Auchnerran Report 2021

The Game & Wildlife Scottish Demonstration Farm







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Acknowledgements

As ever, we are extremely grateful to all those who have supported our work at GWSDF. We would like to express our thanks to Andrew Salvesen, the Allerton Project Steering Committee, Working for Waders, Perdix Wildlife Supplies, Kings Crops, Moredun Research Institute, John Riley and Ewan Webster, and all those too numerous to mention who have given donations, visited or got in touch.

Foreword

David Noble, Scottish Chairman

Infortunately, the beginning of 2021 did not see the end of the COVID-19 pandemic and activities at Auchnerran were, once again, significantly curtailed. In particular, the opportunities for welcoming policy makers and other visitors to the farm were much reduced. On the farming front, despite a very bad spring, it is encouraging that the lambing ratio held up well and that the financial position remained in positive territory. Monitoring the wildlife of the farm and maintaining our datasets is of course vital and thanks are due to the staff and to the students who, while able to devote time to their particular studies, contribute so much to this ongoing work. The shoot has had a good year and given much pleasure to those lucky enough to have taken part.

As we look forward to 2022, the imminent appointment of a senior scientist, based at Auchnerran, will contribute to the further development of research activities at the farm and it is very pleasing to see the interesting summaries on page 13.

Nothing can be achieved without good people and our Scottish Demonstration Farm is fortunate to have an extraordinarily dedicated, knowledgeable and skilled team who not only pursue their specific work but also work together and support each other splendidly across all aspects of the farm's activities, be it farming, research or the shoot. This collaboration within such a small team is vital if the farm is to meet its objectives. In this, my last foreword as Scottish Chairman, I should like to record my sincere thanks to them all for their continued hard work in pursuit of these objectives, particularly under the difficult circumstances of the last two years.

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Introduction

Dave Parish

ello and welcome to another Annual Report of our activities at Auchnerran. What a challenging year it has been! Significant snowfall in May and the dry spring and summer that followed posed problems for both the farm (page 7) with early lamb losses higher than normal, and perhaps some of our resident wildlife with wader numbers down slightly, and coincided with an unexpected jump in the rate of badger predation on some of our breeding waders (page 13), which contributed to a poor year for chick production. That said, farm output overall was maintained at a good level with a high lambing rate and the team has been as busy as ever and, I'm delighted to say, we were able to start welcoming visitors to the farm again. Not that 2021 could be called a normal year as COVID-19 restrictions were still in place for much of the time, but we were able to host a few key meetings (page12).

Auchnerran is coming out of the COVID-19 crisis stronger than ever, with significant changes underway in 2022. We have a new management structure and a larger team including new staff, as well as some exciting new projects. As ever, please let us know what you think and if you want to come and visit the farm, do get in touch (Ideraad@gwct.org.uk; 07903 210005).

GWSDF AIMS

The Game & Wildlife Scottish Demonstration Farm, Auchnerran aims to demonstrate to practitioners, policy makers, influencers and learners of all ages, how a wild, mixed-species shoot and productive farming can contribute to a net gain in natural capital, in a marginal, hill-edge setting.

The Farm

Allan Wright, Ross MacLeod & Dave Parish

2 021 started off like any other year but when May came round everything seemed to go in reverse. We experienced serious blizzard conditions just as lambing began, causing a huge upturn in the workload for an already busy period. Instead of enjoying lush grass growth, we had to return to feeding the ewes, as well as digging them out of drifts regularly. Lamb losses increased slightly at this time, but our increased vigilance and effort meant that the proportion of lambs which eventually weaned was as high as ever at 126% (TABLE 1). Farm profits in 2021 are summarised in FIGURE 1.

Flock size has now stabilised at just over 1,400 ewes. This is the number thought to be necessary to help control ticks on the moor, about as many as the farm can support through the lean winter months and is around the maximum that can be managed by a single person.

