

12. References

This section provides details of references cited in the text. Copies of a database of most of these references, plus many more which were consulted but not quoted directly have been made available to EN and CCW as a fully-operational computer database.

- ADAS, 1992. *ADAS heather regeneration studies*. Unpublished Report. pp 26.
- ADAS, 1993. *New Horizons for Upland Environments*, Scientific Seminar, ADAS Pwllpeiran, 9 September 1993. Unpublished Report.
- AERTS, R. 1990. Nutrient use efficiency in evergreen and deciduous species from heathlands. *Oecologia*, **84**, pp. 391–397.
- ALLEN, S.E. 1964. Chemical aspects of heather burning. *Journal of Applied Ecology*, **1**, pp. 347–367.
- ANDERSON, P. 1986. *Accidental moorland fires in the Peak District. A study of their incidence and ecological implications*. Report for Peak District Moorland Restoration Project, Peak Park Joint Planning Board, Bakewell. 164pp.
- ANDERSON, P. & RADFORD, E. 1994. Changes in vegetation following reduction in grazing pressure on the National Trust's Kinder Estate, Peak District, Derbyshire, England. *Biological Conservation*, **69**, pp. 55–63.
- ANDERSON, P. & YALDEN, D.W. 1981. Increased sheep numbers and the loss of heather moorland in the Peak District, England. *Biological Conservation*, **20**, pp. 195–213.
- ARMSTRONG, H.M. & MILNE, J.A. 1995. The effects of grazing on vegetation species composition. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 162–173.
- BAINES, D. 1988. The effects of improvement of upland marginal grasslands on the distribution and density of breeding wading birds (Charadriiformes) in Northern England. *Biological Conservation*, **45**, pp. 221–236.
- BALL, D.F., DALE, J., SHEAIL, J. & WILLIAMS, W.M. 1981b. *Ecology of vegetation change in upland landscapes. Part 2: Study areas*. Occasional paper, No.3. ITE, Bangor Research Station.
- BALL, D.F., DALE, J., SHEAIL, J., DICKSON, K.E. & WILLIAMS, W.M. 1981a. *Ecology of vegetation change in upland landscapes. Part 1: General Synthesis*. Occasional paper, No. 2. ITE, Bangor Research Station.
- BANAGE, W. 1960. *Studies on the nematode fauna of moorland*. PhD Thesis, Durham University.
- BANNISTER, P. 1966. Biological Flora of the British Isles: *Erica tetralix* L. *Journal of Ecology*, **54**, 795–813.
- BARCLAY-ESTRUP, P. 1974. Arthropod populations in a heathland as related to cyclical changes in the vegetation. *Entomologist's Monthly Magazine* **109**: pp. 79–84.
- BARDGETT, R.D. & MARSDEN, J.H. 1992. *Heather Condition and Management in the Uplands of England & Wales*. Peterborough: English Nature. 51pp.
- BARDGETT, R.D., MARSDEN, J.H. & HOWARD, D.C. 1995. The extent and condition of heather on moorland in the uplands of England and Wales. *Biological Conservation*, **71**, pp. 155–161.
- BATES, M.A., COLE, D.A. & TEW, T.E. 1993. *A Strategy for the Conservation of Upland Birds in Wales*. Peterborough: JNCC Report No. 88. 49pp.
- BAXTER, E.V. & RINTOUL, L.J. 1953. *The Birds of Scotland*. Oliver & Boyd, Edinburgh.
- BELL, J.N.B. & TALLIS, J.H. 1973. Biological Flora of the British Isles: *Empetrum nigrum* L. *Journal of Ecology*, **61**, 289–305.
- BERDOWSKI, J.J.M. & SIEPEL, H. 1988. Vegetative regeneration of *Calluna vulgaris* at different ages and fertilizer levels. *Biological Conservation*, **46**, 85–93.

- BIBBY, C.J. 1988. Agriculture and upland birds. *In*: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 223–236.
- BIGNAL, E.M., CURTIS, D.J. & MATTHEWS, J.L. 1988. *Islay: Land types, bird habitats and nature conservation, Part 1: Land use and birds on Islay*. NCC Chief Scientist Directorate. Report No. 809. Part 1.
- BIRNIE, R.V. & HULME, P.D. 1990. Overgrazing of peatland vegetation in Shetland. *Scottish Geographical Magazine*, **106**, pp. 28–36.
- BIRSE, E.L. 1980. *Plant Communities of Scotland: A Preliminary Phytocoenonia*. Aberdeen: Macaulay Institute for Soil Research.
- BLAIR, H.M.S. 1961. *In* Bannerman, D.A. *The Birds of the British Isles*. Vol. 9, pp. 47–52. Edinburgh: Oliver & Boyd.
- BLOCK, W.C. 1966a. The distribution of soil Acarina on eroding blanket bog. *Pedobiologia* **6**: pp. 27–34.
- BLOCK, W.C. 1966b. Seasonal fluctuations and distribution of mite populations in moorland soils, with a note on biomass. *Journal of Animal Ecology* **35**: pp. 487–503.
- BOWER, M.M. 1961. The distribution of erosion in blanket peat bogs in the Pennines. *Transactions of the Institute of British Geographers*, **29**, 17–30.
- BRADSHAW, R. & McGEE, F. 1988. The extent and time-course of mountain blanket peat erosion in Ireland. *New Phytologist*, **108**, 219–224.
- BROWN, A.F. 1995a. *Upland management for birds*. English Nature Advisory booklet.
- BROWN, A.F. 1995b. *Lowland Heath and Breckland management for birds*. English Nature Advisory booklet.
- BROWN, A.F. & BAINBRIDGE, I.P. 1995. Grouse moors and upland breeding birds. *In*: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 51–67.
- BROWN, A.F. & SHEPHERD, K.B. 1991. *Breeding birds of the South Penine Moors*. JNCC Report No.7.
- BROWN, A.F. & STILLMAN, R.A. 1993. Bird habitat associations in the eastern Highlands of Scotland. *Journal of Applied Ecology*, **30**, pp. 31–42.
- BUNCE, R.G.H. (Ed) 1989. *Heather in England and Wales*. ITE research publication no. 3. London: HMSO. 40pp.
- BUNCE, R.G.H. & BARR, C.J. 1988. The extent of land under different management regimes in the uplands and the potential for change. *In*: M.B. USHER & D.B.A. THOMPSON, eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 415–426.
- BUSE, A. 1988. Habitat selection and grouping of beetles (*Coleoptera*). *Holarctic Ecology*, **11**, pp. 241–247.
- BUTTERFIELD, J.C. & COULSON, J.E.L. 1975. Insect food of adult Red Grouse *Lagopus lagopus scoticus*. *Journal of Animal Ecology*, **44**, pp. 601–608.
- BUTTERFIELD, J. & COULSON, J.C. 1983. The carabid communities on peat and upland grasslands in Northern England. *Holarctic Ecology*, **6**, pp. 163–174.
- CADBURY, C.J. 1992. *Grazing and other management of upland vegetation: a review with special reference to birds*. RSPB, unpublished Report.
- CADBURY, J. 1993. Grazing and other management of upland vegetation for birds in the UK. *RSPB Conservation Review*, **7**, pp. 12–21.
- COUNTRYSIDE COUNCIL FOR WALES (CCW), 1992. *Tir Cymen Management Guidelines*. Countryside Council for Wales.
- CHAMBERS, F.M. 1983. Three radio-carbon-dated pollen diagrams from upland peats north-west of Merthyr Tydfil, South Wales. *Journal of Ecology*, **71**, pp. 475–487.
- CHAPMAN, S.B. & ROSE, R.J. 1991. Changes in the vegetation at Coom Rigg Moss National Nature Reserve within the period 1958–86. *Journal of Applied Ecology*, **28**, pp. 140–153.

