

Dartmoor Debates

Farming and Forestry Review Paper

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1. Introduction

- 1.1. This is one of six Review Papers which have been prepared to provide evidence for the Dartmoor National Park Management Plan Review, leading to the publication of the 2019-2024 Management Plan. It has been written by Rural Focus Ltd (Robert Deane and Anne May) reporting to a steering group of staff from the National Park Authority.
- 1.2. An earlier draft was reviewed at a workshop in November 2018 involving a range of people from the farming and forestry sectors. This final version of the paper incorporates changes suggested at the workshop.
- 1.3. The paper covers the two main sectors of the land-based economy on Dartmoor: Farming and Forestry. The paper is structured into two main parts.
 - **The first part**, in sections 2 to 4, provides an overview and then separate analysis of the farming and forestry sectors. Drawing on published data, assessments are made of the current characteristics of these sectors, including the areas and activities involved, the physical and human assets (natural capital) they use and the economic value they create. Where available, recent trends are also described.
 - **The second part**, in sections 5 and 6, anticipates the future, examining the drivers of change currently affecting farming and forestry businesses on Dartmoor and introducing a series of potential scenarios for businesses and management practices.
- 1.4. Key facts and issues are summarised in a box at the start of each section (pages 3, 5, 15 and 26). Sources of evidence in the main text are shown in the main text (but not summary sections) with numbers in brackets (i.e. ⁽¹¹⁾) which are referenced at the end of the paper in section 7.

2. Overview of farming and forestry

Key facts and issues

- Farming and forestry are the dominant land uses of the National Park, covering 98% of the area. Unenclosed moorland grazing occupies just under half of the National Park (49%), enclosed farmland a little over a third (37%) and 12.5% is woodland.
- Farming and forestry businesses account directly for about 10% of the National Park's economy (13% of employment, 9% of turnover and 8% of the Gross Value Added).
- The sectors are critical in maintaining the natural beauty and environmental quality of the National Park and, through this, in supporting the tourism and leisure sector.
- 2.1. Together, the land-based sectors of farming and forestry make up almost all of the National Park's land uses and are the bedrock of the local economy. Of Dartmoor's area, 86% (82,313 ha) is utilisable for agriculture and 12% (11,242 ha) is woodland (11.8%)⁽¹⁾. A majority of the agricultural area is unenclosed moorland and rough grazing (49% of the National Park) and the remaining 37% is enclosed farmland, mostly permanent pasture⁽⁵⁾. A majority of the woodland is broadleaved (62%), with the remainder being conifer (29%) and other types (9%)⁽¹⁴⁾. Figure 1 provides a simplified representation of these areas.
- 2.2. There are a variety of ways of assessing the economic significance of the farming and forestry sectors. Because the following figures use different ways of measuring the economy (for instance business turnover and gross value added) they may not be directly comparable.
 - In 2012, farming and forestry businesses in the National Park had an annual turnover of around £56 million which was 9% of the turnover of all businesses⁽³⁾.
 - The sectors contributed an estimated £27 million to the local economy (Gross Value Added based on employment), which is around 8% of the total GVA generated in the National Park⁽³⁾.
 - Table 1, which summarises data from the Inter-Departmental Business Register (IDBR) for 2016 shows that the agriculture, forestry and fishing sector is the largest on Dartmoor in terms of the number of businesses (650 businesses, 30% of the total) and is the third largest in terms of the number of people employed (1,554 employees, 13% of the total)⁽⁴⁾.
 - Each business typically employs just over 2 people which is lower than the average business size of 5 employees on Dartmoor⁽⁴⁾.
 - Farming and forestry have a lower average turnover per head compared to other sectors (£45,600 per employee in 2016)⁽⁴⁾.

Sector (ranked by No. employees)	Nos. of businesses	% of businesses	No. of employees	% of employment
Accommodation & food services	150	7%	2098	18%
Education	35	2%	2004	17%
Agriculture, forestry & fishing	650	30%	1554	13%
Business admin & support services	125	6%	811	7%
Health	75	3%	778	7%
Retail	110	5%	753	6%
Production	105	5%	690	6%
Other sectors	915	42%	3053	26%
Total	2,165	100%	11,741	100%

Table 1. Businesses and Employment in Dartmoor National Park by Sector, 2016

Source: Office for National Statistics 2016, Interdepartmental Business Register (IDBR)

Figure 1. Simplified map of land use on Dartmoor



3. Farming

Key facts and issues

- The principal farming enterprise on Dartmoor is the rearing of beef cattle and sheep (71% of holdings), with most of the remainder being general cropping, mixed or cereals farms. In contrast, there are few dairy, pig and poultry farms in the National Park.
- There are around 780 commercial agricultural holdings but many of these are small (<20ha). There has been a long-term trend of the consolidation of land and agricultural production in larger businesses, and also an increasing number of smallholdings (many non-commercial). It is thought that around 200 farming businesses are responsible for most of Dartmoor's agricultural production and management. There are 850 registered commoners with grazing and other rights but it is estimate that only around 130 of these are actively using these rights.
- Around half of farmland is owner-occupied, 40% is tenanted and the rest is let annually as seasonal 'grass keep'. The largest landowner is the Duchy of Cornwall which owns the Forest of Dartmoor (common land) and a number of tenanted farms.
- An estimate of the value of primary 'farmgate' agricultural production suggests that the value of beef, sheep dairy and arable production on Dartmoor in 2017 was in the order of £25 million. This figure takes no account of value added through processing and marketing and is a gross value, before taking account of farmers' costs. Beef production produced around £12.7 million, sheep production £9.3 million, dairy production £2.7 million and arable crops £0.4 million. It is significant that dairy farming produced 11% of the total value from around 1.4% of the farmed area whereas sheep production produced 37% of total value from around 52% of the area.
- Dartmoor's agriculture is connected to a much larger regional supply chain of businesses and contributes to a significant economic multiplier (national research suggesting a 7:1 ratio of benefits to costs from agriculture). An increasing number of farm businesses are involved in adding value to their primary farm production or other farm assets such as direct sales of beef and/or lamb to the public, tourism accommodation and equine livery.
- In 2015 the average farm on Dartmoor had a farm business income of £18,900. This is
 income after costs but before any personal drawings by the farmer. Payments from the
 Common Agricultural Policy, consisting of the Basic Payment Scheme and agrienvironment payments, amounted to 140% of this income. This means that before receipt
 of these payments, the average farm business made a significant loss. Any reductions in
 these payments from the public exchequer following Brexit are likely to have significant
 negative impacts on the viability of many Dartmoor farms.
- Farming, and particularly extensive livestock grazing, is an essential component of the natural beauty of the National Park, helping to maintain much of its landscape, biodiversity and cultural heritage. In 2018, over half of the National Park's area (55%) was under agreement with the Environmental Stewardship scheme and in 2016, farmers received £4.17 million from this scheme. This area, and these payments, have been falling since 2016 as Environmental Stewardship is replaced by the Countryside Stewardship scheme.

Farm holdings and businesses

- In 2016 there were 787 commercial agricultural holdings on Dartmoor and 613 full-time farmers⁽⁵⁾. The dominant enterprise was grazing livestock (beef and sheep), accounting for 71% of holdings.
 22% were general cropping, mixed or cereal farms. Of the remaining 7% of holdings, 29 were horticultural, 10 were dairy farms, 6 were specialist pig farms and 3 were specialist poultry farms⁽⁵⁾.
- 3.2. **Figure 2** shows that holdings over 100 ha in size are responsible for farming nearly two thirds of the agricultural area (excluding common land), but account for only one fifth of holdings. Conversely holdings of less than 20 ha, account for only 7% of farmland but make up 42% of holdings⁽⁵⁾. On the assumption that some of the larger farm businesses will have more than one registered holding, it is estimated that the majority of Dartmoor's enclosed farmland and farming outputs are in the hands of around 200 (predominantly family-run) businesses⁽⁶⁾.



