

## THE NATURE CONSERVANCY

COMMITTEE FOR ENGLAND19  
MOOR HOUSE & TEESDALE ARCHIVE  
MERLEWOOD RESEARCH STATION  
GRANGE-OVER-SANDS  
CUMBRIA  
LA11 6JUMoor House, Westmorland; 1st Progress Report 1959/60

by M. Rawes and R. J. Elliott

The Management Plan was approved by the Committee for England on 28th January, 1960 (E/Min/59/4: Item 3) This, the first, progress report covers the period 12th October 1959 - 30th September 1960.

GENERAL

The death of K. J. F. Park, Officer in charge of the Station, and the transfer of A. Millar to the Climatological Unit, Speyside, have involved changes in responsibility. M. Rawes has taken over responsibility for the administration of the Field Station and the grassland work previously carried out by K. Park. E. White has taken over responsibility for the woodland projects and the climatological records, duties previously performed by A. Millar.

A revised edition of the "Report of Scientific Work at Moor House N.N.R., Westmorland" has been completed and it is hoped to publish it soon. The report includes a description of the Reserve as well as brief accounts of most of the research undertaken.

A. SCIENTIFIC RESEARCH

The following brief reports have been submitted by the persons concerned.

20 Climatology - E. White

Observations continue to be made at the Climatological Station at Moor House, and data are supplied regularly to the Meteorological Office, the Wear and Tees River Board and the Geography Department of King's College, Newcastle.

The anemograph has, over the years, proved troublesome, due primarily to water reaching the instrument and corroding the working parts. This summer the hut has been improved; a further brick wall has been erected to give a cavity walled building with ventilating bricks, and the roof has been refelted. The outer walls have been treated with a water proofing agent, and, to date, a big improvement has been noted in drier conditions. A new instrument was installed by Munros Ltd., the manufacturers, in July.

21 Vegetation -Measurement of changes in vegetation and soil following the removal of grazing - K. J. F. Park/M. Rawes

During the past summer the botanical analyses of the Braun Blanquet quadrats (last examined in 1955) have been repeated on Little Dun Fell, Hard Hill and Knock Fell. There are no significant changes in the cover abundance of species. The differences are merely of greater height of vegetation. D. Welch, a second year Cambridge undergraduate, gave valuable assistance in the field work.



It is not intended to repeat the point quadrats for several years and next season's work will mainly consist of retaking some of the more general photographs.

The fencing of these high altitude enclosures has needed attention by way of minor repairs each year. It is probable that rewiring will be necessary before long.

[22] The balance between the loss of soil nutrients through leaching and through removal of vegetation by grazing, and the replenishment through the action of natural soil forming processes - K. J. F. Park/Dr. V. M. Conway/M. Rawes

The separate measurements involved in drawing up a nutrient balance sheet are at present being studied by Dr. V. M. Conway with a view to writing up the experiment.

[23] Productivity of high level alluvial grasslands of Festuca-Agrostis and Nardus dominated swards in relation to sheep grazing - M. Rawes

The annual cropping of the Festuca-Agrostis dominated sward has continued. The production of herbage dry matter has now been followed for four years, and the effects of the initial fertilizer treatment and different cutting regimes has been observed from year to year. The drying of the freshly cropped samples in the recently acquired air-circulating oven has saved much time apart from enabling results to be known whilst the field work is still in progress. It is hoped that close examination of the results will show that the experiment can now be concluded.

The fencing of the Nardus dominated sward was removed in 1958, the pilot experiment on this grassland having been finished.

[24] An experiment in raising the productivity of limestone grassland - M. Rawes

This investigation was started in 1959, when measurements were made from which future changes can be assessed. The test site, an enclosure erected on the Moor House pasture field, was subjected to cutting, to manurial treatments and controlled winter grazing by the pony. The 1959 measurements showed that the fertility of the Meadow field (to whose productivity level it is intended to raise the test site) was double that existing in the pasture. Fertility was measured by hay yield and the production of dry matter from grass grown in boxes of soil from each site.

[25] The establishment of natural grassland communities - K. J. F. Park/M. Rawes

In order to establish the present state of the plant introductions, and to facilitate future observations, a record has been made of each individual planting site in all four enclosures. The positions, at the time of planting were pegged and these have now been numbered and the species listed. An indication of the low survival of the original introductions is shown by the following figures:-

Knock Fell - 38 of the known 59 turf plantings were untraced  
Hard Hill - 33 of the known 59 turf plantings were untraced  
Little Dun Fell - half of the 30 introductions were found  
Rough Sike - of the 130 sites 26 now contain no introduced plants



Generally Rough Sike enclosure has been a favourable locality as indicated by the flowering of:-