- CHARMAN, D.J. 1992. Blanket mire formation at the Cross Lochs, Sutherland, northern Scotland. *Boreas (Oslo)*, **21**, pp. 53–72.
- CHERRETT, J.M. 1964. Distribution of spiders on Moor House NNR, Westmorland. *Journal of Animal Ecology*, **33**, pp. 27–48.
- CLYMO, R.S. & DUCKETT, J.G. 1986. Regeneration of *Sphagnum*. *New Phytologist*, **102**, 589–614.
- CONWAY, V.M. & MILLAR, A. 1960. The hydrology of some small peat covered catchments in the Northern Pennines. *Journal Institute of Water Engineering*, **14**, pp. 415–424.
- COTTON, D.E. & HALE, W.H.G. 1994. Effectiveness of cutting as an alternative to burning in the management of *Calluna vulgaris* moorland. Results of an experimental field trial. *Journal of Environmental Management*, **40**, 155–159.
- COULSON, J.C. 1956. Mortality and egg production of the Meadow Pipit with special reference to altitude. *Bird Study*, **3**, pp. 119–32.
- COULSON, J.C. 1959. Observations on the Tipulidae (Diptera) of the Moorhouse National Nature Reserve, Westmorland. *Transactions of the Royal Entomological Society, London*, **111**, 1 pp. 57–174.
- COULSON, J.C. 1988. The structure and importance of invertebrate communities on peatlands and moorlands, and effects of environmental and management changes. In: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 365–380.
- COULSON, J.C. 1989. Animal communities of peatlands and the impact of man. In: O.M. BRAGG, P.D. HULME, H.A.P. INGRAM & R.A. ROBERTSON eds. *Peatland Ecosystems and Man: An Impact Assessment*. Dept. of Biological Sciences, University of Dundee, with I.P.S. pp. 297–308.
- COULSON, J.C. 1990. *The invertebrate fauna of Chapel Fell, Co. Durham in 1989*. A site assessment made for the Central Electricity Generating Board. Unpublished report.
- COULSON, J.C. & BUTTERFIELD, J.E.L. 1980. *The geographical characterisation of moorland using invertebrates*. Final report. Nature Conservancy Council, London. (CST report no. 285)
- COULSON, J.C. & BUTTERFIELD, J.E.L. 1985. Invertebrate communities of peat and upland grasslands in the north of England and some conservation implications. *Biological Conservation*, **34**, pp. 197–225.
- COULSON, J.C. & BUTTERFIELD, J.E.L. 1986. The spider communities on peat and upland grasslands in Northern England. *Holarctic Ecology*, **9**, pp. 229–239.
- COULSON, J.C. & WHITTAKER, J.B. 1978. Ecology of moorland animals. In: *Production Ecology of British Moors and Montane Grasslands*. O.W. HEAL & D.F. PERKINS. Eds. Springer-Verlag, Berlin. pp. 52–93.
- COULSON, J.C., BUTTERFIELD, J.E.L. & UNGPAKORN, R. 1984. The spiders and harvestmen of some peat areas and upland grasslands in Co. Durham and adjacent areas of Cumbria. *Vasculum* **69**: pp. 101–109.
- COULSON, J.C., FIELDING C.A. & GOODYER S.A. 1992. *The management of moorland areas to enhance their nature conservation interest*. JNCC Report No. 134, Joint Nature Conservation Committee, Peterborough.
- COULSON, J.C., BUTTERFIELD, J.E.L., BARRATT, B.I. & HARRISON, S. 1984. The spiders and harvestmen of some peat areas and upland grasslands in Yorkshire. *Naturalist, Hull* **109**: pp. 103–110.
- CRAGG, J.B. 1961. Some aspects of the ecology of moorland animals. *Journal of Animal Ecology*, **30**, pp. 205–234.
- CRAMP, S. & SIMMONS, K.E.L. 1980. *Handbook of the Birds of Europe, the Middle East and North Africa; the birds of the Western Palearctic, Vol 2: Hawks to Bustards*. Oxford: Oxford University Press.
- CURRALL, J.E.P. 1981. *Some effects of management by fire on wet heath vegetation in Western Scotland*. PhD. Thesis, University of Aberdeen.

- CURTIS, J.D. & BIGNAL, E.M. 1980. *Variations in peat bog spider communities related to environmental heterogeneity*. Proceedings of the 8th International Congress of Arachnology, Vienna: pp. 81–86.
- CURTIS, D.J. & STINGLHAMMER, R.G. 1986. *Spider community structure in relation to habitat and prey*. Proceedings of the 10th International Congress of Arachnology, Jaca: pp. 213–217.
- DALBY, M. 1961. The ecology of crowberry (*Empetrum nigrum*) on Ilkley Moor, 1959–1960. *The Naturalist*, **876**, 37–40.
- DALBY, M., FIDLER, J.H. & A. & DUNCAN, J.E. 1971. The vegetative changes on Ilkley Moor. *The Naturalist*, **916**, 49–56.
- DIMBLEBY, G.W. 1952. The historical status of moorland in north-east Yorkshire. *New Phytologist*, **51**, 349.
- DISNEY, R.H.L., COULSON, J.C. & BUTTERFIELD, J.E.L. 1981. A survey of the scuttle flies (Diptera: Phoridae) of upland habitats in northern England. *Naturalist, Hull*, **106**, pp. 53–66.
- DIXON, J. 1984. *The Impact of Agricultural Change on the Ecology of the Welsh Uplands*. University of Wales Institute of Science and Technology.
- DOYLE, G.J. 1982. The vegetation, ecology and productivity of Atlantic blanket bog in Mayo and Galway, Western Ireland. *Journal of Life Sciences, Royal Dublin Society*, **3**, 147–164.
- EDDY, A., WELCH, D. & RAWES, M. 1969. The vegetation of the Moor House National Nature Reserve in the Northern Pennines, England. *Vegetatio*, **16**, 239–284.
- ELLIOT, R.J. 1953. *The effects of burning on heather moors of the south Pennines*. PhD Thesis, University of Sheffield.
- ENGLISH NATURE, 1994a. *Species Action Plans for Birds: Black Grouse*. Peterborough: English Nature.
- ENGLISH NATURE, 1994b. *Species Action Plans for Birds: Hen Harrier*. Peterborough: English Nature.
- ENGLISH NATURE, 1994c. *Species Action Plans for Birds: Merlin*. Peterborough: English Nature.
- ENGLISH NATURE, 1995. *The Grazing Index for Heather Moorland (with field notes)*. Peterborough: English Nature. 16pp.
- EQUIHUA, M. & USHER, M.B. 1993. Impact of carpets of the invasive moss *Campylopus introflexus* on *Calluna vulgaris* regeneration. *Journal of Ecology*, **81**, pp. 359–365.
- FAREY, J. 1815. *A general view of the agriculture of Derbyshire; with observations on the means of its improvement*. Vol. 1. London.
- FIDLER, J.H., DALBY, M. & DUNCAN, J.E. 1970. The plant communities of Ilkley Moor. *The Naturalist*, **912**, 41–48.
- FISHPOOL, M. & USHER, M.B. 1989. The association between Carabid beetle distribution and vegetation on the North York Moors. *The Naturalist*, **114**, pp. 41–50.
- FORREST, G.I. 1971. Structure and production of North Pennine blanket bog vegetation. *Journal of Ecology*, **59**, 453–479.
- FORREST, G.J. & SMITH, R.A.H. 1975. The productivity of a range of blanket bog vegetation types in the Northern Pennines. *Journal of Ecology*, **63**, pp. 173–199.
- FRASER, G.K. (1933). Studies of Scottish moorlands in relation to tree growth. *Forestry Commission Bulletin*, **15**.
- FRITSCH, F.E. & SALISBURY, E.J. 1915. Further observations on the heath association on Hindhead Common. *New Phytologist*, **14**, 116–138.
- FULLER R. J. 1982. *Bird Habitats in Britain*. London: Poyser.
- GARDNER, J.C. & USHER, M.B. 1989. Insect abundance on burned and cut upland *Calluna* heath. *Entomologist*, **108**, 147–157.
- GARDNER, S.M. 1991. Ground beetle (Coleoptera, Carabidae) communities on upland heath and their association with heathland flora. *Journal of Biogeography*, **18**, 281–289.
- GIBBONS D.W., REID J.B. & CHAPMAN. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991*. London: Poyser.