Readers may recall that the infrastructure (fencing and buildings) on the farm was in a poor state of repair and the sheep, and the grass resource they depended on, were in poor health when we first took it on. The farm is now much improved with a significant investment of time and money from both the Trust and our landlord. This is an ongoing process with fencing still being upgraded – specially to make it rabbit proof in some areas, and fields receiving inputs or being reseeded. For example, on average seven fields have been limed each year at Auchnerran since 2015 out of the 52 or so farmed parcels of land on the farm, and 19 fields on average received fertiliser. Most of this goes onto improved grass of one kind or other with some on forage crops. Nineteen of the fields have also been reseeded with grass since 2015, either replacing older grass swards or other crops.

All these changes were necessary to improve conditions for the sheep and thus farm economics, but there have been consequences for our breeding waders which we are currently analysing.

We continued to undertake carbon audits at Auchnerran in 2021 to track greenhouse emissions and carbon sequestration. After commissioning an independent natural capital assessment of the farm with Eftec in late 2020, the work was completed during 2021. This suggested that we had a slight positive balance of carbon sequestration over emissions and flagged the importance of our woodland stock in this regard, which is concerning given that we suffered significant damage to some of our woods in the stormy end to 2021. The finding of a net sequestration of carbon is at odds with our earlier work using the AgreCalc measure. We are currently looking into this. This was a key subject of discussions held during two visits we hosted (page 12). The regular carbon audits and natural capital assessment have paved the way for dialogue with NatureScot, the Scottish Government Agency developing future farming support schemes based on environmental outcomes. The work has also provided us with a considerable body of material from which to identify key areas for future research, advisory and policy initiatives.

TABLE 1

The number of ewes, lambing percentage and silage production at Auchnerran 2015-2021. *50 ewes were maintained as tick mops in 2021 and not bred from.

	EWES	% LAMBS WEANED	SILAGE BALES	BALES PER HECTARE
2015	1,440	60	730	17
2016	1,205	97	717	20
2017	1,126	120	1,100	25
2018	1,000	126	460	12
2019	986	124	986	23
2020	1,400	129	830	24
2021	1,430*	126	600	20

FIGURE 1

Auchnerran farm profit, 2015-2021 (figures for 2021 are provisional).

The shoot

Marlies Nicolai

he 2021/22 shooting season was one of our most successful yet. The previous season was cancelled due to COVID-19, however the break in shooting appears to have allowed some of our game species, particularly the pheasant and red legged partridge population to improve. There were some concerns that game numbers may have been negatively impacted by the long winter and very cold spring of 2021, however this did not appear to be the case. The improved feeder management regime which was implemented in 2021 and the presence of fodder crops in proximity to the game crops may have helped the birds through the winter by providing substantial amounts of cover and over winter feed. The adjacent fodder crop to our central gamecrop included large quantities of fat hen, which is a persistent weed, however its seeds provide a very good food source for both gamebirds and songbirds. The game crop seed mix sown was the KALB1 Kings Alba Mix supplied by Kings. It is a wild

bird seed mix comprised of fodder radish, Kings kale rape, Phacelia, spring triticale, spring barley, utopia and vitasso brown mustard. The establishment of these game crops is fundamental to the shoot and the health of resident bird populations.

In addition to the supplementary provision of feed for gamebirds, the duck flighting pond present on the farm was fed with barley through the winter to attract waterfowl such as mallard, teal and wigeon. The barley was kindly donated by John Riley of Semeil Farm. Over the past few years, the pond had become enclosed by the encroachment of silver birch and broom which meant ducks were no longer using the pond to roost on in the winter evenings. In the Autumn of 2021, tall silver birch trees and scrub undergrowth were cleared from the edges of the pond to try and make it more attractive to passing ducks. Come December, a number of mallards and a few teal had returned to the pond. As a result, we may be

THE SHOOT

able to offer one or two duck flighting evenings as part of our shoot programme.

Over the last shoot season, three mixed species days, two rabbit days and one combined mixed species and rabbit day were held between 22/10/2021 and 28/01/2022. Total bag number for the season came to 65 pheasants, three red legged partridge, two snipe, nine woodcock, one woodpigeon, three brown hare and 27 rabbits.

Record bags, excellent weather, great company, a new meeting and lunch venue and a revamp to the menu made the last season very successful and incredibly enjoyable.

"Just a short note to say how much we enjoyed your wonderful hospitality on Friday.

