

Graze the Moor Project

Independent evaluation

Final Report, August 2019

by

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EVALUATION REPORT – GRAZE THE MOOR

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1. Introduction

Graze the Moor is a five-year project supported by the Exmoor National Park Authority's Partnership Fund and involving a range of other partners. The project covers the entirety of Molland Moor, which has an area of 681 ha (1,680 acres). It began in April 2014 and ran until March 2019. It has implemented winter grazing on the moor on a trial basis, looking to establish a sustainable grazing regime for the future that is based on solid evidence, and without compromising the conservation interest of the moor.

1.1 Background – the origins of the project

Molland Moor lies within the South Exmoor Site of Special Scientific Interest (SSSI) which was notified in 1992 due to the presence of extensive areas of heathland, including lowland vegetation communities which are only found in South West England and South Wales. It is also designated as a Special Area of Conservation, (SAC) within the National Park, and is well used by recreational groups and tourism providers. Molland Moor falls within the Exmoor National Character Area (NCA) which is predominantly a landscape of upland plateaux of Devonian sandstones and slates, terminating in the north at the Bristol Channel with a spectacular cliff coastline. The landscape is dominated by an internationally important mosaic of heathland plant communities, grass moor and blanket bog, where heath and high brown fritillaries can be seen.

For many years, the Molland Estate had been concerned about the difficulty of managing the moor to a high standard in the face of what it believed were inappropriate guidelines on stocking as dictated by the prescriptions of policy. There have been significant changes to the management of the moors in south-west England due to successive rounds of CAP reform, the introduction of agri-environment schemes since 1993, and continuing changes in farming practices and systems. These have served gradually to disconnect the surrounding farms from the active management of the moors, leading to scrub encroachment and a reliance on vegetation management by machine cutting, rather than grazing by livestock. Prior to 2012 and under the ESA agreement, only summer grazing by 100 hill cattle, in conjunction with 400-700 sheep, was permitted by Natural England on Molland moor, and no grazing was allowed during the winter. This pattern of management contrasted with local tradition in which moorland had been grazed year-round by cattle and sheep.

Vegetation mapping on the Moor shows a dramatic loss of heather over the last 60 years and its replacement by coarse grasses and scrub, which have lower biodiversity and stock nutrition value. *Molinia* (purple moor grass) dominance on the moor has been a particular concern and is thought to have resulted from (sometimes uncontrolled) burns which were not followed by appropriate grazing, although other factors such as changing climate may also have played some role. There are also concerns that the areas allowed to be burned under agri-environment agreements have been too small to have a positive effect on the condition and extent of heath. The vegetation has become rank, coarse grasses have invaded, and invasive species such as bracken, gorse and scrub woodland have expanded onto the moor. One result of these changes is that the vegetation has lower nutritional value for stock, which makes it less attractive to graziers.

Much of the guidance that is available from Natural England (NE) for moorland and upland area management has been developed from evidence gathered in the northern uplands of England, where winters are colder and the growing season shorter than on the moors in the south-west. The Molland estate was therefore concerned that NE-led management was not well-tuned to the environmental conditions on the moor. This issue was discussed with the then Chairman of Natural England, Poul Christensen, in 2012. The conversation led to an initiative establishing a special project on Molland. This sought:

- to change the current management of the moor and reverse the downward spiral of its condition by reintroducing year-round grazing, in close consultation with NE;
- to gather a range of ecological, economic and management information to allow management decisions to be made based on local evidence of what would be more environmentally, economically and socially sustainable.

An initial two-year Case Study (March 2012- March 2014), sought to test the validity of the approach but its short duration produced insufficient information to allow robust conclusions to be drawn. Once funding and a management structure were secured, the Graze the Moor project (April 2014-2019), trialled grazing by the same number of cattle and sheep over the summer months and grazing by up to 60 cattle and up to 200 sheep over winter. It was hoped that this could make fuller use of grazing to provide enhanced management control of the vegetation. The Graze the Moor project offered an opportunity to collect evidence that could be used to develop guidance of wider relevance to Molland Moor, Exmoor and the other moors in the south-west.

Molland Moor is an ideal location for this work: it has a long history of testing novel management techniques and it has a detailed vegetation monitoring record that spans 25 years, allowing the impact of changes implemented through the project to be fully assessed.

At the outset of the project, different partners had different aims. For the Molland Estate the principal concern was to maintain active management of the moor in order to protect and enhance its multiple values (for wildlife, landscape, recreation and agriculture). For the National Park it was more about the value of learning about sustainable moorland management in the South West in order to enable lessons to be learned and transferred across all of Exmoor. For the tenant farmer, the project was a valuable opportunity to test and learn about effective moorland management in Exmoor as part of a successful farming enterprise, while for Natural England the main interest in the project was to enable the agency to understand how to reverse the significant decline in habitat quality and biodiversity of Exmoor's moorland since the 1940s. All of these aims were complementary, and each was reflected in the agreed aims for which project funding was sought and secured.

1.2 Aims, activities and structure of the project

The aims of the Molland Graze the Moor project were to:

- Monitor the impact of changes to the grazing regime on Molland Moor
- Draw conclusions from this information, in order to make recommendations for future grazing management
- Provide a focus to implement other best practice moorland management in support of the project
- Evaluate and develop the role of the 'Moorkeeper' which had been trialled in the previous case study (2012-2014)
- Carry out a farm economic study to understand the relative viability of the management system introduced on the moor
- Continue to monitor animal health issues and coordinate tick control measures
- Link to other relevant activity taking place on Molland Moor and across Exmoor
- Disseminate information from the project across Exmoor and the other moors in the south-west.

