Uplands Newsletter

JUNE 2023 | ISSUE 14 | THE GWCT SPRING UPDATE

INTRODUCTION

Welcome to the spring edition, of our 14th Upland Newsletter. In this issue, we bring you the latest news on our on-going projects. These involve national red grouse monitoring, factors influencing maternal grouse condition, and identifying predators of wader clutches. We bring you the conclusion of the Merlin Magic Project and latest staff arrivals. We herald our aspirations for new projects on black grouse chick ecology and range expansion (see page 8), and a PhD studentship to measure stoat movements and diet on grouse moor fringes (see page 10). You will note that stoats are a recurring feature in our articles in this issue, so please support us in developing this new study. Finally, I'd like to thank everyone who attended our Northern England Grouse Seminar in Harrogate in February, especially those who provided their kind feedback. We had 200 attendees, a record for this event, so we must be doing something right. ■

David Baines
Director of Upland Research

The hugely popular Northern England Grouse Seminar held at Harrogate.

Game & Wildlife CONSERVATION TRUST
gwct.org.uk/uplands

INSIDE THIS ISSUE

CONTACT US:
Eggleston Office
The Coach House, Eggleston Hall,
Barnard Castle, Co. Durham,
DL12 0AG
E: uplands@gwct.org.uk
T: 01833 651936

Phil Warren and his pointer dogs flush a covey of red grouse.

RED GROUSE SPRING COUNTS

by David Baines

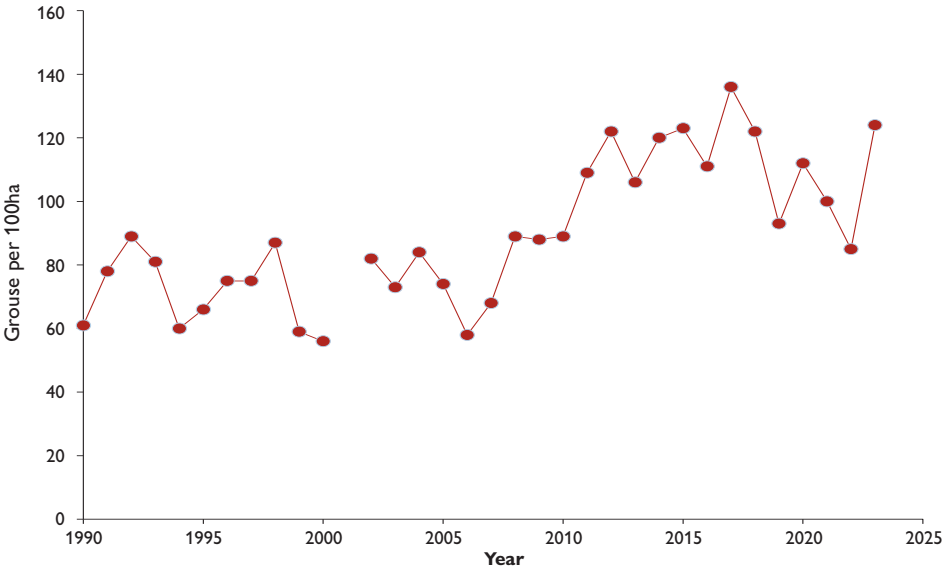
This spring saw David Baines and Phil Warren, assisted by Holly Appleby and David Newborn, complete red grouse pair counts at 42 sites in northern England. Of these, 18 were in the North Pennines Area of Outstanding Natural Beauty, 13 in Swaledale/Wensleydale, five in the North York Moors and three in Nidderdale.

Across all sites, the average density was 124 grouse per 100 hectares (ha). This represented the second highest annual density recorded in 40 years, the highest being 135 grouse per 100ha in 2017. Since that high, several poor breeding seasons following heather beetle attacks, untimely snow and frosts, and a mismatch between cranefly emergence and grouse chick hatch had reduced densities to only 85 birds per 100ha in spring 2022 (see Figure 1). A good breeding season in summer 2022 resulted in an increase in pair density of 46% this spring, relative to last spring, this despite a reasonable harvest last autumn.