Figure 2. The size of farm holdings, 2016

Source: Defra Agricultural Survey, June 2016

3.3. Over the period since 2009, the total number of commercial agricultural holdings has decreased by 15% while the number of larger holdings has increased by 30% (the number in all the small size brackets shown in Figure 2 having declined)⁽⁵⁾. This shows that there has been a consolidation of farmland in the hands of larger businesses.

Farm tenure

- 3.4. Around half of Dartmoor's enclosed farmland is owner-occupied and nearly 40% is tenanted for a period of 1 year or more, the remainder being held as seasonal grass keep⁽⁵⁾. The majority of the common land is owned by the Duchy of Cornwall (the area covered by the Forest of Dartmoor, covering 28,328 ha), with the remainder owned by a number of private estates. Around 850 farms have rights to graze the commons⁽³³⁾ and there at least 1,500 individual registered rights⁽⁷⁾, but it is thought that only around 100 commoners actively exercise their rights by grazing common land to a significant extent⁽³⁴⁾.
- 3.5. The balance of owned and tenanted land has been relatively stable in recent years, although the latest data from Defra (2016) shows an increase in both the area owned and tenanted for 1 year or more, suggesting a possible decline in the area of grassland available for rent on a seasonal basis⁽⁵⁾.

Farming land use

- 3.6. Unenclosed and rough grazing, consisting of heather moorland, mire, grass moorland and rough pasture, is the main agricultural land use, covering around 46,000 ha. As Figure 1 shows, this occupies the central swathe of land in the National Park. Enclosed permanent pasture makes up most of the rest of the farmed land, at 44,780 ha in 2016. Other farmland consists of temporary grassland (2,757 ha in 2016), arable crops (1,252 ha in 2016) and horticultural crops (171 ha in 2016)⁽⁵⁾. As shown in Figure 1, these land cover types are dispersed in the north east and down the eastern edge of the National Park (occurring in the area shown in Figure 1 as 'mixed farming').
- 3.7. Data showing the trends in agricultural land use for the National Park are only available since 2009 and show little change but data for Devon County that cover a longer period are likely to reflect the changes that have taken place on Dartmoor over this period. In the 26 years between 1980 and 2016, the area of permanent grassland on farms in Devon increased by 8.4% at the expense of rough grazing, temporary grassland and arable crops, with a particularly large fall in the area of cereals⁽⁵⁾.

Farming outputs and primary value

- 3.8. Analysis for this paper shows that the largest output from Dartmoor farms in terms of numbers of livestock is lamb, with the majority being sold as store lambs for finishing by other farmers outside the National Park. In 2016, there was a breeding flock of 99,533 ewes⁽⁵⁾ which are likely to have produced around 144,000 live lambs. An informed estimate, made by the authors of this paper, is that around 20% of the lambs were retained by the farms as herd replacements, 55% were sold as store lambs and the remaining 25% were finished on Dartmoor and sold for slaughter. Based on prices in October 2017, the annual primary or 'farmgate' value production from the sheep sector on Dartmoor, including the sale of cull ewes and the wool clip, is estimated to be around £9.3 million⁽⁸⁾. This is a simple measure of the value received by farmers, taking no account of their costs of production. It does not include value that is added by farmers and other businesses on Dartmoor through processing and retailing these products (see following section).
- 3.9. The second main output from Dartmoor farms is beef cattle, with the majority sold as weened calves or stores for finishing by other farmers outside the National Park. In 2016, there was a breeding herd of 13,506 beef cows⁽⁵⁾ which are likely to have produced around 9,000 live calves. An informed estimate is that around 18% of calves were retained as herd replacements, 33% were sold as weened calves, 40% were sold as stores and the remaining 10% were sold as finished beef cattle for slaughter. Again, based on prices in October 2017, the annual value of 'farmgate' production of the beef sector on Dartmoor, including the sale of cull cows, is estimated to be around £12.7 million⁽⁸⁾. Again, this takes no account of costs of production or value added from processing or retailing.
- 3.10. The third largest output from Dartmoor farms, in terms of land use covered, are arable crops. It is estimated that Dartmoor farms produced around 11,300 tonnes of cereals (wheat, barley and oats), 525 tonnes of oilseed rape and 4,500 tonnes of straw. However, the large majority of harvested crops are likely to be retained on the farm for home-milled feed or for bedding (straw). Taking this into account, it is estimated that the farmgate value of sales from arable crops in October 2017 was about £0.4 million⁽⁸⁾.
- 3.11. The smallest sector in terms of the number of farms and area of farmland involved is the dairy sector. There were 1,447 dairy cows kept on Dartmoor in 2016⁽⁵⁾. An informed estimate is that 90% of these cows were productive, producing around 7,700 litres of milk per cow per annum. Taking account of sales of bull calves and cross-bred heifers to beef finishers, it is estimated that the farmgate value of production from the dairy sector in October 2017 was about £2.7 million⁽⁸⁾.
- 3.12. The overall breakdown of value from this primary agricultural production, excluding minor sectors such as pigs, poultry and horticulture, is shown in the left-hand pie chart in Figure 3. The caveats

stated above (end of para. 3.8) should be emphasised. These figures represent a snapshot in time and the market values pertaining in October 2017. The right-hand pie chart makes an estimate of the share of the total farmed area involved in each commodity. This shows that dairy farming has a disproportionately high value of production compared to the area is occupies, with the reverse being the case for sheep production.



Figure 3. Estimate of the value of primary agricultural production on Dartmoor

Source: Analysis for this paper ⁽⁸⁾. Note: In the right-hand chart, beef and sheep are allocated across the grazed area on the basis of livestock units, and dairy farming is allocated on the basis of livestock units on improved in-bye land only.

Farming businesses adding value

3.13. A brief internet search shows that there are many farm businesses on and around Dartmoor that undertake some form of value addition to their farming assets, including processing and marketing of their products and on-farm diversification such as farm tourism or horse riding. Table 2 is based on this internet search and is therefore not comprehensive (for instance significantly underestimating the number of farmhouse B&Bs and self-catering). It gives a breakdown of businesses by type of activity and Figure 4 shows their location.

Type of activity	No. businesses	Type of activity	No. businesses
Direct sales	25	Farm self-catering	5
Farm livery	8	Woodland products	3
Farm B&B	6	Farm walks	2
Farm camping	5	Farm Shop	1
		Total	55

Table 2. Number of land-based businesses engaged in adding value on Dartmoor

3.14. The stock of redundant traditional agricultural buildings provides an important supply of employment space throughout Dartmoor, providing rental and sales income to the farm. Removal of agricultural ties was sought on 15% of dwellings approved over the last 40 years⁽⁴⁾.

Figure 4. The location of businesses adding value to, or diversifying, their land-based production

Note: Business identified by an internet search which was not comprehensive. In particular, the map significantly underestimates the number of farmhouse B&Bs and self-catering enterprises.