- GIMINGHAM, C.H. 1960. Biological Flora of the British Isles. *Calluna*. *Journal of Ecology*, **48**, pp. 455–483.
- GIMINGHAM, C.H. 1964. Dwarf-shrub heaths. In: J.H. Burnett ed. *The Vegetation of Scotland*. Edinburgh: Oliver & Boyd. pp. 232–289.
- GIMINGHAM, C.H. 1972. *Ecology of Heathlands*. London: Chapman & Hall. 266pp.
- GIMINGHAM, C.H. 1985. Age related interactions between *Calluna vulgaris* and phytophagous insects. *Oikos*, **44**, pp. 12–16.
- GIMINGHAM, C.H. 1995. Heaths and moorland: an overview of ecological change. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 3–8.
- GORDON, I.J. 1989a. Vegetation community selection by ungulates on the Isle of Rhum (Scotland, UK): I. Food supply. *Journal of Applied Ecology*, **26**, pp. 35–52.
- GORDON, I.J. 1989b. Vegetation community selection by ungulates on the Isle of Rhum (Scotland, UK): II. Vegetation community selection. *Journal of Applied Ecology*, **26**, pp. 53–64.
- GORDON, I.J. 1989c. Vegetation community selection by ungulates on the Isle of Rhum (Scotland, UK): III. Determinants of vegetation community selection. *Journal of Applied Ecology*, **26**, pp. 65–80.
- GORE, A.J.P. 1975. An experimental modification of upland peat vegetation. *Journal of Applied Ecology*, **12**, pp. 349–366.
- GRANT, S.A. & ARMSTRONG, H.M. 1993. Grazing ecology and the conservation of heather moorland – the development of models as aids to management. *Biodiversity and Conservation*, **2**, pp. 79–94.
- GRANT, S.A. & MAXWELL, T.J. 1988. Hill vegetation and grazing by domesticated herbivores: the biology and definition of management options. In: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 201–214.
- GRANT, S.A. & HUNTER, R.F. 1968. Interactions of grazing and burning on heather moors and their implications in heather management. *Journal of the British Grassland Society*, **23**, 285–293.
- GRANT, S.A., BOLTON, G.R. & RUSSEL, A.J.F. 1984. The utilization of sown and indigenous plant species by sheep and goats grazing hill pastures. *Grass and Forage Science*, **39**, pp. 361–370.
- GRANT, S.A., BOLTON, G.R. & TORVELL, L. 1985. The responses of blanket bog vegetation to controlled grazing by hill sheep. *Journal of Applied Ecology*, **22**, pp. 739–752.
- GRANT, S.A., HUNTER, R.F. & CROSS, C. 1963. The effects of muirburning *Molinia*-dominant communities. *Journal of the British Grassland Society*, **18**, 249–257.
- GRANT, S.A., BARTHAM, G.T., LAMB, W.I.C. & MILNE, J.A. 1978. Effects of season and level of grazing on the utilization of heather by sheep. 1. Responses of the sward. *Journal of the British Grassland Society*, **33**, 289–300.
- GRANT, S.A., LAMB, W.I.C., KERR, C.D. & BOLTON, G.R. 1976. The utilization of blanket bog vegetation by grazing sheep. *Journal of Applied Ecology*, **13**, pp. 857–869.
- GRANT, S.A., MILNE, J.A., BARTHAM, G.T. & SOUTER, W.G. 1982. Effects of season and level of grazing on the utilization of heather by sheep. 3. Longer-term responses and sward recovery. *Grass and Forage Science*, **36**, 311–320.
- GRANT, S.A., TORVELL, L., SMITH, H.K., SUCKLING, D.E., FORBES, T.D.A. & HODGSON, J. 1987. Comparative studies of diet selection by sheep and cattle: blanket bog and heather moor. *Journal of Ecology*, **75**, pp. 947–960.
- GREEN, S.E., HACK, P.C. & MOSCROP, C.S. 1994. *Elenydd project 1991–94. Part 1: Vegetation survey and monitoring*. Unpublished Report to CCW, Llandrindod Wells.
- GREENSLADE, P.J.M. 1968. Habitat and altitude distribution of Carabidae (Coleoptera) in Argyll, Scotland. *Transactions of the Royal Entomological Society*, **120**, pp. 39–54.
- GRIEVE, I.C., DAVIDSON, D.A. & GORDON, J.E. 1995. Nature, extent and severity of soil-erosion in upland Scotland. *Land Degradation and Rehabilitation*, **6**, pp. 41–55.