This marked upward trend from spring 2022 to spring 2023 was consistent in three of the four regions where we conduct counts, being highest at 61% in the North Pennines, followed by 55% and 42% in the North York Moors and Swaledale/Wensleydale respectively, but showed no significant change in Nidderdale. ■

Figure 1

Red grouse spring counts in northern England from 1990 to 2023



MATERNAL CONDITION IN RED GROUSE

by David Baines & Leah Cloonan

In a previous newsletter (spring 2022), we introduced our new project that considers which factors influence the body condition of pre-breeding hen red grouse and how that body condition in turn influences egg and clutch sizes and subsequent chick survival. Previous studies conducted in north-east Scotland during the 1970s and 80s concluded that hen condition was positively influenced by the nitrogen content of the heather and the period of heather growth in the weeks prior to laying, and that those hens in better condition laid better eggs. However, those Scottish studies were on dry heath habitats with few cotton grass flowers, strongyle worm parasites or craneflies for chicks.

Given the recent occurrence of several poor grouse breeding years associated with extreme weather events, poor heather quality following beetle outbreaks, and mismatches between cranefly emergence and chick hatch, we decided to run a similar study in northern England. We have seven study sites in Upper Teesdale that combine to form an altitudinal transect running from 275 to 650 metres. The sites are on either heath and blanket bog mixes or on blanket bog only. On some sites, cotton grass is a co-dominant alongside heather, craneflies are numerous, and strongyle worms a problem, ie. different conditions and challenges to grouse relative to those posed in NE Scotland.

Last year, we fitted radio transmitters to 70 hens, 10 per site. We measured wing length, as an index of size, and mass (weight) to derive an index of body condition and we collected caecal material from each hen to estimate their strongyle worm egg parasite burden. We counted cotton grass flowers at weekly intervals and simultaneously sampled heather to look at its nitrogen content. We found their nests, counted and measured their eggs, and inserted a temperature sensitive thermocouple into the nest lining to assess from temperature changes when clutches hatched so that first egg laying dates could be back-calculated. Immediately after each clutch hatched, we sampled craneflies and other invertebrates available to chicks, recorded the daily temperature range, and derived chick survival indices when broods were two weeks and seven weeks old. Finally, we quantified habitat composition and structure within the estimated home range of each hen.

Sticky traps are used to assess insect abundance when grouse chicks hatch.

We found red grouse nests, and counted and measured their eggs.

In 2022, we concluded that nitrogen-rich food in the form of cotton grass flowers was the most important influence over hen condition. More cotton grass was associated with larger clutches containing bigger eggs, whilst high parasite burdens were linked with clutches containing fewer eggs, which were laid later in the season. Whilst egg size did not appear to influence chick survival, more craneflies positively influenced the number of chicks surviving to two weeks old. Hence cotton grass, parasites and craneflies were all more important in explaining grouse breeding success than any measure of heather cover, condition or growth.

It's likely that the importance of each of these factors will vary across years, especially in relation to variations in weather, hence we are repeating the study this year. This March, another 90 hens were caught and radio-tagged. A few tagged birds remained from last year, giving 13-15 tagged hens per site. To date, several patterns look similar to those of last year: cotton grass flowers densities were similar and developed at the same time, grouse clutch sizes have been similar, as have hatch dates, and patterns of cranefly emergence. Subtle apparent differences have been in hen deaths to strongyle worms and stoats, and clutch predation by stoats, all higher this year. We will update these findings in our next newsletter. ■

By radio-tracking hens we have clearly witnessed the predation of grouse clutches by stoats, including three hens.

SOME STRANGE REVELATIONS FROM THERMOCOUPLES

by Leah Cloonan

Another hectic season of fieldwork on the maternal grouse project is resulting in more interesting findings, particularly from the iButton thermocouples sited in the nest cup. Thermocouples are small, wireless data-loggers which we programme to record temperature every nine minutes. By doing so, we can measure the frequency and length of incubation breaks and establish either hatch dates or timings of failure for each clutch. In the event of clutch failure to hatch, they give us clues as to what has happened.

Here, we describe two strange events from this breeding season. Inspecting a nest due to hatch, we found the entire brood, either within or up to 50 centimetres from the nest cup, some of which appeared squashed, but no evidence regarding the cause.

iButton thermocouples are placed in nests and used to measure nest temperature.

