to be no pattern between HAT and HNMF on the other farms.

2.4 Management of HNMF farmland and features and link to farming system

On all of the farms HNMF is managed positively, all with the incentive of AE scheme funding. A number of farmers have a more personal motivation for managing the land and environment, and most of them have a personal interest in conservation and the environment. For each of the eight farms, the farm circumstances and approach to HNMF management are set out in Table A3 in Appendix 1.

Farmers' attitudes are generally positive; in most cases management is seen as part of general farm maintenance with support through AE schemes. The farmers' attitude to HNMF landscape features, their management, the effect of agri-environment schemes on this management, and the relevance/integration of HNMF to the farm business is set out in Table A3.

HNMF moorland and grassland habitats are generally lightly grazed with beef cattle and sheep, or sheep only. Grazing units are highly defined by AE scheme prescriptions, and usually requires winter stock removal. One farm is permitted a reduced number of cattle on the common in winter months. Three farms undertake grazing with native ponies. For four farms the reduction in stock numbers due to scheme prescriptions has negatively impacted the habitats, and the farmers raised issues with scrub, gorse and bracken encroachment due to under-grazing. For the other farms entry of the land into the scheme has resulted in a positive change, through specified grazing or payments for scrub and bracken management.

The relevance to or integration of the HNMF into the main farm business varies between farms and depends on the range of enterprises. On Farms 1 and 2 the main farm business is not related to management of HNMF, but management is supported by AE schemes. On Farm 5 the main income is off-farm but management of HNMF is an interest and is integrated into the desire to build up a herd of hardy pedigree cattle suitable for grazing the HNMF land. On Farms 3, 4, 6, 7 and 8 management of HNMF is well integrated into the farm system, particularly on Farm 4 where moorland management is integral to the functionality of the hefted flock³. Woodland is generally not relevant to farming practice and is generally not proactively managed. Farm 3 is reverting a plantation to naturally regenerated woodland.

2.5 Benefits of farming systems and practices for nature values

A brief summary of HNMF management and condition is set out in Table A4 in Appendix 1.

In the majority of cases, the HNMF moorland habitats are in fair to good condition (and in some cases recovering) as a result of grazing prescriptions under ESA or HLS. On Farms 3, 4, 5 and 7, the farmers noted that moorland habitats were suffering from

³ Hefted flock – A hefted flock is a flock which is attached to a piece or parcel of land in unenclosed hill and mountain pasture (the 'heft') usually because they have been bred on it. In Dartmoor, hefting is known locally as Learing, with the land area known as the 'Lear'.

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under-grazing due to the stocking restrictions under ESA and HLS. Gorse, bracken and scrub encroachment was highlighted. Farms 7 & 8 also mentioned scrub being an issue. The majority of farms were grazing cattle on the moor from around April/May to November/December, Farms 4 and 8 were grazing some cattle year-round. Sheep grazing was generally year-round. Only Farm 2 does not use the common land for grazing animals.

HNVF landscape features such as hedges and Devon banks are generally in good condition, often as a result of capital works programmes within AE schemes. Woodland management is minimal, with only one farm mentioning a programme of natural regeneration. Farm 3 has increased the amount of hedges on the farm through his AE scheme.

Additional evidence

Agri-environment scheme uptake has been successful in the area, through targeted projects by DNPA and various partner organisations, and Natural England's own targeting for the ESA and HLS schemes.

The Dartmoor Hill Farm Project included advice and application assistance to farmers wishing to enter agri-environment schemes. The Dartmoor Mires Project is a project funded by South West Water aimed at restoring mires and blanket bog to deliver water management and wider biodiversity and carbon sequestration benefits. Farmers and landowners are also involved in project management.

The management of HNVF features such as stone walls and hedgebanks has been promoted by training events run by DNPA and the Devon Rural Skills Trust. The Dartmoor Grant, directly funded by DNPA, also funded items relating to the natural environment such as tree planting, but was closed to new applicants after the 2009/10 year due to budget restrictions.

Both anecdotal evidence and research would suggest that under-grazing is becoming more of an issue for the management of HNVF due to reduced stocking numbers. Natural England has estimated that within all the agri-environment schemes (ESA and HLS) there is about a 30% shortfall in the total LU (Livestock Units) permitted on the moor in summer, the peak grazing season. However while stakeholders recognise that undergrazing is occurring in some places, they also point out that elsewhere overgrazing is an issue. On the open moorland, the mismatch relates to the lack of shepherding. Shepherding is critical to obtain the right grazing pressure however it is difficult to manage the quality of shepherding (via the commons associations) and the increasing cost of labour and fuel is tending to reduce regularity of stock checking.

Discussions with stakeholders suggest that more farmers now wish to increase numbers and out-winter stock for economic reasons; the extent to which they do so will depend on entry of their land into HLS and the HLS agreement terms. There is now more flexibility to tailor stocking rates and timings under HLS than there was under the ESA, including potentially extended the grazing period on more resilient habitats into late autumn/early winter. However shepherding and control is important, to avoid damage to sensitive habitats, and Natural England is against winter feeding given the damage caused in the past from poaching, nitrification and wheel ruts.

DNPA has increased the areas of moor subject to 'swaling' (controlled burning) in recent years due to a reduction in stock numbers. The regulations regarding swaling are

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likely to be putting off many farmers from continuing this traditional practice. They are restricted to burning smaller areas, which require greater man power, and risk penalties to their payments if the fire burns out of control.

The grazing of moorland habitats by semi-feral native ponies has also declined dramatically in the last three decades, due to increased costs from regulation and a dramatic decrease in market value. It is estimated that the population was around 30,000 in the 1980s but is now down to around 1,500 animals. Anecdotally this is seen to be having an effect on the encroachment of bracken which was previously trampled by the ponies. Pony grazing can also be beneficial for Rhos pasture habitats.

Specific projects (run by Butterfly Conservation) have targeted habitat management on Rhos pastures for the marsh fritillary butterfly and on bracken dominated moorland for the high brown fritillary and the pearl bordered fritillary. The success of the projects has been due to the proactive nature of the employed project officers, who have assisted farmers with HLS applications and organised habitat management days such as scrub clearance on small and difficult sites.

The effect of the introduction of UELS in 2010 is yet to be fully assessed, but it could be assumed that options within the scheme should be of benefit to the management of HNMF. However some stakeholders feel that UELS will have a negligible impact on HNMF management as it will only replace HFA payments and does not go much further than cross compliance requirements. There are also no capital works payments to support the restoration of HNMF landscape features such as hedges, hedge banks and walls. Due to budget restrictions UELS is likely to be the only AE scheme on most home farms.

2.6 Socio-economic context of farms and HNV farmland management

The socio-economic context of each of the eight farms is set out in Table A5 in Appendix 1.