- GUILE, D.P.M. 1965. *The vegetation of the Brecon Beacons National Park*. Unpublished PhD Thesis, University of Wales.
- HALE, W.G. 1966. A population study of moorland Collembola. *Pedobiologia*, **6**, pp. 65–99.
- HARDING, N.J., GREEN, R.E. & SUMMERS, R.W. 1994. *The Effects of Future Changes in Land Use on Upland Birds in Britain*. Unpublished Report, Royal Society for the Protection of Birds, Edinburgh. 177pp.
- HARRISON, A.F. 1985. Effects of environment and management on phosphorus cycling in terrestrial ecosystems. *Journal of Environmental Management*, **20**, pp. 163–180.
- HAWORTH, P.F. & THOMPSON, D.B.A. 1990. Factors associated with the breeding distribution of upland birds in the south Pennines, England (UK). *Journal of Applied Ecology*, **27**, pp. 562–577.
- HAYSOM, K. 1994. *Aspects of the Ecology of the Lepidoptera Associated with Calluna vulgaris on Managed Northern Heath*. PhD thesis, University of Durham.
- HEAL, O.W. 1980. Fauna of heathlands in the United Kingdom. *Bulletin of Ecology*, **11**, pp. 413–420.
- HEAL, O.W. & PERKINS, D.F. (Eds) 1978. *Production Ecology of British Moors and Montane Grasslands*. Ecological Studies No 27. Berlin: Springer Verlag. 426pp.
- HESTER, A.J. & MILLER, G.R. 1995. Scrub and woodland regeneration: prospects for the future. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 140–153.
- HESTER, A.J. & SYDES, C. 1992. Changes in burning of Scottish heather moorland since the 1940s from aerial photographs. *Biological Conservation*, **60**, pp. 25–30.
- HEWSON, R. 1976. Grazing by Mountain Hares *Lepus timidus* L., Red Deer *Cervus elaphus* L. and red grouse *Lagopus L. scoticus* on heather moorland in north-east Scotland. *Journal of Applied Ecology*, **13**, pp. 657–666.
- HEWSON, R. 1977. The effect on heather *Calluna vulgaris* of excluding sheep from moorland in north-east England. *Naturalist*, **102**, 133–136.
- HEWSON, R. 1989. Grazing preferences of mountain hares on heather moorland and hill pastures. *Journal of Applied Ecology*, **26**, pp. 1–12.
- HEWSON, R. 1995. Mountain hares *Lepus timidus* on Hoy, Orkney, and their habitat. *Journal of Zoology*, **236**, pp. 331–337.
- HILL, M.O., EVANS, D.F. & BELL, S.A. 1992. Long-term effects of excluding sheep from hill pastures in North Wales. *Journal of Ecology*, **80**, pp. 1–13.
- HOBBS, R.J. 1984. Length of burning rotation and community composition in high-level *Calluna* and *Eriophorum* bog in Northern England (UK). *Vegetatio*, **57**, pp. 129–136.
- HOBBS, R.J. & GIMINGHAM, C.H. 1984. Studies on fire in Scottish (UK) heathland communities: 2. Post-fire vegetation development. *Journal of Ecology*, **72**, pp. 585–610.
- HOBBS, R.J. & GIMINGHAM, C.H. 1987. Vegetation, fire and herbivore interactions. *Advances in Ecological Research*, **16**, pp. 87–173.
- HOBBS, R.J. & LEGG, C.J. 1983. Markov models and initial floristic composition in heathland vegetation dynamics. *Vegetatio*, **56**, 31–43.
- HOBBS, R.J., MALLIK, A.U. & GIMINGHAM, C.H. 1984. Studies on fire in Scottish (UK) heathland communities: 3. Vital attributes of the species. *Journal of Ecology*, **72**, pp. 963–976.
- HODGSON, J., FORBES, T.D.A., ARMSTRONG, R.H., BEATTIE, M.M. & HUNTER, E.A. 1991. Comparative studies of the ingestive behavior and herbage intake of sheep and cattle grazing indigenous hill plant communities. *Journal of Applied Ecology*, **28**, pp. 205–227.
- HODKINSON, I.D. 1973. The biology of *Strophingia ericae* (Curtis) (Homoptera, Psylloidea) with notes on its primary parasite *Tetrastichus aceris* (Walkker) (Hym., Euphridae). *Norsk. Entomol. Tidsskr.* **20**, pp. 237–243.
- HOLMES, R.T. 1966. Feeding ecology and annual cycle adaptations of the red-backed Sandpiper (*Calidris alpina*) in Arctic Alaska. *Ecology*, **47**, pp. 32–45.
- HOOOPER, S. 1987. *Heather, grouse and land use management: An annotated bibliography*. Agricultural Environment Research Group, University of Newcastle Upon Tyne.

- HOUSTON, W.W.K. 1971. Carabidae (Col.) from two areas of the north Pennines. *Entomologists' Monthly Magazine*, **107**, pp. 1–4.
- HUDSON, P.J. 1983. Red grouse, chicks and insects. *Game Conservancy Annual Review*, **14**, pp. 65–68.
- HUDSON, P.J. 1986. *The Red Grouse, The Biology and Management of a Wild Gamebird*. Game Conservancy, Fordingbridge.
- HUDSON, P.J. 1992. *Grouse in Space and Time, the population biology of a managed gamebird*. Game Conservancy Ltd., Fordingbridge.
- HUDSON, P.J. 1995. Ecological trends and grouse management in upland Britain. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 282–293.
- HUDSON, P.J. & NEWBORN, D. 1995. *A Handbook of Grouse and Moorland Management*. Fordingbridge: The Game Conservancy Trust. 169pp.
- JENKINS, D. (Ed) 1984. In: *Agriculture and the Environment*. Proceedings of ITE Symposium No 13. Feb/March 1984. ITE (NERC), Cambridge. 195pp.
- JOINT NATURE CONSERVATION COMMITTEE (1994). *Guidelines for the selection of biological SSSIs: bogs*. Peterborough: JNCC.
- KEATINGE, T.H., COUPAR, A.M. & REID, E. 1995. Wet heaths in Caithness and Sutherland, Scotland. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 20–27.
- LACK, P. 1986. *The Atlas of Wintering Birds in Britain and Ireland*. London: Poyser.
- LANCE, A.N. 1983. Performance of sheep on unburned and serially burned blanket bog in western Ireland. *Journal of Applied Ecology*, **20**, pp. 767–775.
- LAWTON, J.H. (Ed), 1990. *Red Grouse Populations and Moorland Management*. British Ecological Society, Ecological Issues No.2. Field Studies Council.
- LEGG, C. 1995. Heathland dynamics: a matter of scale. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 117–134.
- LEGG, C.J., MALTBY, E. & PROCTOR, M.C.F. 1992. The ecology of severe moorland fire on the North York moors: Seed distribution and seedling establishment of *Calluna vulgaris*. *Journal of Ecology*, **80**, pp. 737–752.
- LINDSAY, R. & ROSS, S. (1994). Monitoring of Peat Bog Systems. In: G. AUBRECHT, G. DICK & C. PRENTICE, eds. *Monitoring of Ecological Change in Wetlands of Middle Europe*. Proceedings of an International Workshop. Linz, Austria, 1993. Stapfia 31, Linz, Austria and IWRB Publication No. 30, Slimbridge, UK.
- LINDSAY, R.A., CHARMAN, D.J., EVERINGHAM, F., O'REILLY, R.M., PALMER, M.A., ROWELL, T.A. & STROUD, D.A. 1988. *The Flow Country. The peatlands of Caithness and Sutherland*. Nature Conservancy Council. 174pp.
- MACDONALD, A. 1990. *Heather Damage: a Guide to Types of Damage and Their Causes*. Edinburgh: Nature Conservancy Council *Research and Survey in Nature Conservation: Conservation Management of the Uplands*, No. 28.
- MACDONALD, A.J., KIRKPATRICK, A.H., HESTER, A.J. & SYDES, C. 1995. Regeneration by natural layering of heather (*Calluna vulgaris*) – frequency and characteristics in upland Britain. *Journal of Applied Ecology*, **32**, pp. 85–99.
- MACLEOD, A.C. 1955. Heather in the seasonal dietary of sheep. *Proceedings of the British Society of Animal Production*, **1955**, 13–17.
- MAFF, 1992a. *Code of Good Upland Management*. Ministry of Agriculture, Fisheries and Food. 5pp.
- MAFF, 1992b. *The Heather and Grass Burning Code*. London: Ministry of Agriculture, Fisheries and Food. 18pp.
- MALLIK, A.U., GIMINGHAM, C.H. & RAHMAN, A.A. 1984. Ecological effects of heather burning: 1. Water infiltration, moisture retention and porosity of surface soil. *Journal of Ecology*, **72**, pp. 767–776.