Downloading the thermocouple data logger surprised us (see Figure 2). The first part of the graph (dates 6 May-15 May) shows the normal temperature with the incubating hen present, with each sudden dip being an incubation break. A sudden, sharp increase on 16 May at 02:35 of +5°C can be seen. It could have been higher as the maximum temperature setting on the thermocouple is 26°C. This increase lasts for just over four hours until 06:38, after which it gradually falls to 8.5°C. We interpret this as something warmer than a grouse covering the nest for the duration, squashing the chicks as it did. This rules out a quad bike, person or small mammal and we concluded that a passing sheep stopped for an untimely nap on the nest, directly squashing some chicks, and smothering the others.

A second bizarre event occurred at a further nest depicted in Figure 3. On the 12-13 May, all appears well and normal, typically she has six to seven evenly-spaced incubation breaks each day and then incubates for most of the night (from 21:30 until 04:45). On 14 May, her behaviour appears erratic, her incubation breaks double to 12, and she stays off her nest for most of the night (from 22:22 until 04:30). On 15 May her incubation breaks remain erratic and average 12 per day for the following four days. On 19 May at 00:19 she is again off her nest until 04:04, mirroring the pattern seen four

Figure 2

2023 iButton data output from a nest where the chicks hatched but then died

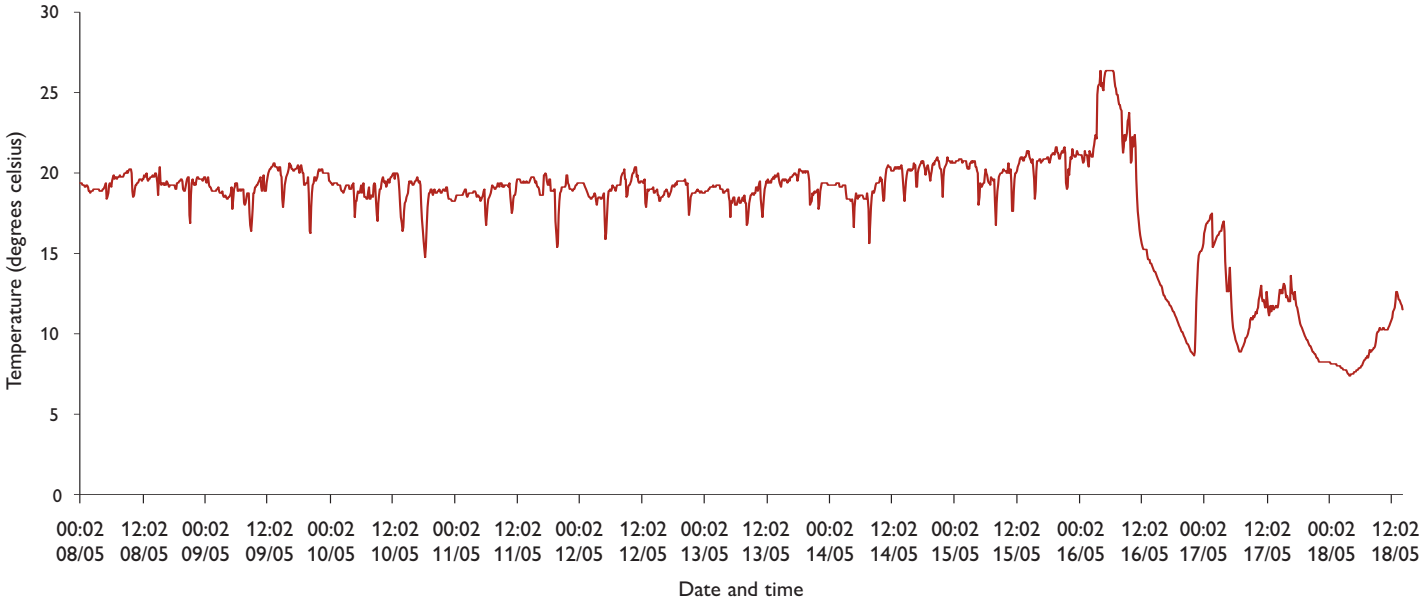
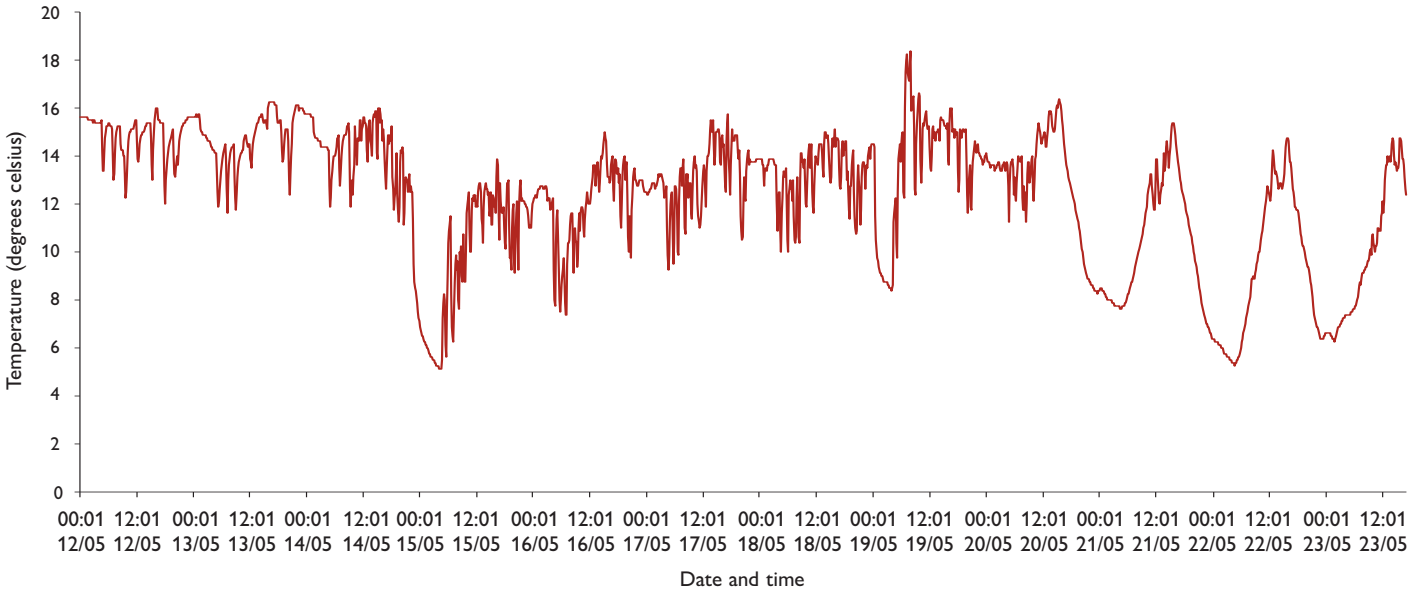