On all of the eight farms, AE schemes are supporting the costs of managing the moorland habitats; however all farms stated that the payments do not cover the full costs associated with grazing livestock on such land. On Farm 4 the support from AE combined with SPS and the Uplands Transitional Payment (UTP) - an interim payment bridging the gap between the end of HFA payments and entry into UELS, for those presently in classic schemes - gave the farm a small profit, but the limits on stocking rates within the schemes meant there was no way of building up the herd and benefitting from economies of scale. Reduced inputs on land within scheme options was also mentioned as restricting yields, and therefore the number of stock the farm could support. Farm 2 also said that the cost of managing grassland with cattle was covered by the SPS subsidy.

The costs associated with removing stock in the winter such as feed, straw and housing were mentioned as negative factors in keeping cattle on these systems, with farms unable to cover these costs without subsidy. Without AE restrictions, Farm 6 would be likely to out-winter some of his hardy cattle on the common, as wintering them off the moor is very expensive, he also mentioned that winter housing hill cattle is not beneficial for their health and hardiness.

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On Farm 5, the farmer was trying to establish a new herd to graze his HNMF land, and whilst he was receiving UELS/HLS management payments on the land, these went nowhere near covering the cost of purchasing new stock or handling facilities. Farm 8 stated that farming on LFA land is not profitable or even possible without subsidy support.

On seven out of the eight farms, the grazing livestock enterprises are being subsidised by other enterprises including poultry production, tourism and residential lettings. Two of the farmers were also undertaking off-farm work, in one case to supplement income and in another as the main source of income.

On five farms (Farms 3, 4, 6, 7 and 8) the HNMF is regarded as a net asset to their farm business, due to the ESA or HLS payments. On Farms 1 and 2 the income from AE helps with the management of HNMF but is a small part of main farm business. On Farm 5 off-farm income is supporting the farm, along with some AE income. On all the farms in stewardship there is recognition that profitable HNMF management is highly dependent on HLS payments. It can also be assumed that dependency on AES means that whilst secure in the short to medium term (up to 10 years) the long term management of HNMF is particularly uncertain.

Examples of HNMF cost-benefits

Two examples of cost-benefits of specific HNMF approaches/practices arising on the visited farms are set out below. The physical and financial figures shown are based on estimates, but are informed by actual data collected from the farms visited.

Table 2-2 shows the potential impact of switch from ESA payments to UELS or UELS/HLS payments on one farm. Only part of the farm is eligible for ESA payments; on the rented land these payments are taken by the landlord. The current ESA agreement ends in 2014. The figures show a potential increase of either £2,502 (under the switch to UELS only) or £4,902 (under the switch to UELS/HLS). This is positive however there would be additional management and costs associated with the new schemes. The farm would be eligible for UTP between the end of the HFA and entry into UELS; this is worth around £37-39/ha. It is worth noting that the SPS payment on whole farm has decreased by over 40% (over £30,000 p.a.) since 2005.

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264 ha medium-sized, SDA beef farm – switch from ESA to UELS or UELS/HLS			
	ha	£/ha	£/farm
Permanent grassland	180		
Temporary grassland	61		
Other land including arable and woodland	23		
<i>Total area</i>	<i>264</i>		
Home Farm only (121 ha)			
[no ESA payments receivable on rented land]			
Current – ESA			
ESA Tier 1A All land (including arable, temporary grassland etc)		£20	
ESA Tier 1B Improved permanent grassland		£30	
ESA Tier 1C Low input permanent grassland		£37	
ESA Tier 2A Species-rich hay meadow		£160	
Total annual payment on farm	121	£41 est	£5,000 est
Alternative - UELS			
UELS SDA land below Moorland Line	121	£62	£7,502 est
Alternative – UELS/HLS			
UELS SDA land below Moorland Line	121	£62	£7,502
HLS HK5 Maintenance of species-rich grassland (10% only est)	12	£200	£2,400
Total annual payment on farm	121	£82 est	£9,902 est
Potential uplift in agri-environment scheme payments			£4,902 est

Table 2-2: Cost-benefit: 264ha SDA beef farm – change from ESA to UELS/HLS

Table 2-3 shows the importance of public payments to total farm income on another farm. There is an array of schemes. The main farm is in an ESA agreement presently and the common land is in UELS/HLS. The farm receives UTP and SPS payments. Altogether, the farm receives around £87,000 in public payments, equivalent to 46% of total turnover. As indicated by the farmer, “livestock farming on the hills is not profitable without support. With SPS, UTP and ESA (etc) it is just possible”. Access to capital grants is also considered very important as there is no spare money to improve the infrastructure.

464 ha large, SDA mixed farm – importance of public payments			
	ha	£/ha	£/farm
Permanent grassland	210		
Temporary grassland	40		
Other land including arable and woodland	12		
Moorland	202		
Common land – 922 rights on 3 commons	-		
<i>Total area</i>	464		
SPS			
Total SPS payment			£60,000 est
UTP			
Total UTP			£10,000 est
ESA on own farm & UELS/HLS on common land			
ESA Tier 1A All land (including arable, temporary grassland etc)		£20	
ESA Tier 1B Improved permanent grassland		£30	
ESA Tier 1C Low input permanent grassland		£37	
UELS SDA land above Moorland Line (parcels >15ha)		£23	
HLS HL9/ HL10 Maintenance/restoration of moorland		£40	
Total agri-environment scheme payment	464ha + common	£37 est	£17,000 est
Total public payments	464	£187 est	£87,000 est
Total public payments as % turnover/output			46%

Table 2-3: Cost-benefit: 464ha SDA mixed farm – importance of public payments

Additional evidence

The farm business income evidence indicates very low profitability and high dependence on public support for LFA farms in Dartmoor. The income is highly dependent on SPS, agri-environment schemes and also tourism diversification; hence the economic importance for these farms of maximising subsidy receipts from SPS and agri-environment scheme payments. For five out of the eight farms which were happy to provide figures for farm profitability, the profit was always lower than the income from AE and SPS.

Other anecdotal socio-economic evidence gained from stakeholder interviews in relation to Dartmoor includes the following:

- There are a greater number of farmers in Dartmoor taking on part-time off-farm work as farming alone is unsustainable and is not covering living costs.
- As hill farmers turn their attentions elsewhere, in addition to the loss of their stock, the skills and experience required to manage what is a complex and unique environment are also at risk.
- The harsh climate and unproductive land means that livestock grazing on permanent pasture is often the only possible management, even if it is not very profitable.