The wider economic contribution from farming

- 3.15. Agriculture on Dartmoor is connected to many other businesses on Dartmoor and to the wider regional economy through the goods and services that farmers buy and the products they sell. 'Upstream' of farms are the vets, machinery manufacturers and dealers, agrochemical companies, farm advisers and requisite suppliers. 'Downstream' of farms are the livestock markets, hauliers, abattoirs, meat processors and retailers. Farming also has a close relationship with Dartmoor's tourism economy since it is the landscape that farmers manage that is one of the main reasons that visitors come to Dartmoor. Farming activity also provides a range of non-monetised goods and services that society values such as conservation of wildlife, sequestration of atmospheric carbon in soils and vegetation and holding back flood water in soils and wetlands.
- 3.16. There are no reliable figures to be able to measure these wider economic multiplier impacts on Dartmoor. However, national research has compared the total benefits to society from UK agriculture with its costs. It estimated that in 2015, UK agriculture generated benefits to costs in a ratio of 7.4 to 1.0⁽⁵⁴⁾.

Farm incomes

- 3.17. In 2015 the average farm on Dartmoor had a farm business income (FBI) of £18,900⁽¹⁰⁾. FBI is a measure of the income received by the business after costs but before any personal drawings made by the farmer for their own labour. The average FBI on Dartmoor for the last four-year period was £21,800 and the average between 2005-2015 was £33,000, showing a significant decline between the two periods. The proportion of FBI that is derived from public subsidy payments was 140%. This statistic shows that before receipt of these payments, the average farm business was making a significant loss.
- 3.18. **Figure 5** shows the trends in different sources of income for Less Favoured Area beef and sheep farms in the South West as a whole⁽¹¹⁾. This shows that in all but one of the last ten years, income from agricultural activities such as the production of livestock has been negative, with a slight downward trend since 2008/09, with the exception of a good year in 2011/12.
- 3.19. Income from Pillar 1 schemes (currently the Basic Payment Scheme) makes up the largest proportion of overall income, with income from agri-environment schemes (Environmental Stewardship and before that the Dartmoor Environmentally Sensitive Area Scheme) the second largest source⁽¹¹⁾.



Figure 5. Sources of income on LFA farms in the South West

Source: Farm Business Survey for Grazing Livestock (LFA) Farms in the South West of England (11)

3.20. These average farm income figures mask a wide variation in individual performance between businesses, depending on their costs, size, structure and the productivity of their assets. Tenant farms, in particular, are constrained by their limited access to financial credit for investment. Many farm businesses on Dartmoor are currently only viable, even with their public subsidy income, because of significant non-farming income, such as employment of family members off-farm. Other businesses, particularly those able to operate on low costs and high margins, are likely to be less reliant on public subsidy income. The variation in economic performance between businesses will be important if, as expected, the levels of public subsidy available to farms on Dartmoor falls after Brexit (covered further in Section 5).

Farming and the environment

- 3.21. Extensive livestock grazing on Dartmoor is intimately bound up with the National Park's natural beauty, wildlife and cultural heritage. The practice of commoning is a heritage asset in its own right, reflecting a form of shared land management that has been taking place for thousands of years. Similarly, the sights and sounds of cattle, ponies and sheep on Dartmoor's commons and enclosed farmland are distinctive characteristics of the landscape valued by local people and visitors.
- 3.22. The grazing actions of livestock, and associated management such as moorland burning, are essential to maintaining the open character of the commons and other unenclosed land and maintain the dwarf shrub heathland vegetation and its associated wildlife. Without the appropriate levels and types of grazing and associated management provided by farmers on Dartmoor, changes to the landscape and biodiversity of the National Park would take place relatively quickly.
- 3.23. The public has legal right of access on foot to over 50,000 ha of open access land on Dartmoor⁽⁹⁾. On the Commons open access on foot or horseback was made a legal right by the Dartmoor Commons Act 1985, this covers much of the open moorland within the Park. In addition, Countryside Rights of Way Act 2005 provided a new right of open access to 'open country' and registered common land on foot.
- 3.24. Farmers on Dartmoor have been receiving payments for environmental management for several decades, first through the Dartmoor Environmentally Sensitive Area (1994-2008), then Environmental Stewardship (2005-2016) and latterly Countryside Stewardship (2016 onwards). The area of land, and the value of payments, has fallen in the last few years as agreements under the Environmental Stewardship scheme, particularly those in the Entry Level tier, have ended. Based on data from Natural England dated November 2017, but excluding agreements that ended in 2017, Table 3 shows that 52,096 ha (55% of the National Park) were in Environmental Stewardship agreements of 2018⁽¹²⁾. As of July 2018, a further 817 ha were in Countryside Stewardship agreements (6 agreements on 190 ha in the higher tier and 20 agreements on 623 ha in the mid tier)⁽¹²⁾. The location of areas in the various tiers of Environmental Stewardship are shown in Figure 6. Data from Natural England stated that the value of payments made to farmers on Dartmoor from Environmental Stewardship in 2016 was £4.17 million⁽¹²⁾.

Scheme	2018	2019	2020	2021	2022	2023	2024	Total
Entry Level	1,777	3,439						5,216
Organic Entry Level	137	233						370
Entry plus Higher Level	991	5,742	6,096	3,925	18,176	4,374	5,822	45,126
Organic Entry + Higher Level	17	64	322	131	25	99		659
Higher Level only	725							725
Total	3,647	9,479	6,418	4,056	18,201	4,473	5,822	52,096

Table 3. Areas under Environmental Stewardship agreement by year of completion



Figure 6. Areas under agri-environment agreement, as at 1 October 2018

- 3.26. Just over half of the area under ES agreement in the National Park (52%) covers common land (28 agreements). The largest of these, on the Dartmoor Forest, covers 122,863 ha and was, for a time, the highest value agri-environment agreement in England.
- 3.27. **Table 3** and **Figure 7** show how the area in Environmental Stewardship is due to fall as the five year entry level and ten year higher level agreements come to an end.



Figure 7. Chart showing sizes of ES agreements and the dates when they end

4. Forestry and woodland management

Key facts and issues

- Woodland covers 12.5% (11,926ha) of the National Park area and has been increasing gradually in area in recent years. Roughly 60% of Dartmoor's woodland is broadleaved and 40% is conifer.
- The majority of the woodland area is privately owned, with organisations such as the National Trust, the Woodland Trust, the National Park Authority, as well as various community or private individuals/estates, owning woodland. The Forestry Commission manages or owns 1,581ha (13% of woodland) on behalf of the state.
- Over half (58%) of Dartmoor's woodland is under some form of active management or management agreement. Grant schemes over the years have incentivised forestry management, particularly through the English Woodland Grant Scheme, leading to a rise in the area of woodland in agreements and the number of felling licence applications.
- On land managed by the Forestry Commission, the annual production forecast is anticipated to rise from 20,000m³ timber in 2021 to 33,000m³ in 2026. Timber harvesting by the Woodland Trust and National Trust, as part of the restoration of semi-natural woodland at Fingles Wood, will add further significant volumes over the next six years or so.
- The market value of timber in the UK has been rising and is forecast to increase further, with private sector woodlands playing an increasingly important part. Sitka spruce is a valuable timber species on Dartmoor. The economics of forestry is likely to bear favourable comparison with hill farming in the future, particularly if the subsidy regime changes following Brexit. Investment in access and other infrastructure could enable more profitable use of unmanaged woodland and there are likely to be opportunities for new woodland creation.
- Dartmoor's woodland provides a range of important public goods including biodiversity, flood mitigation and carbon storage. A quarter of the total woodland area is classed as ancient semi-natural woodland and a further 2% are plantations on ancient woodland sites (PAWS). 17 woodlands are designated as SSSI's and several of those are already included in SAC's or meet the criteria for inclusion. Upland oakwood is an important habitat on Dartmoor and encompasses approximately 1,600ha of the ancient woodland area.
- Pests and diseases are an ever-increasing threat to UK woodlands. On Dartmoor the main threats are physical damage from deer and squirrels and tree disease from *Phytophthora ramorum* in larch, *Hymenoschyphus fraxineus* (ash dieback), acute oak decline and sweet chestnut blight. With all these diseases there is the potential for far-reaching environmental impacts and significant effects on the industry.

