COMMONS ACT 2006: SECTION 38
PROPOSED WORKS ON IPING AND TROTTON COMMONS, WEST SUSSEX
APPLICATION REFERENCE: COM 749

PROOF OF EVIDENCE OF
DR JOHN UNDERHILL-DAY
FOR SUSSEX WILDLIFE TRUST

SUMMARY

A. I am John Underhill-Day and I hold a BSc degree in Biology and a PhD research degree. I am a member of a number of professional Institutes and a retired Fellow of the Royal Institution of Chartered Surveyors.

B. Since 1970 I have been employed by RSPB and am currently their heathland casework adviser. I have, for some years run an ecological consultancy specializing in heathland and have been closely involved in the conservation and management of lowland heathland, for some 40 years.

C. Iping Common SSSI (which includes Trotton Common) is nationally important site for its dry heath and wet heath habitats as well as its invertebrate species and assemblages. It is of county important for its birds including those listed on Annex I of the Birds Directive: Nightjar, Woodlark and Dartford Warbler. The main habitats are dry heath, typified by Calluna heather and dwarf gorse, wet heath and mire with Purple Moor-grass and Wavy Hair-grass dominated grassland in some drier areas.

D. The Commons are also important as an archaeological site and as a much used and cherished open space amenity.

E. A review of the scientific evidence both from a summary produced Natural England in 2001 and of subsequent papers and reports, some of which have been cited by the objectors concur that grazing is an appropriate management for lowland heathland, but that it needs to be set at the right level with respect to the type and size of the animals, their density on the grazed site and the seasonality of grazing. Both over-grazing and under-grazing can lead to undesirable effects but in the majority of cases, heathland managers have found that grazing meets one or more of their management objectives. Emphasis in a number of reports is given to the need to vary the grazing conditions to suit individual sites.
F. There is no evidence that grazing has been a factor in the decline in the numbers of Dartford Warblers at Stedham Common with all the evidence pointing to the recent hard winters as the controlling factor in population declines. Detailed studies have shown no effect from grazing on the ground-nesting Woodlark and that Nightjars prefer to forage over grazed rather than ungrazed areas. At Stedham Common, there is no evidence that either Nightjar or Woodlark populations changed as the result of the introduction of grazing or that Nightjars have declined recently at Iping and Trotton Commons.

G. Grazing can create a diverse vegetation matrix which provides a wide range of habitat niches for flora and fauna, can encourage the domination of heather, reduce grass dominance, help to control scrub encroachment, create bare ground for specialist heathland plants and invertebrates, reduce nutrient loadings, create dung habitat for a wide range of invertebrates and the birds which feed on them and contribute to the restoration of habitat following burning or cutting. However over-grazing can damage heather communities and on its own, grazing will not control scrub. Overall biodiversity will benefit from the right levels of grazing, but each site requires its own particular grazing regime.

H. The best overall outcome from grazing management will be achieved where sites are managed by experts who are able to take into account the particular features of the site and its flora and fauna and who are committed to maximising the overall biodiversity of the site. In the case of Iping and Trotton Commons, the Sussex Wildlife Trust has such expertise with experienced site managers, a grazing manager and expert ecological advice both in-house and from a range of external specialists.
EVIDENCE

Personal background

1. I am John Underhill-Day and I hold a BSc degree in Biology and a PhD research degree. I am a member of the Institute of Biology and a Chartered Biologist, and a member of the Institute of Ecology and Environmental Management. I am a retired Fellow of the Royal Institution of Chartered Surveyors.

2. Between 1971 and 1986 I supervised the management of the main lowland heathland reserves of the Royal Society for the Protection of Birds. Between 1986 and 1996 I was responsible for the management of a large area of upland heath and from 1996 to 2005, I was managing the teams looking after the RSPB lowland heathland reserves in south-west England and for the Dorset Heathland Project which carried out research, gave advice and undertook management work on privately and institutionally owned heathland.

3. In April 2006, I retired as a full time officer of the RSPB but have been retained as the ecological adviser and expert witness to the RSPB on issues in relation to development threats to nationally and internationally important heathland conservation sites.

4. During the last five years I have published and contributed to a number of reports on aspects of heathland management and visitors to heathlands. I supervised the successful completion of projects by a PhD student working on the role of livestock grazing in the conservation of lowland heath from 1999-2002, an MSc student working on the effects of deer grazing on heathlands 2002-2004, and a PhD student working on human disturbance and the population dynamics of Dartford Warblers on heathland from 2004-2007.

5. I have run and contributed to numerous heathland training courses for a wide range of organisations, and have organised and undertaken survey work on all three Annex I heathland bird species, Nightjar, Woodlark and Dartford Warbler.

6. I have appeared as an expert witness for RSPB and NE on lowland heathland issues at a number of inquiries, as well as attending as expert witness at two inquiries into fencing schemes to facilitate the re-introduction of grazing on heathland commons.

7. I am a director of an ecological consultancy called Footprint Ecology, established in 2004, that works with conservation organisations, government agencies, such as Natural England, and regional authorities. In this role, I have carried out a review for English Nature (the forerunner of NE) on urban effects on lowland heaths and their wildlife and on the introduction of deer grazing to heathlands. I have recently advised, or am currently advising, heathland owners and managers in Sussex, Surrey, Dorset, Hampshire and Devon on the management of heathland sites including Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas and Ramsar sites.
8. Footprint Ecology has been involved in a range of recent projects on heathlands and commons in southern England. This work has included advice on grazing of heathlands on the Suffolk Sandlings and coastal heathlands on Lundy Island, the introduction of grazing schemes on a number of commons, writing a series of guides on all aspects of the management of commons commissioned by Natural England and producing a series of management plans for a range of commons in the Chilterns for Chilterns Conservation Board. I have led or contributed to a number of these studies. I have also jointly authored management plans for Blackheath Common SSSI in Surrey and Canford Heath, and Brownsea Island in Dorset, both part of the Dorset Heathlands SAC and the Dorset Heathlands SPA and Ramsar site.