We had anticipated a day chasing rabbits but the addition of your elevenses, brilliant lunch and friendly, welcoming attitude made for a memorable day.

It was a pleasure to meet you, Dan, the five ferrets and Pickles, and we really appreciate the effort you all put into the outing. Thank you."

"I've never seen the farm in such beautiful weather, and you looked after us all like family, which is a big compliment, as we were all made to feel very welcome."

The upcoming season so far includes three mixed species days and two rabbit days. We hope that this season will be as good as the last however the recent outbreak of bird flu is a concern, and we hope that our wild game population has not been negatively affected.

The challenges of growing game crops at Auchnerran

kings

Alan Johnson Scotland Technical Advisor, Kings Crops

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have been working alongside the team at Auchnerran for around six years now, advising on the management of the game crop plots. Back in 2016 when I first visited the demo farm, it was clear that trying to establish the wild bird seed plots was going to be a challenge as we were faced with three main obstacles: rabbits, poor soil and prolific weeds. At that time, a specialist pest control firm had estimated the population of rabbits at around 20,000, all of which it seemed found the game crops irresistible. Another stumbling block we faced was the chemistry of the soil in the designated plots. Before sowing anything, we took a few soil samples from each to test acidity and the phosphorus and potassium index, which helped us to design an appropriate fertiliser regime. We found the pH was around 5, meaning that the soil was acidic and that action would be needed to raise the pH to a level more suitable for many of the plants we wanted to sow. As far as anyone knew, the game crop plots we were working with hadn't been used at all for some time prior to the Game & Wildlife Conservation Trust taking over management at Auchnerran. Therefore, the weed burden had built up significantly with a mix of grasses, thistles and docks dominant in all of them.

The team at the Game & Wildlife Scottish Demonstration Farm invested time and money

in erecting rabbit fencing around the plots, which had to be checked frequently as we found that the rabbits were persistent and occasionally broke through. Calcifert lime was also added to the soil, which raised the pH. Trials showed that an application of 100kg/acre increased the pH by 0.9 within four weeks at a depth of 2-3cm. Whilst this work was taking place in 2016, we sowed the Kings Highland Mix in the plots which comprised triticale, barley, oats, linseed, rye and radish. This is not particularly loved by rabbits, but more importantly provides good cover in the conditions and allows for the spraying of broad-leaved weeds which helped us get on top of the weed burden early on. Since those improvements were made, we have been able to sow our Kings Alba Mix – triticale, barley, radish, brown mustard, utopia (a mustard/kale cross), phacelia and kale rape (a cross between kale and rape).

I'm delighted to say that the hard work has paid off, as year-on-year we are establishing fantastic wild bird cover which is producing an abundance of pollen and nectar throughout the summer and then providing a natural source of seeds over the winter for farmland birds. It has been a pleasure working with the team at Auchnerran and highlights what can be achieved in difficult conditions.

Demonstration and education

Ross MacLeod & Dave Parish

s we mentioned in last year's report, visitor activity at GWSDF has been greatly curtailed due to COVID-19. Unfortunately, 2021 was still heavily affected by travel and meeting restrictions, resulting in a much-reduced schedule of events. We held some one-to-one meetings with researchers, GWCT members and company representatives, discussing opportunities for a variety of collaborations, and were lucky enough to host a couple of group visits too. Two 'Walk & Talk' events, where we often mix presentations with less formal discussions whilst touring the farm, were held with Scottish Land & Estates and NFU Scotland members at Auchnerran in the Autumn. We used these opportunities to discuss our experience with carbon audits, natural capital assessment and farmer cluster collaboration. The new meeting room and kitchen facilities, described in last year's report, were put to good use!

Working with the Scottish Rural Colleges, Auchnerran was used as a teaching resource for a group of Wildlife Conservation Management students, albeit delivered remotely. We discussed the balance between farming and conservation, and the challenges posed by common predators eating protected or threatened species and the problems posed by a rampant rabbit population and how we are trying to deal with them. We hope to continue this association and to host the students on site in person in the near future.

Members of NFU Scotland on a tour of Auchnerran in autumn 2021.