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- The Duchy of Cornwall and to a lesser degree, The National Trust are large landowners in the area, leading to a relatively high proportion of tenanted farms. Reduced profitability means that tenant farmers are unlikely to invest heavily in the future of the farm, and as such the long-term sustainability of these farms is likely to depend on the decisions made by these organisations.
- However the Duchy “actively encourages its tenants to practice conservation alongside commercial farming”. It does this by spreading information on best practice and responsibilities under environmental legislation, encouraging high levels of biodiversity, and raising awareness of the principles of organic farming, and the potential of other agri-environment schemes. Good land management is encouraged, and the Duchy supports the reduction and recycling of waste and the Duchy also sets aside a portion of its repairs budget to be spent on conservation and amenity projects, of particular relevance for the current study is funding towards walling on Dartmoor.
- Tourism is very important. This means farmers engage with the general public and there is also an important, additional income stream for some farms.
- Several larger farms have been broken up and sold off in recent years, this has led to a greater number of small landowners who may not have the skills or knowledge required to manage HNV habitats, or possess the stock needed to graze such sites.
- In general farmers and active commoners are aging, with fewer new entrants. This is resulting in a loss of skills in the specialized farming of the uplands.

2.7 Obstacles to managing HNV farmland

In order to maintain and manage HNVF, basic needs - from a farmer’s perspective - include the availability of suitable livestock, machinery and suitably qualified labour and sufficient returns to cover costs and generate an element of profit.

A range of obstacles to managing HNVF were identified from the farms visited.

Relevance to business

- Irrelevance of HNVF to the core farming business, it is only managed because of availability of ESA/ HLS payments (however, without AE subsidy the farms would be struggling).

Practicalities

- HNVF is considered marginal in terms of grazing productivity, but in some cases could support more stock if permitted (particularly open moorland).
- Checking animals on the open moor is time consuming.
- Livestock health issues, in particular TB can be a barrier to grazing sites, grazing livestock on unenclosed moorland increases the likelihood of interaction with other herds.

Profitability

- The view that farming is too reliant on subsidies and should be market led.
- Concern over reduced subsidy, and over-dependency on subsidy.
- The costs of buying in hay and straw for animals wintered off commons are increasing, without any increase in market price.
- Building up a herd of suitable animals (native, hardy breeds) is costly.

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- Cheap labour in the 1960s enabled management of the landscape as part of the farm; this now too costly when labour is stretched.

Schemes

- ESA/HLS has enabled management, but prescriptions are often too rigid. In particular the restrictions on stock numbers reduce profitability, and lead to under-grazing
- The payments do not recognise the true cost of providing moorland grazing management.
- Some prescriptions do not take account of the traditional farm management which has created the valuable habitat in the first place!
- The scheme requirements of summer grazing do not take into account that livestock needs year-round forage and/or housing overwinter.
- Some tenanted farms are compromised in their ability to manage HNMF due to AES payments being taken by the landlord, or have challenging rental costs on marginal/HNMF land.
- The view that government does not give clear direction to what it wants farmers to do.

Farmers also had positive comments regarding managing HNMF, including:

- Farming extensively suits the land and benefits the environment.
- They see themselves as custodians of the land.
- Farming extensively with HLS means land can be farmed with less labour input, reducing costs. Common grazing enables enclosed land to be managed for silage/hay or rested during summer months
- They believe there is a moral obligation to farm the land when receiving subsidies from public money.
- Farming is a lifestyle they know, and they feel a responsibility towards the family farm.

Additional evidence

Other issues mentioned by stakeholders include the following:

- Dependence on AES to fund management on HNMF is not sustainable in the long term, the restoration of habitats of Dartmoor needs a long term (50 year) vision, supported by appropriate funding mechanisms, which 10 year AES schemes cannot offer.
- The presence of common land can cause difficulties in gaining agreement on management. Many commons with ESA schemes are now looking to enter HLS, with agreement required on stocking rates and payments. These factors can cause issues and arguments within the local communities, with schemes being delayed due to a lack of agreement. Agreements on smaller commons appear to work more effectively, with fewer individuals needing to agree to management requirements. The smaller commons are often easier to manage from a practical point of view and are closer to the home farms.
- There is a particular trend for short-term tenancy agreements on rented land, meaning that tenants are often not eligible for scheme payments which require a five year commitment (previously tenants/graziers would have received the HFA).

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- The restrictions on stocking rates for land in schemes are a barrier to having grazing stock, particularly on common land. Smaller flocks/herds still need checking and managing but the returns from less stock are less for similar inputs.
- AE payments are based on income forgone, which in upland situations is starting from a very low payment base, a preferable system would be to pay for the service being provided, at its true cost.
- Many smaller sites, particularly Rhos pastures are not economically viable to manage, so depend wholly on scheme payments to prevent abandonment.
- The move of livestock production 'downhill', and the intensification of these areas, poses a threat to both non SSSI and moorland HNV.

2.8 Future trends and consequences for nature values

Future trends in the interviewed farmers' approaches to HNVF and the potential vulnerability of HNVF as a result of these trends are set out in Table A5 in Appendix 1.

For the farms in HLS on the home farm (Farms 3, 5, 7 and 8) the scheme should secure consistent, positive management of HNVF for the remainder of the agreement term (up to 10 years). On Farm 5 income from off-farm employment means that management is fairly secure, although there is the consideration of retirement within the next 10 years; the farmer has an aspiration to build up a herd of pedigree Galloways.

For the three farms in ESA schemes (Farms 1, 2 and 4) the future beyond the end of the scheme is less clear. Although they are within the target area for HLS, current restrictions on the budgets for agri-environment mean that there is no guarantee on them successfully gaining an agreement. HNVF management on Farm 1 is highly dependent on AE "if support went, so would we"

On Farms 1 and 3, a poultry enterprise is likely to be the main supporting factor for the farm, enabling HNVF management to be absorbed into overall farm business. The future direction of Farm 6 is likely to be a reduction in stock numbers, unless markets dramatically improve. Farm 5 is likely to remain a livestock farm, as there are few other options.

The availability of a successor was also mentioned in relation to the future direction of a number of farms. For instance on Farm 2, if the farmer's children do not want to continue with the farm, they are likely to reduce stock numbers and live off the SPS payment.

The future of HNVF habitats on common land is likely to be generally secure, due to both designations (SSSI, SAC) and HLS schemes.

The management of HNV landscape features such as hedges is likely to be generally static or improving.

A number of the holdings were tenanted, but without specific information on the motivations of the landlords it is not possible to gauge the long-term future direction of these farms.

Additional evidence

There is a range of additional evidence available from studies and stakeholder interviews which provide some indication of future trends for farms with HNMF. Butler et al (2007) undertook a postal survey of 598 Devon farmers in late 2006 in part to ascertain farmer intentions and drivers of future plans. Key findings relevant to this study (albeit from a now dated survey) were as follows:

- 82.1% of farms will continue under the management of the same family over the next five years. This includes 62.9% of who intend to be managing their farm as they are now or with increased production or increased diversification activities and a proportion who intend to retire or semi-retire and have identified a successor to take over the family business.
- 30.7% of farms will increase livestock numbers but conversely 24.8% will reduce numbers. This reflects gradual structural adjustment in the sector. This figure is likely to have changed in more recent years, with sheep prices in particular increasing. Beef producers are facing increased costs from market volatility in the cereals sector, leading to feed prices increasing.
- The majority (76.2%) of Devon farmers consider farm profitability to be the main influencing factor affecting future farm plans. This includes agricultural enterprises, as well as schemes and other activities. Other factors include market prices (60.1%), cost of inputs (52.4%), 'to make life easier' (49.8%), SPS (46.6%), time of life (39.4%) and environmental schemes (37.3%).