9. I have been closely involved in the conservation and management of heathland for over 40 years.

**Terminology and scope of this evidence**

10. Sussex Wildlife Trust seeks permission to erect fencing around Iping and Trotton Commons. I shall refer to those areas as Iping and Trotton Commons, or by their individual names if referring to specific locations within one of these two commons. Stedham Common is separate but nearby and I refer to it by that name. The area of land notified as Iping Common Site of Special Scientific Interest contains Iping, Trotton and Stedham Commons and an area called Fitzhall Heath, which is within Iping Common. When I refer to the notified area I use the name Iping Common SSSI.

11. In this proof of evidence I will give a brief description of Iping and Trotton Commons, the traditional management of heaths, the results of abandonment and the vegetation on Iping and Trotton Commons under current management and environmental influences. I will then go on to consider grazing as a suitable management for maintaining lowland heathland and summarise the references quoted by the objectors. I then investigate whether the claims that the Annex I bird species have been affected by grazing on Stedham or management at Iping and Trotton. I will then consider the wider practices of the use of grazing as a favoured means of managing heathland across Western Europe and the UK.

**Iping and Trotton Commons – description and status**

12. Dr Alonso will give a broad history and background to lowland heathland in the UK, so in this section I will describe the broad characteristics of Iping and Trotton Commons, their status and main biological interest. More detailed descriptions of various features are contained in other evidence to be given on behalf of Sussex Wildlife Trust.

**Designations**

13. Iping and Trotton Commons (and the adjacent Stedham Common) are part of a chain of heaths in West Sussex. They are the remnants of the once extensive line of heaths marking the poorer soils of the Lower Greensand. Most of the area of heathland here has been lost since 1813 to forestry, housing, agricultural improvement quarrying and other uses. Iping and Stedham Commons are both part of the Iping Common Site of Special Scientific Interest, notified in 1954 (revised 1986)
and designated as one of the richest examples of heathland in West Sussex, of particular interest for its invertebrate fauna, of county importance for its breeding heathland birds and the only county site for Bristle-bent grass (*Agrostis curtissii*). The SSSI is divided into units for assessment of its condition by Natural England (NE) with Stedham Common comprising Unit 1 (36.1ha), Iping and Trotton Commons Unit 2 (79.6ha) and Fizhall Heath (which is part of Iping Common) Unit 3 (9.7ha). The last assessment of the condition of the SSSI undertaken in October 2013 found that Unit 1 was in favourable condition and Units 2 and 3 were unfavourable recovering.\(^1\)

14. In 1978, Iping and Trotton Commons were declared a Local Nature Reserve (LNR) under Section 21 of the National Parks and Access to the Countryside Act 1949. Bridglands Plantation in the S-W corner and Fizhall Heath in the S-E corner of the common are both outside the LNR. The declaration was extended in 1986 to include Stedham Common.

**Nature conservation interest - flora**

15. The soils on Iping and Trotton Commons consist of leached podsols\(^2\) above the lower greensands. Podsols are light soils consisting mostly of sands or gravels with a thin, acid humus layer over a nutrient poor soil. This provides the right conditions for heathland vegetation usually dominated by heather. Any increase in nutrients, from atmospheric nitrogen inputs, for example, allows colonisation by nutrient demanding plant species that can out-compete the heather and lead to a decline in the specialised flora and fauna of the heath.

16. The main habitats on Iping and Trotton Commons are dry heath, typified by heather (*Calluna vulgaris*, hereafter referred to as **Calluna**) and dwarf gorse (*Ulex minor*), but associated in places with slightly damper conditions marked by Purple Moor Grass (*Molinia caerulea*) (hereafter referred to as **Molinia**) and transitioning into Molinia wet heath and mire in wetter areas and Wavy Hair-grass (*Deschampsia flexuosa*) (hereafter referred to as **Deschampsia**) dominated grassland in some drier areas.

17. Some 444 species of vascular plants have been recorded on Iping Common SSSI including Bristle Bent at its only site in West Sussex, and a number of red listed species, Species of Principal Importance (BAP priority species) and county notable species. There are also a number of scarce and rare mosses, liverworts and lichens together with nearly 500 species of fungi.

18. Iping and Trotton Commons support two habitats listed under Annex I of the Habitats Directive, which must be maintained in favourable conservation status. These are 4010 Northern Atlantic wet heaths with Erica tetralix and 4030 European dry heaths.

---

\(^1\) There is reference in one of the letters of objection to a JNCC report dated 2004. This is taken to refer to the report on Common Standards Monitoring for Lowland Heathland which sets out the methodology and standards to be used by Natural England when assessing heathland SSSIs.

\(^2\) See later footnote for a more detailed definition
Nature conservation interest - fauna

19. A description of the Species of Principal Importance, red listed species and species listed under the Wildlife and Countryside Act 1981 is given in the proof of Mr. Lyons.

20. A good assemblage of mammals has been recorded including the scarce Harvest Mouse and the more widespread species of reptiles and amphibians are also found on the site.

21. There are three particularly important bird species on Iping and Trotton Commons listed on Annex I of the Birds Directive that are wholly or mainly reliant on lowland heathland habitats. (Birds listed on Annex I require special conservation measures to ensure their survival and reproduction). The three Annex I species are:

- Nightjar (Caprimulgus europaeus)
- Woodlark (Lullula arborea)
- Dartford Warbler (Sylvia undata)

22. Since 1997, Nightjar numbers have fluctuated on Iping and Trotton Commons between 1 and 8 singing birds. There was only 1 singing bird in 1998, after which numbers climbed to 8 singing birds in 2000 and between 4-8 have been recorded every year since then. There were 7 singing birds in 2014 and 6 in 2015. Woodlark numbers have varied between 1-8 pairs with between 4 pairs (in 2002) and 8 pairs (in 2005 and 2014). Dartford Warblers were found in very small numbers on Iping and Stedham Commons during the early 1990s and gradually built up to some 19 pairs by 2008. Following the hard winters of 2008/09 and 2009/10 numbers were first reduced and then eliminated by severe weather. Recolonisation at Iping and Trotton began in 2011 since when 1-3 singing males have been recorded.