<i>Alchemilla alpina</i>	<i>Potentilla crantzii</i>
<i>Anthyllis vulneraria</i>	<i>Salix arbuscula</i>
<i>Cerastium alpinum</i>	<i>S. reticulata</i>
<i>Dryas octopetala</i>	<i>Saxifraga aizoides</i>
<i>Hypericum pulchrum</i>	<i>S. oppositifolia</i>
<i>Luzula sylvatica</i>	<i>Silene acaulis</i>
<i>Polygonum viviparum</i>	<i>Thalictrum alpina</i>

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#### The establishment of high-level woodland - E. J. White

The pilot plots have provided much information on the reaction of several tree species to the various factors at each plot, and on the type of tree required. They have shown that the very varied conditions at this marginal altitude for tree growth (about 1,800' above sea level) cause a wide variety of growth response. Information provided by these plots forms a firm basis for future studies on high level tree growth.

The Biometrics Unit has given helpful advice on the statistical selection of trees for periodic measurement to record growth. These will be marked shortly.

An experiment started by A. Millar to measure the course of growth in three species during the season, and to correlate it with temperature, has been continued, and the results are being analysed.

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#### Plant nutrition studies on peat - A. J. P. Gore

1. "The role of calcium and phosphate in the growth of Eriophorum vaginatum and Molinia caerulea on blanket peat - Force Burn"

This experiment has been completed and the results are being prepared for publication. (The treatments are being continued however for observations on a long term basis.)

2. "The role of calcium and phosphate on the growth of six species on mineral soil exposed by peat erosion - House Hill"

This experiment has been completed. (The treatments are being continued for longer term observations and photographs are being taken annually.)

3. "Reclamation of eroded peat - Moss Flats"

Photographs and notes are being taken but otherwise this is receiving no attention apart from fence maintenance.

4. "The role of nitrogen and phosphate in the growth of Molinia caerulea and Dactylis glomerata on a) high-level blanket peat and b) raised moss peat at sea-level - Bog Hill and Deer Dike Moss"

An experiment designed to investigate the role of nitrogen as a possible limiting factor in the growth of a calcicole and/or calcifuge species. Further studies on phosphate were undertaken to confirm findings of the previous experiments and to investigate nitrogen and phosphate interactions. The role of climate was investigated by comparing the growth rates of the two species used at the two different altitudes. (This experiment has been completed and the results being prepared for publication. No further treatment or observation will be undertaken.)



5. "A study of the productivity and sensitivity to different cropping regimes of cotton grass swards growing on blanket peat - Bog Hill"

This investigation is designed to provide estimates of the annual and seasonal productivity of Eriophorum vaginatum dominated areas. It should also show, provisionally, the rate of cropping that is acceptable in terms of rates of natural replacement. A balance sheet of the rain-borne nutrients and nutrients removed by annual cropping is being assembled. (This experiment is expected to continue for several years.)

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A vegetational survey of the Moor House National Nature Reserve - Professor D. H. Valentine

This work is being carried out by A. Eddy under the supervision of Professor D. H. Valentine. The main aim is to prepare an account of the vegetation of the Reserve.

The Reserve has been intensively examined and a preliminary analysis of the plant communities has been made, using Poore's system of noda as a basis. With the help of aerial photographs and Dr. G. A. L. Johnson's soil maps, a vegetation map of the eastern part of the Reserve, showing the mosaic of communities, has been made. Work on the western part of the Reserve is now in progress.

Lists and specimens of the flowering plants, bryophytes and lichens of the Reserve have been prepared. There have been some interesting discoveries, such as that of Alopecurus alpinus, previously unknown in England, on Little Dun Fell. An account of this has been published.

Fauna -

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Faunal list - Professor J. B. Cragg

Progress has been made in listing and classifying general collections made on the Reserve. A card index of the fauna information to date is being built up and collections, particularly of insects, are growing. Some of the collections are to be submitted to specialists for checking and for identification. It is expected that Dr. Lewis Davies, who re-joins the staff of the Zoology Department in January 1961, after three years in Canada, will deal with several of the groups of insects.

Alan Backley has been engaged on the faunal list and other work in his role of Research Assistant to Professor Cragg. Backley resigned from this post on 30th August and, at present, it appears very unlikely that a suitable successor will be obtained for the remaining one year of the three year grant.

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Special investigations - Professor J. B. Cragg

- a) M. Cherrett's studies on spiders and Banage's studies on Nematodes came to an end in September 1960. Both these Ph.D. students are at present writing up their investigations.
- b) W. Hale has made considerable progress in his studies on the Collembola of moorland soils. This work, which can be regarded as an extension of D. H. Murphy's studies, is giving valuable quantitative information on the distribution of many Collembolan species. A considerable advance has been made in the extraction of Collembola from soil samples containing peat. The laboratory studies of Collembola, together with experiments in the field, are adding to our knowledge of common moorland species.



c) Laboratory studies on the respiratory rates of different types of moorland soils are in progress. A satisfactory technique has now been developed and the next stage will be to extend the study to the investigation of the respiratory rates of dominant animal species. These studies have been carried out by Professor Cragg with A. Backley's assistance and their smooth progress depends on finding a suitable successor for Backley.

d) Dr. J. C. Coulson has continued to estimate the number of Tipulidae associated with some of the sites described in Trans. roy. ent. Soc., Lond., Vol. 111, Part 7, pp.157-74.