Aside from farmer views, it is important to note the following general trends and drivers likely to affect farming and land management on Dartmoor. These are based on a review of various studies and reports including Cumulus (2007) and Andersons (2010), together with stakeholder comments:

- **Market volatility.** There is likely to continue to be market volatility as beef and sheep products are influenced by a range of global, European and domestic factors. Beef farmers are presently experiencing increasing prices but feed costs are also rising.
- **Local markets.** There continues to be an interest from consumers in locally-sourced food. A recent survey of 1000 shoppers in the UK by IGD (IGD (2010) Shopper Trends Report, see article on www.thefoodnetwork.co.uk) showed 30% had specifically bought local food in the last month (up from 15% in 2006) and 54% said they wanted to support local producers (up from 28%). This would suggest a continued place for the production and marketing of local foods even in the current recession - "*shoppers are looking for both value and values*".
- **Input prices.** Prices of inputs such as fertilisers and fuel are expected to continue to increase gradually over the years ahead, indicating continued need to make efficiencies to maintain profitability.
- **Single Payment.** SPS payments can be expected to continue to decrease until 2012 for the majority of farmers in the SDA, as indicated in Section 1.4. Thereafter, CAP reform can be expected to result in a reduction in and re-targeting of support payments (possibly linked to the delivery of public goods / ecosystem services). Some estimate that the average Single Payment could be halved by 2020, although land of high environmental value including that in the SDA could be protected from the worst of the cuts.
- **LFA subsidy** – Although the HFA has now been abolished, its replacement with UELS and, for those with ongoing classic AE schemes, the UTP should provide

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some continuity. However CAP reform may influence the nature and location (Pillar I or Pillar II) of LFA support in the medium-long term.

- **Agri-environment Schemes.** Environmental Stewardship will continue however it seems inevitable that it will be under budgetary pressure in the future. Existing ELS/UELS and HLS agreements are probably secure for the remainder of their agreement term, but prospects for new HLS agreements in terms of number and total payments could become more limited up to the end of 2012 and beyond. There is no absolute guarantee the scheme will be available in any RDPE after 2013.
- **Other rural development expenditure** is similarly likely to be curtailed over the remainder of the 2007-2013 period, reducing investment in farm business, farm diversification and rural community projects.
- **Exchange rate.** A weak sterling over the past two years has benefited farming via improved export prospects and increased support payments. This may change if the pound strengthens (as a result of current government policies and the performance of the economy), with a resultant reduction having an adverse impact on farm profitability.
- **Animal health and welfare.** TB and other animal diseases will continue to adversely affect livestock farming in the SW (including Dartmoor) both in terms of profitability and confidence. A reduction in the number of herds and the trend towards more finishing is likely to result in fewer hardy animals suitable for moorland grazing.
- **Climate change.** In the medium-long term, livestock producers in the county will need to adapt to warmer summers and winters, reduced summer rainfall, more heavy rainfall events and a generally less predictable climate. These changes may result in changes in stock types, reduced stocking rates, different grazing regimes and changes in forage crops grown.
- **Land market/land values.** In general, agricultural land values are expected to increase over the next few years on the back of growing population, demand for food and other products from the land, and rising commodity prices (Savills (2010) Agricultural Land Market Survey 2010).
- **General economic circumstances.** Reduced public expenditure, reduced consumption of certain goods and services, and increased unemployment could all adversely affect income from on-farm diversified (tourism and other) enterprises and off-farm income, reducing farm profitability.
- **Diversification opportunities.** These are more limited in the uplands due to the sparse population and, for a number of areas, greater distances to large population centres. Defra's FBS data highlights that LFA farms have the lowest proportion of diversified activity: 37% of LFA grazing livestock farms undertook some form of diversification in 2009/10 (compared to 50% across all farms) and the contribution of these diversified activities to farm business income was 5%. The survey highlighted that over half of upland farmers with no current diversified activity felt there was either no scope or they had no plans to diversify, and a further significant group had never thought about diversifying (28% of those with no current on-farm enterprise and 43% of those with no current off-farm enterprise or income). There is, however, an increased tendency in the uplands towards supplementing farm income with off-farm employment – whether on the part of the farmer or spouse – reducing the time available for further on-farm diversification.

If these trends are applied to HNVF in Dartmoor, key points about the future to highlight include the following:

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- The prospects for beef and sheep farms which support HNVF are uncertain in the short term, although the underlying trends for agriculture in terms of commodity and local markets are generally positive in the medium-long term.
- Beef and sheep farms in the LFA, especially in the SDA, are vulnerable to a decrease in SPS income up to 2012 and then beyond, over the next CAP period to 2020. They are also vulnerable to a reduction in agri-environment scheme and diversification income. This is likely to adversely affect farm profitability resulting in further restructuring (ie. fewer farmers and farms being responsible for the grazing of more land).
- Livestock numbers are vulnerable not only to underlying enterprise profitability but also animal disease risks.
- Traditional breed livestock appear likely to continue to play a small, but important part in grazing habitats on Dartmoor due to their hardiness. Traditional breeds may add value to the beef where it is being sold to local markets.
- Environmental outcomes will be dependent, to an extent, on the continued availability of agri-environment scheme income. However future budget cuts could limit the area under HLS in particular, even though Dartmoor moorland is a priority area for HLS.
- Income from off-farm working appears to apply significantly in Dartmoor when compared to the rest of Devon.
- The potential income from diversification is likely to be lower within the SDA than elsewhere in Devon, although tourism offers possibilities.