Figure 3

2023 iButton data output from a red grouse nest predated by a revisiting stoat



nights earlier. She incubates her clutch for another two days, then it hatches, with subsequent fluctuations from 21 May onwards simply representing the normal daily rise and fall of the ambient temperature when she has left the nest.

Now for the interpretation. When we visited the nest on 17 May, most of the eggs had been stashed in small tunnels around the nest, ie. by a stoat, explaining the hen's absurd behaviour on the night of May 14/15, which was repeated on the night of May 18/19. Despite these raids and the loss of seven eggs, the hen remained on her nest and incubated her last remaining egg, though clearly on edge due to her erratic incubation breaks, until it successfully hatched one week later.

This year we have clearly witnessed the predation of grouse clutches by stoats. Within 300 metres of this nest, three other clutches from radio-tagged hens were predated by stoats and three of the radio-tagged hens were also killed. This is a staggering level of loss, considering how many other nests will have been targeted in this area that we don't know about. ■

We found that the availability of tall heather and prey were both sufficient and unlikely to limit merlin abundance or their breeding success on grouse moors.

MERLIN MAGIC PROJECT– FEEDING BACK RESULTS

by Philip Warren

We completed the Merlin Magic Project at the end of May following an intense 20-month study. We aimed to improve the understanding of merlin breeding requirements on grouse moors in northern England by collecting field data to test the hypothesis that intensive heather management for grouse was causing declines. To do this, we brought together different groups with a shared passion for merlin and differing perspectives on how to drive their recovery.

