A Guide to the Moor House Collection

J.P. Gill

Aspects of the ecology of the Ecology of the Northern Pennines Moor House Occasional Paper No. 13

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Note that much microbiological information appears in chapter 12, rather than chapter 6. There is considerable overlap between the contents of chapters 7, 8 & 10, although each reference is listed only once, where it seems to fit most neatly.

Chapter 1 INTRODUCTION

1.1 Background

The Moor House Collection comprises the material which was removed from the research station of the Moor House National Nature Reserve when it closed in 1982. It is currently stored at NCC NW Regional Office, Blackwell and comprises the results of thirty years' of scientific data and associated material collected up to the closure of the research station on the NNR in 1982.

This guide was compiled in March 1990 as part of a contract to archive the Moor House Collection. The contract aimed to make the collection more accessible to the scientific community for the purpose of long term monitoring of environmental change. The subjects covered by chapters 2 to 12 were identified by a NERC working group as being important data for long term reference sites (Heal 1989). Similar subject headings were also used in the previous publication list in this series (Rawes 1982).

It is anticipated that this document will be regularly updated as the recommendations are fulfilled or modified, as further work is published and as omissions are brought to the attention of the NCC NW Regional Office.

1.2 Publications and theses

The material is arranged alphabetically by the first named author, into work that originates from work done wholly, or at least primarily, at Moor House (Class A), or those where the research has only partly been done on the Reserve (Class B). A third section (Class C) includes references of work done before 1952, when the Nature Conservancy purchased the property.

Class A are publications of data derived from Moor House research

Class B are publications in which only part of the research was done at Moor House

Class C publications of work prior to 1952

Each of these classes is further subdivided into types asw follows:

I books and papers published

II degree theses

III occasional papers

In the report, references are given within brackets thus ( ), while other material is indicated thus < >. Theses which are held in the Collection are given a * suffix (e.g. Randall 1980*). Published references are listed at the end of chapters 2 to 12.

1.3 Unpublished reports

Between 1959 and 1984, an Annual Report was produced. Meteorological data was published monthly and summarised annually by the Meteorological Office. Nineteen volumes of the Reserve Record hold unpublished reports and the results of student projects. In the various chapters, references to Annual Report articles are given as <year>-AR<volume>, <page>. For example, 80-AR16, 6 refers to a 1980 article on page 6 of volume 16 of the Annual Reports. Similarly, 69-RR3c refers to a 1969 article in volume IIIc of the Reserve Record.

a) Annual Reports 1959-84.

b) Meteorological data 1952-1983.

c) Reserve Records 19 volumes.

Chapter 2 ATMOSPHERIC CHEMISTRY

2.1 Measurements <data may be requested from Dr. D. Fowler, Institute of Terrestrial Ecology (ITE) Edinburgh, and Dr. T.W. Choularton of UMIST.

2.1.1 Sulphur dioxide (Chandler 1988, Unsworth & Fowler 1988)

Class B

Type 1

CARRUTHERS, D.J. & CHOULARTON, T.W. 1983. A model for the seeder-feeder mechanism of orographic rain including stratification amd wind-drift effects. Q. J. Met. Soc., 109, 575-588.

CARRUTHERS, D.J. & CHOULARTON, T.W. 1984. Acid deposition in rain over hills. Atmos. Envir., 18, 1905-1908.

CHANDLER, A.S., CHOULARTON, T.W., DOLLARD, D.J., GAY, M.J., HILL, T.A., JONES, A., JONES, B.M.R., MORSE, A.P., PENKETT, S.A. & TYLER, B.J. 1988. A field study of cloud chemistry and cloud microphysics at Great Dun Fell. Atmos. Env., 22(4), 683-694.

CHANDLER, A.S., CHOULARTON, T.W., DOLLARD, D.J., EGGLETON, A.E.J., GAY, M.J., HILL, T.A., JONES, B.M.R., TYLER, B.J., BANDY, B. & PENKETT, S.A. 1988. Measurements of ambient H2O2 and SO2 in cloud and estimates of their rate of reaction under field conditions. Nature, 336, 562-565.

CHANDLER, A.S., CHOULARTON, T.W., DOLLARD, D.J., GAY, M.J., HILL, T.A., JONES, A., JONES, B.M.R., MORSE, A.P., PENKETT, S.A. & TYLER, B.J. 1988. In: Acid deposition at elevated sites.
(Eds. M.H. Unsworth & D. Fowler), pp189-215. Klewer Academic Press,

CHANDLER, A.S., CHOULARTON, T.W., DOLLARD, D.J., GAY, M.J., GALLACHER, M.W., HILL, T.A., JONES, B.M.R., PENKETT, S.A., TYLER, B.J. & BANDY, B. 1989. A field study in the oxidation of SO2 in a cap cloud at Great Dun Fell. Q. J. Met. Soc., 115, 397-420.

CHOULARTON, T.W., CONSTERDINE, I.E., GARDINER, B.A., GAY, M.J., HILL, M.K., LATHAM, J. & STROMBERG, I.M. 1986. Field studies of the optical and microphysical characteristics of clouds enveloping Great Dun Fell. Q. J. Roy. Met Soc., 112, 131-148.

CHOULARTON, T.W., GAY, M.J., JONES, A., FOWLER, D., CAPE, J.N. & LEITH, I.D. 1988. The influence of altitude on wet deposition: Comparison between field measurements at Great Dun Fell and the predictions of the seeder-feeder model. Atmos. Env., 22(7), 1363-1371.