The main activities of the project were as follows.

- Testing and monitoring the impact of locally-adapted approaches to moorland management, including winter cattle grazing and active control of Molinia and to a lesser extent bracken and gorse, by various techniques including cutting and burning.
- Assessing the ecological condition of the moor through a series of trials and monitoring activity including: a grazing exclusion plots study, a Molinia control study, habitat monitoring and grazing impact surveys, heather condition surveys and bird surveys.
- Assessing and management of animal health issues including ticks, redwater fever and bovine TB.
- Comparing the economic viability of farms that make year-round use of the moor using hardy hill stock, with those that operate more conventional systems without winter moorland grazing.
- Comparing current and historic management practices on Molland Moor to better understand what might constitute a long-term sustainable approach for the future.
- Encouraging dialogue and promotion of the results of the work as it develops.

Project Structure

The project was based upon a multi-actor partnership, bringing together bodies and individuals with a key interest in Molland moor and its condition -

- Molland Estate: the landowner, overseeing management of the moor, employing a part-time 'moorkeeper' and supporting the farm tenancy as well as being responsible for the agri-environment agreement on the Moor.
- Exmoor National Park Authority, which funded and supported project development and provided strategic and ranger input to management and decision-making
- Natural England, with its expertise and responsibility for designated site issues and ecological monitoring

- An independent Ecological consultant who had been monitoring the moor for some years
- An external project manager from a national NGO with relevant knowledge (The Heather Trust)
- The Malcolm McEwan Trust which provided funding support for a studentship to support the project
- Elms Estate Office who took initial responsibility for economic monitoring of the project. After 2016 this task was taken on by the CCRI/RAU evaluation team.

As the project developed, the Langdon farming family who took the tenancy of Luckworthy farm and undertook to develop a farming system to provide the stock with which to graze the moor, became active members of the project partnership.

In addition, other parties were drawn into various aspects of project work. RSPB undertook some bird monitoring on the Moor, and the veterinary practice supporting the tenant (Torch Farm Vets) provided advice and input to its work on stock health and the relationship to vegetation management on the Moor. An expert was also involved in tick surveying on the Moor, in 2018.

The project partnership met regularly throughout its lifetime and produced reports and promotional material to help encourage wider dialogue about moorland and heathland management in south-west England. Events were held at intervals, many including site visits on the moor and involving interested parties including local farmers, experts from NGOs and agencies, community groups and researchers.

1.3 Purpose of this report

This report is the independent evaluation of the Graze the Moor project prepared by the CCRI and RAU team in accordance with a specification agreed with the Project manager and Steering Group in September 2016. The evaluation ran from November 2016 to March 2019.



2 Results of the project – Moorland management impacts

2.1 Management history – from the 1950s to the early 1990s

A ‘senior farmers’ meeting was held in 2016, bringing together farmers who had been Molland graziers in past decades, preceding the advent of the SAC designation and agri-environment agreements. The aim of the meeting was to provide a historical context for the external evaluation, by better understanding how the moor had been managed in the post-war period and the factors which had influenced its management, including custom and practice dating back even further. We here summarise the recollections of this group, which numbered around 8 retired and 2 still-active farmers and graziers. The meeting was hosted by the landlord and attended by the moorkeeper and tenant farmer at Luckworthy, the project manager and evaluation team, at the London Inn in Molland.

The longstanding system of moorland and inbye livestock production had a low output and ran at a low cost. Previously, of the 23 farms on the estate, 10 had grazed sheep and/or cattle on the moor. At the peak period each year, in July and August, up to 3,000 sheep had been turned out onto the moor to graze. Management was collaborative: this was made easier by the fact that the farmers met frequently up on the moor to talk about conditions and plan joint activities (it was suggested that this was a Sunday morning custom, to escape church). Today, this has virtually ceased. The three main drivers for change from this system were cited as: high levels of sheep ticks on the moor; not enough swaling of the moorland vegetation (and therefore forage for stock); and a shortage of labour to manage the moor. In the 1960s there were no ticks apparent on the moor – they arrived in the 1970s. Before that, ewe hogs and ewe lambs were turned out onto the moor in the summer. Some Galloway cattle were on the moor all year and even calved out there, calves then spending their first winter on the moor before being sold. Dry ewes would stay out until the end of September, some even till December. The stock all had their own ‘leers’ (hefts) in different areas of the moor.

The management of the moor had traditionally been a very co-operative operation, with the graziers working together with 8-9 farmworkers on the estate, to burn quite large areas (up to 100 acres), which was favoured over smaller burns. After burning, it was agreed that the vegetation returned to its natural state. Back burning was preferred in order to assist disease control by generating a hot burn, and using a 12-year rotation. During the winter, cattle were taken up to the Moor to graze by day and return to the farmsteads in the evening. The breeding ewe flock would be brought down to the in-bye land. However, winter grazing was an essential management tool to ensure that vegetation, which continued to grow for much of the winter period, was kept in check and not allowed to get too rank, so that its nutritional value in spring and summer could be maintained. The cattle were a key part of this system, keeping the sward clean and productive to maximise its summer value for sheep.