Current characteristics of Dartmoor's woodlands

4.1. Twelve and a half percent (11,926ha) of the National Park is woodland⁽¹⁵⁾, 56% of which is actively managed⁽¹⁹⁾. Table 4 shows the different types of woodland in the National Park for 2015, 2016 and 2017 from the Forestry Commission's National Forestry Inventory. Although the relatively small differences in area between the three years may be due to changes in the way the data were collected as well as real changes in woodland area, the evidence points to an overall long-term increase, in woodland area on Dartmoor, due to factors such as natural regeneration, scrub increase and the rise in grant-aided woodland planting.

Table 4. Areas of different woodland types on I	Dartmoor – using	2015, 2016 ⁽¹⁴⁾ an	d 2017 ⁽¹⁵⁾ data
Interpreted Forest Type	2015 (ha)	2016 (ha)	2017 (ha)
Total area of woodland	11,263	11,269	11,926
Broadleaved	6,810	6,919	7,387
Conifer	3,194	3,206	3,372
Young trees	525	407	407
Mixed	295	315	317
Assumed woodland	-	-	93
Felled	361	359	359
Coppiced	7	7	7
Ground preparations	35	6	6
Low density	-	-	35
Shrub	35	36	36

⁽¹⁴⁾ Note: IFT categories of 'Uncertain', 'Cloud or shadow', 'Low density' and 'Assumed woodland' are omitted from the total areas of woodland. ⁽¹⁵⁾ Note: Forest blocks are often adjacent to others of same tree or management type.

4.2. Figure 8 maps the distribution of woodland on Dartmoor, showing that most woodland occurs off the highest moorland areas in the eastern part of the National Park, but that there are large coniferous plantations on the edge of the moor around the Fernworthy and Burrator Reservoirs and at Bellever and Sousson Down. Particular concentrations of woodland occur in the major river valleys of the Teign, the Bovey and the Dart.

Woodland ownership

- 4.3. The majority of the wooded area on Dartmoor is in private ownership. On Dartmoor the Forestry Commission manages 1,331 ha of acquired or freehold forestry and owns 250 ha leasehold⁽¹⁶⁾. This includes a substantial amount of Duchy of Cornwall land. There are many large wooded estates on Dartmoor in private ownership, and those on Dartmoor's periphery which own woodland inside and outside of the Park. The National Trust owns around 460ha of woodland and The Woodland Trust owns around 240 ha⁽¹⁷⁾. Between the two organisations they also own Fingle Wood which is 334 ha⁽¹⁸⁾. Other institutional woodland owners in the National Park include Natural England, the Devon Wildlife Trust and Dartmoor National Park Authority.
- 4.4. There is no available data comparing the characteristics of woodland under different types of ownership on Dartmoor. However, analysis of data for the whole of Devon, based on data from 2002⁽⁴⁵⁾ shows that woodland managed by the Forestry Commission has a higher proportion of conifer compared to woodland under other ownership. Sitka spuce and Douglas Fir are the most frequent species in Forestry Commission woodland whereas in privately owned woodland they are oak and mixed broadleaves.





Active management

- 4.5. Data on the area of woodland in active management within the Dartmoor National Park between 2017 and 2018 ⁽¹⁹⁾ classifies 6,581 ha (58%) as actively managed and 4,816 ha as unmanaged. In this context 'active management' means woodland that is under a management agreement, such as the English Woodland Grant Scheme, and does not necessarily describe particular management on the ground.
- 4.6. Information from the Forestry Commission on the number of felling licence applications on Dartmoor each year since 1997 ⁽²⁰⁾ shows how clear felling and selective felling/thinning varies between years (Figure 9).



Figure 9. Number of felling licences issued on Dartmoor⁽²⁰⁾

Forestry grants

4.7. The English Woodland Grant Scheme (EWGS) was launched in 2005 and offered six grants for the creation and management of woodland, the EWGS was replaced in 2015 by Countryside Stewardship. According to the National Park Authority's State of the Park Report in 2017 ⁽¹⁰⁾ the EWGS and a good wood fuel market encouraged management of neglected woods, which the figures above support. It is generally accepted that Countryside Stewardship is not as popular to woodland owners as the EWGS although it provides woodland creation grants, management plans, tree health restoration and improvement grants and woodland improvement applications. **Table 6** shows the number of active EWGS agreements on Dartmoor between 2005 and 2015. By 2012 the scheme was proving very popular and large areas of woodland were coming under agreement.

Year of agreement start	No. of agreements	Area (hectares)
2005	1	5
2006	14	106
2007	7	52
2008	5	23
2009	5	19
2010	12	421
2011	34	361
2012	37	2,498
2013	49	815
2014	50	2,322
2015	2	84

Table 6. English Woodland Grant Scheme agreements on Dartmoor⁽²¹⁾

Table 7. Countryside Stewardship Woodland Agreement 2015-16 on Dartmoor⁽²²⁾

Agreement Type	No. of agreements	Area
Woodland Planning Grant	6	305 ha
Felling	4	64 ha
Woodland creation	2	49 ha
Tree health	4	26 ha
Woodland Management Plan	1	8 ha
Type not listed	5	69 ha
TOTAL	22	521 ha

Note: Some overlap between felling and woodland creation (double counting). Total area of all agreements approved in 2015-16 is 482.27ha.

- 4.8. The combined total for woodland management through EWGS and CS for 2015-2016 is 605 ha. This is a large area but potentially dropping from the previous levels of management by the EWGS. It is important to note that although entering an agreement creates a management plan and therefore an indication of active management it is difficult to assess how much on the ground management is actually taking place.
- 4.9. As of March 2017, under Environmental Stewardship, 4 ha of woodland was created in Severely Disadvantaged Areas but much larger areas were managed or maintained (Table 8). Under the scheme many field trees were protected, particularly on grassland (Table 9).

Table 8. Woodland managed and created under Environmental Stewardship ⁽²³⁾	(March 2017)			
No. agreements involving woodland management / creation 75				
Maintenance of woodland	324 ha			
Restoration of woodland	244 ha			
Creation of woodland in the SDA	4 ha			
Management of wood edges	573 ha			
% Option Area in National Park 1 %				
Table 9. Hedgerow and in-field trees managed under ES, 2017 ⁽²⁴⁾ (March 2017)				
Number of Agreements	33			
Protection of in-field trees (arable)	13 trees			
Protection of in-field trees (grassland)	264 trees			
Protection of in-field trees on arable land	1 trees			
Protection of in-field trees on grassland	53 trees			
Ancient trees in intensively-managed grass fields 7 tree				
Protection of in field trees - grassland	35 trees			

- 4.10. The government's Woodland Carbon Fund, administered by the Forestry Commission, provides grants for large scale productive planting (>10ha) with a standard planting rate receiving 80% of standard costs for planting and establishment, rising to 100% of costs near urban areas. In addition, the Woodland Trust is currently running a project called MOREwoods aimed at planting areas over one hectare in size, including shelter belts and for self-provision of woodfuel. The Woodland Trust can provide up to 60% of the costs⁽²⁵⁾.
- 4.11. Poor access and other infrastructure in woodlands can make it uneconomic or practically difficult to manage or establish woodland. The Countryside Stewardship scheme includes a woodland infrastructure capital grant for items such as extraction tracks and haulage roads, stacking areas and drainage culverts, paying 40% of costs.