RESEARCH AND MONITORING

Research and monitoring

Dave Parish, Marlies Nicolai & Ross MacLeod

BACKGROUND

When we started working at Auchnerran in 2015, we began with a two-year period of baseline monitoring. This was to give us an idea of the range and abundance of wildlife using the farm before we introduced any major changes. We have continued to monitor some of these groups since 2017 as indicators, helping us adapt farm and shoot management to minimise negative impacts. The farm is also an excellent research resource helping us to understand how to manage natural capital alongside productive farming and other land uses.

Focus on badgers

As already mentioned, 2021 was an unusual year with a prolonged cold period in early spring topped with blizzards in May. This probably contributed to a fall in the number of breeding waders recorded on site (down approximately 20% compared to 2020) but may also have triggered an increase in the number of lapwing clutches predated by badgers.

Lapwings are our most numerous species of wader at Auchnerran and probably the best monitored, with a lot of effort spent finding and observing nests, often using trail cameras (see the 2020 Annual Report). Each year, we calculate the probability of hatching, which gives us a more accurate estimate of true hatching success than that acquired through observation alone, as it is well known that no matter how diligent observers are, a significant number of nests are missed and these are most likely to be nests that fail early on. In 2021, this measure of lapwing hatching success was down 83% compared to 2020, to just 11%.

Our camera trap data showed that the single biggest cause of this poor hatching success was an increase in the rate of predation on eggs (FIGURE 2), with badgers responsible for most of this, taking 22% of all lapwing clutches monitored via trail cameras (FIGURE 3). To put that in context, the average rate of predation in previous years from all causes was around 11%. It is pleasing to note that the estimate of badger predation rate for those clutches not monitored via trail cameras was similar at 20%, suggesting that badgers leave clear signs that can be recognised after a predation event and that our field researchers are skilled at spotting them.

The high rate of badger predation in 2021 was something of a surprise given that previously this was scarce, but it did come on the back of a recent increase in badger activity during the winter 2020/21 at Auchnerran (page 17). It has been suggested that this unusually high level of badger egg predation may have resulted from a lack of alternative food due to the prolonged cold spell. Badgers' staple diet revolves around earthworms gleaned from the soil surface or just below, which would have been impossible to access in the frozen, dry ground during the spring cold spell. That said, predation did continue to a lesser degree throughout the season.

We have started monitoring badger activity at the farm in more detail to try to better understand the number of individuals on site and their movements. At the time these events took place there were no active setts on site, though at the time of writing (May 2022) we have three probable satellite setts. These are setts which are not always occupied for a variety of reasons.

Our monitoring of activity to date, again with the help of trail cameras, suggests that there are relatively few individuals regularly on site. We have begun work to try to find out where they have come from and exactly where they go. This is done by searching for setts in the wider landscape with help from our neighbours and deploying marked baits, with different markers used for each sett. These are eaten by the badgers and the markers can be found in their faeces, showing us where they have been. This will give us a better understanding of the badger population at Auchnerran and perhaps suggest ways we might mitigate future predation on our vulnerable waders.

Focus on wader movements

As we at Auchnerran have written many times before, wader populations in Scotland, and indeed across much of Europe, have declined drastically in recent decades with no sign of their fortunes changing anytime soon. The main species at Auchnerran that we monitor most closely are lapwing, oystercatcher and curlew. All have declined in Scotland between 1995 and 2018 according to data from the British Trust for Ornithology (-56%, -39% and -59% respectively).

These species, and many others, spend their winters away from the breeding areas in places where the weather is usually more benign and food easier to come by, and some of the time at either end of the breeding season is spent moving around the vicinity of the breeding grounds. Part of our research at Auchnerran aims to better understand how our breeding waders use the habitats in the wider landscape and where they gather during the winter months. This will allow us to better identify and help to manage key habitats at large scales to conserve these species throughout their annual cycle. This is achieved by fitting a sample of birds with tags that record their location at regular intervals to a high degree of accuracy. The data collected to date are still to be analysed fully, but here we summarise some of the early findings regarding lapwing movements.

