

Capercaillie Reinforcement Feasibility Study – Phase 2 Final Report, May 2026

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A. Summary

This report is based on three sections looking at site selection, population viability analysis and the logistics of population reinforcement. A summary for each of the sections is provided here. The full reports are in the Annexes.

Site selection

1. The Capercaillie Emergency Plan Programme Board recommended focusing on Deeside for a potential reinforcement programme at their meeting on 16 December 2025. Deeside is a former stronghold for Capercaillie and while numbers of birds are currently very low, there is still perceived to be extensive suitable habitat in the region. In addition, across the area active habitat improvement for Capercaillie is underway. There is lower human disturbance pressure in Deeside, compared to Speyside.
2. A habitat assessment protocol, focussing on brood habitat, was designed based on previous literature and land manager and researcher knowledge and experience. It was developed for use in Deeside with the idea that the feasibility assessment and could also be used for other sites in Scotland as needed. Assessment criteria were discussed at a stakeholder workshop with land managers in Deeside on January 16 2026. After discussion and subsequent feedback, twelve specific habitat focussed criteria were identified along with seven wider area criteria.
3. At the workshop, land managers also took part in a mapping exercise to identify sites in Deeside that would be most likely to meet habitat criteria and therefore have the highest potential for reinforcement. There was consensus that the site with greatest potential took in the Ballochbuie SPA within Balmoral Estate, Invergelder and the FLS Inver forest block, here termed the 'Ballochbuie / Inver / Garmaddie / Invergelder' site.
4. A meeting and walkover of part of the site was held with land managers from the three landholdings – Balmoral Estate, Invercauld Estate and Forest and Land Scotland - on the 6 February 2026 to identify optimal areas to conduct the habitat assessment. Factors such as ongoing and future habitat management, accessibility for management and low human disturbance were discussed. Three potential locations were identified: Ballochbuie West; Meall Alvie and the Woods of Garmaddie.
5. In February 2026, a total of 514 plots were surveyed within the site, approximately 120 plots for each of the three locations plus additional plots within the wider area. Of the three potential locations, the Woods of Garmaddie had the highest score, making it the most favourable of the three sites surveyed. Across the wider area most of the criteria scored highly, especially for the lack of deer fences / marked deer fences; the presence of open tree canopy; low deer presence; low human disturbance and good ground vegetation access for chicks to move around. This suggests that the area would be suitable for most of the criteria deemed important for brood survival and ultimately population re-enforcement.

6. The area scored lowest for the criteria: presence of ant nests; bog cotton; water availability; dust baths and the vegetation structure i.e. juniper like understory and fallen trees. The lack of water availability and bog cotton have been noted in previous Capercaillie surveys as a feature of the geology and hydrology in Deeside. Small scale ditch blocking has been taking place, e.g. in the Woods of Garmaddie.

Population viability analysis

7. Work under this section explored the benefit of Capercaillie translocations for the population's long-term viability. In particular, the benefits compared to the status-quo of a population decline were looked at, also under plausible population increase scenarios that are predicted under other management strategies (combining deer fence removals and diversionary feeding of predators). Using these two baseline scenarios the importance of delayed translocations, and clustering of translocations by lek or year and density dependence were explored.
8. These questions require a reliable tool for Population Viability Analysis (PVA), a relevant definition of risk and a clear set of environmental and management scenarios. The approach taken here for all three of these requirements is particularly novel and methodologically efficient. Specifically, our bespoke definition of risk incorporates formal measures of viability and the effects of risk-discounting for large populations into the distant future (conversely, weighting risk higher when populations are small in the short term). Our implementation of the Strathspey PVA is fast, stochastic, and fully parameterized by fitting the model to the combined population and demographic data. Finally, using the PVA speed, our scenarios are systematically explored by automatic optimization of management strategies.
9. The model is based on the Strathspey lek size distribution because this is where sufficient data existed to fit the original model. There is no a-priori reason to believe the parameter values are different, but the smaller and more isolated leks in Deeside compared to Strathspey, may be subject to qualitatively different pressures, yet to be postulated. Given the overall estimated population on Deeside is an order of magnitude smaller with only a handful of birds remaining, it is most susceptible to chance events (stochasticity).
10. The model contains several simplifying features and biological assumptions that can readily be relaxed in future extensions to this work. First, despite the ability of the model to incorporate environmental covariates (such as the pattern of April warming), future projections of such covariates are generally not available, so even those covariates that have previously been found to be influential were not incorporated. However, the model accounted for environmental influences (including those resulting in catastrophic events in breeding or survival) via random effects whose magnitude had been estimated during model fitting. Second, no measure of metapopulation connectivity was used between leks in the population, merely representing exchange of individuals by the use of a small rescue effect in extinct lek. Other values can be rapidly investigated, if required.