FOWLER, D., LEITH, I., CAPE, J.N., JONES, A., CHOULARTON, T.W. & GAY, M.J. 1988. Wet deposition with altitude: The role of orographic cloud. In: Acid deposition at elevated sites. (Eds. M.H. Unsworth & D. Fowler), pp231-259. Klewer Academic Press,

FOWLER, D., MORSE, A.P., GALLACHER, M. & CHOULARTON, T.W. 1989. Measurements of cloud water deposition on vegetation using a Lysimeter and a Flux/Gradient technique. Tellus in press

anchester.

Chapter 3 CLIMATE

3.1 Parameters

3.1.1 Temperature (Manley 1936,38,42,43,80,
<unpublished manuscript>
<monthly summaries for 1957-84
held at NCC Blackwell>
<computer tape data for 1974-83
with Dr. K. Taylor>
<Meteorological Office data (Met)
for 1952-1982, NCC Blackwell>
<Dr. J. Grace may have some data>

3.1.2 Rainfall <monthly summaries for 1957-84
held at NCC Blackwell>
<raw data for 1974-83, K. Taylor>
<Met for 1952-82 NCC Blackwell>

3.1.3 Solar radiation (Bailey 1975)
<raw data for 1974-83, K. Taylor>

3.1.4 Wind (Baldwin & Smithson 1979)
<summaries for 1974-83, K. Taylor>

3.1.5 Days of snowlie (Manley 1939)
<monthly summaries for 1957-84 held
at NCC Blackwell>

3.2 Recording sites

3.2.1 Moor House

3.2.1.1 Meteorological Office Station

3.2.1.2 Automatic Weather Station

3.2.2 Great Dun Fell

3.2.3 Widdybank (Cow Green Reservoir)

3.2.4 Helbeck Wood

3.3 Temperature lapse rate
(Green & Harding 1979)
<Taylor unpubl. data>

3.4 References (see at end of Chapter 4 HYDROLOGY)

Chapter 4 HYDROLOGY

4.1	Pools	<Tallis 1976-AR17:24>
4.2	Watercourses	
4.2.1	Gullies	(Williamson 1981*)
4.2.2	Streamflow	<raw data in Hydrology Box File>
4.2.3	Flooding	(Jamieson 1967*, Painter 1967, Carling 1983, Archer 19??, Stewart & Lance 1983)
4.3	Conductivity	(Rawes 1975, Clymo in prep.)
4.4	Chemistry	
4.4.1	Surface water	(Gorham 1956, Crisp 1977)
4.4.2	Rainwater	(Crisp 1966, Gore 1968, Clymo 1984)
4.5	Temperature	(Harding 1979, Crisp & Le Cren 1970, Crisp & Howson 1982)
4.6	References for CLIMATE & HYDROLOGY	

Class A

Type I

CONWAY, V.M. & MILLAR, A. 1960. The hydrology of some small peat covered catchments in the northern Pennines. J. Instn. Wat. Engrs., 14, 415-424.

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MILLAR, A. 1964. Notes on the climate near the upper forest limit in the northern Pennines. Q. Jl. For., 58, 239-246.

SMITH, K. 1971. Some features of snow-melt recession in the upper Tees basin. Water and Water Engineering, , 345-346.

Type II

JAMIESON, D.G. 1967. The spatial and temporal distribution of storm rainfall. Ph.D. Thesis, University of Newcastle upon Tyne.

PAINTER, R.B. 1967. The formation of flood waves in natural channels. Ph.D. Thesis, University of Newcastle upon Tyne.

WILLIAMSON, 1981

Type III

BAILEY, A.D. 1975. Solar radiation recordings at Moor House. Merlewood Research Station Research and Development Paper No. 65.

Class B

Type I

ARCHER, D.R. 1982. Severe snowmelt run-off in North East England and its implications. J. Instn. Civil Eng.

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GLASSPOOLE, J. 1953. Frequency of cloud at mountain summits. Met. Mag., 82, 156-157.

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MANLEY, G. 1943. Further climatological averages for the northern Pennines. Q. Jl. R. met. Soc., 69, 251-261.

MANLEY, G. 1946. The helm wind of Cross Fell 1937-1939. Q. Jl. R. met. Soc., 71, 197-219.

	Chapter 5	GEOLOGY/SOILS
5.1	Geomorphology	
5.1.1	Periglaciology	(Tufnell 1971,76)
5.1.2	Topography	(Bell 1984)
5.1.3	Natural pipes	(Carling 197?)
5.2	Geology	
5.2.1	General	(Dunham 1948, Johnson & Dunham 1963)
5.2.2	Mining	<maps dated 1825,91,1919,75,78> <see Chapter 18 MAPS>
5.3	Soil	
5.3.1	Types	(Hornung 1968*,76) <map-in colour>
5.3.2	Erosion	(Bower 1959*,60,61,62, Gore & Allen 1965)
5.3.3	Rehabilitation	(Gore & Godfrey 1981)
5.3.4	Minerals	(Gore & Allen 1956? Howard & Howard 1976, Smith 1972, Marrs, Rizand & Harrison 1988)
5.3.5	pH	(Gorham 1959, Rawes 1975)
5.3.6	Gas production	(Claricoates 1990)
5.3.7	Water relations	(Welch & Rawes 1969, Urquhart 1969*, Williamson 1981*, Hayward & Clymo 1982)
5.4	References	

Class A

Type I

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URQUHART, C. & GORE, A.J.P. 1972. The redox characteristics of four peat profiles. Soil Biol. Biochem., 5, 659-672.

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Type II

BOWER, M.M. 1959. A summary of available evidence and a further investigation of the causes, methods and results of erosion in blanket peat. M.Sc. Thesis, University of London.