3 Conclusions

Our conclusions from this case study are as follows:

- HNVF is estimated to cover 3,936 ha or 49% of the Dartmoor case study area. The moorland included in the study area comprises parts of the North Dartmoor SSSI, the East Dartmoor SSSI and the Dartmoor SAC. It ranges from blanket bog and tors at higher altitudes, through heather and gorse areas, acid grasslands with bracken stands, with valley mires on the lower slopes. Several of the valleys in the study area hold Rhos pastures along with a number of unimproved dry grasslands, especially in the area to the west of Chagford, and include several fields managed as hay-meadows. The woodlands include a small number of ancient broadleaf sites which tend to follow the valley of the River Teign through a central band of the study area.
- 54% of this HNVF is designated SSSI, with 5% designated as CWS, and 53% designated SAC (some areas are both SSSI and SAC). 86% of HNV farmland is under some form of agri-environment scheme (mainly HLS and ESA).
- HNVF occurs in a spectrum of farming situations. The farms surveyed represent those most typical of the Dartmoor area. All were livestock farms, either a mix of beef and sheep, or just beef or sheep only. Two farms had a herd of native Dartmoor ponies. Farms ranged in size from 16ha to 572ha, and all had access to moorland common land. Farms had land with SSSI, SAC, NNR and SAM designations, all were within the SDA and the National Park.
- HNVF habitats represented included lowland meadows, purple moor grass, upland heathland, blanket bog, valley mire and fen, upland oakwood, wet woodland and lowland deciduous woodland. The proportion of HNVF habitats as part of the total farm area ranged from 10% to 98%, with a high density of HNVF features such as hedgerows and Devon banks due to the small field sizes. HNVF habitats were generally buffered or adjacent to semi-improved or improved permanent pasture. Arable cropping was limited to fodder crops and a small amount of HLS wild bird seed mix on one farm.
- HNVF is regarded by the farmers surveyed as being both secondary/peripheral to their business and a key asset due to HLS payments; all of the farmers surveyed had a personal interest in conservation and the environment. On all of the farms management was dependent on AE payments, and in all cases where farm profitability figures were offered the total profit was less than SPS and AE payments. On seven out of the eight farms, the grazing livestock enterprise were subsidised by other enterprises including poultry production, tourism and residential lettings. Two of the farmers were also undertaking off-farm work, in one case to supplement income and in another as the main source of income.
- HNVF management is influenced by the beef rearing and finishing, and sheep systems which predominate in the Dartmoor National Park. In the majority of the farms visited, HNVF grazed habitats are in fair to good condition as a result of light-moderate spring and summer grazing, however it was noted that HNVF habitats on common land were suffering from scrub encroachment due to under grazing. HNVF

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landscape features such as hedges and hedge banks were in satisfactory to good condition.

- Farm business profitability for many farms with HNMF in Dartmoor is low and highly dependent on SPS and AE income. Upland grazing (beef and sheep) farms will be particularly vulnerable to reductions in subsidy which are expected to occur as part of CAP reform from 2013 onwards. All commercial farms with HNMF (including beef and sheep, and mixed farms) are subject to financial pressures arising from (often short term) market volatility; this affects output and input prices, profitability and ultimately land use and land management decisions.
- The profitability of HNMF management *per se* is generally positive, but this is heavily reliant on SPS and agri-environment scheme income. This is positive in the sense that it shows that policy is having an important effect. However, agri-environment schemes are, in some cases, enabling HNMF management only on an artificial, temporary basis which may not be sustainable after the end of an agreement. Reduced income from SPS and agri-environment schemes could lead to a change of management of HNMF. This could have negative impacts. For example, where HLS is unavailable, farmers will have to take a different strategy to maintain profitability by increasing stocking on the moor and/or focusing production on inbye and lower land.
- Aside from financial pressures, there is a range of other obstacles to managing HNMF. These included animal health and welfare concerns, switch to finishing systems and less hardy breeds, lack of labour, lack of successors, and eligibility for and the commitments involved with HLS.
- Key policy messages from the case study include the following:
 - There is generally low profitability for upland livestock farms on Dartmoor. The profitability of livestock and mixed farms with HNMF is particularly dependent on SPS and agri-environment scheme income and vulnerable to changes in scheme design and payment rates.
 - SPS will evolve with CAP reform, but where farms provide valuable public benefits via HNMF management, scheme payments should be sustained to avoid significant, adverse effects on farm profitability and hence HNMF management.
 - Agri-environment schemes are very beneficial for HNMF in Dartmoor but could be improved. HLS needs to be available and made simpler, more flexible and more user-friendly, harnessing the knowledge and experience of farmers.
 - The future impact of reduced and/or inappropriate stock grazing on the uplands should not be underestimated, and there needs to be strong incentives to ensure sustainable hill farming.
 - Ecosystem services provide an opportunity for additional/alternative income sources for HNMF; however appropriate payment mechanisms and markets need to be developed. (see Defra's Upland Policy Review).
 - The importance of tourism for the Dartmoor National Park area should be considered, and links developed between HNMF on farms and tourism-related businesses. This should be encouraged to help improve the long term sustainability of HNMF management.



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- There is still a need to address some of the practical obstacles associated with managing HNMF including: shepherding, livestock health; management with ponies etc.

The implications of these findings for policy and for future conservation of HNMF will be developed in the report for Phase 3 of this project.

Appendix 1: Farm Interview Findings – Summary Tables

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8
Categorisation	Large mixed livestock farm. Family farm	Medium sized livestock farm.	Smallholding with sheep only	Large mixed livestock farm	Small farm building up new cattle herd	Medium sized mixed livestock farm	Medium sized. Mixed livestock. Some arable for bird cover. Family farm.	Small sized plus common rights. Mixed livestock. Family farm
Holding area /ha	572	264	18	464	40	121	155	45
Tenure	9ha freehold 562 Tenanted Rights on common	122 freehold 142 tenanted rights on common	18 freehold rights on 2 commons	162 freehold 292 tenanted rights on 3 commons	40 freehold rights on 2 commons	81 lifetime tenancy 40 tenanted Rights on 4 commons	75ha Freehold 80ha Tenanted	45ha Freehold Rights to graze 50 cattle and 150 sheep on moor.
Enterprises	90 Suckler hill cows plus followers. 260 ewes 30 Ponies 4000 Turkeys	150 beef cows plus followers (300) 8 sheep	140 ewes 70 yearling sheep 1000 organic turkeys 2 horses 1 pony Off-farm work for 20hrs p/w. house let	180 beef cows plus 220 followers 90 breeding ewes 6 horses 40 ponies	4 beef cows 2 horses 2 ponies	120 cows plus 130 followers 750 breeding ewes 3 working horses 40 ponies	Beef and sheep. Livery for local hunt. Holiday cottage and long term lets.	Beef and sheep.
Designations	NP, 3 x SSSI, 1 NNR, numerous SAMs	NP	NP, SSSI, SAM	NP. SAMs on common	NP. SSSI, SAC, SAMs on common	NP SSSI, SAMs on common	SAM. CWS. NP.	SAM. CWS. NP
Agri-env participation	ESA on home farm. HLS on common	ESA on home farm	UELS/HLS on home farm	Farm in ESA Commons in UELS/HLS & ESA	UELS/HLS on home farm and on common, plus ESA on common	ELS on home farm. HLS on 2 commons ESA on 2 commons	Was ESA Now UELS/HLS	UELS/HLS