23. All bird species in the UK (including Channel Islands and Isle of Man) are assigned to one of three lists, red, amber and green. The red list consists of breeding species which are globally threatened, exhibit a historical decline or a severe decline in numbers of over 50% in the last 25 years or a severe decline of more than 50% in breeding range between 1988/91 and 2007/11 (when UK bird breeding atlas studies were carried out). The amber list contains species on the European red list (not red listed in the UK), species exhibiting a historical decline with some recovery, species which have seen a moderate decline in numbers or range of >25-<50% over 25 years using the same criteria as for red listed species and rare breeding species with under 300 pairs nationally or species where the UK holds at least 20% of the European population. There are similar criteria for wintering species but they are not relevant here. These lists have been put together and agreed by the RSPB, the Game and Wildlife Conservation Trust, Natural England, Wetlands and Wildfowl Trust, British Trust for Ornithology and the Joint Nature Conservation Committee (Eaton et al., 2015) [SWT document no. 62].

24. In recent years Iping Common SSSI has had 13 red listed breeding species (Turtle Dove, Cuckoo, Lesser-spotted Woodpecker, Wood Warbler, Skylark, Tree Pipit, Song Thrush, Mistle Thrush, Spotted Flycatcher, Marsh Tit, Starling, Linnet, and Yellowhammer) and 10 amber listed breeding
species (Kestrel, Tawny Owl, Nightjar, Willow Warbler, Meadow Pipit, Dunnock, Redstart, Dartford Warbler, Bullfinch and Reed Bunting).

25. In summary, Iping Common SSSI is of considerable nature conservation importance because:

- It is one of the largest and richest heathland remnants of the once more extensive heathlands in West Sussex which contribute over 1% of the national lowland heathland resource present in the UK.

- It holds a rich assemblage of vascular plants, lower plants and fungi with individual species of county and national importance.

- It is of regional importance for its bird assemblage with three Annex I breeding species (Nightjar, Woodlark and Dartford Warbler) and a rich assemblage of red and amber listed bird species with an important county population of breeding Redstart.

- It holds a nationally important invertebrate assemblage which includes rare and scarce species (details are in the proof of evidence of G. Lyons).

- Overall Iping, Trotton and Stedham Commons are designated as being of national importance for nature conservation under the appropriate legislation.

Other important interests

26. Iping and Trotton Commons are also important as an archaeological site with a number of Scheduled Ancient Monuments including Bronze Age tumuli and a Roman road.

27. Iping and Trotton Commons are also an important open space, with a high value for visitors who come from a wide area to walk, dog walk, ride and enjoy the scenery and wildlife (see Ms Willmott’s evidence for details).

Management and grazing on lowland heathland

Management

28. Lowland heaths were originally created through the conversion of woodland to pastoral or arable agriculture land on light soils, and have been maintained as open ground down the centuries by the activities of rural communities. These would have included cutting curves and scrub for fuel and firewood, felling trees for timber, taking sand and gravel for building, cutting heather for thatching and winter animal food and burning the vegetation to provide fresh shoots for grazing animals.

29. The heathlands were not ‘managed’ as we think of doing today, they were exploited for the products that the surrounding communities found useful or essential. Burning was associated
with grazing, and although there were undoubtedly large wild fires at times, generally, the vegetation would have been protected and only managed fires in the winter would have been used to create fresh growth. These fires would have been carefully controlled to prevent them getting out of hand, as still happens in the New Forest today.

30. Without such management almost all heaths would revert to woodland and scrub and their special cultural, landscape and wildlife features would be lost. A side effect of these activities has been the continual depletion of nutrients on generally freely draining substrates, leading to the continued dominance of heathland vegetation on nutrient poor, acid soils.

31. More recently, the effects of atmospheric nitrogen deposition have encouraged conversion of the heather communities to grass. Over the last 100-150 years inputs of nitrogen from the atmosphere have increased, arising from sources including the production and use of fertilisers, intensive livestock farming and fossil fuel combustion by transport and industry. Calluna responds to increased inputs of nitrogen from the atmosphere by increasing shoot (but not root) growth, increasing canopy height and density, and increasing flowering and litter production. These changes in shoot growth and structure make the plants more vulnerable to cold and drought, and to attacks by heather beetle. The opening up of the Calluna canopy by frost, drought and insect attack increases light levels and with the heightened levels of nitrogen in the soil and litter this encourages the growth of grasses, particularly Molinia and Deschampsia (Cunha et al., 2002) [SWT document no. 61]. This process helps drive the conversion of heather dominated vegetation to grassland dominated vegetation.

32. For the heathland manager, the challenge is to produce a biodiverse heathland habitat with a range of successional stages represented to provide the wide variety of niches for the associated specialist flora and fauna. Most heathland has survived only because of human management or exploitation and without this would rapidly revert to woodland. The rate of successional change is probably getting faster as a result of atmospheric inputs and their associated effects (increased frequency of attacks on dry heath by heather beetle for example). The speed of change is such that on most heathlands continuous management is necessary and long delays to carry out further research or experimentation is neither necessary nor desirable given the range of research already available and the collective experience of heathland managers.

33. There are a range of management tools available to the heathland manager but each management, whether it be scrub cutting, mowing, burning, turf stripping or grazing provides different results such that they are complementary rather than alternatives. In terms of the habitats they create, the nutrient stripping they achieve and their subsequent successional pathways and rates, all these techniques are different. Mowing, burning and turf stripping are all one-off measures, to be repeated at long intervals and restricted in their extent and frequency. By contrast grazing is more continuous and has less immediate destructive effects on the vegetation, it results in a far wider variety of habitat structures and niches and it can, uniquely, complement all the other managements.