2.2 Impact of agri-environment schemes on grazing practices

Molland Moor entered an agreement in the Exmoor Environmentally Sensitive Area (ESA), from 1993 to 2003, then renewed for a further 10 years. Under this agreement the maximum stocking levels were 0.225 LU/ha (equivalent to 1.5 ewes and followers or 0.225 suckler cows and their calves/ha), with no grazing by cattle initially between 16 July and 14 May, later redefined as between 1 November and 15 April, and a maximum of 1 ewe/ha in that period. Ponies could also be grazed with prior approval, and there were restrictions on supplementary feeding.⁴ The site then entered a Higher Level Stewardship (HLS) agreement in 2009, which specified two alternative detailed stocking calendars for sheep, cattle and equines, depending on the number of ponies included. The stocking rates (if 30 ponies were present) were 0.11 LU/ha in summer (May to September inclusive) and 0.04 LU/ha (October to April) or (if 60 ponies were present) 0.11 LU/ha and 0.055 LU/ha respectively. There is also a detailed burning plan, requiring just 20 ha to be burnt annually (c. 3% of the total area of the site), along with bracken and European gorse control programmes. Thus, prior to the start of the Graze the Moor pilot in 2012, summer grazing by 100 hill cattle was required by Natural England, in conjunction with 400-700 sheep, but winter grazing by cattle was not practised at all after 1993.

During this period the Molland Estate has become increasingly concerned about the difficulty of managing the moor to a high standard. Managers felt instinctively that management 'by match or mouth' should be much more environmentally and landscape sensitive than using chemicals or machinery. Grazing is the main management input to the Moor but graziers have become reluctant to use it for a variety of reasons. As a result, the quality of the moorland habitat has degenerated. The pilot case study on Molland was therefore established to see if, by negotiating a management regime slightly closer to what might be recognised as longstanding local practice, moorland grazing could be revived among farmers on the estate.

2.3 Grazing management under the project

During the pilot phase 2012-2014, it was decided to test the original practice: cattle had been grazed on the moor during daylight hours and they were gathered into adjoining in-bye fields each night, where they could be fed, which was how the estate had previously licenced the farmers to use the moor. It was also agreed that sheep could be grazed out of season on the moor, providing that the stocking levels did not breach the HLS limits. During the pilot phase it was found that gathering in the cattle each evening was not viable due to the high labour requirement; it also led to significant vegetation damage around the gateways onto the moor because the stock stayed too close to their entry points all day, under these conditions. A new tenancy was created at Luckworthy farm for someone who could run a permanent herd of hardy native cattle up on the moor, all year round.

⁴ Taken directly from Natural England. Moorland Habitat Monitoring: A resurvey of Selected Moorland Agri-environment Agreement Sites: Site reports – No.13
<https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwifqpkjyY3cAhVHCMAKHYNRBvAQFggqMAA&url=http%3A%2F%2Fpublications.naturalengland.org.uk%2Ffile%2F4965333532672000&usg=AOvVaw1f0gENuMgyQqdlpFadea15>

Agreed stock levels for grazing on the moor with Natural England were: 100 cattle in the summer, 60 cattle in winter, between 400 and 700 sheep in summer and a maximum 200 sheep in winter. After two years Natural England allowed controlled snacker feeding for stock on the moor, managed wherever necessary to target grazing pressure on the areas treated as part of other management work. For example, the benefits of grazing to control Purple moor-grass regrowth after burning on Moorhouse Ridge were very evident. Active movement of stock may be necessary to make sure that all burnt areas get some grazing management early in the season. Target areas included those where prescribed burning took place, an area covered by a wildfire in Poulthouse Combe, and areas of Molinia burned as part of a Molinia Control study.

A herd of ponies is resident on the moor. During the course of the project numbers reduced and are now steady at about 30. A genome database is being established so that it will be possible to remove any doubt when identifying Exmoor ponies, and this will clarify the situation about the registration of the Molland ponies. Red Deer are also present and move around the local moors: their numbers are stable at about 150 (deer monitoring report, 2018).

2.4 Health issues

Sheep tick numbers are thought to be particularly high on the moor, and stock at risk from tick borne diseases – this was recognised as a significant disincentive for other farmers to graze the moor. For the stock in the project, dipping of sheep was undertaken in 2014 to protect against ticks. In early 2017 three calves were lost on the moor due to septicaemia from tick infestation. A tick survey was undertaken in late 2018: the results suggested a particularly high tick burden on the moor. Further checks on the incidence of tick-borne pathogens in the cattle are being undertaken at the time of writing in early 2019.

Ticks are an obvious concern to graziers and potential graziers of the moor. There is no approved tick treatment for cattle so they are given the substance approved for sheep which appears to make them more uncomfortable than it does when used on sheep. Older sheep, when treated, can be used as a way of ‘mopping up’ ticks to leave the vegetation cleaner for cattle and younger stock, but the sheep numbers on Molland are currently too low to function in this way. Deer will also carry ticks and transfer them across the moor, as they graze.

Both vets and farmers have discussed the potential value of testing to see whether larger-than-currently-permitted, hotter burns of the vegetation might be an effective way to reduce the tick burden on the moor. There is some indication that such tests could be acceptable to NE, if carefully designed. Older farmers and former Molland moor graziers stated that there were fewer ticks during the period when more burns took place but a direct link between burning and tick populations has not been proven. It is also possible that higher numbers of sheep, harsher winters and the use of stronger sheep dip chemicals which have now been withdrawn, could have helped keep tick numbers in check.