- MALLIK, A.U., HOBBS, R.J. & RAHMAN, A.A. 1988. Seed-bed substrates and revegetation of Calluna heathlands following burning. *Journal of Environmental Management*, **27**, pp. 379–398.
- MALTBY, E., LEGG, C.J. & PROCTOR, M.C.F. 1990. The ecology of severe moorland fire on the North York Moors. Effects of the 1976 fires and subsequent surface and vegetation development. *Journal of Ecology*, **78**, pp. 490–518.
- MARRS, R.H. & WELCH, D. 1991. *Moorland Wilderness: The potential effects of removing domestic livestock, particularly sheep*. Institute of Terrestrial Ecology. 88pp.
- MARRS, R.H., BRAVINGTON, M. & RAWES, M. 1988. Long-term vegetation change in the *Juncus squarrosus* grassland at Moor House, Northern England (UK). *Vegetatio*, **76**, pp. 179–188.
- MARRS, R.H., RIZAND, A. & HARRISON, A.F. 1989. The effects of removing sheep grazing on soil chemistry, above ground nutrient distribution, and selected aspects of soil fertility in long-term experiments at Moor House National Nature Reserve. *Journal of Applied Ecology*, **26**, pp. 647–662.
- MAXWELL, T.J., GRANT, S.A., MILNE, J.A. & SIBBALD, A.R. 1986. Systems of sheep production on heather moorland. In: M. O'TOOLE, ed, *Hill Land Symposium, Galway, 1985*. Dublin: An Foras Taluntais. pp. 188–211.
- MCCRACKEN, D.I. 1992. *A fuzzy classification of moorland ground beetle (Coleoptera: Carabidae) and plant communities*. Joint Nature Conservation Committee, Paisley (JNCC Report no. 115)
- MCFERRAN, D.M., MCADAM, J.H. & MONTGOMERY, W.I. 1995. The impact of burning and grazing of heathland plants and invertebrates in County Antrim. *Biology and Environment – Proceedings of The Royal Irish Academy*, **95B**, pp. 1–17.
- MCFERRAN, D.M., MONTGOMERY, W.I. & MCADAM, J.H. 1994. Effects of grazing intensity on heathland vegetation and ground-beetle assemblages of the uplands of County Antrim, Northeast Ireland. *Biology and Environment – Proceedings of The Royal Irish Academy*, **94B**, pp. 41–52.
- MCGHIE H.A., BROWN, A.F., REED, S. & BATES, S.M. 1994. *Aspects of the Breeding Ecology of Twite in the south Pennines*. Peterborough: English Nature Research Reports No. 118.
- MCVEAN, D.N. & LOCKIE, J.D. 1969. *Ecology and Land Use in Upland Scotland*. Edinburgh: Edinburgh University Press.
- MCVEAN, D.N. & RATCLIFFE, D.A. 1962. *Plant Communities of the Scottish Highlands*. London: HMSO.
- MERRELL, B.G., HENDERSON, D.J., NOLAN, A.J., SUCKLING, D.E., HULME, P.D. & FISHER, J.M. 1993. Strategies to aid heather (*Calluna vulgaris*) recovery. In: *New Horizons for Upland Environments*. Proceedings of a Scientific Seminar, ADAS, Pwllpeiran, Sept. 1993.
- MERRETT, P. 1976. Changes in the ground-living spider fauna after heathland fires in Dorset. *Bulletin of the British Arachnological Society*, **3**, pp. 214–221.
- MILES, J. (1971). Burning *Molinia*-dominant vegetation for grazing by red deer. *Journal of the British Grassland Society*, **26**, 247–250.
- MILES, J. (1988). Vegetation and soil change in the uplands. In: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 57–70.
- MILLER, G.R. & MILES, J. 1970. Regeneration of heather (*Calluna vulgaris*) at different ages and seasons in north-east Scotland. *Journal of Applied Ecology*, **7**, pp. 51–60.
- MILLER, G.R., MILES, J. & HEAL, O.W. 1984. *Moorland Management: a study of Exmoor*. Cambridge, Institute of Terrestrial Ecology.
- MILNE, J.A. 1974. The effects of season and age of stand on the nutritive value of heather (*Calluna vulgaris* L. Hull) to sheep. *Journal of Agricultural Science, Cambridge*, **83**, pp. 281–288.
- MILNE, J.A. & GRANT, S.A. 1987. Sheep management on heather moorland. In: B.E. POLLETT, ed. *Efficient Sheep Production from Grass*. Occasional Symposium of the British Grassland Society. No. **21**, pp. 165–167.

- MITCHELL, B., STAINES, B.W. & WELCH, D. 1977. *The ecology of red deer: a research review relevant to their management in Scotland*. Cambridge: Institute of Terrestrial Ecology. 74pp.
- MOORE, P.D. 1993. The origin of blanket mire revisited. In: F. CHAMBERS ed. *Climate Change and Human Impact on the Landscape*. London: Chapman & Hall, pp. 217–224.
- MOWFORTH, M.A. & SYDES, C. 1989. *Moorland management: a literature review*. Peterborough: Nature Conservancy Council, *Research and Survey in Nature Conservation Series* No. 25.
- NATURE CONSERVANCY COUNCIL (NCC), 1989. *Management Guidelines for the Dartmoor Commons*. Taunton: Nature Conservancy Council, *Unpublished Report*.
- NELSON, J.M. 1971. The invertebrates of an area of Pennine moorland within the Moor House Nature Reserve in northern England. *Transactions of the Society of British Entomologists*, **19**, pp. 173–235.
- NETHERSOLE-THOMPSON, D. & NETHERSOLE-THOMPSON, M. 1979. *Greenshanks*. London: Poyser.
- NOLAN, A.J., HENDERSON, D.J. & MERRELL, B.G. 1995. The vegetation dynamics of wet heaths in relation to sheep grazing intensity. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 174–179.
- NYMNP, 1986. *Moorland Management*. Helmsley: North York Moors National Park Committee.
- NYMNP, 1991. *North York Moors Moorland Management Programme 1985-1990*. Helmsley: North York Moors National Park Committee.
- OATES, M. 1994. *A Review of the Role of Horses and Ponies in Habitat Management for Nature Conservation*. Cirencester: National Trust. 23pp.
- OSBORNE, B.C. 1984. Habitat use by red deer (*Cervus elaphus L.*) and hill sheep in the west Highlands. *Journal of Applied Ecology*, **21**, pp. 497–506.
- OTTO, C. & SVENSSON, B.S. 1982. Structure of communities of ground living spiders along altitudinal gradients. *Holarctic Ecology*, **5**, pp. 35–47.
- PARR, R. 1980. Population study of the golden plover *Pluvialis apricaria* using marked birds. *Ornis Scandinavica*, **11**, 179–189.
- PEACHEY, J.E. 1963. Studies on the Enchytraeidae (Oligochaeta) of moorland soil. *Pedobiologia*, **2**, pp. 81–95.
- PEARSALL, W.J.I. 1941. The mosses of the Stainmore District. *Journal of Ecology*, **29**, pp. 161–175.
- PHILLIPS, J. & WATSON, A. 1995. Key requirements for management of heather moorland: now and for the future. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 344–361.
- PHILLIPS, J, WATSON, A & MACDONALD, A. (1993). *A Muirburn Code*. Scottish Natural Heritage.
- PHILLIPS, J., YALDEN, D. & TALLIS, J. (eds.) 1981. *Moorland Erosion Study. Phase 1 Report*. Bakewell: Peak Park Joint Planning Board.
- PHILLIPS, M.E. 1954. Biological Flora of the British Isles: *E. angustifolium* Roth. *Journal of Ecology*, **42**, pp. 612–622.
- POWELL, C.F. & MALCOLM, D.C. 1974. Seasonal and spatial variation in the mineral content of some upland vegetation types in Scotland. *Journal of Applied Ecology*, **11**, 1173–1184.
- RADLEY, J. 1962. Peat erosion on the high moors of Derbyshire and West Yorkshire. *East Midland Geographer*, **3**, 40–50.
- RATCLIFFE, D.A. 1959. The vegetation of the Carneddau, North Wales. 1. Grasslands, heaths and bogs. *Journal of Ecology*, **47**, pp. 371–413.
- RATCLIFFE, D.A. 1968. An ecological account of Atlantic bryophytes in the British Isles. *New Phytologist*, **67**, 365–439.
- RATCLIFFE, D.A. 1976. Observations on the Breeding of Golden Plover in Great Britain. *Bird Study*, **23**, pp. 63–116.
- RATCLIFFE, D.A. 1977. *A Nature Conservation Review*. Cambridge: Cambridge University Press.