With the help of raptor workers and gamekeepers, vegetation measures were collected from 52 merlin nests, and we measured habitat and bird prey abundance within 66 occupied and 60 unoccupied territories across the three study areas in the North Pennines, North York Moors and Yorkshire Dales. We found that the availability of tall heather and prey, particularly meadow pipits, were both sufficient and unlikely to limit merlin abundance or their breeding success.

These findings were fed back to moorland managers and raptor workers through a workshop in each of the three study regions and through follow up estate visits. The results have also been incorporated into a *Managing heather to benefit nesting merlin – A best practice note for land managers* leaflet. Two scientific papers are currently being prepared for submission to, and ultimate publication in, peer-reviewed ecological journals.

We also undertook an analysis of merlin ringing returns collated by the British Trust for Ornithology. This, together with observed high breeding success on our grouse moor study areas, strongly suggest that low annual survival by juveniles in their first autumn/winter, when foraging on lowland farmland and coastal areas, is limiting population size. Accordingly, we conclude merlin declines probably do not manifest themselves on grouse moors, but instead whilst birds are away from them.

By using trail cameras at nests to measure merlin diet, we found in our camera footage that some adults were already wearing leg rings. This offers the future opportunity for us to fit colour rings to chicks to consider their return rates to their natal areas to breed using remote camera footage, and to measure their subsequent rates of survival. ■

The Merlin Magic Workshop involving local moorland managers in Middleton-in-Teesdale.

WADER NEST MONITORING
by Holly Appleby

Trail cameras, also known as 'camera traps', can be extremely useful tools for remotely monitoring wildlife with minimal interference. Last year, we trialled their use at wader nests to identify clutch predators that might be contributing to their declines. Forty-five nests were monitored across four estates in Teesdale and Weardale. Of these, 12 clutches and three broods still in the nest were predated, predominantly by stoats, badgers and sheep.

This year, to increase our evidence base, we purchased 20 more cameras and worked with 13 estates, still in Teesdale and Weardale. Gamekeepers, a landowner, and Trust staff have collectively found over 90 wader nests. Initial indications from a combination of field evidence and camera footage are that 78% hatched, 12% were predated, 4% were abandoned, and 6% the fate was unknown. Currently, we are busy sorting through footage to identify this year's predators. The pattern appears the same, stoats, badgers and sheep.

Over the two breeding seasons, we now have nest survival data from 127 clutches: 50 curlew, 46 lapwing, 16 oystercatcher, 14 golden plover and one snipe. It is likely that we will wish to increase this sample next year and if so, will appreciate any help finding nests again. In the meantime, we thank the moorland managers who have so helpfully worked with us this year. ■

Stoat predating a curlew nest. The stoat took the whole clutch, but the adults managed to get away.

Sheep can cause disturbance to nests and can even be observed eating eggs; we have nest survival data from 127 clutches including 14 golden plover nests.

BLACK GROUSE: PLANNED NEXT STEPS

by David Baines

My introduction to the insect needs of black grouse chicks was with the late Dick Potts, then our Director of Research, behind our then Scottish Research Station at Crubenmore Lodge in Inverness-shire. Dick demonstrated to me the art of sampling foliar invertebrates by sweep-netting. We swept wet grassy flushes containing bog myrtle on the moor fringe next to a blackcock lek, releasing the strong aroma of myrtle as we progressed. Emptying our catch into a tray, I was amazed at the array of wriggling caterpillars, including those of sawflies. Dick predicted this would be a good black grouse brood-rearing habitat. A few weeks later, I returned with my pointing dog and found Dick's prediction to be correct, as we pointed and carefully flushed several good broods.

That was back in 1989. Much has happened on our black grouse journey since. We have found that annual changes in numbers at leks are chiefly dictated by breeding success in the previous year, that annual breeding success varies in relation to chick survival rather than hatching success, and that mortality of chicks is greatest in the first two weeks after hatching. We know that it is in those two weeks that chicks require insects for rapid growth and that the insects preferred by chicks are moth caterpillars and sawfly larvae. We have worked out that larval host plants include bilberry, bog myrtle and eared willow for moth caterpillars and an array of rush and grass species for sawfly, and that insect abundance is highest when there are low to modest levels of grazing pressure by deer or sheep. Finally, and perhaps most importantly, we have realised that even in good black grouse habitats containing food plants that host plenty of preferred insects, chick survival can still be low if the weather during the period when chicks depend on insects is either cold, wet or both.