2.5 Ecological management issues

A 2013 Molland Moor vegetation survey aimed to assess the condition of the moorland vegetation, and especially the heathland. When compared with the Exmoor Heathland Survey carried out by Natural England (NE) in 2000, and a detailed vegetation survey of the site by ENPA in 1991, it was apparent that over the last two decades there had been a massive decline in the abundance of heather on Molland Moor. Much of the remaining stock of heather plants was judged over-mature 'old-growth' in very poor condition. The dense *Molinia* litter under the old heather bushes prevents any regeneration. Molland Estate, in liaison with ENPA and NE, has increased the level of burning and grazing on the site in recent years, plus a large amount of gorse control by cutting and burning. This resulted in excellent heather regeneration in some recently burnt plots, and localised increases in grazing pressure that appeared to be controlling excessive grass growth.

A programme of work between 2011 and 2017 aimed to elucidate the impact of burning on the ecology of upland habitats. As heathers have aged and declined, purple moor-grass *Molinia caerulea* has become much more abundant in upland heath where ericaceous dwarf-shrubs were formerly dominant. This is thought to relate primarily to three factors: reduction in grazing; warmer, wetter conditions resulting from climate change; and increased deposition of atmospheric nitrogen. The dense litter layer that results from spread of purple moor-grass into heathland prevents heather from regenerating either by germination or layering into moss cushions. Regular burning of heathland that removes the litter layer is advocated by continental authors as one of the methods of preventing loss of heathland to *Molinia*, as it enables heather plants to regenerate and prevents nitrogen build-up in the litter layer. Ticks and heather beetle also over-winter in damp litter and burning is known to help control their numbers. Stands of old open-grown heather on Molland moor were killed by a 2010-12 heather beetle outbreak. These stands have much *Molinia* between the ling plants, with little or no evidence of heather regeneration. Studies on Molland Moor have shown burning areas of moribund heath has greatly increased the abundance and vigour of heather.

Ecological experts' surveys suggest that levels of other forms of moorland management, such as grazing, bracken and scrub control, as dictated by the Natural England management plan, have been too low on Molland, and that an active burning regime will only be effective for moorland habitats if carried out in concert with grazing and other forms of management. For example, grazing of purple moor-grass in recently burnt areas is vital in allowing heather regeneration. Burning needs to be sufficiently hot to burn off the litter layer, as cool burns may result in dense growth of *Molinia* and little heather regeneration. Low bracken across Molland Moor is judged sufficiently dense in places to shade out heathland vegetation communities, therefore an effective bracken control programme has been recommended as a future management priority.

Natural England agreed four areas for swaling (burning) in winter 2014-15 (total area 30.6ha) on the Moor. A runaway fire occurred at Poulthouse Combe while burning one of the agreed areas. The resulting fire covered 15-18 ha, rather than the planned 7.6 ha. As a result, the plan to burn the fourth area (6.7ha), to the east of Smallacombe Combe was abandoned. Poor weather conditions prevented any swaling in the following season.

2.6 Habitat monitoring and management trials

Aerial photograph interpretation was used to identify trends in habitat change, from three years; 1947, 1998, and 2010. In addition, results from botanical surveys in 2008 and 2013 were used to complement and extend the findings. It found that there was a significant decline in heath cover on Molland Moor between 1947 and 2010 (56.2%) with a simultaneous large increase in purple moor-grass (409%), and acid grassland (62% between 1947 and 2013). The moor also has some bracken and gorse cover. Aerial photograph interpretation indicates that bracken coverage on Molland Moor increased between 1991 and 1998, but declined significantly between 1998 and 2013. According to the analysis there has been a significant increase in the extent of scrub coverage on Molland Moor between 1947 and 2013, although the total area remains small in the context of the total size of the moor.

Molinia treatment trials: These sought to establish the control technique that is the most effective at reducing the dominance of Purple moor-grass. Vegetation recovery of 4 different plots in two separate areas was compared. Different treatments included burning, cutting, and a spray-burn-reseed treatment. Burning was carried out in March 2015, cutting in June / July 2015, and spray-burn-reseed began in July, and was completed in September / October. On March 2016 a wildfire burned through the trial plots at Splatts, in the SW corner of the moor and covered about 60 ha before it was brought under control. The fire had little impact on the treated plots, as most of the vegetation has already been removed, but it removed the vegetation from the control plot. The spray-burn-reseed plots had mixed results. In one of the areas, the *Molinia* was very thick and the herbicide treatment did not appear to be very effective. Treated seed was then applied.

Scrub control: Gorse control by cutting was carried out during 2014, either side of Moor Lane. One area was cut by hand and stumps treated with Glyphosate. The other area was cut by machine and no further treatment was carried out. Stump treatment with Glyphosate proved unsuccessful. The area which had been flailed, without additional treatment, gave better results. Grazing stock are not likely to have a significant impact on gorse at the current stocking densities. Natural England's view is that gorse and scrub are an integral part of moorland habitat and that coverage of up to 20% of the moor area is acceptable. A horse drawn bracken bruiser was used on bracken stands in 2015.

Heather condition survey and treatments: this involved the detailed monitoring of vegetation condition on 28 stops across a transect, annually. *Molinia* remained dominant and undergrazed in all stops where it is found throughout the study period, except in areas where a recent burn encouraged fresh growth causing grazing animals to target these areas. This is important as *Molinia* substantially outcompetes Heather if not managed. Management burning was implemented on areas of mature/degenerate heather stands. Each burn site showed encouraging signs of healthy heather growth. From 2014 onwards a mix age group of heather stands was established at burn sites, improving the heather condition.