- RATCLIFFE, D.A. 1990. *The Bird life of Mountain and Upland*. Cambridge: Cambridge University Press.
- RAWES, M. 1971. *Aspects of the Ecology of northern Pennine Moorland*. 1. *The Influence of Agriculture*. Moor House Occasional Papers, No.1. Unpublished Report. 15pp.
- RAWES, M. 1981. Further results of excluding sheep from high-level grasslands in the North Pennines. *Journal of Ecology*, **69**, pp. 651–669.
- RAWES, M. 1983. Changes in two high altitude blanket bogs after cessation of sheep grazing. *Journal of Ecology*, **71**, pp. 219–235.
- RAWES, M. & HEAL, O.W. 1978. The blanket bog as part of a Pennine Moorland. In: O.W. HEAL & D.F. PERKINS eds. *Production Ecology of British Moors and Montane Grasslands*. Berlin: Springer-Verlag, pp. 224–243.
- RAWES, M. & HOBBS, R. 1979. Management of semi-natural blanket bog in the Northern Pennines. *Journal of Ecology*, **67**, pp. 789–807.
- RAWES, M. & WELCH, D. 1969. Upland productivity of vegetation and sheep at Moor House National Nature Reserve, Westmorland, England. *Oikos*, Suppl. **11**, pp. 72.
- RAWES, M. & WILLIAMS, R. 1973. Production and utilisation of *Calluna* and *Eriophorum*. In: *Hill Pasture Improvement and its Economic Utilisation*. Potassium Institute Ltd. (Colloquium Proceedings No. 3), pp. 115–119.
- READER, R.J., MALLIK, A.U., HOBBS, R.J. & GIMINGHAM, C.H. 1983. Shoot regeneration after fire or freezing temperatures and its relation to plant life-form for some heathland species. *Vegetatio*, **55**, pp. 181–189.
- REED, T. 1985. Grouse Moors and Wading Birds. *Game Conservancy Annual Review for 1984*, **16**, pp. 57–60.
- REED, T.M., LANGSLOW, D.R. & SYMONDS, F.L. 1983. Breeding waders of the Caithness flows. *Scottish Birds*, **12**, pp. 180–186.
- RICHARDS, O.W. 1926. Studies on the ecology of English heaths. III. Animal communities of the felling and burn successions at Oxshott Heath, Surrey. *Journal of Ecology*, **14**, pp. 244–281.
- RITCHIE, J.C. 1955. Biological Flora of the British Isles: *Vaccinium vitis idaea* L. *Journal of Ecology*, **43**, 701–708.
- RITCHIE, J.C. 1956. Biological Flora of the British Isles: *Vaccinium myrtillus* L. *Journal of Ecology*, **44**, 291–299.
- ROBINSON, M. 1985. The hydrological effects of moorland gripping: A re-appraisal of the Moor House (UK) research. *Journal of Environmental Management*, **21**, pp. 205–212.
- ROBSON G., PERCIVAL S. & BROWN A.F. *The Breeding Ecology of Curlew: a pilot study*. English Nature Research Report No. 127.
- RODWELL, J.S. (ed) 1991. *British Plant Communities Vol. 2. Mires and Heaths*. Cambridge: Cambridge University Press.
- ROSE, F. 1953. A survey of the ecology of British lowland bogs. *Proceedings of the Linnean Society*, **164**, 186–211.
- ROWE, J.S. 1983. Concepts of fire effects on plant individuals and species. In: R.W. WEIN & D.A. MACLEAN, eds., *The Role of Fire in Northern Circumpolar Ecosystems*. Chichester: Wiley, pp. 135–154.
- ROWELL, T.A. 1988. *The Peatland Management Handbook*. Peterborough: Nature Conservancy Council, *Research and Survey in Nature Conservation Series* No. 14.
- RSPB, 1995. *Conservation Management of Blanket Bog. A Review*. Report to Royal Society for the Protection of Birds by Scottish Wildlife Trust. 103pp.
- SALONEN, V. 1992. Effects of artificial plant cover on plant colonization of a bare peat surface. *Journal of Vegetation Science*, **3**, 109–117.
- SALT, C.A., MAYES, R.W., COLGROVE, P.M. & LAMB, C.S. 1994. The effects of season and diet composition on the radiocaesium intake by sheep grazing on heather moorland. *Journal of Applied Ecology*, **31**, pp. 125–136.

- SCOTTISH AGRICULTURAL COLLEGES (SAC), 1989. *Heather Moorland – a guide to grazing management*. MLURI for Scottish Agricultural College.
- SCOTTISH OFFICE, 1992. *Code of Good Upland Management*. 3pp.
- SHARROCK, J.T.R. 1976. *The Atlas of Breeding Birds in Britain and Ireland*. London: Poyser.
- SHIMWELL, D.W. 1974. Sheep grazing intensity in Edale, 1692–1747, and its effect on blanket peat erosion. *Derbyshire Archaeological Journal*, **94**, 35–40.
- SHIMWELL, D.W. 1981. Footpath erosion. In: J. PHILLIPS, D. YALDEN & J. TALLIS eds. *Moorland Erosion Study. Phase 1 Report*. Bakewell: Peak Park Joint Planning Board. pp. 160–170.
- SINKER, C.A. 1962. The North Shropshire meres and mosses: a background for ecologists. *Field Studies*, **4**, 101–137.
- SLATER, F.M. 1976. Contributions to the ecology of Borth Bog, Wales. II. Human Influence. *Proceedings of the 5th International Peat Congress, Poznan, Poland*. vol. 1. pp. 174–182.
- SMITH, A.G., GASKELL-BROWN, C., GODDARD, I.C., GODDARD, A., PEARSON, G.W. & DRESSER, P.Q. 1981. Archaeology and environmental history of a barrow at Pubble, Loughermore Townland, County Londonderry. *Proceedings of the Royal Irish Academy*, **81C**, pp. 29–66.
- SMITH, R.A.H. & FORREST, G.I. 1978. Field estimates of primary production. In: O.W. HEAL & D.F. PERKINS eds. *Production Ecology of British Moors and Montane Grasslands*. Springer-Verlag, Berlin. pp. 17–37.
- SNOWDONIA NATIONAL PARK 1984. *Moor & Heath: Its Conservation and Management. Report of a Conference Proceedings, June 1984*. Snowdonia National Park. 94pp.
- SPRINGETT, J.A. & LATTEY, P.M. 1977. Studies on the microfauna of blanket bog with particular reference to the Enchytraeidae. *Journal of Animal Ecology*, **46**, pp. 959–974.
- STAINES, B.W. 1970. *The Management and Dispersion of a Red Deer Population in Glen Dye, North-East Scotland*. PhD Thesis, University of Aberdeen.
- STAINES, B.W., BALHARRY, R. & WELCH, R. 1995. The impact of red deer and their management on the natural heritage in the uplands. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 294–308.
- STEVENSON, A.C. & BIRKS, H.J.B. 1995. Heaths and moorland: long-term ecological changes, and interactions with climate and people. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 224–239.
- STEVENSON, A.C. & THOMPSON, D.B.A. 1993. Long-term changes in the extent of heather moorland in upland Britain and Ireland: palaeoecological evidence for the importance of grazing. *The Holocene*, **3**, pp. 75–81.
- STEWART, A.J.A. & LANCE, A.N. 1991. Effects of moor-draining on the hydrology and vegetation of northern Pennine blanket bog. *Journal of Applied Ecology*, **28**, pp. 1105–1117.
- STILLMAN, R.A. & BROWN, A.F. 1994. Population sizes and habitat associations of upland breeding birds in the south Pennines, England. *Biological Conservation*, **69**, pp. 307–314.
- STROUD, D.A., REED, T.M., PIENKOWSKI, M.W. & LINDSAY, R.A. 1987. *Birds, Bogs, and Forestry: The Peatlands of Caithness and Sutherland*. Nature Conservancy Council, Peterborough.
- SVENDSEN, J.A. 1957. The distribution of Lumbricidae in an area of Pennine moorland (Moor House Nature Reserve). *Journal of Animal Ecology*, **26**, pp. 423–439.
- SYDES C. & MILLER G.R. 1988. Range management and nature conservation in the British uplands. In: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 323–339.
- TALLIS, J.H. 1969. The blanket bog vegetation of the Berwyn Mountains, North Wales. *Journal of Ecology*, **57**, pp. 765–787.
- TALLIS, J.H. 1973. Studies on southern Pennine peats. V. Direct observations on peat erosion and peat hydrology at Featherbed Moss, Derbyshire. *Journal of Ecology*, **61**, 1–22.