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HORNUNG, M. 1968. Soil morphology, mineralogy and genesis. Ph.D. Thesis, University of Durham.

Type III

HORNUNG, M. 1976. Soils of Moor House. In: Aspects of the Ecology of the Northern Pennines Moor House Occasional Paper, No. 9, 12 pp.

HOWARD, P.J.A. & HOWARD, D.M. 1976. Respiration, litter nutrients and soil organic matter in grazed and ungrazed upland limestone grassland. Merlewood Research Station Research and Development Paper, No. 67.

Class B

Type I

BURGESS, I.C. & WADGE, A.J. 1974.
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TUFNELL, L. 1969. The range of periglacial phenomena in northern England. Biuletyn Periglacjalny, , 291-323.

Type II

Class C

Type I

DUNHAM, K.C. 1948. The geology of the northern Pennines ore field. I. Tyne to Stainmore. Mem. geol. surv. U.K.

Chapter 6 MICROBIOLOGY/DECOMPOSITION

6.1	Nutrients	
6.1.1	Cycling	(Jones 1969, Harrison ????)
6.2	Populations	
6.2.1	Bacteria	(Collins et al 1978)
6.2.2	Fungi	(Widden unpublished report in NCC Blackwell current files)
6.2.3	Microflora	
6.2.4	Protozoa	(Heal 1959*,61,62,63,64)
6.3	Decomposition	(Boatman 1951*, Heal et al 1978)
6.3.1	Microbes	
6.3.2	Invertebrates	<see Chapter 11 INVERTEBRATES>
6.3.3	Temperature influence	(Martin & Holding 1978, Latter & Heal 1971)
6.4	References	

Many references are to be found in Chapter 12 INVERTEBRATES.

Class A

Type I

COLLINS, V.G., D'SYLVA, B.T. & LATTER, P.M. 1978. Microbial populations in peat. In: Production - Ecology of British Moors and Montane Grasslands (Ed. by O.W. Heal and D.F. Perkins) pp 94-112. Springer-Verlag, Berlin.

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in long-term experiments at Moor House National Nature Reserve. J. appl. Ecol., 26, 647-661.

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Type II

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Class B

Type I

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HARRISON, A.F., INESON, P. & HEAL, O.W. 1990. Nutrient cycling in Terrestrial Ecosystems: Field Methods, Application and Interpretation. Elsevier, Barking.

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SWIFT, M.J. HEAL, O.W. & ANDERSON, J.M. 1979. Decomposition in terrestrial ecosystems. Oxford, Blackwell Scientific.

TAYLOR, K. 1989. The absence of mycorrhiza in Rubus chamaemorus. Ann. Bot. Fennici, 26, 421-425.

Chapter 7 VEGETATION

7.1	Paleoecology	
7.1.1	Quarternary	(Johnson ????*, Turner & Chambers 1972-AR13:16, Rawes 1975, Hynes 1978, Chambers 1978, Turner & Hodgson 1979,??,83)
7.2	Communities	
7.2.1	Whole reserve	(Eddy, Rawes & Welch 1969) <NCC Uplands CSD hold NVC equivalents on computer>
7.2.2	Montane	(A. Hobbs unpubl., Fearn 1971?)
7.2.3	Submontane	(Kershaw 1957*, Rawes & Holms 1974-AR15:14, Grasslands
7.2.3.1	Blanket bog	(Rawes & Heal 1978)
7.2.3.2	Macrophytes	(Dale 1990)
7.2.3.3	Flushes	(Fearn 1971)
7.3	Species	(Eddy & Welch 1967, Welch & Eddy 1969, Rawes 1981, NCC Blackwell in prep.)
7.3.1	Autoecologies	
7.3.1.1	Alchemilla spp.	(Bradshaw 1962,63a&b,64
7.3.1.2	Alopercus alp.	(Ratcliffe & Eddy 1960, Fearn 1971, 73-AR14:16)
7.3.1.3	Eriophorum vag.	(Urquhart 1969*, Wein 1973, Robertson 1981)
7.3.1.4	Juncus squ.	(Jordan 1955, Welch 1964,66,67a&b)
7.3.1.5	Grimmia aga.	(Holmes 1976)
7.3.1.6	Mysotis spp.	(Elkington 1962,64, Welch 1967)
7.3.1.7	Rubus cha.	(Taylor 1971, Marks 1974*)
7.3.1.8	Trifolium rep.	(Collison 1979)
7.3.1.9	Deschampsia	(Taylor & Davy 1973-AR14-36)
7.3.2	Rarities	(Details held at NCC Blackell
7.4	Determinants of distribution	
7.4.1	Altitude effect	(Grant & Hunter 1962, Graves 1984)
7.4.2	Temp sensitivity	
7.4.3	Metal tolerance	(Rawes 1975) <NCC Blackwell files>
7.4.4	Acid sensitivity	
7.4.5	Water influence	(Donald 1973, Stewart 1979, Hayward & Clymo 1982)
7.4.6	Wind sensitivity	
7.4.7	Recreation	(Marsh 1974,75-AR15:17,16:20, Heslop 1975)
7.4.8	Grazing	(Marrs et al 1986,88,89, A. Hobbs unpubl.) <see Chapter 10 AGRICULTURE, and Chapter 8 PRODUCTIVITY>
7.4.8.1	Exclosures	(Rawes 1983, Marrs et al 1986,88>
7.4.8.2	Introductions	(Rawes & Welch 1972) <unpublished data in Rough Sike and Introductions Files>

7.5 Herbarium (Held at NCC Blackwell)
7.6 References

Class A

Type I

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RATCLIFFE, D.A. & EDDY, A. 1960. Alopecurus alpinus Sm. in Britain. Proc. Bot. Soc. Br. Isl., 3, 389-391.