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A preliminary survey of Brown Trout (*Salmo trutta* L.) and Bullheads (*Cottus gobio* L.) in high altitude becks  
- Dr. D. T. Crisp

This survey was carried out by Dr. Crisp, during the summer months of 1960, whilst he was a temporary member of the Moor House staff. The investigation has obtained information of the ages, growth and feeding habits of these the only fish species on the eastern part of the Reserve. A paper has been submitted for publication.

The following research projects have been completed or added to the list shown in the Management Plan (7j) p.207:

(ii) Geology

Completed Geological survey of the Moor House National Nature Reserve  
(Dr. G. A. L. Johnson)  
(This is to be published as a monograph)

(iv) Zoology

Completed Population studies on *Coleophora alticolella* Zell.  
(Dr. R. C. Reay)

Studies on Protozoa  
(Dr. Q. W. Heal)

A preliminary survey of Brown Trout (*Salmo trutta* L.) and Bullheads (*Cottus gobio* L.) in high altitude becks  
(Dr. D. T. Crisp)  
(This has been submitted for publication)

In progress Studies on the ecology of moorland Collembola  
(W. G. Hale)

(v) Botany

Completed The history of the quaternary organic deposits of the Moor House Nature Reserve  
(Dr. G. A. L. Johnson & Miss M. E. Johnson)

The role of calcium and phosphate in the growth of *Eriophorum vaginatum* and *Molinia caerulea* on blanket peat - Force Burn  
(A. J. P. Gore)  
(This has been submitted for publication)



The role of calcium and phosphate on the growth of six species on mineral soil exposed by peat erosion - House Hill  
(A. J. P. Gore)

The role of nitrogen and phosphate in the growth of Molinia caerulea and Dactylis glomerata on a) high-level blanket peat and b) raised moss peat at sea-level - Bog Hill and Deer Dike Moss  
(A. J. P. Gore)  
(Part I has been submitted for publication  
Part II has not yet been submitted for publication)

In progress A vegetational survey of the Moor House National Nature Reserve  
(A. Eddy under the supervision of Prof. D. H. Valentine)

A study of the productivity and sensitivity to different cropping regimes of cotton grass swards growing on blanket peat - Bog Hill  
(A. J. P. Gore)

#### (vi) Land Use

In progress An experiment in raising the productivity of limestone grassland  
(M. Rawes)

#### Publications

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.  
(This paper describes the results of the first five years of weir-recording at Moor House)

Murphy, D. H. (1959) Sensiterga infusca Gen. et Sp. N., A new isotomid Collembolan from Britain. Proc. roy. ent. Soc. Lond. (B), 28: 118-20.  
(This paper describes a new genus and species occurring in Sphagnum on the Moor House Reserve. The type locality is wet Sphagnum on Bog Hill)

Murphy, D. H. (1960) Some records and redescrptions of British Collembola. Part I. Arthropleona, with a description of Micranurida conjuncta Sp. N. Proc. roy. ent. Soc. Lond. (B), 29: 46-55.  
(This paper gives a number of redescrptions of British Collembola some of them based on material from the Moor House Reserve. The new species, Micranurida conjuncta, is yet only known from the Reserve and its type locality is Sphagnum acutifolium under Calluna on Bog Hill)

White, E. (1960) The natural history of some species of Aphodius (Col. Scarabaeidae) in the northern Pennines. Ent. mon. Mag. XCVI: 25-30.  
(This paper describes various aspects of the biology and the seasonal succession of adult Aphodius beetles in sheep dung at Moor House. Sixteen species were studied of which eight were common. Aphodius lapponum formed 50% of the catches in both years of study)

Ratcliffe, D. A. & Eddy, A. (1960) Alopecurus alpinus Sm. in Britain. Proc. B.S.B.I., 3: 389-91.



B. ESTATE WORK

Roadworks

Road surface: Work has been confined to filling in pot holes with grit and bitumen. This was done by contract (H. Kearton & Son) on that part of the road tar-sprayed in 1959. The remaining stretches were repaired by the Moor House staff.

Drainage: Improvements by means of piped culverts and more side draining continue to be made.

Retaining walls: Three stretches of the road retaining wall alongside the South Tyne have needed repairs. About 80' of wall, south of the concrete bridge over Pether Sike, has been rebuilt by H. Kearton & Son. Two smaller walls further south have been repaired by the Moor House staff.