In the 2012 baseline survey it was found throughout that heather of all age structures had been minimally grazed, with levels well within the national standard set by the Joint Nature Conservation Committee (JNCC). Since winter grazing was introduced, the condition of the plots containing heather has varied, year on year. In 2013 two stops were technically judged as overgrazed (i.e. falling below the JNCC standard). Both of these stops were recent burn sites and grazing animals tend to target these even in summer so it cannot be concluded that this is due to winter grazing alone. In 2014, five stops fell below the JNCC guidelines, equating to around 18% of stops. Unlike in 2013, when overgrazed sites were recent burn sites the five overgrazed sites in 2014 represented differing habitats. In 2015, seven stops failed the JNCC guidelines. This equates to 25% of stops overgrazed. Of these seven overgrazed sites five were on areas of fragmented heath while the other two were on burn sites up to five years old. In 2016, eleven stops fell below the JNCC guidelines. This equates to around 40% of stops overgrazed. Despite this upward trend on sites with palatable heather, with so much fragmented heath that holds leggy and often dead heather plants, and large areas of *Molinia* dominance, it was concluded that further burning and cutting on the moor could have a positive impact as it would create larger areas of available forage over which the grazing stock could move.

It was suggested that most damage to young heather was caused by stock and deer during the winter, so two 10 x 10m exclusions were constructed on the moor to test this, one in September 2016 and the second in January 2017. Deer would be able to graze the enclosures but the stock would not. To date, there is no evidence of better heather growth in the exclusion plots but it is too early to draw firm conclusions from this.

Early results from the 2017 habitat survey indicated that the number of overgrazed stops had fallen to 9, from the 11 recorded in 2016. This 9 included some stops previously assessed as overgrazed and some not previously overgrazed, suggesting that some areas have recovered and some degenerated slightly since the previous year. Clearly, when there has been no overall change in stocking between years, the changes being picked up in the survey indicate that vegetation quality at the micro-level is being affected by other factors, which may influence grazing behaviours or heather plants' vulnerability to grazing pressure. At the time of writing this report, the results of the 2018 habitat monitoring were not yet available but early indications from the surveyor have been positive, as regards quality.

Taking stock of these results over the full 5-year period, it seems clear that annual changes in the stops are not related simply to grazing numbers on the moor as a whole. Graziers' observation of herd behaviour when using the moor suggests that in the early years of building up the herd, cattle tended to stay relatively close together and follow the pattern of supplementary feeding quite closely, as the whole site was still relatively unfamiliar to them. Over a few years their behaviour has changed and they are now more confident in ranging across the whole area. This is likely to have affected the spatial impact of their grazing activity, and might partially explain the temporal variation of vegetation condition measured at the monitored stops. When considered in combination with the positive results from the management treatments concerning heather recovery at sites that were burnt and then grazed, it is possible to say only that the reintroduction of winter grazing by cattle and sheep has had mixed impacts upon heather:

- when applied in combination with swaling of Molinia-suppressed and over-mature stands, some recovery has been observed, whereas
- more generally the stock appear to be having both positive and negative local impacts on heather in different areas of the moor.

An extract from a 2014 RSPB bird survey report (presented to an Exmoor NP Moorland Board meeting, precise source not stated) which covered Molland Moor, shows that breeding bird populations had started to recover across the Exmoor area since the date of the previous survey. Molland Moor showed the greatest improvement of all moorland areas covered by the survey.

2.7 Conclusions on moorland management

Whilst it remains too early to provide conclusive evidence on these points, the combined evidence collected to date would suggest the following:

- That winter grazing on Molland moor, in combination with swaling, has brought some benefits for heather regeneration and Molinia suppression but it is too early to assess the full potential of impacts if grazing is sustained for longer, or at higher stocking rates.
- that the more varied conditions achieved through the different practices tested and applied at Molland may be enhancing other environmental features such as bird populations, and a more accessible sward for recreational users.
- That it would be extremely valuable for further learning about optimal moorland management in Exmoor, for the regimes being developed at Molland to be continued and for their monitoring to continue, beyond 2019.

3 Results of the project – Economic evaluation of the farming system with moorland grazing

The farm economic study seeks to compare the financial results of farms that make full use of the moor using hill stock, with those that operate a more conventional system without moorland grazing. The results will be discussed with local farmers and used to advise farmers of the costs or benefits of using the moor.

Following two years in which management information was gathered by the Elms Estate, the RAU agreed to collect more detailed data from the farm accountant and tenant farmer on a regular basis, starting in late 2016. The aim was to calculate gross margins and other basic performance indicators for the moorland enterprises at Luckworthy farm – both cattle and sheep – and to compare their combined results with those of comparable farms not using moorland grazing. The comparator farms most readily available for this kind of work are those in the Farm Business Survey which are identified as ‘Less Favoured Area sheep and beef’ farms.

Financial farm data was collected over a two-year period between 1 October 2016 and 30 September 2018. The farm has four enterprises: in-bye cattle, in-bye sheep, moorland cattle, and moorland sheep. In the second year of data collection, the farm was under bovine TB (bTB) restrictions for 12 months, which reduces the comparability of financial data and measures.

Four forms of reporting and analysis were used.

- a summary of the profit and loss account data. This gave a broad overview of the farm’s finances and typical costs, as averaged over the 2 years.
- an output per £100 input ratio. While this is used as an input-output efficiency ratio (Agricultural Adjustment Unit, 1968; Nuthall, 2011), its inclusion in this analysis enables comparison across years.
- a gross margin analysis that focuses on the net sales of enterprises and their direct associated costs. This allows a comparison between the enterprises on the moor and in-bye enterprise, for the same types of livestock.