In 2019, 13 adult lapwings (12 female, one male) were tagged at Auchnerran by catching them at the nest. The tags used for lapwings store the location information onboard until they are within range of a receiving station, in this case placed on the breeding grounds at Auchnerran, so we cannot access the data until the birds return to the farm. Of these 13 tagged birds, nine returned in 2020 and provided information on their movements during the intervening period.

RESEARCH AND MONITORING

FIGURE 2

Class of predator, or predator species (where known), for all predated lapwing clutches at Auchnerran monitored via camera traps, 2018-21. The data are proportions (%, +SE) of all clutches monitored, not just of predated clutches. Fox, badger, stoat and hedgehog are components of the Mammal category and likewise, gull and corvid are components of the Avian category. 'Unknown' means it was not possible to classify the predation event.

FIGURE 3

An unfortunately blurry picture of a badger scraping eggs out of a lapwing nest in 2021.

The four birds that didn't return to Auchnerran (as far as we know) were all female. Three of them were smaller than average which might have been significant, being below the mean weight of 224g and either at or below the mean wing length of 232mm. That said, the remaining female that didn't return was the largest bird of all.

The information gleaned from the nine returning birds showed that one had travelled north at the end of the 2019 breeding season and wintered on the Dornoch Firth on the east coast of Scotland, whilst the remainder wintered in Ireland (FIGURE 4).

Interestingly, two birds (both females) made the trip across the Irish Sea twice before settling on

their wintering grounds (FIGURE 5): one bird first visited the Northern Ireland/Ireland border between Armagh and County Cavan for several days before returning to England, where it spent time between the Penrith and Hexham areas. Then it returned to Ireland to the area around Kilrush on the River Shannon in County Clare. It later returned to Auchnerran in 2020 via the Barnard Castle area in northern England. Our second adventurer visited Northern Ireland first, where it spent a few days around Stranford Lough and Lough Foyle, before returning to the vicinity of Auchnerran and then back across the Irish Sea to Ireland, to a spot in County Galway. As far as we are aware, this hasn't been reported before.

FIGURE 4

Prime wintering locations for nine adult lapwings tagged at Auchnerran in the 2019 breeding season. For seven individuals there was a single significant wintering location (red dots), for one individual there were two (yellow dots), and another individual had three significant wintering locations (orange). © Google Maps.

All nine of the lapwing tagged in 2019 moved around more after the breeding season than they did prior to the 2020 breeding season, by spending more time, at locations further from Auchnerran. One bird, for example, spent time in the Birse Glens 15-20km away, where we know there are also breeding lapwing, whilst three visited Angus, up to approximately 65km away, and another went in the opposite direction to the area near Newburgh, Aberdeenshire, a distance of around 60km. The purpose of these movements is unclear. Were they avoiding bad weather, exploiting rich sources of food or checking out alternative breeding areas? This research is just beginning and progress was slowed by COVID-19, so we hope to know more once we have tagged additional birds in future.

In-brief: monitoring of mammalian predators

Why?

Monitoring the abundance or activity levels of some predatory mammals can be difficult because they are not always present in large numbers and are usually very secretive and/or nocturnal. We have tried regularly searching for scats (faecal remains) across the farm, but this is labour-intensive and it is not always easy to identify the culprit. Fox and pine marten scat, for example, are extremely difficult to tell apart. We also record sightings of these species during other surveys, but these are rare and no doubt do not reflect true activity levels.

FIGURE 5

Movements across the Irish Sea of two adult female lapwing tagged at Auchnerran in the 2019 breeding season. Return journeys to Auchnerran in 2020 are not shown for clarity. © Google Maps.

What are we doing?

In 2016, we started hanging carcass baits (rabbits, pheasants or pigeons) from trees in some of our wooded areas during the winter (mostly November through to March), assuming that this would attract any predators in the vicinity. These baits were monitored with trail cameras, saving us time and minimising disturbance.

What have we found?

The principal mammalian predators visiting bait stations were cats (domestic or feral, plus hybrid wild cats), badgers, foxes, otters and pine marten. As mentioned above, we noticed a sharp increase in badger activity at bait sites in 2020/21 (FIGURE 6). We also noted an unfortunate decline in pine marten activity over recent years (FIGURE 6), although just recently they have been recorded again.