The woodland economy

4.12. In a similar way to farming, production of timber and other activities in woodland are part of a much larger economic supply chain which takes place at a regional level. Figure 10 shows how woodland products that are harvested from woodlands can be processed into a range of products. It should be emphasised that there are large differences between the markets and value of softwoods and hardwoods, and between timber from well-managed woodlands and unmanaged sites. There is large variation in Dartmoor's woodland and this affects it economic value and potential.

Figure 10: Wood processing sectors and businesses (44)

Primary Processing	Secondary Processing	Tertiary Processing
 Saw logs: construction products, joinery grade timber, structural beams, paper, pulp and board Small round wood: stake, fencing, gates, seasoned logs, kindling, wood chips Residuals: animal bedding, compressed briquettes, pellets New technologies: glulam beams, finger- jointed materials 	• Sawmills, veneer manufacturers, wood carvers, wood turners, furniture makers, charcoal makers, hedge laying, hurdle makers	• Final stage of processing and uses the products of secondary processing to manufacturer products frequently sold to the individual consumer, e.g., furniture and kitchen units production

- 4.13. The supply chain starts with the harvesting of timber from woodland. Data available to this study on Dartmoor is limited to the Forestry Commission's woodland and to Fingle Woods, owned by the Woodland Trust and National Trust.
- 4.14. Yield data from the Forestry Commission's Dartmoor Forest Plan 2016, which covers the forestry blocks at Fernworthy, Bellever, Soussons and Brimpts (total area 1,388 ha), forecasts average annual timber production of 20,000m³ by 2021 and 33,000m³ by 2026⁽²⁶⁾. Dartmoor produces large and high quality Sitka spruce⁽²⁶⁾ and this species is the main commercial crop from the Forestry Commission's woodland. The market value of UK-grown Sitka spruce has increased significantly in recent years (currently £57/m³ as a standing crop, up from £30/m³ a few years ago⁽⁵⁵⁾) and it is likely to remain the most viable timber crop on Dartmoor for the foreseeable future.
- 4.15. Fingle Woods (334 ha) lie in the steeply-sided Teign valley between Castle Drogo and Dunsford. Most of it is an ancient woodland site that was converted to conifer in the 20th century. The main commercial species is Douglas fir planted in the mid 1980s. The woods were purchased by the Woodland Trust and National Trust in 2013 in order to convert the site back to semi-natural woodland. Commercial harvesting has increased from around 600 tonnes a year prior to 2013 to around 2,500 tonnes a year since⁽⁵⁶⁾ and this is set to continue until 2024⁽⁵³⁾.
- 4.16. Although there is some local processing of timber on Dartmoor, it is part of a larger regional and national supply chain. Most sawlogs from the Forestry Commission's woodland currently go to the large sawmill at Pontrillas in South Wales to make for internal construction beams. Much of the Forest Commission's smaller timber (logs and chip) is sold locally, although a significant quantity if currently going to a biomass plant in Kent. Some oversized timber goes to the Norbord factory in South Molton, where it is used to make furniture, and some goes to Truro⁽²⁶⁾.

4.17. A number of woodland owners on Dartmoor are adding value to their timber products to supply local markets. Figure 10 provides an example of such activities at The Hillyfield.

Figure 10. The Hillyfield: a case study of value-adding(King-Smith, D. 2019. Pers. comm.)

The Hillyfield (<u>www.thehillyfield.co.uk</u>) sells homegrown timber to a local market. Between 2013 and 2017 a total of £44,062 was generated from timber sold including round-wood, planks and firewood. The timber is licenced with the 'Grown in Britain' kite mark, guaranteeing that the woods and products are produced sustainably and legally in accordance with the UK Forestry Standard. Prices are worked out according to their current price structures, or to match other similar products from local providers.

Products produced at The Hillyfield	Price (where disclosed)			
Chopped firewood (delivered within 7 miles, less than 25% moisture content)	£75/m³			
'Rocketlogs'™ (speciality one log bonfire, trademark registered to The Hillyfield)	£25/each, equivalent to £850/m ³			
Rough sawn planks	Between £423/m ³ and £459/m ³			
Milled timber – waney edge or straight-cut (joists, floorboards, construction material, decking and cladding)				
Commitment from local construction companies to use locally sourced, untreated timber for timber clad houses				
Roundwood timber, loads up to articulated lorry size (woodchip biomass producers, local firewood suppliers)				
Roundwood timber, stripped of bark, sold to local playground makers	Up to £459/m ³			
Roundwood fence posts and strainers	Between £95/m ³ and £145/m ³			
BBQ charcoal	£1,620/m³			
Biochar	£1,080/m ³			
Artist charcoal	Up to £6,000/m ³			
Non Timber Forest Products – still to be developed (nettle and bracken roots for natural dye production, resin from trees for incense production, nettle leaves and herb flowers for tea-making, foliage for Christmas wreaths and weddings, jam and wine from wild and cultivated berries, wild mushrooms, cultivated herbs, orchards for apple juice and cider)				

4.18. A study from 2004 provides a snapshot of the volumes of timber produced and the key markets for Devon as a whole (Table 11) ⁽⁴⁵⁾.

Table 11. Estimates of timber produced in Devon per annum and its destination (2004) (45)					
Туре	m³/yr	Destination			
Mixed Conifer Chipwood	60,900	85% sold to sawmills/processors in Devon. 15% sent to processor in North Wales			
Mixed Conifer Fencing	23,400	Includes fencing stakes, rails, struts and posts. 95% sold into sawmills in the South West region.			
Mixed Conifer Sawlogs	70,500	75% Sold to sawmills outside the South West			
Mixed Conifer Bar / Pallet	48,500	70% sold to sawmills outside the South West			
Miscellaneous	1,500				
TOTAL	204,800				

4.19. A study in 2014 in the Scottish Borders compared the economics of forestry and hill farming⁽⁵⁸⁾. On a like-for-like basis, it found that commercial forestry could produce three times the economic output of hill farming before subsidy (with 11% higher direct employment and 30% high total

employment) and that, without subsidy, a forestry enterprise could trade at a profit whereas hill farming makes a loss. It is not known what the comparison would be on Dartmoor.

- 4.20. The economic viability of commercial forestry production in the UK has been improving significantly in recent years as a result of growing global demand and favourable exchange rates. The 2018 market reached record prices with strong demand for all products and the Forestry Commission is predicting a 25% increase in timber prices year-on-year⁽⁴⁷⁾. More timber was brought to the market in 2018 than in recent years, but this barely kept up with demand from traditional users and new market entrants, particularly two new large energy plants and a rise in domestic firewood use ⁽⁴⁷⁾. Demand for good quality oak is particularly strong and global prices continue to increase whilst supplies remain constrained⁽⁴⁶⁾. Roughly two-thirds of timber in the UK comes from private woodlands⁽⁴⁷⁾ and it is predicted that volumes from Forestry Commission woodlands will continue to decline, with the market becoming more reliant on the private sector⁽⁵⁷⁾. In the long-term, unless there is a significant increase in new woodland creation, it has been suggested that the industry may reach the stage where timber removals are running ahead of planting⁽⁵⁷⁾.
- 4.21. In addition to the value of timber markets, there is growing increase in public policy in the nonmonetised value of woodlands, such as improving air quality, sequestering atmospheric carbon and reducing the risk of flooding (see below). Following Brexit, it is likely that more of the funding previously directed to agriculture through the Common Agricultural Policy will be made available to woodland owners in recognition of the public goods they provide.