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Chapter 8 PRODUCTIVITY

8.1	Measurement	
8.1.1	Biomass	
8.1.1.1	Above ground	(Welch & Rawes 1964, Rawes 1966,,73,75,81, Rawes & Welch 1969, Forrest 1971, Forrest & Smith 1975, Smith & Forrest 1978)
8.1.1.2	Underground	(Forrest 1971)
8.1.2	Carbon 14 intake	(Ashmore 1975*, Daggitt 1981*, Robertson 1981*, Marks 1974*, Marks & Taylor 1978)
8.1.3	Infra-red analysis	(Marks & Taylor 1978)
8.2	Species data	<see Chapter 10 AGRICULTURE>
8.2.1	Sphagnum spp.	(Grace 1970, Clymo 1970,73, Clymo & Reddaway 1971a&b,74, Tattersfield 1974-AR15:25, 1975-AR16:23, 1976-AR17:23, Hayward & Clymo 1983>
8.2.2	Calluna vul.	(Grace 1970, Forrest & Smith 1975, Rawes 1975, Kwolek 1978, Stewart & Lance 1983)
8.2.3	Eriophorum vag.	(Forrest 1971, Rawes 1975, Robertson 1981, Robertson & Woolhouse 1984a&b)
8.2.4	Rubus cha.	(Marks 1974*, Marks & Taylor 1978a)
8.2.5	Circium pal.	(University College London Botany Dept. 1977-RR5a)
8.2.6	Carex bigelowii	(Drage 1977-RR5c)
8.2.7	Juncus squ.	(Welch 1964, Rawes, Williams & Teasdale 1974-RR7a, Rawes 1975, Rawes, Marsh & Tattersfield 1977-AR18:6)
8.3	Limiting factors	(Gore 1963, Forrest 1971, Forrest & Smith 1975, Ulmanis 1982)
8.3.1	Altitude	(Hatton 198?-RR5a, UCL 1974-RR5a, Graves & Taylor 1984-AR25,14)
8.3.2	Temperature	(Ashmore 1975*, Daggitt 1981*, Ollerenshaw & Baker 1982)
8.3.3	Nutrients	(Gore 1961,62, Rawes & Williamson 1973, Ulmanis 1982, Daggitt 1981, Hatton 198?-RR5a)
8.3.3.1	Manuring	(Rawes 1965)
8.3.4	Water relations	(Gore & Urquhart 1966, Urquhart 1969*, Stewart 1969, Ashmore 1975*, Daggitt 1981*, Stewart & Lance 1983)
8.3.5	Grazing	(Rawes 1961,63,81, Rawes & Welch 1969, Rawes, Marsh & Teasdale 1976-AR17:7, Drage 1977-RR5c,

		Rawes & Hobbs 1979, Anon 19??-RR5a, Marrs et al 1986,88,89> <see Chapter 10 AGRICULTURE, and Chapter 7 VEGETATION>
8.3.6	Burning	(Allen 1964, Rawes & Hobbs 1979, Hobbs & Gimingham 1980, Hobbs 1981*, Marks & Taylor 1972, Marrs et al 1986) <see Chapter 10 AGRICULTURE and Chapter 11 VERTEBRATES>>
8.3.7	Competition	(Jones 1980)
8.4	Models	(Gore & Olsen 1967, Gore 1971, Jones & Gore 1972?,78, Grace 1970, Grace & Woolhouse 1970,73a&b,74, Robertson 1981, Daggitt 1981) <see Chapter 10 AGRICULTURE>
8.5	Composition	(Rawes & Holms 1974-AR15:16 <raw data in Grouse Box File with letter from K. Taylor , Marks & Taylor 1978, Ulmanis 1982, Pitcairn, in prep.)
8.6	Herbarium	<Held at NCC Blackwell>
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Chapter 9 TREES

9.1	Productivity	
9.1.1	Yield	
9.1.2	Growth	(Rawes 1978-AR 16,18,80-AR20,6,84-AR14,6)
9.2	Native species	
9.2.1	Plantings	<Green Hole Box File>
9.2.2	Rabbit damage	(Rawes J. Ecol 69)
9.3	Exotic species	(Madgwick 1962*)
9.3.1	Fertilizer	(Carlisle & Brown 1973, Dighton & Harrison 1983)
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Chapter 10 AGRICULTURE & CONSERVATION MANAGEMENT

10.1	Sheep	
10.1.1	Commons	(Rawes 1971 <Sheep Box Files, RR2>)
10.1.1.1	Burning	(Allen 1964, Rawes & Hobbs 1979, Rawes & Williams 1973, Hobbs & Gimingham 1980,87, Hobbs 1981*, 1984, Marks & Taylor 1972, Marrs et al 1986)
10.1.1.2	Grazing	(Rawes 1961,63,81,83 Rawes & Welch 1969, Welch & Rawes 1966, Rawes & Hobbs 1979) <see AGRICULTURE>
10.1.1.3	Heafs	<Five maps showing boundaries 1962,65,66,67,76>
10.1.1.4	Stocking rate	(Welch & Rawes 1966, Rawes & Welch 1964,66&69, Rawes & Heal 1978))
10.1.1.4.1	Counts	<Welch 1964> (Randall 1976-RR5a)
10.1.1.4.2	Interviews	(Cooper 1989)
10.1.1.4.3	Location	
10.1.1.5	Production	(Rawes & Welch 1964,66&69) <Three Sheep Files>
10.1.1.6	Calendar	(Rawes & Welch 1964,66&69) <Three Sheep Files>
10.1.1.7	Feeding	<Box File data>
10.1.1.8	Impacts	(Welch & Rawes 1964, Rawes & Welch 1964,66, Rawes 1968, Welch 1968, Rawes 1981)
10.2	Conservation	
10.2.1	General	(Eddy 1963, Mallett 1972*, Armitage 1973, Hynes 1978)
10.2.2	Heather	
10.2.2.1	Regeneration	(Gore & Urquhart 1981)10.3 References