34. The dynamic nature of heathland plant and animal communities and their reliance on human intervention for their survival means that to do nothing is not an option if the special
characteristics of the heaths (and the legal responsibilities under national legislation for designated sites) are to be maintained.

35. Over the last 50-100 years, as heathlands have increasingly become divorced from the agrarian activities of local communities, and management has declined or ceased, there have been marked changes. Scrub and woodland have spread back onto many heaths and the heather dominated communities have declined and been supplanted by grasses. At Iping and Trotton Commons some grazing was still taking place until shortly before WWII together with bracken cutting (for animal bedding) turf cutting (for use on the farms and for fuel) and burning in spring (to promote grazing). On the drier ground the main grassland invader has been Deschampsia and on the wetter ground Molinia.

36. In 2009, based on National Vegetation Classification maps created from a vegetation survey on Iping and Trotton Common SSSI undertaken for Sussex Wildlife Trust, the area of the Common dominated by Molinia was 18.18 ha and the area dominated by Deschampsia was 8.51 ha. In addition, there were 25.55 ha of heath vegetation of a type that is classified as having about 33% cover of Molinia. There was thus a total of 26.69 ha of habitat dominated by coarse grasses, or about 30% out of the Common area of 89.3 ha and a further 28.6% in which coarse grasses were present as a substantial part of the community. Only 14 ha (15.7%) of the Common was classified as Calluna rich heathland.

Grazing - introduction

37. Sussex Wildlife Trust’s Application gives a brief summary of some relevant literature on grazing and heathlands and this will not be repeated here. However a more detailed summary is made here of a review of aspects of grazing lowland heathland (Lake, Bullock & Hartley 2001) [SWT document no. 69] as part of a brief review of the references quoted by the objectors. This is followed by a description of investigations into the experience of site managers and others in the UK and grazing practice on nature conservation sites in Continental Europe.

---

3 National Vegetation Classification known as NVC is a method of classifying vegetation types widely used in the UK. It relies on mapping of discrete vegetation stands and then sampling these using quadrats to record presence/absence and cover values for individual species and then comparing these samples against national descriptions to obtain a community classification. In the national classification, communities are labelled by their type e.g. M=Mire, W = Woodland, H= Heathland and given a number, with a letter, if the stand has been further subdivided into Sub-communities.

4 Based on the area of M25a, the Cross-leaved Heath sub-community of Molinia– Tormentil mire, in which Molinia is very much the dominant (Rodwell 1991) [SWT document no. 75].

5 Based on the area of U2a, the Sheep’s-fescue – Common Bent sub-community of Deschampsia grassland, which is dominated by Deschampsia with only small amounts of Calluna. (Rodwell 1992) [SWT document no. 76].

6 Based on the area of H2c, the Molinia dominated sub-community of Calluna – Dwarf Gorse heath. (Rodwell 1991) [SWT document no. 75].
38. By comparison with other forms of management, grazing and trampling promotes variation in vegetation structure and the creation of bare ground - an important habitat for heathland invertebrates. Grazing animals follow broad patterns of behaviour (preferring to graze grassy areas, following regular routes to water or shade for example) and show selective use of sites, for example, spending longer in some areas than others, choosing to lie up or stand in different areas depending on factors such as weather, disturbance and vegetation. The result is the creation of considerable structural diversity with areas of shorter and longer vegetation, bare ground with micro-diversity from size and depth of hoof prints and the deposition of dung. This all creates a variety of niches for plants, fungi (nearly 400 species grow on herbivore dung) invertebrates, birds and reptiles. Grazing animals also spread seed and other plant propagules on their feet and coats. Burning and mechanical management produces habitats which lack the same structural and therefore species diversity.

39. Grazing can be effective in reducing grass cover, and grazing and trampling in breaking down grass litter which builds up rapidly especially under Molinia, which is deciduous. Grazing off the grass encourages the heather to compete more successfully and removal of the litter allows the germination and growth of both species of heath (Cross-leaved Heath and Bell Heather) and Calluna as well as smaller plant species and bryophytes which are otherwise excluded by a dense mat of live grass or dead litter. Cattle are effective at grazing down these tall coarse grasses.

40. A range of management measures are needed to restore and maintain heathland including cutting, mowing, burning and grazing, with the latter complementing the former. Both burning and regular mowing are single event activities intended to remove excess vegetation and nutrients and start the process of regeneration. Both activities can encourage grasses at the expense of heather, unless areas so treated are subsequently managed by grazing.

Review of scientific reviews and studies


41. An English Nature Report published in 2001 (‘the EN Report’) by Lake, Bullock & Hartley considered the evidence then available on grazing of lowland heaths, based on published and unpublished reports, ongoing research, and observation and anecdote from site managers. This comprehensive and in-depth study by heathland ecologists concluded that:

- Grazing by livestock is an appropriate management for lowland heathland to deliver conservation objectives.

- Management regimes using appropriate grazing can produce a greater diversity of habitats and thus a greater biological diversity than other management types such as burning or cutting.

- Grazing impacts must be always considered in terms of the intensity of grazing and the livestock types used: negative effects or poor achievement of targets can arise from
inappropriate grazing. The negative impacts of grazing on biodiversity over much of the upland heathland in Britain illustrate the consequences of over-grazing.

42. The authors also noted that grazing has the following impacts:

- Grazing opens up vegetation and decreases the height of dwarf shrubs and rank vegetation (e.g. Molinia dominated mire, Deschampsia dominated grass heath).
- Grazing shifts vegetation towards a greater representation of fine grasses and herbs. (Fine grasses such as fescues and meadow grasses with associated herbs contribute to dry heathland biodiversity as acid grassland\(^7\)).
- Grazing increases plant species diversity.
- Grazing can control invasive species such as Molinia.