Woodland, the natural environment and natural capital

- 4.22. Woodland can provide multiple public benefits including recreation, flood management, health benefits, water management, aesthetic value, climate change mitigation as well as cultural values ⁽³⁶⁾. The ways in which woodland on Dartmoor provides some of these benefits can be summarised as follows.
- 4.23. In terms of its biological and landscape value, 6,095 ha of woodland is included on the Dartmoor National Park Section 3 map of mountain, moor and heath⁽¹⁰⁾. 17 woods on Dartmoor are Sites of Special Scientific Interest (2,590 ha)⁽¹⁸⁾ and the seven woods are part of the Dartmoor Special Area of Conservation. Dartmoor's woodlands provide habitat for the dormouse, a species vulnerable to extinction in the UK, but still common on Dartmoor. Natural England's Ancient Woodland Inventory classifies 2,957 ha (25%) of the total woodland area is ancient semi-natural woodland⁽¹⁰⁾. However, DNPA's work on the Restoring Ancient Woodland Project suggests that the ancient woodland resource is significantly larger at 3,549 ha (about 3.7% of the National Park area)⁽¹⁾. Upland oakwood, woodland above 250m dominated by oak, is an internationally important habitat due to their extent and distinctive animal and plant communities⁽²⁷⁾. Most broadleaved woodland on Dartmoor is upland oakwood and most of these woodlands within Dartmoor are ancient.
- 4.24. An accurate figure of open access provision within woodlands on Dartmoor is not available but the assumption could be made that all FC woodland except Sousson is open access, land owned by the Woodland Trust, National Trust, Devon Wildlife Trust and local council as well as some charities are also open access. In addition, there will be provision of permissive access in some woodland areas.
- 4.25. Woodland is valued for its noise absorption and visual screening abilities as well as protection from the weather for users⁽⁴⁹⁾. Woodlands can absorb a wide variety of recreational uses including those that are visually intrusive, noisy or physically destructive. Woodlands are also valued economically and socially for their ability to attract people to areas, increase the length of time they spend there and increase the length of the tourist season.
- 4.26. Timber provides a significant store of organic carbon (potentially reducing atmospheric carbon that stimulates climate change). In the South West as a whole, there is an estimated 23.9 million tonnes of carbon stored in woodland trees⁽²⁸⁾. Pro-rata on the area of woodland in Dartmoor, it can be estimated that around 1.4 million tonnes of carbon are stored in Dartmoor's woodlands.

Although traditionally seen as a farmed product, orchards could also be viewed as a type of woodland cover and so are included within this section. Traditionally orchards contribute significantly to landscape character and 'sense of place' and often preserve local varieties of fruit. Natural England's provisional inventory of traditional orchards (2011), supplemented by a local survey, estimated up to 53 ha of traditional orchard on Dartmoor⁽¹⁰⁾.

Pests and disease of trees

- 4.27. Pests and diseases in forestry reduce crop value and can cause major economic, social and environmental damage to woodlands. Diversity of new plantings is important to increase resilience to pests, disease and climate change.
- 4.28. Deer are a significant pest of woodland on Dartmoor. Their browsing and grazing activities can reduce the regeneration of clear fell areas, coppices, new plantings and establishing woodland. The main expansion of deer population has occurred in the last 25 years contributed to by milder winters, changes to agriculture and increases in woodland cover⁽³⁹⁾. Through the Restoring Ancient Woodland Project, the Deer Initiative has been promoting collaborative deer management through the development of a Deer Management Group, awareness days and a series of talks on Best Practice⁽⁴⁰⁾.
- 4.29. Grey squirrels are another significant pest, stripping bark which can kill trees and introduce other pests and diseases. Vulnerable trees are sycamore, beech, oak, sweet chestnut, pine, larch and Norway spruce, however other species, especially broadleaves, and ages class can be damaged in high risk years ⁽³⁹⁾. In addition, they outcompete the native red squirrels and also carry squirrel pox virus⁽⁴¹⁾.
- 4.30. There are several significant diseases of trees which pose a significant threat to woodland and forestry. The first is the water mould *Phytophthora ramorum* which infects a number of species, including the important forestry crop of larch. Between 2006 and 2015 in England and Wales, 15.3 thousand hectares of statutory plant health notices (SPHN) had been issued *Phytophthora*. Of this area, action has been taken to clearfell 3,084 ha (mainly in Wales) to contain the disease.
- 4.31. Hymenoschyphus fraxineus, previously known as Chalara fraxinea, is a fungus which causes ash dieback has spread across the UK at a rapid pace from the identification of the first infection site in 2012. Figure 11 shows confirmed infection sites as of 2nd July 2018, by 10km square in Mid and South Devon, showing several areas of new infection around the edges of Dartmoor in 2018⁽³⁰⁾. Figure 12 shows the results of the Dartmoor Ash Woods Survey in 1997. Ash is an important constituent of many broadleaved woodlands on Dartmoor and a common hedgerow tree. Loss of ash to the disease is likely to have a significant landscape impact, as well as an economic impact such as from loss of firewood production.

Figure 11. Areas (10km2) of infection by ash dieback⁽³⁰⁾



Figure 12: Dartmoor Ash Woods. Information from a 1997 survey (58)

Ancient and ancient semi-natural woods

Of the 175 Ancient Semi-Natural Woodland sites surveyed, 130 woods had ash present. In 21 woods ash was occasional, 24 woods ash was rare, 60 woods ash was locally frequent and in 26 woods ash was locally abundant.

Secondary woods

Of the 599 secondary broadleaved woods surveyed, ash was present as follows:

- Main canopy Ash was dominant in 75 woods, sub-dominant in 162 woods and present in 251.
- Secondary canopy Ash was dominant in 63 woods, sub-dominant in 144 woods and present in 218 woods.
- Underwood Ash was dominant in 65 woods, sub-dominant in 91 woods and present in 202 woods.

The report provides no precise information about the area or percentage of the ash component within in the woodlands. However, the conclusion is that ash dieback will have a significant impact on some of Dartmoor's woodlands and the impact will be greatest on secondary woodlands. An additional concern is the loss of ash trees in the wider environment, particularly on field boundaries. There is no information on numbers of ash trees growing on boundaries.

Loss of ash trees could result in the loss of rare habitats and species. Near Buckland in the Moor there is a linear group of ash, designated as a SSSI for their lichen communities, several of the trees appear to be infected with ash dieback and as the trees decline so will the lichen communities

- 4.32. Acute Oak Decline is an increasing threat to the large proportion of Dartmoor's woodland which is ancient upland oak woodland. The disease most commonly affects the native oak trees pedunculate (*Quercus robur*) and sessile (*Q. petraea*), and also turkey and bali oaks in Britain. Mainly mature trees are affected, aged over 50 years, however, recently the disease has been found on younger trees with diameter 10-12cm. Tree death is likely to be caused by multiple agents, for infection to occur it is likely that trees need to be weakened (predisposed) by certain factors. Symptoms develop rapidly within 18 months and some trees die within 4-6 years of symptom onset⁽³⁷⁾. It appears that many trees are capable of recovering from the disease⁽³⁸⁾.
- 4.33. A further disease, Sweet Chestnut blight, caused by the fungus *Cryphonectria parasitica*, is of increasing concern. In 2016 it was confirmed in trees across the south of the UK and since then there have been 8 confirmed sites in Devon⁽³¹⁾. The fungus can affect oak trees, usually only those close to heavily infected sites, but does little damage. In Devon five prohibition zones were established (Figure 13) in December 2016 (lifted May 2017), three of the zones were located on the

periphery of Dartmoor. Movement of sweet chestnut material including plants, logs, bark, branches, foliage and firewood was prohibited within a 2km radius of the zone and movement of oak was also prohibited within 1km of the zone. For mixed woodlands this poses a serious threat.