To calculate the gross margins, certain assumptions were necessary. These include: an average stocking of breeding stock (cattle and sheep) on the moor, breeding sheep on in-bye and suckler cows on in-bye; with apportionment of GM using filtered data from the farm accounts as far as possible⁵. Gross margins were calculated as a two-year average to lessen the effect of the TB breakdown.

Finally, gross margins were compared against FBS benchmarking data. This included 53 LFA farms with breeding upland and hill ewe enterprises, and 142 upland farms with suckler

⁵ Where this was not possible, allocation in these variables was based on the proportion of grazing livestock units on the farm

cows. This gave an indication of how well the GMP enterprises performed compared to a wider sample of farms. It was not possible to compare the upland in-bye cattle system of the project with a general benchmark from FBS.

After just 2 years of monitoring, the economic results suggest that the moorland-based enterprises at Luckworthy are performing at a similar standard to the average 'LFA sheep and beef' farm in the South-West uplands. The grazing herd of cattle has been built up over the full period of the project but ideally would continue to increase to provide a more secure basis for future business health, from the tenant's perspective. Economic performance to date would suggest that using the moor does not economically disadvantage the farm business, if suitable hardy stock are kept. Whilst the economic value of outputs from the moorland enterprises is lower than it would be for other LFA farms in the south west, costs are also lower because of the forage value of using the moor, notwithstanding its generally low productivity. This is evident even though the general level of moorland usage by stock is much less than it would have been in the past, before 1973.

Figure 1. Combined costs for the total combined enterprise, 2016/17 and 2017/18

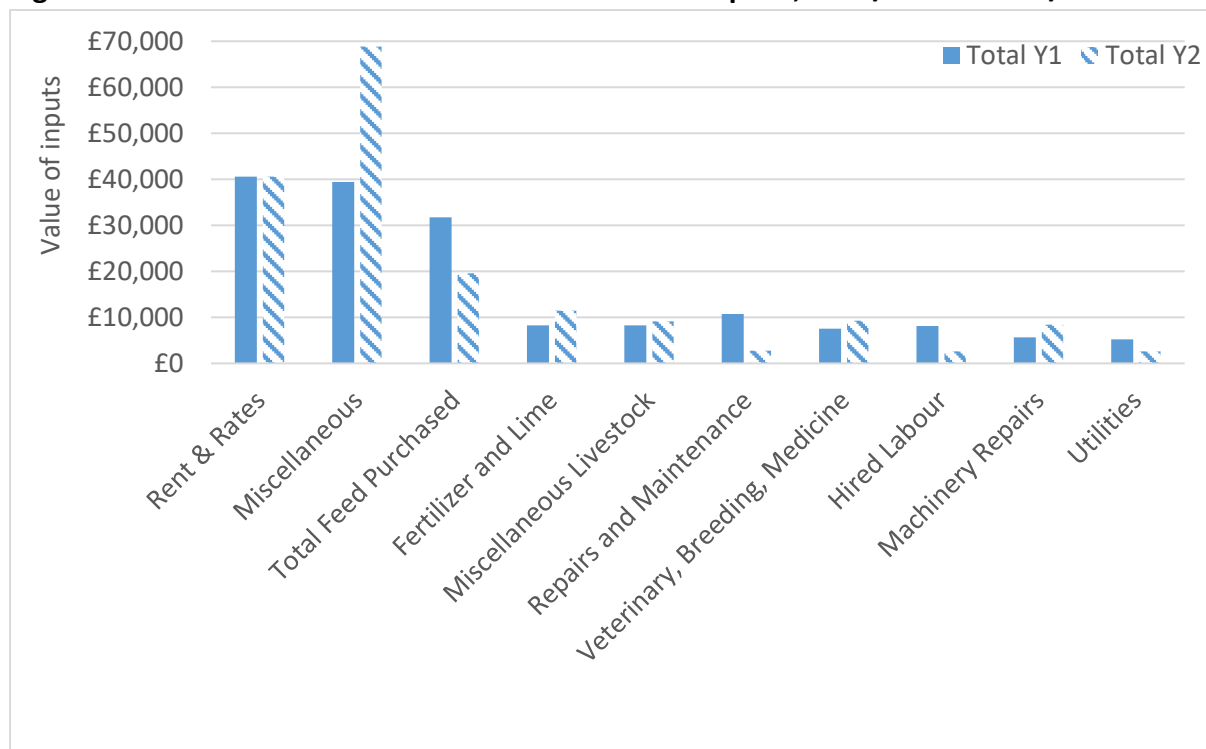


Figure 1 demonstrates the cost structure of the farm as a whole, including moorland and in-bye production. From this it is clear that rent and rates, miscellaneous spending, and purchased feed are the major farm costs. Indeed, rent and rates account for approximately one-third of business costs. It is also evident that the bTB breakdown cause a spike in miscellaneous costs. It is recognised that bTB breakdowns have short-term and longer-term financial implications for farm businesses and potentially less tangible personal and emotional costs (Butler et al, 2010). Nevertheless, the range of costs overall is low.