43. They also suggested that:

- Many of the lowland heath plant species of conservation concern (e.g. species of Principal Importance, red listed species) will be benefited to some degree by grazing.
- Many lowland heath vertebrates and invertebrates of conservation concern have a clear need for grazed habitat, although the necessary grazing intensity is species specific.
- Many other plant and animal species require tall, scrubby habitat characteristic of low levels of grazing or no grazing at all.
- Therefore, grazing management should aim to maintain heterogeneity of vegetation types and structures to provide habitat for a diversity of key heathland species.

44. In general, the EN Report concluded that livestock activity on heathlands reduces vegetation cover, re-establishes the early successional stages of vegetation, and creates an uneven aged vegetation mosaic in the dominant heathland species.

45. On dry heathland, the EN Report noted that an intermediate density of grazing animals increases the number of plant species and the structural diversity of the vegetation with benefits for animal communities. On wet heathland an absence of grazing (and trampling) has been linked to an increase in Molinia, and this is in turn correlated with a decrease in plant richness. The EN report describes a number of studies which have shown: increases in plant species number; the re-appearance of species which had been lost when grazing was re-introduced; an increase in characteristic mire species, an increase in bare ground and a decrease in Molinia as a result of grazing. Several studies together with personal observations of site managers were reported as concluding that grazing can reduce the dominance of Molinia.

\(^7\) My explanatory note
46. The report concludes that grazing is a key determinant of vegetation structure and therefore is one of the main influences on invertebrates with the appropriate grazing management achieving the required habitat diversity. Several bird species of conservation concern may benefit from livestock presence particularly from increased structural diversity and a potential increase in invertebrate prey. Research is needed to assess the effects on reptiles and small mammals. Over or under-grazing may however lead to the loss of bird and invertebrate habitats and overgrazing or trampling could damage reptile and small mammal habitat.

47. The overall conclusion from the EN Report is that grazing is a suitable form of management for maintaining and diversifying heathland vegetation, but that the intensity and timing of grazing is critical in achieving objectives related to vegetation management and that over-grazing should be avoided. Grazing reduces grass tussocks and specifically Molinia, creates a more varied structure in the heather communities and trampling provides regeneration niches and micro-habitats. In the light of my experience as a manager of heathland I would endorse these conclusions of the EN report.

Bokdam & Gleichman, 2000 [SWT document no. 54].

48. In the paper by Bokdam & Gleichman (2000), cited by certain objectors, the authors investigated the effects of free grazing cattle on the recovery of Calluna, tree encroachment and plant species richness in six open habitats within a 60ha area of open grassland, heathland and forest in Holland. The six habitats were pioneer (young) heather which had been either turf stripped or mown previously, mature heather, grass heath with tussocks of Deschampsia or Molinia all of which were on podzolic soils (with Molinia plots also on podzolic peat) and Deschampsia tussocks on enriched former arable fields (plaggen8 soils).

49. In this Dutch study, from about 1960, Deschampsia invasion of all the open habitats began, helped by high levels of nitrogen deposition (at about 40kg/ha/yr which is over twice the level recorded on Iping Common of 17.48kg/ha/yr9), which by 1983 covered major parts of the heathland, with minor parts covered by heather and Molinia. Cattle grazing at about 1 animal per 5 ha was introduced in 1983 when sample plots were recorded, and recording continued for ten years to 1993. Ungrazed control plots were introduced on the plaggen soil in 1983 and on the Molinia soil on podzolic peat in 1987.

50. Under the grazing regime, the Calluna cover increased in the turf stripped and mown plots, initially declined and then recovered in the mature heather plots and increased in the Molinia heath. Calluna cover showed no change from very low levels on Deschampsia heath on plaggen soils. Deschampsia also increased in cover in all habitats except turf stripped pioneer heather. Juvenile heather establishment in the grass heaths (which contained no juvenile heather before

---

8 A plaggen soil has been enriched by repeated applications of used livestock bedding, seaweed, rotted vegetation or any other material to hand under a subsistence farming regime, where the plaggen fields are part of the in-bye for growing arable crops and the out-bye is used for grazing.

9 http://www.apis.ac.uk/src/select-a-feature?site=1000461&SiteType=SSSI&submit=Next223
growing began) was higher in both Deschampsia and Molinia heaths on podzolic\textsuperscript{10} soils than on plaggen soils and only one seedling established on ungrazed Deschampsia heath and none on ungrazed Molinia heath during the trial.

51. Tree cover remained low partly due to cattle browsing and partly because the site manager carried out tree removal during the trial period. During the first five years species richness increased in all the grazed plots and then stabilised except in the pioneer plots where it declined. It remained low in the ungrazed plots. Most of the increase in herb species richness was due to increases in heathland species of nitrogen-poor environments.

52. The relevance of these findings in relation to Deschampsia to the situation at Iping and Trotton is questionable, mainly because of the much higher levels of atmospheric nitrogen deposition in Holland than in the UK. As Bokdam and Gleichman note in their discussion, Deschampsia is a grass with a relatively high nitrogen demand while Calluna is limited indirectly by high nitrogen availability which causes reductions in longevity, increases in heather beetle damage, and a higher risk of damage by frosts and drought. Under relatively high nitrogen inputs therefore, the competitive ability of competing grasses is increased. The findings relating to the enriched plaggen soils are of no relevance to Iping and Trotton, but the increased species richness and the recovery of heather in grass plots under grazing on podzolic soils and peat are of relevance.

53. In summary, the authors found that grazing generally increased Calluna cover on Molinia heath, but that Deschampsia continued to increase under grazing. However, at the study site in the Netherlands, levels of nitrogen deposition are higher than in the UK and one of the soils types was nutrient-rich. These conditions, which particularly favour the growth of Deschampsia over Calluna, are different from those found at Iping and Trotton. The authors conclude that free-range grazing combined with tree cutting appears to be a suitable management for the maintenance of open heathlands with dynamic grass-heather mosaics.