5. Drivers of change

Key issues

- Brexit is the most significant challenge facing farming, and to a lesser extent forestry, for many decades. At the time of writing, there is considerable uncertainty about the impacts it will have in both the short and long term. However, the anticipated removal of direct support payments, likely to be completed by 2027, together with potential changes to livestock export markets are likely to accelerate structural change in farming businesses on Dartmoor.
- In the short term, agri-environment incentives are likely to continue to shrink in area and value (although the extension of Higher Level Stewardship agreements is possible in 2019) and the scale and format of the proposed Environmental Land Management scheme, to be introduced in 2025, is currently unknown.
- Partly related to Brexit, financial pressures such as a likely rise in interest rates from the historically low levels that have existed for ten years, and a potential fall in the value of farmland, are increasing risk and volatility in the land-based sectors.
- In the medium to long term, there are likely to be opportunities arising from changing consumer demands (for instance for high quality goods and experiences) and these opportunities will be enhanced if the status and recognition of the National Park grows further.
- In the long term, the changing climate, with warmer, wetter and stormier winters and hotter drier summers, will require changes in farming and forestry practices. Plant growth may increase in the winter but soil erosion, summer heat stress and pests and diseases are all likely to increase. The long growth cycles of trees will make these changes more challenging for the forestry sector. Government policy to mitigate and adapt to climate change will produce opportunities and constraints.
- 5.1. This section examines the key pressures (constraints and opportunities) affecting the farming and forestry sectors on Dartmoor. It uses a PESTEL framework, covering Political, Economic, Social, Technological, Environmental and Legal drivers of change.

Political change - public policy

- 5.2. The over-riding issue facing land-based businesses, particularly the farming sector, at the current time is Brexit. As shown above (para. 3.17), the profitability of most Dartmoor farm businesses has depended for many years on public payments received through the Common Agricultural Policy (CAP).
- 5.3. Although the UK Government has committed to maintaining the overall level of the payments to UK agriculture during the life of the current parliament, there is considerable uncertainty about what will replace the CAP following Brexit. Following the publication of the Agriculture Bill (September 2018), the Government has proposed progressive reductions in direct payments to farmers through the Basic Payment Scheme, starting in 2021, with the final year of direct payments in 2027.
- 5.4. The forestry sector on Dartmoor has not benefited significantly from the Common Agricultural Policy or other EU programmes and so is less likely than farming to be directly affected by Brexit.

- 5.5. Agri-environment schemes on Dartmoor are in transition from Environmental Stewardship to Countryside Stewardship (a process independent of Brexit). As noted earlier (Table 3), the area benefiting from Environmental Stewardship agreements has already fallen significantly and this is set to continue until all agreements expire in 2024. The smaller national budget of the successor scheme, Countryside Stewardship, means that it will not fully replace Environmental Stewardship. To date the area under the new scheme on Dartmoor is small (see para 3.22).
- 5.6. Following requests from National Park Authorities and others, Defra has applied to the European Commission to be able to roll-over Higher Level Stewardship agreements that expire from 2019 onwards for a period of four years but, at the time of writing, no decision has been made on this. If this takes place, it will safeguard environmental management on large areas of Dartmoor, particularly the commons and other moorland areas, and will bring significant income to many farming businesses.
- 5.7. Defra is working on a new Environmental Land Management (ELM) scheme that is intended to replace Countryside Stewardship and direct payments, starting in 2025. Tests and trials of the new scheme design will take place from 2019 and a national pilot will start in 2021. Little is currently known about the scale or structure of the new scheme, although Defra has announced it will be 'broadly accessible' and competitive and based around the concept of natural capital.
- 5.8. The Government's broader approach to environmental policy was set out in the 25 Year Environment Plan, published in January 2018. This includes ambitious goals to improve the state of the environment in England, helping nature recover where it has declined, enhancing the condition of landscapes, connecting people with nature to improve their health and wellbeing, and reducing pollution and waste. The concept of natural capital, defined as *"the parts of the natural environment that produce value to people"* is embedded throughout the 25 Year Environment Plan and this is likely to be a recurring theme in policy programmes delivering the Plan. A review of protected landscapes, announced in the Plan, is currently underway (The Glover Review) and this may lead to changes in the way the National Park designation affects farming and forestry businesses.
- 5.9. The Government has a long-term goal of increasing England's woodland cover, including a manifesto commitment to plant 11 million trees, and new policies will be needed, beyond the existing Countryside Stewardship scheme, if this is to be realised.
- 5.10. A range of other areas of public policy constrain and incentivise change in farming and forestry in Dartmoor. These include the planning system and development control which restrict built development in the countryside, immigration policy which affects the availability of labour, particularly in sectors such as horticulture, and environmental regulation.

Economic change – markets and finance

- 5.11. The future of farming and forestry businesses, and the contribution they make to Dartmoor's economy will depend on market prices for their products, the cost of inputs such as the value of land, energy costs, machinery and vets bills, and the availability of finance for investment.
- 5.12. Here again, Brexit is a significant issue for the farming sector, with the value of lamb and beef sales being strongly dependent on the UK's trade policy and the access this gives to overseas markets and competition from foreign imports. At the time of writing, the UK's position *viz a viz* the EU customs union and World Trade Organisation trade rules is not clear. If the UK were to leave the EU without a trade agreement, it is likely that lamb prices in particular would fall sharply due to the imposition of export tariffs leading to a reduction in export demand.
- 5.13. The value of farmland is a significant factor, affecting sales and acquisitions of land, farm rents, and the capital that owner occupiers can raise through financial markets. Many economists are predicting that the value of farmland may fall as farmers lose the direct payments they have been receiving through the CAP and which many farmers have used to fund land purchases. It is likely

that the value of residential farmland (land surrounding properties) will be less affected than the value of 'bare' land. A fall in agricultural land values could lead to increased structural change in farming and forestry, accelerating the growth of larger and more profitable businesses and the purchase of farmland by new entrants and non-farmers.

- 5.14. Indications from the Bank of England are that the long period of very low interest rates since the financial downtown of 2008/09 is likely to end as the UK economy recovers. Higher interest rates will increase the cost of finance, making business expansion more expensive, and could further dampen property and land prices.
- 5.15. Taking these economic pressures together, the farming and forestry sectors are entering a period of significant economic uncertainty and potential volatility perhaps greater than at any time since the agricultural depression of the 1930s.