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Chapter 11 VERTEBRATES

11.1	Mammals	(Coulson 1979)
11.1.1	Shrews	(Butterfield, Coulson & Wanless 1981)
11.1.2	Voles	(unpub. AR, RRIIIc: Gardner 1957, Laughlin 1966, Ferns 1979)
11.2	Birds	
11.2.1	Species	(Parkin 1977, Species List Index>)
11.2.2	Grouse	
11.2.2.1	Management	(Taylor & Rawes 1974)
11.2.2.1.1	Butts	<maps in Map Room>
11.2.2.1.2	Burning	
11.2.2.1.3	Shooting	<1909-1917 data in Box File>
11.2.2.2	Population	(Taylor & Rawes 1974)
11.2.2.2.1	Counts	<Taylor 1971,72a&b, Holms 1973-79-unpublished reports in Box File>
11.2.2.2.2	Studies	<Taylor 1971,72a&b, Holms 1973-79>
11.2.2.2.3	Cycles	(Potts, Tapper & Hudson 1984, RO RS12 file)
11.2.2.3	Reproduction	
11.2.2.3.1	Territories	<colour map of counting areas in Box File>
11.2.2.3.2	Adult:young	<summary of 1962-1972 ratios in Box File>
11.2.2.4	Movements	<unpublished data 1971 in Box File>
11.2.2.5	Diet	
11.2.2.5.1	Insects	(Butterfield & Coulson 1975)
11.2.2.5.2	Calluna	<Crop samples in NCC Blackwell laboratory-undated>
11.2.2.6	Grit	
11.2.2.6.1	Digestive	
11.2.2.6.2	Medicated	
11.2.2.7	Soil status	<calcium levels 1974 in Box File>
11.2.2.8	Disease	<Welbourn & Statham 1970 in Box File>
11.2.2.8.1	Coccidiosis	
11.2.2.8.2	Catarrhal enteritis	
11.2.2.8.3	Aspergillosis	
11.2.2.9	Parasites	<Welbourn & Statham 1970 in Box File>
11.2.2.9.1	Tapeworms	
11.2.2.9.2	Trichostrongyles	
11.2.2.9.3	Ticks	
11.2.2.9.4	Mites	
11.2.2.9.5	Lice	
11.2.2.9.6	Lagopoecus aff.	
11.2.2.9.7	Other	
11.2.3	Non-game birds	
11.2.3.1	Waders	

11.2.3.2 Passerines (Coulson 1956, Reynolds & Randall 1975-AR16:25, S. Jones, 19??)
11.2.3.3 Corvids
11.2.3.4 Raptors
11.2.3.4.1 Population (AR, Wardens reports, RR2
11.2.3.5 Dipper

11.2.4 Reptiles
11.2.4.1 Common lizards

11.3 Amphibians
11.3.1 Newts
11.3.2 Frogs
11.3.2.1 Diet (Houston 1973)
11.3.2.2 Altitude (Holms 1979,82, Beattie 1977)

11.4 Fish
11.4.1 Streams (Crisp 1963, Crisp et al 1975,78,84)
11.4.2 Reservoir (Crisp et al 1974)
11.5 References

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Chapter 12 INVERTEBRATES

12.1	Communities	
12.1.1	Streams	(Crisp et al 1965, Armitage et al 1975, Haile 1979*, L. Davies 1957,56,77-AR18:14, unpubl. data, <NCC Freshwater CSD study <1985?>
12.1.2	Mineral soils	(Coulson & Whittaker 1978)
12.1.3	Peat soils	(Coulson & Whittaker 1978)
12.2	Species	
12.2.1	Rarities	(Details held by NCC Blackwell, and Invertebrate Site Register at NCC Peterborough)
12.3	Population sizes	
12.3.1	Long data sets	
12.3.1.1	Tipulids	(Coulson 1956*,59,62, Horobin 1971*, Smith 1973, Butterfield 1973/4*, Coulson et al 1976, Hadley 1966*,69,71a&b, Randall et al 1981)
12.3.1.2	Simulids	(Wooton 1974,76,77)
12.3.1.3	Carabids	(Houston 1970,71,81, Buttefield 1986, Butterfield & Coulson 1983)
12.3.1.4	Cercopids	(Whittaker 1964,65a&b,68,70,71,74, 75,78,85,88, Hogkinson 1971,72,73a&b, Hodkinson, Whittaker & Flint, Parkinson & Whittacker 1975)
12.3.1.5	Lepidoptera	(Jordan 1955*,62, Reay 1959,64, Edwards 1973-AR14:19, Edwards & Holdaway 1975-AR16:43, Randall, 1980*,82, Burnham 1980-RR3c) <1973-9 raw data in Box File>
12.3.1.6	Enchytreids	(Peachey 1959*,63, Springett 1967*,63,64,69, Springett et al 1970, Standen 1973,77,78)
12.3.1.7	Springtails	(Hale,1962,63,64a&b,65a,b&c,66a&b Murphy 1956,59,60,62, Bell 1972*)
12.3.2	Short studies	
12.3.2.1	Nematodes	(Banage 1960,62,63,66)
12.3.2.2	Mites	(Block 1963,65a&b,66a&b,67)
12.3.2.3	Stoneflies	(Brown 1955*, Brown et al 1964)
12.3.2.4	Spiders	(Cherrett 1961*,63,64, Ladds 1979-AR20:20, Coulson & Butterfield 1985,86,88))
12.3.2.5	Blowflies	(Cragg 1953,56,61)???
12.3.2.6	Pseudoscorpions	(Goddard 1979-AR20:19)
12.3.2.7	Earthworms	(Svendsen 1955,56,57a&b)