Groome and Shaw, 2015\textsuperscript{[SWT document no. 67].}

54. There is also reference by certain objectors to a paper by Groom and Shaw (2015) and their finding that low intensity grazing was insufficient to prevent scrub encroachment. Sussex Wildlife Trust’s application clearly recognises the limitations of grazing in this regard, where it says that “Generally grazing may help to reduce tree and scrub encroachment but will not control it without other active management measures”.

55. However, the study by Groom and Shaw also found that on their study site at Folly Bog, where no grazing had been recorded for at least five decades, the reintroduction of grazing led to an increase in species richness across the valley mires, largely as a result of grazing-induced decreases in Molinia and litter and an increase in bare ground. (Molinia is a deciduous species

\textsuperscript{10} A podzolic soil is an acid soil on a free draining (usually sand or gravel) substrate where organic residues react with iron and aluminium compounds and move down the soil horizon leaving a thin organic litter layer with a bleached, nutrient poor subsoil and a dark deposit (iron pan) below.
which produces large quantities of dead leaves ‘litter’ in autumn and this tends to suppress other plant species). The cover of bog mosses and species richness increased significantly on wet heath (wet heath forms where there is winter flooding and drying out in summer compared to the valley mires which are wet all year round).

56. These finding are particularly relevant to Iping and Trotton Commons, which have not been grazed for at least five decades and where there are large areas of wet heath dominated by Molinia. Groom and Shaw also found that a number of county rare species were greater in grazed than in ungrazed stands and that reduction of litter cover and the creation of bare ground encouraged colonisation by Round-leaved Sundew and a bog moss species, *Sphagnum tenellum*, both of which are species also found at Iping and Trotton. Their findings are also similar to those of Bokdam and Gleichman, mentioned above, who also found an increase in species richness under grazing.

57. In summary, while Groom and Shaw suggest that grazing will not prevent scrub encroachment, the proposal at Iping and Trotton already recognises this. They indicate that grazing on wet heath in a similar situation to Iping and Trotton can decrease Molinia and increase the number of desirable wet heath species.

Offer, et al., 2003 [SWT document no. 32].

58. The report by Offer et al. (2003) sets out a process called a Grazing Impact Assessment (GIA) that helps identify and assess potentially adverse impacts of grazing on heathland insects and reptiles on individual sites. If the GIA identifies any potentially adverse effects it will then highlight any necessary adjustments in the grazing regime. It thus provides a means by which site managers can deliver effective grazing on conservation sites without compromising the requirements of the species they are seeking to conserve.

59. In effect Offer et al. are recognising the benefits of conservation grazing provided this is carried out in a way which recognises the needs of the specific species and communities on site, something which requires the knowledge, experience and expertise which can be provided by a body such as the Sussex Wildlife Trust (SWT) who have carried out a GIA at Iping and Trotton as described in the evidence of Graeme Lyons.

Newton et al., 2009 [SWT document no. 71].
Newton et al., 2009 [SWT document no. 72].

60. Two documents are cited here, as Newton et. al. first published their findings as a report on a conservation evidence website (Newton et. al., 2009a in the reference list) and then published a rather shorter version as a paper in the journal Biological Conservation (Newton et al., 2009b). My summary here derives from the report but I have included both references as these were both have been cited by objectors to the fencing proposal.
61. Newton et al. (2009) aimed to carry out a systematic review of the literature on grazing of
lowland heathland and compare this with other types of management. The reviewed literature
was only considered for systematic analysis (meta-analysis) where there were quantitative
comparators before and after application of treatments (e.g. grazing or burning) and/or between
the experimental treatments and controls\textsuperscript{11}. Because most of the studies found by the authors
did not meet the requirement for a comparator, they were rejected for detailed analysis but
were nevertheless summarised.

62. For these other summarised studies, 144 documents were assessed in total although in many
cases it was difficult to ascribe any impacts specifically to grazing and in the majority of cases
there was no monitoring or supporting data. The results found that there was decrease in height
of ericaceous shrubs (6 studies), grasses (5) and gorse (2) under grazing, a reduction in the cover
of ericaceous shrubs (17), gorse (6), and bracken (2), a decrease in the abundance of grass
tussocks (11), and tree and shrub saplings (8) and an increase in cover of grasses (12), forbs (non-
grassy herbaceous species) (6), and mosses and liverworts (4). A small number of studies
reported an increase in bare ground (1) the quality of pond margins (1) and the presence of over-
grazing indicators (1). All the samples were below 13% of the total number of assessed papers.

63. It should be noted that these results were often found in a small sub-set of the studies (e.g. an
increase in the cover of grasses was found in 12 of the 144 publications, a decrease in tree and
shrub abundance in 8 studies and a decrease in grass height in 5). There was no indication as to
whether the increases in grass cover were in coarse, invasive species such as Molinia (an increase
that conservation management usually aims to prevent) or in beneficial fine leaved species such
as Sheep’s Fescue. Lastly, none of the parameters mentioned were quantified, e.g. extent of
changes in vegetation height or abundance. This is relevant because changes in vegetation height
could be beneficial to a range of invertebrates, reptiles and birds if it creates a heterogeneous
matrix of habitats, but damaging if it results in a short grazed and trampled sward over large
areas. This analysis gives no information on this nor any data on the site characteristics, climate,
when grazing commenced, whether it has been continuous, type of grazing stock (sheep, horses,
cattle etc.), the stocking density, the seasonality of grazing and whether the grazing was
commercially or conservation motivated. In these circumstances, in my view, these results are of
very limited value.

64. The authors carried out a more detailed analysis of 13 papers which did contain comparator
data. Of these, three each looked at impacts of burning and cutting respectively, another three at
the impacts of burning, grazing or cutting in combination and only four at the impacts of grazing.
The conclusion was that grazing increases the ratio of graminoids to ericoids\textsuperscript{12} by a small amount

\textsuperscript{11} An example of these requirements would be a grazing experiment where grazing was carried out within a
fenced inclosure and the condition of the vegetation was recorded before grazing started and after it had taken
place, or the effects of grazing within the inclosure were compared to an ungrazed area outside the inclosure
which was otherwise similar in all respects. In this example the grazing would be the experimental treatment
and the recording plot outside the inclosure would be referred to as a control plot.