- TALLIS, J.H. 1981. Uncontrolled fires. In: PHILLIPS, J., YALDEN, D. & TALLIS, J. eds, *Moorland Erosion Study. Phase 1 Report*. Bakewell: Peak Park Joint Planning Board. pp. 176–182.
- TALLIS, J.H. 1985. Mass movement and erosion of a southern Pennine (UK) blanket peat. *Journal of Ecology*, **73**, pp. 283–316.
- TALLIS, J.H. 1987. Fire and flood at Holme Moss (England, UK): erosion processes in an upland blanket mire. *Journal of Ecology*, **75**, pp. 1099–1130.
- TALLIS, J.H. 1995. Blanket mires in the upland landscape. In: B.D. WHEELER, S.C. SHAW, W.J. FOJT & R.A. ROBERTSON eds. *Restoration of Temperate Wetlands*, Chichester: Wiley, pp. 495–508.
- TALLIS, J.H. & YALDEN, D.W. 1983. *Peak District Moorland Restoration Project. Phase 2 Report: re-vegetation trials*. Peak Park Joint Planning Board, Bakewell, Derbyshire.
- TALLIS, J.H. & YALDEN, D.W. 1984. *Peak District Moorland Restoration Project. Phase 2 Report*. Peak Park Joint Planning Board, Bakewell, Derbyshire.
- TANSLEY, A.G. 1939. *The British Islands and their Vegetation*. Cambridge: Cambridge University Press.
- TAYLOR, K. 1971. Biological Flora of the British Isles: *Rubus chamaemorus* L... *Journal of Ecology*, **59**, pp. 293–306.
- TAYLOR, K. & MARKS, T.C. 1971. The influence of burning and grazing on the growth and development of *Rubus chamaemorus* L. in *Calluna-Eriophorum* bog. In: E.A.G. DUFFEY & A.S. WATT, eds. *The Scientific Management of Plant and Animal Communities for Conservation*. Oxford: Blackwell. pp. 153–166.
- THOMPSON, D.B.A. & KIRBY, K.J. (eds.) 1990. *Grazing Research and Nature Conservation in the uplands: proceedings of a seminar, 1988*. Peterborough: Nature Conservancy Council *Research and Survey in Nature Conservation*, No. 31.
- THOMPSON, D.B.A. & MILES, J. 1995. Heaths and moorland: some conclusions and questions about environmental change. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO, pp. 362–388.
- THOMPSON, P.S. & THOMPSON, D.B.A. 1991. Greenshank *Tringa nebularia*, and long-term studies of breeding waders. *Ibis*, **133 Suppl. 1**, 99–112.
- THOMPSON, D.B.A., HESTER, A.J. & USHER, M.B. (Eds) 1995a. *Heaths and Moorlands: Cultural Landscapes, 2nd annual conference of the Research and Advisory Services Directorate of SNH (1993)*. Edinburgh: HMSO. 400pp.
- THOMPSON, D.B.A., MACDONALD, A.J. & HUDSON, P.J. 1995b. Upland moors and heaths. In: W.J. SUTHERLAND & D. HILL. *Habitat Management*. Cambridge: Cambridge University Press, pp. 292–328.
- THOMPSON, D.B.A., MACDONALD, A.J., MARSDEN, J.H. & GALBRAITH, C.A. 1995c. Upland heather moorland in Great Britain – a review of international importance, vegetation change and some objectives for nature conservation. *Biological Conservation*, **71**, pp. 163–178.
- USHER, M.B. 1992. Management and diversity of arthropods in *Calluna* heathland. *Biodiversity and Conservation*, **1**, pp. 63–79.
- USHER, M.B. 1995. Heather moorland patch dynamics and consequences for wildlife. In: D.B.A. THOMPSON, A.J. HESTER & M.B. USHER, eds. *Heaths and Moorland. Cultural Landscapes*. Edinburgh: HMSO. pp. 256–272.
- USHER, M.B. & GARDNER, S.M. 1988. Animal communities in the uplands: how is naturalness affected by management?. In: M.B. USHER & D.B.A. THOMPSON eds. *Ecological Change in the Uplands*. Oxford: Blackwell Scientific Publications, BES Special Publication No. 7, pp. 75–92.
- USHER, M.B. & SMART, L.M. 1988. Recolonisation of burnt and cut heathland in the North York Moors by arachnids. *The Naturalist*, **113**, pp. 103–111.
- USHER, M.B. & THOMPSON, D.B.A. 1993. Variation in the upland heathlands of Great Britain – conservation importance. *Biological Conservation*, **66**, pp. 69–81.