12.3.2.8 Dung beetles (White 1957,60a&b)
12.3.2.9 Harvestmen (Jennings 1982*,82,83)

12.4 Determinants of distribution
12.4.1 Altitude (Coulson et al 1976, Ladds 1979-AR20:20)
12.4.2 Temperature (Butterfield in prep., Whittaker 1985)
12.4.3 Water (Stewart 1979, Jardine 1979-AR 20:11, Jackson & Wright 1979-AR 20:11)
12.5 Insect collection <Held by J. Coulson, Durham University>
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Chapter 13 PUBLICATIONS

13.1	Identification	<at the end of each of the previous chapters>
13.2	Card index	<stored in Blackwell Library>
13.2.1	Numerical	<divided into 20 categories>
13.2.2	Author	<some categories are not used>
13.3	Theses	<stored at NCC Blackwell>
13.3.1	Held	<marked * in bibliography at end of Chapters 2 to 12, eg Marks 1974*>
13.3.2	Required	(Houston 1980, Wooton 1974, Hayward 1980, Holms 1979)
13.4	Reprints	
13.4.1	Subjects	

Agriculture>
Systematics & Distribution
Botany
Climate
Conservation
Vegetation description
Ecology
Forestry
General
Geology-Soils-Quarternary research
Pollution
Microbiology
Improvement of pasture & bog
Sheep & intake studies
Experimental ecology & land use
Grassland production
Zoology-(invertebrates)
Birds
Vertebrates-other than birds
Biometrics-Systems analysis

13.4.2	In collection	<stored at NCC Blackwell>
13.4.2.1	On Moor House	
13.4.2.2	Other subjects	
13.4.3	At ITE Merlewood	
13.4.4	Elsewhere	
13.5	Recomendations	

13.5.1 The existing card index system needs to be reorganized. At present the numerical index is divided into twenty subject categories. These could be lumped and/or renamed to match the chapter headings employed in this report, which follow those used by Rawes (1982). Some duplicate cards have been placed within other subject categories. The author index however, does not classify reports into all twenty subjects. For instance, sheep and vegetation distribution reprints may be located in a number of other subject areas.

Most books from the original Moor House library were transferred to NCC Blackwell, to NCC Newcastle or to NCC EHQ

at Banbury (J. Robinson pers. comm.). The index cards have not been removed from the card index system. This clearly needs to be done, and should be done when the index is reorganized.

13.5.2 Enquiries should be made with the universities concerned, as to the cost of obtaining microfiche copies of the required theses. Fiches may not be available for the earlier theses, and cost may be prohibitive in these cases.

13.5.3 In order to track down the remaining unknown publications a standard letter and questionnaire (see Appendix 3) should be prepared by NCC Blackwell. This should be modelled on the one sent out by M. Rawes on 8th December 1970. Completed Research Application forms are to be found in NCC Blackwell's current files. These would be very useful in locating any unfinished and/or unpublished work. It is clearly most important for NCC Blackwell to hold as much of the published data concerning the reserve.

13.5.4 The numerous duplicates of Annual Reports, Occasional Publications, maps, 1976 guides to the reserve, and selected reprints are currently stored in the NCC Blackwell attic. These are now easily accessible for distribution to educational and research establishments.

13.5.5 The reprint collection, theses, master copies of unpublished reports, map chest and herbarium are stored together at NCC Blackwell and may be consulted by arrangement with the Regional Officer.

Chapter 14 UNPUBLISHED REPORTS

14.1	Annual Reports	
14.1.1	Contents	<Twenty five issues: 1959-84> <A number of otherwise unindexed reports have been entered onto Paperbase software on the Moor House microcomputer> <see Chapter 16 COMPUTER GUIDE>
14.2	IBP Reports	<Two issues: 1969-70 & 1979-71; may be wholly incorporated into Annual Reports>
14.3	Reserve Records	
14.3.1	Contents	<Nineteen ring-bound, hard-backed files; reports and data up to 1982 more recent data stored in relavent Box Files; each is individually indexed, overall index in Appendix 4; three sets exist, one more complete than the others (two at NCC Blackwell, one with warden>
14.4	Files	
14.4.1	Contents	<Box & hard-backed; thirty, in total, divided into sites and subjects; unique data; most now indexed>
14.4.1.1	Exclosures	<data from those relating to the ten sites still monitored by R.Marrs have been computerized> <see Chapter 16 COMPUTER GUIDE>
14.4.1.2	House Hill	<ongoing recording by M. Rawes, every 5 years-box in possession of M. Rawes>
14.4.1.3	Rough Sike	<ongoing recording by J. Robinson on fate of grassland species introduced within sheep exclosure>
14.4.1.4	Introductions	<raw data on other discontinued experiments>
14.4.1.5	Green Hole	<tree enclosure data>
14.4.1.6	Others	<various discontinued study areas.>
14.4.1.7	Sheep	<see Chapter 10 AGRICULTURE>
14.4.1.8	Grouse	<see Chapter 11VERTEBRATES>
14.4.1.9	Lepidoptera	<moth trap data & summaries 1973-9>
14.4.1.10	Upper Teesdale	<various reports awaiting dispatch to NCC Newcastle>
14.4.1.11	Hydrology	<raw data on streamflow from Troutbeck guaging station
14.4.1.12	Meteorology	<monthly summaries of rainfall 1969-79 duplicated see 3.?.?>
14.5	Species indices	<stored on index cards with Moor House Collection>