Figure 2. Income for the total combined enterprise: output per £100 of input, 2016-18

	Y1 1 Oct 16 – 30 Sep 17	Y2 1 Oct 17 – 30 Sep 18
Cattle Sales	48.1	47.0
Contracting	2.4	2.2
Insurance claim	0.3	0.0
Machinery sales	5.7	0.0
Sheep Sales	15.2	23.6
Subsidy	38.8	38.1
Uncategorised Income	0.7	3.1
Wool Sales	0.7	0.5
Gross Output	111.9	114.5

Figure 3. Gross margins by enterprise type on the farm

Moorland	Moorland Cattle	Moorland Sheep	In-bye	In-bye Cattle	In-bye Sheep
Breeding	60	700	Suckler/Breeding	250	960
Sales per animal	457.26	9.26	Sales per animal	136.66	25.89
Variable Costs			Variable Costs		
Feed costs	70.47	3.66	Feed costs	51.53	5.72
Veterinary and medicines	18.86	1.98	Veterinary and medicines	16.14	1.79
Contracting	2.59	0.45	Contracting	4.93	0.51
Other livestock costs	19.91	1.98	Other livestock costs	16.35	2.04
Forage costs	15.64	1.65	Forage costs	131.11	2.82
Total Variable Costs	127.46	9.71	Total Variable Costs	220.07	12.87
Gross Margin	329.79	-0.46	Gross Margin	-83.40	13.02

The financial analysis of the farming enterprise managing the land on Molland Moor demonstrates several important conclusions.

- The farm finances are similar to many upland farms on Exmoor and other upland areas: verging on the margins of profitability and very dependent on subsidy payments (figure 2).
- When cattle are grazed on the moorland throughout the year, although sale values are lower this is offset by lower costs leading to a significant positive margin (fig. 3).
- Of the four enterprises analysed, gross margins from the moorland cattle enterprise were the most favourable, in these 2 years, although the inbye cattle GM was undoubtedly significantly affected by the bTB breakdown in year 2.

- While the analysis here shows differences between enterprises, the project emphasizes the importance of all four enterprises to the farming business as a whole, enabling best use of the land and equipment available to the tenant (i.e. the farm, the moorland and another area of enclosed grazing land nearby – typical for many Exmoor farms). So although the gross margins of one enterprise may be low compared to benchmark data, it is the interaction between, and cumulative performance of, all enterprises that is important to the viability of the farm.

The Farm Business Survey results for marginal farms in the South-West are relatively poor over the period, emphasising the financial vulnerability of upland agriculture currently.

Figure 4 – Gross margins per head over the 2 years, Molland compared to FBS data

£ per head	GM for in-bye sheep	GM for hill sheep	GM for hill suckler cows
Molland data	13 – average to low	0 – low	330 – average to high
FBS data	21	21	221

Compared to the Molland enterprises (figure 4), FBS hill sheep GMs are generally higher, which reflects the relatively low stocking rate for sheep currently on Molland; whereas the Molland GM for hill cattle is higher than average, reflecting its much lower costs, even with lower output. Strategies to increase business resilience are a priority, for future planning. These could include direct marketing of beef from the moorland herd, and increased stock numbers (e.g. of sheep on the moor, to make better use of the available grazing which the cattle have now created), which would require additional lambing facilities at the farm.

In considering the results from the habitat management trials and monitoring, it has been suggested that there could be further ecological benefits from increased moorland grazing and associated management action (swaling, especially). We anticipate that such an increase might also enable greater cost savings for the enterprise with stock on the moor, as well as stock health benefits and thus potentially lower treatment costs linked to higher numbers of treated sheep and closer-cropped vegetation, keeping tick levels suppressed. This raises the possibility that a careful shift towards some increased moorland use and management by grazing and burning could increase the resilience of the farm business. However, this would need to be tested in practice before firm conclusions could be drawn.

It is important to note that there are limitations to the financial analysis that need further consideration. Two years of data is insufficient for understanding the financial performance of the farm business and making a robust comparison between enterprises – ideally, at least 5 years should be used. In addition, given the complexity of the farming system and wider goals of the project on Molland Moor, a Total Economic Valuation framework may be a preferable approach to use, to capture not only the direct financial values but also indirect use and non-use values (Kenter et al, 2015⁶), such as heather regeneration on wildlife; and the enhancement of the moorland for future generations to appreciate.

⁶ Kenter, J. O., O'Brien, L., Hockley, N., Ravenscroft, N., Fazey, I., Irvine, K. N., ... & Church, A. (2015). What are shared and social values of ecosystems?. *Ecological Economics*, 111, 86-99.

4 Results of the project – Governance and outreach activities

4.1 Governance and the development of the partnership

The successful management of a multi-actor project such as this one requires good co-ordination and co-operation between partners. Reflecting upon the achievements of the project after 5 years, the partners have been unanimous in affirming their commitment to what they express as a very positive experience of working together. Key to that experience has been co-learning in a spirit of open investigation, willing to try different tactics and to promote information about the project widely among local farmers and other interested parties, with a view to deepening everyone's understanding.

In discussion in the final quarter of the project, Steering Group members reflected on the value of the group. Initially, the moorkeeper and the 'independent' chair were seen as a good idea and important for building knowledge and trust among the other group members. Over time, the tenant farming family has taken on more of the role that was formerly filled by the moorkeeper as they have settled into the tenancy and built up the grazing herd. In addition the relationship between the owner and tenants, the National Park and Natural England has developed very positively to a point where management discussions are frequent and largely positive, centred around testing a wider range and larger scale of interventions as time goes on. As a result, it may be that as the project moves into its next phase there is less need for an external independent chair. Natural England is happy to continue with habitat monitoring and the tenancy seems to be working well with both landlord and tenant expressing satisfaction with its overall workability.

This evaluation has not investigated in depth, the financial impact of the project upon both landlord and tenant. The estate has born some of the costs of the project but received no income from it, while the HLS agri-environment scheme income is shared with the tenant. In final discussions, both affirmed their satisfaction with the relationship and the way that the project had operated, overall.