Social changes – behaviour and demography

- 5.16. Compared to the political and economic changes discussed above, social change could be described as a 'slow-burner' which is likely to play out over many decades. The broader societal changes of any ageing population with increased leisure time and, amongst many people, growing interest in health and the environment, will affect the markets for agricultural and woodland goods and services and opportunities for businesses to diversify their activities.
- 5.17. It remains to be seen whether the current interest amongst UK consumers in vegetarian and vegan diets will be maintained, and whether the balance between white and red meat consumption will change. Both these trends will affect Dartmoor's predominantly livestock-based farming.
- 5.18. The status of Dartmoor as a National Park and tourism destination may be an increasingly important asset, generating opportunities to add value to high quality goods such as lamb, beef and woodland products through processing and product association.
- 5.19. As a high profile tourism destination, an increase in leisure spending and demand for UK-based 'staycations', will provide new opportunities for land-based businesses to develop tourism and leisure enterprises.
- 5.20. Dartmoor is typical of most of the UK in having a relatively elderly farming workforce. The age profile, coupled with the scale of changes brought about by Brexit, are likely to mean that a significant proportion of farmers on Dartmoor will retire. This will provide opportunities for the next generation of farming sons and daughters and new entrants to take on and expand their businesses.

Technological change

5.21. Technological innovation and the impacts they will have are always difficult to predict. Upland livestock farming and forestry are probably less likely to be affected by technological change than other land-based sectors such as horticulture which stands to benefit from robotic automation. However, wider technological change affecting society, such as from driverless cars, cheaper energy and improved health care, could affect consumer practices and the value of farming and woodland goods and services.

Environmental change – the climate

5.22. The Government's latest UK Climate Projections (UKCP09) suggest that by 2080 (under the medium emissions scenario), average annual rainfall in the South West of England will stay roughly the same but with significantly more falling in the winter and less in the summer. Critically, the number of days of heavy rain (exceeding 25 mm) are projected to increase by a factor of between 2 and 3.5 in

winter, and 1 to 2 in summer by the 2080s. Extreme storm events and flooding are therefore likely to increase throughout the year, but particularly in winter. Summer temperatures in the South West are projected to be nearly 4°C higher compared to the average between 1961 and 1990, with more periods of extreme hot dry weather⁽³⁵⁾.

- 5.23. These changes will have impacts on agricultural and forestry productivity. Rates of plant growth are likely to rise during the winter but heat and drought stress will affect crops and livestock in the summer. Soil erosion on steep slopes will increase as a result of high rainfall events and the oxidation peat soils and decline of wetland habitats will accelerate during periods of drought. As noted previously (paras. 4.30-4.33), Dartmoor's woodland and trees are already affected by new pests and diseases and this is likely to increase in coming decades. The Schmallenberg virus, which affects sheep and cattle on Dartmoor and is transmitted by midges, has been linked to climate change. Other economically significant pests and diseases are likely to follow.
- 5.24. Farming and forestry will need to adapt to the changing climate and its impacts. The long growth cycle of trees means that adaptation in forestry is more difficult and impacts are less easy to avoid than in farming. Future Government policies to mitigate and adapt to climate change may affect the regulatory and financial framework for farming and forestry, such as incentives to enhance natural flood management, increase woodland and tree cover or reduce greenhouse gas emissions from soils and livestock.

Legal change

5.25. Most of the legal issues affecting the farming and forestry sectors have already been covered under the politics heading, above. The structure of environmental regulation is likely to change following Brexit but significant de-regulation, or increase in regulation, seems unlikely. Similarly, regulations affecting animal health and welfare, employment, food labelling, the role of the Groceries Adjudicator and other issues will evolve but are unlikely to present significantly new constraints or opportunities to businesses.

6. Future scenarios

- 6.1. In order to facilitate discussion over the issues facing the farming and forestry sectors, in the context of Brexit and other forces for change, this section outlines three potential scenarios for private businesses and other landowners/managers in these sectors.
- 6.2. The aim of these scenarios is to stimulate discussion over likely change in the farming and forestry sectors and the impacts this may have on Dartmoor. The scenarios take a business focus, looking at the way business structures and practices will evolve in response to external drivers of change. Once these changes are understood, the likely impacts of the scenarios on Dartmoor's natural environment and special qualities can be considered, leading to sets of actions that might be developed in the revised Management Plan.
- 6.3. The scenarios are not intended to be mutually exclusive on Dartmoor. For instance, a combination of scenarios may take place at different times or in different places. The scenarios are also presented as extremes of potential outcomes to stimulate debate, rather than predictions of what will actually happen.
- 6.4. The timescale which the scenarios describe is not fixed. This is because the timescale of Brexit, which will be a key driver of change, is not yet clear and will depend on the agreement reached with the EU and the length of any transition period. However, it may be helpful to think of the scenarios taking place over a period of 15-20 years, accepting that some changes may take place much more quickly within that period.
- 6.5. The three scenarios are summarised in **Figure 14** and described further below. The descriptions cover the external drivers that are likely to trigger the scenarios and the ways in which they will change the state of farming and forestry businesses. It should be emphasised that many of these scenarios are affected by national or international influences and policy which will be outside the control of organisations and individuals on Dartmoor.



Figure 14. Schematic representation of the three scenarios

Public goods and incentives

- **6.6. External drivers**: Under this scenario, the provision of public goods from land, funded through public subsidy or other buyers such as utility companies, becomes a primary influence on land management decisions. There is widespread availability of agri-environment agreements and other economic instruments, such as quality assurance schemes, which focus on public-good outcomes, above a baseline of regulation.
- 6.7. **Potential change in Dartmoor businesses**: In general, change in most businesses is likely to be smaller and more gradual than other scenarios, especially where payments for current practices maintain incomes near current levels. Competition for public resources from other sectors such as the NHS and schools will require clearer understanding of the expected outcomes and the way these benefit the public. Farmers and foresters will be rewarded for their skills in delivering these. Particular effects on land cover, management, stocking, investment etc. will depend on which public good objectives are prioritised in policy (e.g. climate change mitigation / nature recovery / water/ focus etc.) and on which assets are present on each holding (e.g. moorland, woodland, peat, commoning, access, etc.).

Market led enterprise

- 6.8. **External drivers**: Under this scenario, businesses respond to strong opportunities in domestic and/or exports markets. These may be coupled with lower regulatory costs, resulting from Government policies which support productivity, and lower inputs costs which may arise following Brexit.
- 6.9. **Potential change in Dartmoor businesses**: Two directions are open to businesses: 1) To add value and differentiate, selling to high price markets; or 2) to cut costs and scale up, selling into commodity markets. Much will depend on product prices and costs, and consumer trends affecting food, leisure and lifestyles. Businesses most likely to succeed will be those that have access to finance to invest and the skills and interest to respond to market opportunities. There is likely to be greater 'churn' in businesses in the form of increased sales of land, transfer of tenancies and succession, as well as a move to enterprises which make more intensive use of capital and labour.

Retreat and withdrawal

- **6.10. External drivers**: Under this scenario, economic opportunities become more restricted due to a fall in value of farm and woodland products and/or a rise in cost of inputs, and to narrower availability of public subsidy. Land values remain relatively high due to strong demand from the residential market.
- 6.11. **Potential change in Dartmoor businesses**: More of farmland and woodland on Dartmoor becomes economically marginal, especially the areas that are least productive in terms of market outputs or public benefits such as non-SSSI common land and rough grazing. Business costs will be spread over larger areas, involving low-cost livestock 'ranching'. There will be reductions in business outputs such as livestock and timber and there will be lower investment in infrastructure such as hedges and woodland rides. There is likely to be greater 'churn' in businesses, including from forced sales of land and changes in tenancies, with more land bought for residential and private amenity uses. Planning policies will constrain some of the change away from agricultural land use but land purchase by environmental NGOs could see significant landscape scale change.

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