Table A1: Description of Sample Farms

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	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8
HNVF habitats⁴ (note these are on-farm habitats and do not relate to the habitats on the common land farmed by the sample farms)	<ul style="list-style-type: none"> Lowland hay meadow Purple moor grass Upland heathland/moorland Blanket bog Mire and fen Upland Oakwood S/I grassland 	<ul style="list-style-type: none"> Lowland meadow Wet woodland Lowland mixed deciduous woodland S/I grassland 	<ul style="list-style-type: none"> Mire and fen Semi-improved grassland Wet woodland Plantation woodland S/I grassland 	<ul style="list-style-type: none"> Lowland meadow Purple moor grass Upland heathland Mire and fen Wet woodland S/I grassland 	<ul style="list-style-type: none"> Lowland meadow Lowland mixed deciduous woodland 	<ul style="list-style-type: none"> Lowland meadow Purple moor grass Wet woodland Orchard S/I grassland 	<ul style="list-style-type: none"> Unimproved grassland (Rhos pasture) Species rich meadow Gorse, bracken & scrub. Wet woodland Lowland mixed decid. woodland Wild bird cover S/I grassland 	<ul style="list-style-type: none"> Rough unimproved grassland Scrub Wet woodland S/I grassland
HNVF habitats as % of farm	86%	10%	29%	78%	98%	12%	45%	65%
Context of HNVF– S/I land⁵	The majority of the farm comprises the HNVF habitats listed above. The remainder is S/I grassland and a 4ha spruce plantation	90% of the farm is S/I grassland.	HNVF is set within mosaic of S/I grassland	The HNVF habitats listed above cover the majority of the holding with the rest being S/I grassland	27ha of the total 40ha area is lowland meadow, with 13ha of deciduous woodland. there are small areas of scrub which are invasive laurel and rhododendron	The majority of the farm is S/I grassland	River valley meadows and steep banks mainly S/I. Woodland, hedge banks and scrub throughout. Small area of wild bird cover. Adjoins improved and S/I land	The majority of the farm is S/I or scrub. Some I on flat pastures/meadows
HNVF landscape features	Hedgerows Rivers and streams Pond	Hedgerows Rivers and streams Pond	Hedgerows Rivers and streams	Hedgerows Rivers and streams	Devon banks, beech hedges Stone walls Rivers and streams	Hedgerows Rivers and streams	Devon hedge banks Walls Stream valley Ponds	Devon hedge banks Walls (Corn Ditch) Stream valley Copses
Density of HNVF landscape features⁶	High density	High density due to small field size	High density	High density due to small field size	High density	High density due to small field size	Variable – high on steeper slopes and in valley bottom.	Medium/high density

Table A2: HN VF Farmland and Features on Sample Farms

⁴ Habitat composition of main areas of semi-natural vegetation on the farm

⁵ Are the semi-natural habitats in isolation amongst improved land, or is there a 'buffer' of semi-improved (S/I) land around them – a progression from semi-natural, through semi-improved, to improved?

⁶ Higher density of HN VF features suggests greater ecological connectivity across the holding

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	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8
Attitude to HNVF habitats	Positive under ESA and HLS, has actively sought land with SSSI designation to increase income through AE schemes	Positive, believe obligation to farm if receiving public support. Believes cattle grazing is best management for perm pasture	Positive – being outdoors and protecting landscape is a life choice	Positive but if frustrated by management restrictions	Positive, is establishing own herd as considers extensive grazing best option.	Positive through personal motivation and ESA/HLS incentive	Positive through personal motivation, interest, tradition. HLS incentive helps.	Positive and interested, led by HLS incentive and Project Officer enthusiasm.
Attitude to HNVF landscape features	Positive	Positive	Positive	Positive	Positive and interested	Positive – manages hedgebanks under ELS	Positive towards maintaining features. Goes beyond ESA/HLS capital works.	Positive and interested.
Method of management	Beef and sheep grazing at light stocking rates to meet ESA/HLS prescriptions. cattle graze moorland in summer only	Grazing permanent pasture on home farm year-round with continental cattle. Doesn't use common	Sheep grazing may to November, around 40 winter on common	Some winter grazing permitted at low stock numbers	4 cows grazing moorland in summer	Grazes spring calving South Devon and Galloways on common April-December. Sheep year-round	Grazing with beef cattle and sheep. Light native pony grazing. Topping and brash/scrub cutting. Rewetting.	Grazing with beef cattle and sheep. Topping and brash/scrub cutting.
Effect of a-e scheme	Livestock grazing is only viable with AE scheme support. Habitats would go un-grazed without AE.	ESA requires removal of stock from wetter areas but otherwise limited effect	Support from AE is vital but stock restrictions mean under-grazing is an issue	Support from AE (along with SPS/UTP) means farms is just profitable with stock. Restricted stocking rates prevent progress	AE provides some funding but cost of establishing new herd exceeds payments	AE is vital in keeping stock, without it he would reduce numbers, possibly wintering a very small number year round. AE has negatively reduced stocking rates – now too low.	AE helps support management/ restoration. Options not always suited site - undergrazed, weed issues etc. Redwater increase. AE doesn't pay but fun and benefits tourism/ hunt/riding	AE helps support management and some restoration. Couldn't do it with out. Moving to a less is more approach.
Relevance to/integration with main farm business	HNVF is key to beef & sheep grazing & AE schemes, no relevance to Turkey business	Suckler cattle is main business, small area of HNVF has little bearing on this system	Grazing HNVF is integral part of farm system	Moorland management integral to system, stock is hefted to moorland	Main income is off-farm. Aspiration to become livestock holding again with pedigree herd of stock suitable for moorland grazing	HNVF is key to beef & sheep grazing & AE schemes,	HNVF is well integrated to farm business.	HNVF is key to sustainable management upon which the business is now based recognising the lands limitations.

Table A3: Farmer attitude to HNVF, management, scheme effect and relevance to farm business on Sample Farms