14.5.1 Botanical <see Chapter 16 COMPUTER GUIDE>
14.5.2 Faunal <some data already stored on Invertebrate Site Register>

14.6 Recommendations

14.6.1 The Botanical Species List (Rawes 1981) should be entered onto a text file for use with the Moor House computer. (see Chapter 16 COMPUTER GUIDE).

14.6.2 Faunal site index needs urgent attention. The first step should be to compare the Invertebrate Site Register, Parin (1977) and Burnham (1980) with the data contained on the index cards.

Chapter 15 SITE INDEX

15.1 Usefullness

Because there may be further study within the Biosphere Reserve, it is imperative that previous study areas be precisely located for two reasons. Firstly, collections and some studies should avoid previously disturbed sites. Secondly, in order to accurately replicate other studies, and experiments in particular, those planning such work should have as accurate information as is practicable about the precise localities used.

15.2 Existing system

This perforated index card system operates by the use of a pin to establish the optical coincidence of holes punched along the outer margin of the cards. The method of hole punching condenses and partially digitizes information on study areas, investigators, date, subject and methods of study, details of publications and related work. There is usually one card for each study area, identified by a 6 figure grid reference, as well as the name of the site. Where the whole reserve was under investigation, one particular hole is punched.

15.3 Limitations

Because two numbers are used to define the subject and method of study, and because the name of the investigator is lumped with a range of other surnames (e.g. Holms lies between Holmes, N and Holp and is therefore assigned the three figure code 422), the cards that drop out of each search need to be manually sorted to exclude non relavent selections. This problem is further compounded by the need to punch out all the holes where the study site grid reference is not known, and the practice of punching holes to include both the dates of the study and the date of publication.

15.4 Recommendations

15.4.1 The full computerisation of the site index would require a considerable amount of work by persons familiar with the study areas. However, the grid reference information uniquely contained in the site index should be prepared for eventual transfer to the NCC databases. <see CHAPTER 16 COMPUTER GUIDE>

Chapter 16 COMPUTER GUIDE

16.1	Bibliographies	
16.1.1	Unpublished reports	<stored on Paperbase microcomputer software at NCC Blackwell>
16.1.2	Entscape	<stored on Status mini-computer
16.1.3	Wildscape	software at NCC Peterborough>
16.2	Databases	
16.2.1	Exclosures	<currently stored on a mainframe computer at ITE Monks Wood>
16.2.2	Weather	<currently stored on computer tapes at University College London and due to be transferred to ITE Merlewood>
16.2.3	Invertebrates	<Invertebrate Site Register stored on a minicomputer at NCC Peterborough>
16.2.4	Vegetation	<NVC equivalents of Eddy, Rawes and Welch's original data stored at NCC Edinburgh>
16.2.5	Productivity	<data from IBP studies stored on Michigan Terminal System. Hard copies in Moor House Collection>
16.3	Text files	
16.3.1	Guide	<the text of Rawes (1982) was scanned at ITE Merlewood by the author and remains on disc as an ASCII file. This has been updated and corrections made, with appropriate sections underlined, gaps removed and some spelling checked: file named BIBLIO>
16.3.2	Development Report	<file named REPORT>

16.4 Recommendations

16.4.1 The publications contained within the Guide should be converted from the ASCII file, BIBLIO, into the bibliographic database software package Paperbase. NCC Blackwell would then have a fully cross-referenced retreival system, bringing together the published and unpublished works together for the first time.

It should be possible to convert the bibliographic information from Paperbase onto Status or Advanced Revelation software, which are used at NCC Peterborough (J. Rigell pers. comm.). If keywords are used there should be the basis of a fully cross-referenced retreival system for to the vast bulk of the Moor House collection.
Status is used by NCC Information & Library Services Branch to accomodate bibliographic references, Wildscape and Entscape (S. Penny pers. comm.). Twenty one references to work done at

Moor House are already stored on the Wildscape database, and 58 on the Entscape database. The former includes a field containing an abstract, while the latter just uses keywords.

16.4.2 Once the Moor House bibliography has been entered onto the Peterborough systems the chapter headings (eg Vegetation, Productivity, Agriculture & Conservation Management for Rawes & Welsh 1969)) and the words Moor House, and the name of the study area (if known) should be added. It is most important that the grid reference, identifying the location(s) of each study are included with the database. Both Status ans Advanced Revelation have fields suited for this purpose.

16.4.3 The Botanical Species List (Rawes 1981) should be converted to microcomputer disc, using an optical scanner. The data could then be updated and published at NCC Blackwell.