SG members agree that the most important continuing need for the project's lasting legacy will be for ongoing economic evaluation and further promotional and learning events. Some funding to enable ongoing year-round moorland management at a level which is commensurate with what has been achieved under the project is also seen as critical to the viability of continuing with the regime beyond 2019.

4.2 Events and promotion / publicity

Each year the project hosted workshops and other events to invite people from all the south-west moors to discuss the work of the project and other moorland management issues. Over 150 moorland farmers and owners have come to demonstration days and seen the project in action, since it began. Whilst the detail of all events is provided in the Project

report, some of the most important ones are described here, to give a flavour of actions and outcomes.

A workshop was held on 24th September 2014 for an Exmoor audience, which attracted a range of local farmers and other stakeholders who came to learn about the project and discuss issues and the potential value of the work.

In 2015 Natural England held a workshop at Molland that was facilitated by The Heather Trust, to explain the National Upland Outcomes approach, which seeks closer integration between Natural England and the owners and managers of land. The Molland Estate volunteered the moor as a pilot site for the Outcomes Approach, to

- Provide greater recognition for output from the Graze the Moor project;
- Possibly extend the duration of the work being carried out under the Graze the Moor project beyond the current end of the project in March 2019;
- Provide an opportunity to expand the area included in the project to take in Anstey & Cuzzacombe Commons, or possibly other moorland parts of North Molton estate

On 16th September 2015, 28 people attended a workshop to present results of the range of management work and analysis undertaken by the project. A site visit took place in the afternoon, where these issues were discussed on the moor.

On 21st September 2016 a workshop was held on the moor. This workshop aimed to attract a wider audience to include those who might not currently know anything about moorland management. A key theme was how the whole community should see the moor as an asset, not a millstone. The role of the moor in providing food, or how upland farming cares for wild and farm animals are other issues that were addressed.

On 11th July 2017 representatives from Defra, Natural England and nearly all of the English National Parks and colleagues from the RSPB, FWAG South West, The Exmoor Hill Farming Network, The Exmoor Society, local farmers and the 'Graze the Moor' project team met to hear about the Graze the Moor project.

On 25-26 September 2018, a major event combined a day at Molland with a second day visiting the Clinton Devon Estate and Pebblebed Heaths site, comparing approaches to grazing management of moor and heathland habitats. At each site, presentations about the projects were combined with a site visit and discussion of grazing and habitat management challenges and options. A total of 50 people attended for both or one of the two days. The discussion at Molland was summarised in five principles

1. People need an active interest and sense of ownership in land to manage it effectively.
2. Land managers, NGOs and government, need to be bold in our ideas and practices.
3. We need to allow small-scale dynamic change to engender wider landscape-scale change.
4. Long term commitments are required to allow businesses to restructure to support change.
5. Farmers and foresters' long-term respect and knowledge of the land must be considered and engaged, in any future decision making: place based solutions are key.

5. Key Conclusions

1. **The Graze the Moor Project has demonstrated clear and positive results** from a carefully planned and integrated programme of farm/estate and habitat management, teamwork among a core team of dedicated partners and a strong focus on outreach and communication, to explore and promote better understanding of the needs and opportunities for sustainable and resilient moorland enhancement, in Exmoor.
2. The project plan, management activities and emerging results presented here show clearly that **this is a long term exercise. Ideally it should be continued** for a further five years as a minimum, to learn more lessons and to resolve some of the uncertainties around best economic and ecological practice for moorland-focused farm and biodiversity management.
3. The longstanding practice of good data collection on this moor, and the management flexibility available, arising from a co-ordinated and positive landlord-tenant relationship and the ability to control all grazing by stock on the moor, means **it is an ideal test-bed for this kind of applied research.**
4. There are some indications that the **various management actions/experiments could benefit from being a bit more bold and spatially significant** than they have been, to date. This would probably make the identification of transferable lessons easier, also.
5. The economic case for winter grazing of stock is not strong at present but **early financial results are positive, and there is evidence to suggest that its value could be increased** if stocking levels were further, but carefully, increased to make better use of moorland vegetation value. Performance could also be boosted significantly if additional value could be obtained for the products of the management system (e.g. high nature value, rare breed meat sales; farm visits for schools or other educational groups).
6. Ensuring good stock health and welfare on moorland where the vegetation condition has clearly deteriorated in recent decades is a particular concern, particularly where this is combined with a significant growth in the numbers of ticks at the site, due to unknown causes. Focusing some management effort upon **testing options for more effective reduction of the tick burden on moorland could be valuable**, not only for Molland but also for other Exmoor moors where all-year-round grazing is now being considered.
7. **A particularly valuable and valued aspect of the project has been its ability to demonstrate the positive aspects of local partnership** between active managers of sites (landlords and tenant), government agencies and a range of relevant stakeholders, to determine strategies for enhanced benefits and increased sustainability.
8. The project findings to date suggest already that **there could be opportunities to extend the management across neighbouring moors**, with positive impacts both economically and ecologically.
9. **Under a future policy regime, an approach which increases the opportunity for local Land Management, with flexibility and the power to experiment, to attract sustained public funding would be beneficial.** This would enable the current approach here,

including the partnership, to continue for the benefit of all concerned with moorland management on Exmoor and across the southwest.

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References

All the monitoring reports and annual reports of the Graze the Moor Project, as used in the preparation of this evaluation, can be obtained via Simon Thorp, convenor of the Project team: info@sprthorp.co.uk. Other references are given within the body of this report, in footnotes.



All photographs are the authors' own.