The practical problem we now need to overcome is how to make black grouse more resilient to inclement weather in June, which may become more common with predicted climatic changes. We hope to adopt two approaches. First, we will research how to manage vegetation swards to not only increase chick-food insects and their host plants, but also how to manage for patches of shorter vegetation, where chicks can dry-off following rain. To do this we will track broods, having already fitted a satellite tag to the greyhen. Tags can be remotely configured

to download brood positions as frequently as required, so perhaps every 10 minutes, all done from the office without disturbing the brood itself. This will also remotely provide roost locations from which chick droppings containing insect fragments can be later collected. Field sampling of insects at brood locations, delayed until the brood has moved on, will allow brood habitat usage and subsequent brood survival to be related to insect abundance, sward height, structure, and composition and importantly to management processes such as the number and type of grazing animals. In this way, we will learn how to create and manage better brood habitats.

Given that chick survival is negatively impacted by rainfall, our second approach would be to establish black grouse in areas of northern England that are drier and warmer, for example in more easterly areas such as the North York Moors and the Cheviots in north Northumberland. Here, habitats have been recently improved to suit black grouse, but a fragmented landscape and low dispersal capacity means that black grouse are unlikely to recolonise naturally. Instead, we would expand their range into these areas by moving birds through conservation translocations. That way, surplus birds following good breeding years in the core black grouse range of the North Pennines would be caught and released into specially prepared receptor sites, first in the North York Moors, and then, subject to success, into the Cheviots. We have already trialled such translocations in parts of the Yorkshire Dales, first by moving males only to augment the presence of yearling females, which had naturally dispersed and settled there, and then by moving both males and females to sites where hitherto birds had been absent.

Last month, we applied to Natural England's Species Recovery Challenge Fund to seek financial support to simultaneously initiate these two approaches. We will learn the outcome in July. In the meantime, counts of displaying males at a sample of leks in the North Pennines this spring showed a provisional 60% increase on numbers present in spring 2022. This followed fine weather last June, which promoted good breeding success. This means that the likelihood of birds being available to donate to the project for translocation should be reasonably high. ■

We wish to study the movements and diet of stoats on grouse moors. © Sander Meertins Photography