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	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8
HNVF habitats								
Stocking level	Very low to meet ESA/HLS	Moderate: 1.3LU/ha.	Low to meet ESA/HLS	Low to meet ESA/HLS	4 cows – building up herd	Low to meet ESA/HLS	Light: 1LU/ha across whole farm. Thought to be too low in places – under-grazing on HLS land.	Moderate: 1.4 LU/ha. Common grazing allows for resting/extensive grazing of S/I land.
Timing of grazing	Cattle – summer on moorland Sheep – year-round	Cattle year round on home farm-removed off wetter areas. Does not use common land rights	Mainly May to November	As per ESA/HLS mainly summer grazing though some cattle allowed on common in winter	Cattle summer graze moor	Cattle – April- Dec Sheep – year-round	Cattle - spring, summer, autumn. Sheep – year round Ponies – year round	Year round.
Resulting condition of HNVF habitats	Favourable or recovering	Small areas on HNVF in ESA, favourable condition	Under -grazing is an issue, encroachment of scrub	Largely favourable, some areas under-grazed and gorse is an issue	Largely favourable, some areas under-grazed	Largely favourable, some areas under-grazed	Largely favourable, some scrub, thistles, bracken.	Largely favourable, but scrub a problem (now being cut back).
HNVF landscape features								
Management of linear features	Managed as part of general farm maintenance	Hedgerow management in ESA	Has increased length of hedgebanks but time limited	Uses capital works to manage hedges/Devon banks	Managed as part of general farm maintenance	Managed as part of general farm maintenance	Hedge bank and wall restoration through capital works	Corn Ditch being restored.
Woodland	Minimal on home farm, wood on common is NNR	Minimal on this holding	Reverting a plantation to naturally regenerated native woodland	Minimal on this holding.	Managed by contractors as required	Minimal on this holding.	Minimally managed for conservation.	Minimal on this holding.
Resulting condition of HNVF landscape features	Generally good	Generally good.	Generally good, but needs support for continued up-keep	Hedges generally good, banks improving	Generally good.	Generally good.	Generally good.	Generally good.

Table A4: HNV Management Prescriptions and Condition on Sample Farms

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	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8
HNVF habitats								
HNVF costs being met, absorbed or rejected	ESA/HLS payments are supporting management of HNVF	ESA payments don't cover real costs of managing grassland with cattle, met by SPS subsidy	AE supports but off-farm work and turkey business are main income which absorb rest of costs	AE scheme supports livestock farming to graze HNVF but does not cover feed costs when stock are off the moor	AE schemes help but go nowhere near costs of establishing a new herd to graze them	AE require removal of stock in winter – payments do not cover feed, hay, straw etc or capital for suitable housing.	HLS does not cover cost of grassland management due to reduced forage yield and stocking rates. ESA helped with capital works but no HLS funding for current work.	Farming is not profitable on this land – HLS for HNVF is helping to support sustainable management.
Is the HNVF an asset, burden or irrelevance to farm business?	AE schemes make it an asset (approx. £50k p/a)	Irrelevant to suckler business	AE schemes make it an asset (approx. £2k on home farm, £5k on common)	AE schemes make it an asset (approx. £17k p/a) but high costs and hill cattle slow to mature	Asset through attitude and AE scheme income (approx. £14k p/a)	AE schemes make it an asset (approx. £25k p/a)	HLS makes it a net asset worth £126/ha but costs are high. Asset to tourism business and livery.	HLS makes net asset worth £266/ha (not including common)
Trends in approach to HNVF	HLS means HNVF on the farm should remain positively managed.	Continued management under ESA	AE support and attitude of farmer means HNVF should remain managed, wants to do more if time/money permit	HLS means HNVF on the farm should remain positively managed.	HLS means HNVF on the farm should remain positively managed.	HLS means HNVF on the farm should remain positively managed.	HLS means HNVF on the farm should remain positively managed.	HNVF will be managed under HLS for next 10 years. Destocking and doing more HNVF.
Vulnerability of HNVF resulting from above	Secure whilst AE payments remain- "if support went, so would we"	Vulnerable when ESA ends (2014), but cattle grazing is likely to continue as is farm system	Goal is good land management, but requires support	Secure with AE support, unsure of future without. Livestock farming is life, but realise not viable without subsidy	Secure with AE, will review at end of scheme and either continue or retire	Secure with AE. Without AE would reduce stock, so HNVF management would decrease	Sustainable land management goal so secure in long term. Secure for short term (10 years) on rented land.	Sustainable land management goal so secure in long term.

Table A5 part A HNVF habitats: Socio-economic Context for HNV Management – Relevance, Trends and Vulnerability – on Sample Farms

Commercial in Confidence

HNVF landscape features – hedges and other linear features, ponds etc								
HNVF costs being met, absorbed or rejected	Capital works under ESA/HLS, partly met/absorbed.	Capital works under ESA partly met/absorbed	Capital works under ESA/HLS, partly met/absorbed.	Capital works under ESA/HLS, partly met/absorbed.	Capital works under ESA/HLS, partly met/absorbed.	Capital works under ESA/HLS, partly met/absorbed.	Capital works under ESA covered 50%. Rest absorbed. No HLS capital works.	80% costs met by HLS payments. Payments key to viable management.
Is the HNVF an asset, burden or irrelevance to the farm business?	Minimal asset. Seen as normal farm maintenance	Seen as normal farm maintenance	Not relevant to business but done through own motivation	Minimal asset. Seen as normal farm maintenance	Minimal asset. Seen as normal farm maintenance	Minimal asset. Seen as normal farm maintenance	Minimal asset. Seen as normal farm maintenance	Generally irrelevant to business but part of farm maintenance.
Trends in approach to HNVF	General programme of restoration.	Programme of work in ESA	Increasing management if time/money allow	Devon banks need more work	General programme of restoration.	General programme of restoration.	General programme of restoration.	New programme of restoration.
Vulnerability of HNVF resulting from above	Safe whilst under current tenure and while funding is supporting.	Secure when supported in ESA	Secure whilst under current ownership, with support	Supported under AE	Secure whilst AE support continues	Safe whilst under current tenure and while AE funding is supporting.	Safe whilst under current ownership and tenure. HLS budget restrictions threaten restoration.	Safe whilst under current ownership and while funding is supporting.

Table A5 part B HNVF landscape features: Socio-economic Context for HNMF Management – Relevance, Trends and Vulnerability – on Sample Farms

Appendix 2: Notes

NOTE 1: METHODOLOGY FOR DERIVING THE DRAFT MAP OF HNMF EXTENT

The following data were used to produce the map:

- OS Mastermap (used as the base map from which HNMF land parcels were copied)
- Sites of Special Scientific Interest
- County Wildlife Sites
- Semi-natural vegetation
- Topography/slope
- Field size
- Landscape character
- Aerial photographs

The HNMF layer consists of copied OS Mastermap polygons. These polygons are taken from the Topo_Boundary layer. To facilitate selection and copying of the polygons the OS Mastermap layer was simplified to white polygon outline so that aerial photography could be seen beneath them.

The process for identifying HNMF was as follows:

1. The first stage was to digitise those OS Mastermap polygons which are co-located with SSSI and CWS.
2. The next stage was to work systematically across the AONB, using up to date aerial photographs, and digitise every instance of what appeared to be, from the aerial photographs, semi-natural vegetation (scrub, rough grazing, ponds etc.).
3. Another set of criteria for selection into the HNMF layer were agglomerations of small fields (high density of hedgerows), areas of orchard, small farm woodlands (broadleaved or mixed only – pure conifer plantation was excluded) and in some cases larger arable or grassland fields.
4. Finally, woodlands were brought in as High Nature Value Forestry is an aspect of the HNMF project.