Pine martens at a carcass bait.

In brief: update on the carbon and natural capital audits

Why?

The biodiversity and climate crises have stimulated a huge desire to quantify and mitigate the impact that farming has on the environment. Carbon audits and natural capital assessments will allow farmers to see how their actions might affect climate change, habitats and species, and how they can alter management to minimise negative effects, and even how they might be able to cash-in in future.

What are we doing?

At GWSDF, we continued to undertake carbon audits in 2021 to track greenhouse gas emissions and carbon sequestration. Also, after commissioning an independent natural capital assessment of GWSDF with eftec in late 2020, the work was completed during 2021.

Once it became possible to host meetings after the end of COVID-19 restrictions, two 'Walk & Talk' events were held with Scottish Land & Estates and NFU Scotland members at Auchnerran in the autumn. We used these opportunities to discuss our experience with carbon audits, natural capital assessment, and farmer cluster collaboration.

What have we found?

Although not yet complete, the carbon audits suggest GWSDF has a slight surplus of emission over sequestration of greenhouse gases. The assessments to date have not yet been able to incorporate soils into this equation, which is likely to increase sequestration. The natural capital assessment has given us an idea of how the habitats at GWSDF might be valued in future, but the process highlighted how difficult it is to do the same for the species which inhabit them.

The regular carbon audits and natural capital assessment have paved the way for dialogue with NatureScot, the Scottish Government Agency developing future farming support schemes based on environmental outcomes. The work has also provided us with a considerable body of material from which to identify key areas for future research, advisory and policy initiatives.

RESEARCH AND MONITORING

FIGURE 6

The number of badger (top) and pine marten (bottom) registrations (the number of times an individual triggered one of the camera traps) per trap night (one camera active for 10 nights = 10 trap nights, two cameras active for five nights each = 10 trap nights) at carcass bait stations. Note, the graphs only show months and years when this monitoring was carried out. 2019 was not included because of the impact of COVID-19.

Financial report

Game & Wildlife Scottish Demonstration Farm Statement of financial activities (including the income and expenditure account) year ended 31 December 2021

	2021			
	Unrestricted	Restricted	Total	2020
	£	£	£	£
INCOME & EXPENDITURE INCOME FROM				
Donations & legacies				
Donations	48,411	-	48,411	17,386
Grants	205,883	-	205,883	8,781
Charitable activities				
Farm income	352,428	-	352,428	323,551
Sundry income	4,800	-	4,800	434
Total income	611,522		611,522	350,152
EXPENDITURE ON				
Charitable activities				
Farming	242,004	-	242,004	206,351
Research project	99,809	-	99,809	79,185
Total expenditure	341,813	-	341,813	285,536
Net income/(expenditure)	269,709	-	269,709	64,616
TOTAL FUNDS AS AT 31 DECEMBER 2020	58,536		58,536	(6,080)
TOTAL FUNDS AS AT 31 DECEMBER 2021	£328,245	£0	£328,245	£58,536

Game & Wildlife Scottish Demonstration Farm Balance sheet as at 31 December 2021

		2021		2020
	£	£	£	£
FIXED ASSETS				
Tangible assets		117,927		108,781
	-	117,927	-	108,781
CURRENT ASSETS				
Stock	243,397		241,150	
Debtors	276,532		137,834	
Cash at bank and in hand	43,606	_	116,595	
	563,535	-	495,579	
CREDITORS: amounts falling due within one year	39,317		22,049	
NET CURRENT ASSETS	_	524,218	_	473,530
TOTAL ASSETS LESS CURRENT LIABILITIES		642,145		582,311
CREDITORS: amounts falling due after more than one year	-	313,900	-	523,775
		£328,245	-	£58,536
Representing:				
Income & expenditure account		328,245		58,536
Restricted funds		-		-
			-	
TOTAL FUNDS		£328,245		£58,536

Meet the team

Below is the team at Auchnerran, not forgetting the students and volunteers from universities across the UK and Europe who make an invaluable contribution to our work each year. If you have any queries, would like to volunteer at the farm, make a donation, to shoot or would just like to visit, please get in touch:

0131 202 7670 or scottishhq@gwct.org.uk

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