Bridges: H. Kearton & Son repaired the foundations of the concrete bridge over Pether Sike.

In April the stone bridge known as the Dipper Bridge, was found to have severe cracking in the south spandrel. The attention of the Land Agent was drawn to this and it was decided to seek further advice. This was obtained from Mr. Davison, The Assistant Surveyor, Cumberland County Council, who has furnished the Conservancy's Land Agent with a comprehensive report suggesting necessary repair work.

Cattle Grids: Since the Management Plan was approved four additional grids have been installed. The County Council, with a financial contribution from the Conservancy, have built a further cattle grid at West Ashgill on the Garrigill road. This means that there are now no gates across the road between Garrigill and Moor House: a very great improvement for staff and visitors alike.

Trout Beck Land Rover Track: A start to this scheme was made in 1959 by the Warden, labourer and a temporary assistant. Aided by the exceptional dry conditions good progress was made and 700 yards of track suitable for Land Rover traffic was available by the end of the year.

In 1960 a contract was signed by Mr. Rex Readle, of Newbiggin-in-Teesdale, to tackle obstacles presented by Trout Beck itself. The result of this work has been to give us a tractor way 1 mile up the valley. Mr. Beadle has chosen to divert the beck at the first obstacle rather than fording. Two further obstacles have been overcome by bull-dozing banks and building rough retaining walls. Meanwhile the warden has continued to build up the track surface, to lay culverts and dig side drains.

The use of heavy contractor's gear, especially in wet weather, is bound to result in a lot of mess. Although a considerable amount of surfacing with stone is still necessary it is felt that one of the most difficult sections of the project has now been done. It is possible that labour will be required to consolidate our gains, especially should next year prove to be a wet one.

Buildings

For the first time since 1954 the outside wood work of the house and Warden's cottage have been repainted by contract. The work was done by H. Kearton & Son.

Numerous repairs to the house and buildings have been done by T. L. Hodgson, the Reserve Warden, whose willingness to tackle any job is of inestimable value in the running of Moor House.



**Sanitation:** The septic tank was emptied for the first time since its construction in 1954. The work was done by H. Kearton & Son. Sludge removal firms would have done the job but no tanker driver was prepared to bring a vehicle over the access road.

**Water supply:** H. Kearton & Son have eventually completed alterations to the water supply which now flows through a series of tanks in an attempt to provide potable water. However, there does not seem much hope of this being successful. It is unlikely that water from this source will ever be free of bacterial contamination, nor will it be chemically satisfactory.

#### Telephone

A radio telephone has been installed at Moor House and apart from teething troubles gives a much needed service. The link consists of two V.H.F. transmitting and receiving sets, one at the house and the other in a hut erected on the S.E. slope of Great Dun Fell, close to the radar station road. The radio service is linked to the telephone line laid to the Dun Fell radar station.

#### Ordnance Survey

In June 1960, the Ordnance Survey erected a Triangulation Station near the summit of Hard Hill. Materials were delivered by helicopter and by Land Rover, which under the then dry conditions of the fells, was able to approach from Great Dun Fell and return without difficulty.

#### Moor Burning

Due to lack of staff (only the Warden and M. Rawes were at the Station for most of March) little moor burning was possible. Ten acres were burnt on the lower North-east facing slopes of Hard Rigg.

#### Hay Meadow

The Conservancy exercised their option of purchasing some of the hay harvested from the meadow, which is rented to T. Hodgson the Reserve Warden. Most years in the past the whole crop has been taken. This year  $\frac{1}{2}$  ton was decided upon.

### C. PUBLIC RELATIONS

There have been few requests to visit the Reserve. However, a number of people see the Reserve when walking along the Pennine Way. Such fishing as has occurred has been done in ignorance and those concerned have left readily enough when asked to do so.

Disregard by motorists of the "Private" notices on the access road can be troublesome to official traffic but this is only a minor problem.

The following have visited Moor House during the past 12 months.

Mr. J. R. Rundle (Regional Land Commissioner) and  
Mr. T. F. B. Tew (Assistant Research Officer), M.A.F.F., Leeds  
Dr. & Mrs. L. J. Webb, C.S.I.R.O., Australia  
Mr. James Cuthbertson & his technicians, Biggar  
Mr. E. D. le Cren, Dr. W. Frost, & Miss J. McCormack, The  
Freshwater Biological Association, Ambleside  
Mr. H. F. D. Holgate, The Meteorological Office  
Dr. C. E. M. Tidmarsh (Assistant Chief of the Division of Crops  
& Pastures), Department of Agricultural Technical Services,  
South Africa  
Professor W. H. Pearsall.

M. Rawes  
R. J. Elliott  
November 1960



Appendix 1

NUMBERS OF GROUSE SHOT ANNUALLY

DURING THE PERIOD 1909-1942