Critique of effectiveness of aerial photograph analysis

Aerial photograph analysis varies in its ability to identify these categories of HNMF occurrence. HNMF on steep slopes or on cliff tops and maritime slopes is easily identified remotely. Lowland meadows (neutral grassland) tends to occur in fields which have been partially improved in the past, and have a more even, smooth texture from the air, which can easily be overlooked. Riparian wetland is usually rough in texture and can be identified. It is not possible to identify low input arable, a Type 3 HNMF through this method. Hedgerow and hedge bank corridors can be identified relatively easily from aerial analysis.

Hence aerial photograph analysis can (provided it is carried out by a trained individual) identify a large proportion of HNMF in this type of landscape, but difficulties include the following:

- Good quality semi/unimproved neutral grassland, where not identified as SSSI or CWS, are almost impossible to identify from aerial photography. Rough/scrubby

grassland is quite obvious. Some semi-improved rush pasture may also be overlooked.

- Arable land is problematic. CWS/SSSI do not generally represent good quality arable (i.e. rare plant/bird interest), though some CWS are designated for bird interest (South Devon Cirl Bunting CWSs). Stubbles or other cropland could also be mis-identified as being heath/tussock, given their similar rough texture
- Field patterns are not necessarily an indicator of high nature value.

NOTE 2: DATA SOURCES FOR FARMING CHARACTERISTICS AND TRENDS

Farming characteristics and trends in the case study area can be analysed through the following data sources:

- Farm Survey data (from the latest Defra June Survey). This data is available for the AONB and the sample parishes. For the sample parishes, some limited data for holdings with HNVF has also been obtained from Natural England. More detailed data on the farming characteristics of holdings with HNVF is unfortunately not available.
- Rural Land Register data (from the Rural Payments Agency). For the sample parishes, some limited RLR data for holdings with HNVF has been obtained from Natural England. More detailed data (e.g. RLR holding size, field size etc) is unfortunately not available.
- Single Payment Scheme data (from the Rural Payments Agency). This has the potential to show, by individual holding, land use, stock type present and other data. Unfortunately, this data was unavailable to review and analyse.

NOTE 3: DATA SOURCES FOR FARM BUSINESS INCOME

Farm Business Income (FBI) data is collated for Defra by Duchy College in the SW region. It provides robust financial data for a sample of farms in the SW region however it is not possible to extract a sub-sample for farms in the AONB, let alone farms with HNVF in the AONB.

The Farm Business Income section also draws on reports produced by the Centre for Rural Policy Research for Devon County Council. These include 'Farm Incomes in Devon 2007/8' (Lobley et al, 2009), which has been updated to include the latest available FBS data for South West England (2008/9). FBI is Defra's preferred measure of farm income and represents the return to all unpaid labour (farmers, spouses and others with an entrepreneurial interest in the farm business) and to all their capital invested in the farm business including land and farm buildings. This is essentially the same as net profit. Note only farms capable of supporting at least 0.5 labour unit are included in the FBS (for lowland grazing livestock farms, this equates to 30 suckler cows and progeny, equivalent to a 75 acre farm at an average stocking density).

NOTE 4: NATURAL ENGLAND HOLDING ASSESSMENT TOOLKIT SCORING

Natural England uses the Holding Assessment Toolkit (HAT) to score individual holdings in terms of the presence of particular features, designations or other characteristics in order to prioritise holdings for HLS funding. The criteria include:

- Target areas and theme areas

- Access, including
 - Public rights of way
 - CROW (Countryside and Rights of Way Act 2000) designated land
- Biodiversity, including
 - SSSI and other designations
 - BAP habitats
 - Rare species
- Historic Environment, including
 - Scheduled Monuments
 - Undesignated sites/features
- Landscape, including
 - AONB
- Resource Protection, including
 - Catchment Sensitive Farming area
 - Flood risk

There are five categories of HAT score: A (highest), B, C, D and E (lowest).

Not all holdings have been HAT scored.

NOTE 5: HNV FARM TYPOLOGY

A number of studies have attempted to identify farming systems associated with HNV farmland. These include Anderson et al (2003) and IEEP (2007) which both set out HNV farming systems typologies. Simplified versions of the more recent IEEP typology is set out below, showing those HNV farming systems potentially relevant to the Devon case studies.

Broad Category	HNV Farming System
Potential HNV cattle systems (beef and dairy)	Extensive systems using semi-natural pastures
	Extensive grass based systems
	Extensive grass/arable systems
Potential HNV sheep and goat systems	Sedentary low-intensity systems on semi-natural grassland
Potential HNV arable crop systems	Semi-intensive arable systems
Potential HNV permanent crop systems	Traditional orchards

Source: adapted from IEEP (2007)

Table A6: HNV Farm Typology - IEEP

When scoping potential farms to be surveyed, a number of categories were identified by the project team as representing the range of farms in Dartmoor likely to have HNV farmland – essentially a local HNV farm typology. This typology was based on an analysis of Defra farm survey data for the AONB and sample parishes, and a review by the project team of farming systems known and likely to support HNV farmland. The typology provides a number of sub-categories reflecting the extent of HNV land and the nature of the ownership. The local typology is shown in Table A7 alongside the relevant IEEP categories and Defra farm types (using our best estimates).

HNV farm type (Dartmoor)	HNV farm type (IEEP)	Defra farm type
LFA grazing livestock farm (beef/sheep) – small amount of HNV	Extensive systems using semi-natural pastures	Grazing livestock (LFA)
LFA grazing livestock farm (beef/sheep) – medium amount of HNV	Extensive systems using semi-natural pastures	Grazing livestock (LFA)
LFA grazing livestock farm (beef/sheep) - high amount of HNV	Extensive systems using semi-natural pastures	Grazing livestock (LFA)
LFA grazing livestock farm (beef/sheep) – medium-high amount of HNV	Extensive systems using semi-natural pastures	Grazing livestock (LFA)
LFA grazing livestock farm (beef/sheep) – small-medium amount of HNV	Extensive systems using semi-natural pastures	Grazing livestock (LFA)
LFA Mixed farm – small-medium amount of HNV	Extensive grass/arable systems	Mixed farm
LFA Non-farming landowner – small-medium amount of HNV	Extensive grass based systems	Other
LFA Dairy farm – small-medium amount of HNV	Extensive grass based systems	Dairy
LFA Other farm – small-medium amount of HNV	Extensive grass based systems	Other, Poultry, Horticulture

Table A7: HNV Farm Typology – Local

Sample Parishes

A series of four sample parishes in the Dartmoor were identified at the outset of the case study in order to provide a manageable area as the basis for analysing detailed RPA/NE data including RLR and SPS data. These parishes were also used to identify suitable farms for survey using the local typology referred to above. The sample parishes – Gidleigh, Throwleigh, Chagford and North Bovey – include habitats which are broadly characteristic of National Park as a whole.

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