MOVEMENTS AND DIET OF STOATS

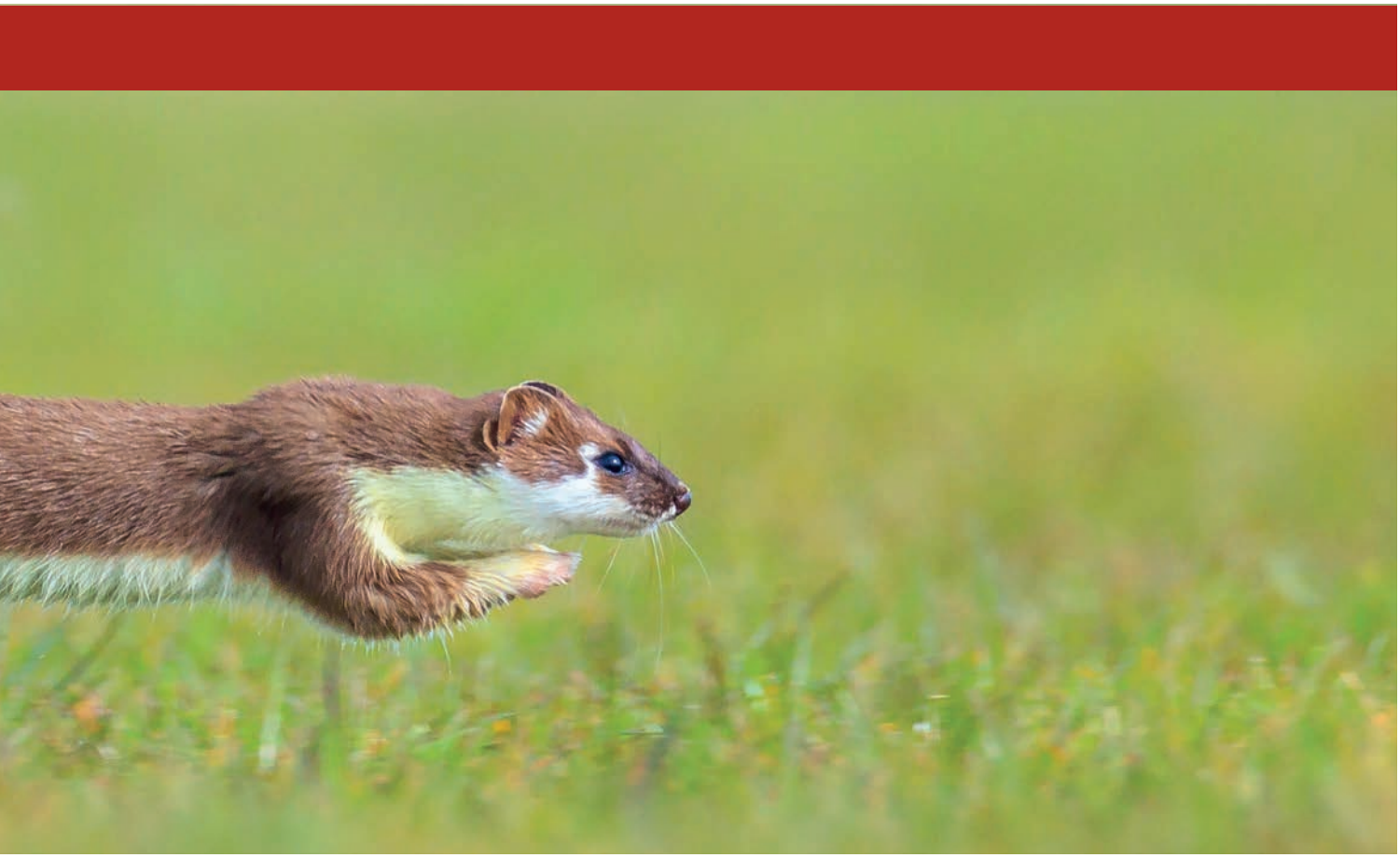
by David Baines

We are developing a joint research proposal with Dr Jarek Bryk of the Dept of Biological & Geographical Sciences at Huddersfield University. We wish to run a three-year PhD studentship that considers movements and diet of stoats on grouse moors in northern England using genetic material from stoats killed by gamekeepers.

Stoats are common mustelids native to mainland UK, where their prey is typically rabbit. In northern England, where high densities of rabbits are associated with intensive fox control, stoats also consume eggs, chicks and even adults of several species of ground-nesting birds of conservation concern, including curlew and black grouse. They also form a key predator of red grouse, a species of economic importance across many parts of the UK uplands. For this reason, gamekeepers employed to provide surpluses of red grouse for shooting on driven grouse moors legally trap stoats and weasels, amongst other mammalian and avian predators, to reduce predation risk to grouse. Elsewhere, their introduction to New Zealand at the end of 19th century had disastrous consequences, contributing to the extinction of 25% of native bird species. Similar impacts are anticipated in the Orkney Islands where stoats are non-native, have recently been released, but have been the subject of an eradication effort since 2020.

Both myxomatosis and rabbit viral haemorrhagic disease have been associated with high annual mortality rates in adult rabbits and almost 100%

Stoats are also a key predator of ground-nesting birds such as curlew.



mortality amongst juveniles. Recent outbreaks of both in northern England have markedly reduced rabbit numbers. Whether this directly negatively impacts stoat numbers, or merely causes a dietary shift is currently unclear, but the latter may increase predation pressure on species of conservation concern.

Stoat population dynamics have not been well studied, but it is evident that intense trapping effort by gamekeepers seasonally reduces local densities, but then numbers are augmented in the summer and autumn following the immigration of dispersing juveniles. This makes it difficult to manage their populations in areas where bird species are under care due to commercial or conservation interests.

We would describe linkages between local populations of stoats, how they are connected by seasonal dispersal patterns of juveniles, and the diet of stoats across areas managed as grouse moors. We would do this by considering genetic variation between stoats routinely caught by gamekeepers from 20-30 moorland estates. The dietary focus will be split into the bird breeding season, when red-listed birds are present, and the non-breeding season, when most of them are absent. Classification of stoat prey will be based on DNA isolated from their stomach/gut content.