\textsuperscript{12} Graminoids includes grasses and grass like plants such as sedges and ericoids includes heather like plants
including Calluna, Cross-leaved Heath and Bell Heather.
(but did not specify whether the graminoids were mainly coarse or fine grasses, or sedges or other grass-like species). Other desirable outcomes of grazing on heathland such as increases in the area of bare ground, structural heterogeneity or control of scrub were not addressed as sample sizes were too small.

65. Of these four papers on grazing, one was confined to the impact of very high intensity sheep grazing in paddocks (Gallet & Roze, 2001) [SWT document no. 65] which has no relevance to Iping and Trotton, and another has already been discussed in this proof (Bokdam & Gleichman 2000).

66. The third paper, by Bullock & Pakeman (1996) [SWT document no. 56] looked at grazing intensity by comparing lightly grazed (including 2 ungrazed sites), with heavily grazed sites across 26 sites in all. Seven sites with moderate grazing that showed varying results were excluded from analysis. Heavy grazing resulted in a decline in Calluna and a varying response from grasses (in two sites there was a significant increase in grass cover) and a significantly lower cover of ericoid shrubs compared to lightly grazed sites. Generally the results are representative of heavily grazed situations, e.g. Breckland grass heath and parts of the New Forest.

67. The paper concludes that grazing can generally open up the vegetation, repress scrub, encourage low-growing plants and promote vigorous growth of dwarf shrubs. The authors of this study concluded that the conservation objectives of heathland management can be met by grazing with livestock.

68. The final example was part of a PhD study of mires in the New Forest by Clarke (1988). This found that plant species diversity was greater in heavily grazed than in lightly grazed or ungrazed mire and that under heavy grazing there was a decrease in Molinia and heather but an increase in sedges. Stock type and intensity was unknown but almost certainly was confined to ponies and cattle or just ponies. The author concluded that “at sites no longer grazed, there has been a loss of nature conservation interest in those mire communities which are not limited by low intrinsic productivity” and “The cessation of commoning is thus the main management problem for lowland valley mires as it is for the lowland heaths”.

69. Finally, this study by Newton et al. sent out a questionnaire which was returned for 53 heathland sites by heathland managers. Of these, seven sites had a continuous grazing history and on the remaining 46 sites grazing had been reintroduced relatively recently. On most sites, grazing was practised historically but most commonly ceased in the 1930s or 1940s. On many other sites other techniques such as burning or cutting has also been used. Thirty-five of the sites were grazed by cattle, with ponies on 25 and sheep on 18. In 30% of cases there was a formal monitoring programme via permanent sample plots. A large proportion of the respondents (94%) believed that grazing had been effective in meeting at least one management objective, with 82% (out of 34 responses) believing grazing had been effective in suppressing scrub, 75% (20 responses) that it had resulted in a reduction in coarse and tussocky grass (Molinia and Deschampsia) and 93% (14 responses) in an improvement of vegetation structure in each case where these had been included as a management objective. Generally all other responses totalled 8 or less.
70. The Newton et al. paper does not conclude that grazing is an inappropriate management tool for lowland heathland but that “heathland managers therefore need to adopt an adaptive management approach based on knowledge of the characteristics of individual sites and involving experiments or field trials supported by regular monitoring”. With experience and monitoring of grazing at Stedham Common over some 15 years this is the approach adopted by the Trust (see Miss Willmott’s and Mr Lyons’ proofs for details).

71. In summary, the picture presented in the Newton review is complicated by the number of variables, site-specific considerations and the small number of relevant studies. Newton et al. suggest that grazing may lead to a small increase in the cover of graminoids compared to ericoids. However, there is no precise definition for graminoids (whether coarse or fine grasses for example), it gives no indication of the grazing intensity at which this may occur, nor does it assess it in terms of the management objectives of the sites concerned, or other outcomes from grazing. I agree with their assertion that an adaptive management approach is needed.

Britton et al., 2000 [SWT document no. 55].

72. Further literature cited by objectors includes a reference to Britton et al. 2000 which considers the factors influencing the regeneration of vegetation in gaps in the dominant Calluna canopy. Factors which were studied were geographical location (the Brecklands versus a site in the Lancashire Wirral), whether Calluna or Deschampsia was dominant, the management techniques of cutting, rotovating or turf stripping, the size of the gap and the availability of a seed source. This paper measures the results of non-grazing management but neither considers grazing per se nor the results of following or combining these treatments with grazing. Nor do they consider grazing as an alternative treatment to those they describe.

Scientific literature - summary

73. In summary, the scientific literature referenced by the objectors and the other references in this proof and the application with relevance to heathland grazing concur that grazing is an appropriate management for lowland heathland, but that it needs to be set at the right level with respect to the type and size of the animals, their density on the grazed site and the seasonality of grazing. Both over-grazing and under-grazing can lead to undesirable effects but in the majority of cases, heathland managers have found that grazing meets one or more of their management objectives. Emphasis in a number of reports is given to the need to vary the grazing conditions to suit individual sites.

Heathland birds

74. It has been suggested by a number of objectors that the numbers of Nightjars and Dartford Warblers have declined and that this is due to the management put in place by SWT. In addition it has been suggested that the introduction of grazing on Stedham Common has resulted in a reduction in the breeding birds on that site.
75. It has also been suggested that grazing is deleterious to breeding Dartford Warblers and that this is supported by scientific research. I am not aware of any research which has concluded that Dartford Warblers are affected by grazing although very heavy grazing and trampling might affect their breeding habitat, and burning certainly destroys breeding habitat in the short term. The figures in Table 1 clearly show that there was a consistent crash in Dartford Warbler numbers on all sites after the hard winter of 2008/09 and that following the introduction of grazing in 2000, Dartford Warbler numbers increased on Stedham Common.