Chapter 17 PHOTOGRAPHS

17.1 Slides
17.1.1 Indexed
17.1.1.1 At NCC Blackwell
17.1.1.2 With Warden
17.1.2 Unindexed
17.1.2.1 Unidentified <various monochrome>
17.1.2.2 ITE Merlewood <A. Gore's records of his experiments>
17.2 Negatives
17.2.1 Indexed by photographer
17.3 Prints
17.3.1 Indexed
17.3.1.1 By photographer
17.3.1.2 By keywords
Streams
Weirs
Pools
Erosion
Mines
Sheep
Wildlife
Winter
Meteorology
Meetings
General views
Buildings
Experiments
Burning
Trees
Blanket Bog
Limestone Grassland
Nardus
Juncus
Eriophorum
Alluvial Grassland
(Plant) species
House Hill
(Heavy) grazing
Little Dun Fell
Silverband
Public usage
Skiing
Great Dun Fell
Knock Fell
Hard Hill
Rough Sike
Fence Lines
17.3.2 Unindexed
17.3.2.1 Unidentified large prints

17.4 Aerial photos <Map Room, East Cumbria Room & Drawer 3 of Map Chest>

17.5 Recommendations

17.5.1 All slides should be catalogued according to the keywords used in the print index, or new keywords, where necessary. These could then be added to the bibliographic database, permitting their rapid location by keyword.

17.5.2 All large scale prints should be identified as to subject, area and date. This could involve a small contract. Recommend M. Rawes.

17.5.3 The aerial photographs should be mapped and all be stored together in the Map Room at NCC Blackwell.

Chapter 18 MAPS

Maps are stored within the collection either in a map chest or on a roll. Locations within the chest are indicated by D<number>, referring to the relavent drawer. ROLL indicated that the map may be found on a roll.

18.1	Ordnance Survey	<NY63SE <NY72NE <NY72SW <NY73NE <NY73SE <NY62NE
18.2	Other	
18.2.1	Whole reserve	(Smith 1972 <many duplicates>))
	Geological	(Smith 1972 <many duplicates>) Johnson & Dunham 1963 <many duplicates>)
18.2.2	Soils	(Hornung 1976 <some duplicates>)
18.2.3	Vegetation	(Eddy, Rawes & Welch 1969)
18.2.4	Exclosures	(Marrs et al 1986)
18.3	Historical	<location given drawer number in Map Chest, eg D1 = 2nd drawer>
18.3.1	Geology	
18.3.1.1	Solid & drift	<1954-57 D2>
18.3.1.2	Key	<colour D2>
18.3.1.3	Mines	
18.3.1.3.1	Reserve	<1825, showing allotments on west-ON ROLL>
18.3.1.3.2	Hard Shins	<1891 D1>
18.3.1.3.3	Silverband	<1919, 6" D1> <1975 from aerial photo, with overlays D1> <1978 overlay D1>
18.3.2	Soils	
18.3.2.1	Erosion	<1956-75 River Tees with diagram & overlay D175 D5>
18.3.3	Vegetation	
Bellbeaver Rigg		<1978 reseeding D5>
Site index		<identifying location of all studies ROLL>
Nether Hearth		<1961 contours DRAWER5 & ROLL>)
Rough Sike		<vegetation from aerial photo-1957 ROLL> <larger scale on ROLL> <1956>
Knock Fell		<ROLL> <1956&74 of 2nd exclosure D4> <1955 of 1st> <1974 selected areas of 1st>
Little Dun Fell		<ROLL> <1955&74 of 2nd D4> <1955 of 1st>

<1974 selected areas of 1st>
Hard Hill <1955&74 of 2nd D4>
<1955 of 1st>
<1974 of selected areas of 1st>
Great Dun Fell <contours ROLL>
Troutbeck Head> <1974 colour & b/w D4>
Silverband> <1974 " " " D4>

Unidentified roll <extent of heather-no date>
<Vegetation showing Carex, Racomitrium, Vaccinium, Agrosto-Festuca-as key-no date>
<various drafts with original data>
Tree enclosures <Nether Hearth, Pasture: on ROLL>
<Green Hole, veg & soil D5>

18.3.4 Studies
Sheep counts <count areas and view points in Sheep Box File>
<Farmers on Moor House, sheep distribution, maps & overlay in Drawer3>
Sheep study <1967 two; are these heaf and vegetation? D1>
Heafs <unlabelled map, presumed mid-1960s?>
(Randall 1976-RR5a, Cooper 1989
Hard Rigg 1974 <Five, showing position of butts, drives, extent of 72ha burnt and 65ha. control- on ROLL>
<original plus 9 copies D1>
Green Burn 1974 < " " 8 " D1>
Grouse <6" to 1 mile, including some burnt sites- on ROLL>>
Burning <1952-1975 overrlay ROLL&D5>
<1952-1976-ROLL>
<Hard Hill plots, scatttered D3>
<Green Burn " " D3>

18.3.5 Moor House plans <architects plans of house and lab on ROLL>
<2 plans as above? D1>

18.3.6 Road <1:2500-Low Lee House to Moor House-ROLL>

18.3.7 Recommendations

18.3.7.1 There are too many copies of recent maps. Should these be disposed of or stored in the NCC attic?

2. Road improvements on the eastern access road may become necessary/advisable in the future, in which case the map of the existing road may be invaluable.

3. Demolition contractors may which to consult the architects plans before the walls are pushed in.

Chapter 19 SOCIAL HISTORY

There is a small amount of non-scientific material which relates to the running of the research station. It is a source of useful insights into the history of this tremendously significant phase of environmental research.

19.1 Address books

19.2 Inventory of equipment

19.3 Diaries, accounts

19.4 Maps <see CHAPTER 18 MAPS>

19.5 Meteorological guides

19.6 Recommendations

19.6.1 This archive material is stored in the PABX Room at NCC Blackwell. It could be used in the future should a documentary about the Research Station be contemplated.