- WALKER, F. & ELIAS, D. 1989. *Heather Regeneration Scheme: The Berwyn Mountains Case Study*. Bala: Nature Conservancy Council. *Unpublished Report*.
- WALLACE, H.L., GOOD, J.E.G. & WILLIAMS, T.G. 1992. The effects of afforestation on upland plant communities: an application of the British National Vegetation Classification. *Journal of Applied Ecology*, **29**, pp. 180–194.
- WATSON, A. & LANCE, A.N. 1984. Ecological aspects of game shooting and upland conservation. *ECOS*, **5**, pp. 2–7.
- WATSON, A. & MILLER, G.R. 1976. *Grouse Management*. Banchory: Institute of Terrestrial Ecology, Game Conservancy, Booklet 12. 86pp.
- WATSON, A. & O'HARE, P.J. 1979. Bird and mammal numbers on untreated and experimentally treated Irish bog. *Oikos*, **33**, pp. 97–105.
- WATSON, A. MILLER, G.R. & GREEN, F.H.W. 1966. Winter browning in heather (*Calluna vulgaris*) and other moorland plants. *Transactions of the Botanical Society of Edinburgh*, **40**, 195–203.
- WATT, A.S. 1947. Pattern and process in the plant community. *Journal of Ecology*, **35**, 1–22.
- WATT, A.S. 1955. Bracken versus heather, a study in plant sociology. *Journal of Ecology*, **43**, 490–506.
- WEIN, R.W. 1973. Biological Flora of the British Isles: *Eriophorum vaginatum*. *Journal of Ecology*, **61**, pp. 601–615.
- WELCH, D. 1984. Studies in the grazing of heather moorland in north-east Scotland. (I, II, III). *Journal of Applied Ecology*, **21**, pp. 179–225.
- WELCH, D. & RAWES, M. 1964. The early effect of excluding sheep from high-level grasslands in the north Pennines. *Journal of Applied Ecology*, **1**, pp. 281–300.
- WELCH, D. & RAWES, M. 1966. The intensity of sheep grazing on high level blanket bog in Upper Teesdale. *Irish Journal of Agricultural Research*, **5**, pp. 185–196.
- WELCH, D. & SCOTT, D. 1995. Studies in the grazing of heather moorland in northeast Scotland .6. 20-year trends in botanical composition. *Journal of Applied Ecology*, **32**, pp. 596–611.
- WELCH, D., SCOTT, D., MOSS, R. & BAYFIELD, N.G. 1994. *Ecology of Blaeberry and its Management in British Moorlands*. Banchory: Institute of Terrestrial Ecology, NERC. 39pp.
- WHITBY, M. & GRANT, S. (Eds) 1990. *Modelling Heather Management, A Workshop Report*. Department of Agricultural Economics & Food Marketing, University of Newcastle. pp. 97.
- WHITE, E. 1960. The natural history of some species of *Aphodius* (Col., Scarabaeidae) in the north Pennines. *Entomologist's Monthly Magazine*, **29**, pp. 243–250.
- WHITTAKER, J.B. 1964. Auchenorrhyncha of the Moor House Nature Reserve, Westmorland, with notes on *Macrosteles alpinus* (Zett.), a species new to Britain. *Entomologist's Monthly Magazine*, **100**, pp. 168–171.
- WHITTAKER, J.B. 1985. Population cycles over a 16-year period in an upland race of *Strophingia ericae* (Homoptera: Psylloidea) on *Calluna vulgaris*. *Journal of Animal Ecology*, **54**, pp. 311–321.
- YALDEN D.W. 1974. The Status of Golden Plover (*Pluvialis apricaria*) and Dunlin (*Calidris alpina*) in the Peak District, *The Naturalist*, **930**, pp. 81–90.
- YALDEN, D. (undated). *Sheep grazing levels. Information Sheet No. 2*. Peak District Moorland Management Project, Bakewell. 3pp.

Appendix 1.

RELATIONSHIPS BETWEEN GRAZING AND BIRDS WITH PARTICULAR REFERENCE TO SHEEP IN THE BRITISH UPLANDS

Robert J. Fuller

British Trust for Ornithology

(In preparation)

[Draft contents list, as at February, 1996]

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 - 3.4 Vegetation change – alteration of mosaics
 - 3.5 Vegetation change – alteration of food resources
 - 3.5.1 Fruit
 - 3.5.2 Invertebrates
 - 3.5.3 Small mammals
 - 3.6 A link between grazing pressure and predation rates?
 - 3.7 Relationship between grazing and other habitat changes
 - 3.7.1 Burning

3.7.2 Drainage and 'land improvements'

3.7.3 Forestry and predator control

3.7.4 Acidification and air pollution

3.8 Conclusion

4. Consequences for upland birds of reducing grazing pressure

4.1 Responses of birds to possible vegetation changes

4.2 Scrub and woodland development in the uplands

4.3 how much grazing?

5 Changes in grazing pressure – a species perspective

Red-throated diver *Gavia stellata*

Black-throated diver *Gavia arctica*

Greylag goose *Anser anser*

Wigeon *Anas penelope*

Teal *Anas crecca*

Mallard *Anas platyrhynchos*

Red-breasted merganser *Mergus serrator*

Goosander *Mergus merganser*

Red kite *Milvus milvus*

Hen harrier *Circus cyaneus*

Buzzard *Buteo buteo*

Golden eagle *Aquila chrysaetos*

Kestrel *Falco tinnunculus*

Merlin *Falco columbarius*

Peregrine *Falco peregrinus*

Red grouse *Lagopus lagopus*

Ptarmigan *Lagopus mutus*

Black grouse *Tetrao tetrix*

Oystercatcher *Haematopus ostralegus*

Ringed plover *Charadrius hiaticula*

Dotterel *Charadrius morinellus*

Golden plover *Pluvialis apricaria*

Lapwing *Vanellus vanellus*

Temminck's stint *Calidris temminckii*

Purple sandpiper *Calidris maritima*

Dunlin *Calidris alpina*

Ruff *Philomachus pugnax*

Snipe *Gallinago gallinago*
Whimbrel *Numenius phaeopus*
Curlew *Numenius arquata*
Redshank *Tringa totanus*
Greenshank *Tringa nebularia*
Wood sandpiper *Tringa nebularia*
Wood sandpiper *Tringa glareola*
Common sandpiper *Actitis hypoleucos*
Red-necked phalarope *Phalaropus lobatus*
Stock dove *Columa oenas*
Cuckoo *Cuculus canorus*
Snowy owl *Nyctea scandiaca*
Short-eared owl *Asio flammeus*
Nightjar *Caprimulgus europaeus*
Skylark *Alauda arvensis*
Shore lark *Eremophila alpestris*
Meadow pipit *Anthus pratensis*
Grey wagtail *Motacilla cinerea*
Pied wagtail *Motacilla alba*
Dipper *Cinclus cinclus*
Wren *Troglodytes troglodytes*
Whinchat *Saxicola rubetra*
Stonechat *Saxicola rubetra*
Wheatear *Oenanthe oenanthe*
Ring ouzel *Turdus torquatus*
Chough *Pyrrhocorax pyrrhocorax*
Jackdaw *Corvus monedula*
Carrion & hooded crow *Corvus corone*
Raven *Corvus corax*
Twite *Carduelis flavirostris*
Lapland bunting *Calcarius lapponicus*
Snow bunting *Plectrophenax nivalis*

6 Grazing and birds in non-upland habitats

7 Conclusions and future research

References

Appendix 2.

List of contacts

Contact Name	Organisation
Dr David Stroud	JNCC
Dr Andy Brown	English Nature
<i>Various</i>	Scottish Natural Heritage
Dr David Gear	Countryside Commission
Mr Jeff Byrne	EHF
<i>Various</i>	ADAS
Mr Ian Condliffe	Yorkshire Dales ESA
<i>Various</i>	ITE
Mr Phil Taylor	Lake District National Park
Mr Steve Preston	Northumberland National Park
Ms Sue Rees	North York Moors National Park
Ms Judy Palmer	Yorkshire Dales National Park
Mr Rhodri Thomas	Peak National Park
Ms Sue Goodfellow	Dartmoor National Park
Mr David Boyce	Exmoor National Park
Dr Gritten	Snowdonia National Park
Mr Philip Immirzi	Scottish Natural Heritage
Dr Rob Fuller	BTO
Ms Caroline Steel	RSNC
Dr Petty	Ardentinny Research Field Station
Mr David Newborn	The Game Conservancy
Sir Anthony Millbank	The Moorlands Association
Mr John Phillips	The Heather Trust
Mr Paddy Shillington	The Joseph Nickerson Heather Improvement Foundation
Dr Derek Ratcliffe	
Dr Penny Anderson	Penny Anderson Associates
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Prof. Charles Gimingham	Aberdeen University
Dr Peter Hudson	University of Stirling
Dr Peter Hulme	Macaulay Land Use Research Institute