76. Dartford Warblers continue to breed on a large number of sites where grazing takes place in the New Forest, Dorset, the Thames Basin and Wealden Heaths and on the Pebblebed heaths of Devon, and after a series of mild winters an expanding population of Dartford Warblers colonised both Dartmoor and Exmoor, which are both grazed. Management which benefits Dartford Warblers is the rotational cutting or burning of heather and European gorse, which, on a small scale, then develops into suitable habitat for both breeding and wintering Dartford Warblers. In my view, Dartford Warbler populations and distribution are determined by hard winters in the UK, with excessive burning and human disturbance having local detrimental consequences and heathland management such as extensive grazing, small scale cutting and burning having beneficial effects.

77. Stedham Common (but not Iping and Trotton) was censused for its breeding birds in a long term project every year between 1993 and 2012. The method used was in accordance with the Common Birds Census methodology, developed by the British Trust for Ornithology and involved recording every bird heard or seen and marking these on a map using standardised symbols. This methodology has been widely used across the UK for the last 40 years. Using set criteria the records for each species are transferred to maps and the clusters of registrations interpreted to identify individual territories. The results are reported in a paper by Crane (2012) [SWT document no. 60].

78. The table of all breeding territories in Crane’s paper shows that prior to the introduction of grazing in 2000 there had been an average of 86 territories of breeding birds annually on Stedham common during the seven years 1993 to 1999. In the seven years following the introduction of grazing the annual number of territories was 166. If the two Annex I species, Nightjar and Woodlark, only are considered and if, when birds were recorded as present (P), this is taken to mean a minimum of one territory, then there were 10 Nightjar territories and 14 Woodlark territories in the seven years prior to grazing and 11 and 14 respectively in the seven years following the introduction of grazing. I have excluded Dartford Warbler from this calculation as they only started to breed on Stedham Common in 1999, and disappeared again in 2009. There is no evidence of declines in Nightjar or Dartford Warbler on either Stedham or Iping and Trotton Commons since 1997 (when data for Iping and Trotton became available) (Table 1).

79. The reason for the pattern of establishment and decline in Dartford Warblers during this time on Stedham Common is almost certainly due to hard winters. Dartford Warblers (and Cetti’s warblers in swamps) are the only fully resident warblers in the UK and both are very vulnerable to hard weather. Following the hard winters of 1960/61 and 1961/62 Dartford warbler numbers fell nationally from c. 450 territories to just 11 pairs in 1963. By 1974, numbers had recovered
and a national census in that year recorded c. 560 territories. There was a slight decline to 423 territories by 1984, possibly reflecting some hard winters during the late 1970s, but by the national census in 1994, numbers had climbed to a maximum of 1,889 territories. At the last census in 2006, the national population was estimated to be 3,142 territories (Wotton et al., 2009) [SWT document no. 80].

80. However the hard winters of 2008/09 and 2009/10 resulted in another crash in Dartford Warbler numbers. There has been no further national survey but it is known that on the Thames Basin and Wealden Heaths where numbers have been censused annually since the early 1960’s, and constituted over 25% of the national population in the 2006 survey, numbers reached an estimated 978 territories in 2008. However severe weather and heavy snow in the 2008/09 winter resulted in a drop to 112 territories in 2009 and further hard weather during the winter of 2009/10 saw a further decline to 50 territories in 2010 (Clark & Eyre 2012) [SWT document no. 59]. This was reflected in the same pattern of growth and decline at Stedham and a number of other local heathland sites (Table 1). On Iping and Trotton Commons Dartford Warblers have returned in small numbers since 2011.

81. The only research to look at nesting of one of the Annex I species and cattle grazing was undertaken by Eyre and Baldwin (2014) [SWT document no. 64]. The authors monitored 148 Woodlark nests during 2009-2012 and found that there was no difference either in the percentage of nests which were successful (i.e. reared at least one young) or in the daily nest survival rates of nests in grazed and ungrazed conditions.

82. I am not aware of any research on the effects of stock grazing on breeding Dartford Warblers or Nightjars, although there has been some recent research on the effects of grazing on foraging Nightjars. A recent paper by Sharps et al. (2015) [SWT document no. 77] reported on a study of the home range size and foraging behaviour of radio-tagged Nightjars on the Breckland heaths. The area consists of arable farmland, grazed grass-heath, ungrazed grassland, restocked forest 0-4 years and conifer forest of various ages as well as broadleaf forest. In total the activities of 21 male and 10 female Nightjars were analysed.

83. Nightjars selected grazed grass heath for foraging relative to availability but ungrazed heathland was one of the least selected habitats. It was possible that animal dung provides beetle prey for Nightjars. The authors concluded that their results suggest that grazing of open habitats is important for foraging Nightjars, whereas retention of ungrazed, unplanted patches within the forest may not be beneficial. They suggested that the introduction of further patches of grazed heathland reversion within and adjacent to the forest would provide additional foraging resources for Nightjars and benefits for regional biodiversity.

84. In conclusion, there is no evidence that grazing has been a factor in the decline in the numbers of Dartford Warblers at Iping Common SSSI All the evidence both nationally and locally on nearby sites points to the recent hard winters as the controlling factor in population declines. A detailed study of a ground nesting bird on heathland, the Woodlark, based on a very large sample of located and monitored nests found no evidence of effects on the breeding population from the effects of extensive grazing, while another study found positive benefits of grazing open
heathland for foraging Nightjars from the local breeding population. At Stedham Common, where the decline in Dartford Warblers has already been discussed, there is no evidence that either Nightjar or Woodlark populations changed as the result of the introduction of grazing and no evidence for the suggestion that Nightjars have declined recently at Stedham or Iping and Trotton Commons.