We would need stoat carcasses from a range of estates, ideally across two years. The North Pennine Moors would form the main study area. Here, river valleys along which emigrating stoats are considered to move, are separated by high watersheds, which may part-form a barrier to dispersal. Stoats would be sampled from both upper and lower reaches of river valleys to establish whether these act as dispersal corridors, and from adjacent valleys or dales to assess the degree of movement across watersheds. Additionally, it would be possible to compare genetic variation indicating movement patterns between adjacent river valleys in the North Pennines with that in a large, but isolated block of moorland (North York Moors), some 40 kilometres to the east. We anticipate the need to be supplied with perhaps 500 stoat carcasses, from say 20 locations with 25 samples from each. Sampling diet from these would need reasonably fresh carcasses stored in freezers prior to collection. ■

HOW YOU CAN HELP

- By attending a presentation by Jarek Bryk and David Baines on this proposed study in Middleton-in-Teesdale on 11 July.
- By supplying stoat carcasses to the GWCT team at Eggleston. Fresh ones for diet analysis, older ones can still be used to consider genetic variation and hence animal movements inferred through relatedness.
- Huddersfield University would pay the salary and on-costs of the studentship, GWCT would pay for consumables used to process samples, but we need help with the costs of analysing genetic samples. We would need £9k a year for each of three years, which would be a minor cost if spread across a few estates. We will discuss payment details during our proposed meeting (see above).
- Email uplands@gwct.org.uk or ring 01833 651936.

NEW HOME REQUIRED

CAN YOU HELP?

Eggleston Hall, including our rented Coach House offices in its grounds, is for sale. Hence it looks ominous that we will be seeking new office premises to rent in the future.

We would welcome news of any opportunities that anyone may have to house the team. It doesn't need to be of existing office specification, we'd be interested in conversions or similar 'project' ideas. Our existing requirement is office space for eight people, parking space for four Trust vehicles, but also staff cars, and some equipment space. We also rent a two-bedroom flat in Middleton-in-Teesdale as domestic accommodation for short-term contract staff. If there was scope to combine office and residential, we would be interested in that possibility too.

NEW RECRUITS

HOLLY APPLEBY

Having grown up in Weardale and Teesdale, and spent many years beating on local grouse moors, I was very excited to join the GWCT's Uplands team as a research assistant in March this year. Prior to joining, I graduated from Durham University with a BSc in Natural Sciences and a Master of Research in Biology. In addition, I worked as a ranger in the Lake District and on the Farne Islands in Northumberland and volunteered with various conservation organisations both in the UK and across Southern Africa.

I have always had a keen interest in wildlife and conservation, with a primary focus on human-wildlife interactions and citizen science, and as such I am very happy to be working at the intersection of research and practical land management. This year, I am assisting with spring and summer grouse counts, strongyle egg and worm counts, camera trapping nesting waders, water-table, invertebrate and vegetation measurements on heather treatment plots, and more. I am excited to learn even more about my local area and what threatens its wildlife, and better understand the factors which contribute to best practice guidelines.

MARIE JEWITT

After studying a degree in Business at Northumbria, four years studying Conservation at Northumberland College and a varied career including retail and horticulture, I finally found the right path when I joined the Trust in January.

I live local to our offices in Eggleston, and I have a real passion for the countryside. I love going out beating on grouse and pheasant days on local estates and in Northumberland where I am originally from. I enjoy shooting, both game and clays and shoot regularly at Thimbleby Clay Ground.

I am really enjoying my role as Uplands Team Support Officer as I have had a varied year so far, and I am looking forward to seeing what the future has in store.

WHO'S WHO

DR DAVE BAINES Director of Upland Research – dbaines@gwct.org.uk

DR PHIL WARREN Research Scientist – pwarren@gwct.org.uk

DR SIÂN WHITEHEAD Research Scientist – swhitehead@gwct.org.uk

LEAH CLOONAN Research Assistant – lcloonan@gwct.org.uk

HOLLY APPLEBY Research Assistant – happleby@gwct.org.uk

MARIE JEWITT Uplands Team Support Officer – mjewitt@gwct.org.uk

ANABEL COLE Student – acole@gwct.org.uk

HAZEL SARTI Student – hsarti@gwct.org.uk