11. Management under the assumption of density independence showed a near-linear pattern of risk reduction with increasing numbers of translocated individuals (up to 300 over the next 5 years), indicating modest gains via risk reductions (only up to 12% of the benefits that could be obtained by deer fence removal and diversionary feeding). Introducing density dependence made little difference either in the overall risk reduction or the general pattern of clustering across leks and years. So, even though density dependence makes an incremental difference on individual projection scenarios, it is expected that this will not have a great bearing on any decisions about translocation strategies. To investigate whether delays in implementing translocation strategies would increase the risk, the analysis was re-run for five-year translocation programs that were initiated further into the future following further decline. Although this led to a small loss in the efficacy of risk reduction between the three time windows, this is of the order of 2%, an impact that is likely to be undetectable in a real system. It is therefore concluded that the small benefit likely to be conferred by translocations is not going to be lost by postponing them, until more powerful interventions have been examined and attempted
12. Improving base demographic rates (via landscape and diversionary feeding) is, under the most conservative scenarios, approximately eight times more effective than direct population subsidies by translocations. Equivalently, based on our modelling and allowing for a 40% survival of captive-born individuals, it is estimated that ~2,500 birds would need to be translocated to achieve the same results as other forms of management. For comparison, this would mean producing in captivity or importing close to four times the estimated current population in Strathspey.
13. Overall, the findings clearly indicate that for the Speyside population improving habitat conditions and reducing causes of mortality are more powerful conservation tools than supplementing the population through releases. In practical terms, achieving the same benefits as habitat and diversionary feeding would require releasing thousands of birds, making translocation a relatively inefficient strategy on its own.

Logistics of population reinforcement

14. The aim of this part of the study, was to gather information about existing captive breeding programmes and experience in the UK and Europe to inform decisions around logistics associated with sourcing and release of birds. Information was compiled following analysis of literature and correspondence with relevant Capercaillie specialists.
15. Egg transfer is the deliberate movement of wild or captive eggs between locations that can support species recovery, such as boosting genetic diversity, conservation breeding, or improving reproduction. While not commonly used for Capercaillie, it has been applied in both wild and captive contexts across the UK and Europe. Different transfer pathways exist—between wild populations, captive facilities, or a mix of both—each with specific logistical and ecological challenges. Successful transfer depends heavily on the stage of egg development, as unincubated eggs are more resilient, whereas incubated eggs require strict temperature control. The

process also demands careful handling, detailed knowledge of nesting behaviour, and effective monitoring. However, egg transfer carries significant risks, including nest disturbance, egg damage, disease transmission, and potential abandonment by females, meaning it requires high expertise and careful planning to balance risks against conservation benefits. Egg transfers have the potential to play a valuable role in both Capercaillie recovery support however it is recommended that captive “stored” (unincubated) eggs are the preferred choice given associated risks.

16. Capercaillie have rarely been kept in UK zoos, with only seven institutions holding them between the 1970s and 2017, and none currently maintaining birds. Today, the UK’s only captive population is managed by a small group of five private aviculturists, of which four are actively breeding. This population totals around 79 birds, mostly females, and is unevenly distributed, with one holder managing about 60%. All active holders have significant experience in breeding and managing Capercaillie, though none are part of a formal breeding programme. Their expertise is considerable, some have been breeding capercaillie for over 30 years, and high breeding success has been demonstrated, suggesting strong potential for future conservation breeding efforts if coordinated effectively.
17. The European Association of Zoos and Aquaria (EAZA) runs a coordinated breeding programme (EEP) for Western Capercaillie, led by Sainte Croix Zoo (Moselle France), aimed at supporting population recovery, maintaining genetically healthy birds for reintroduction, and improving husbandry and collaboration across Europe. The programme currently includes 15 institutions holding 66 birds, with key breeding centres such as Bern Zoo and Sainte Croix Zoo producing significant numbers of chicks for release projects. The EEP programme currently collaborates with several breeding for release projects across Europe providing 20-30 birds in 2025. Across Europe, several dedicated breeding centres are actively releasing birds (from both wild and captive source) using mainly soft-release strategies. Discussions during a site visit to Scotland by the EAZA EEP Breeding Programme Coordinator highlighted the potential for a) breeding and transfer support for future breeding for release of Capercaillie in Scotland b) potential to explore a complimentary Capercaillie breeding programme for UK management under the existing EAZA framework.
18. Animal transfers for conservation—whether wild or captive—must follow strict legal and biosecurity rules, typically including quarantine and disease screening to reduce risks to wildlife and people. The level of quarantine varies but often requires a Disease Risk Assessment (DRA); however, derogations (exceptions) can be granted where strict quarantine would harm sensitive species. In the UK, such derogations have been used for species like the white-tailed sea eagle and spoon-billed sandpiper to minimise stress while still managing disease risk. Across Europe, similar approaches have been applied to Capercaillie, including reduced or no quarantine for wild-to-wild transfers with rapid disease testing, which has proven successful with no recorded disease issues. Overall, while quarantine is usually required—especially for bird transfers—there is growing evidence that carefully managed derogations, supported by robust screening protocols and

veterinary oversight (e.g. through APHA and Scottish Government), can improve survival outcomes without increasing disease risk.

19. Information from UK private breeders and the European zoo breeding programme shows that captive Capercaillie breeding follows similar social structures (one male with multiple females) but differs significantly in rearing approaches and enclosure quality. Three main rearing methods are used—parent, hand, and foster rearing—each with trade-offs between productivity and behavioural development, with European zoos favouring parent rearing, while UK private breeders rely more on hand and foster methods. Techniques like double clutching are used to boost productivity. Successful rearing depends on strong parasite control, appropriate diet, well-designed enclosures, skilled staff, and reliable equipment. Overall, European facilities tend to provide larger, more naturalistic enclosures that better support behavioural development, while enclosure design (raised vs floored) presents a balance between disease control and natural conditions, highlighting the need for carefully planned systems in any future breeding-for-release programme.
20. Selecting source populations for Capercaillie translocations involves balancing genetic, ecological, welfare, disease, and logistical factors, as well as minimising impacts on donor populations. Both wild (in-situ) and captive (ex-situ) sources offer advantages: captive birds can be bred with limited impact and managed more easily, while wild birds already possess natural behaviours and predator awareness. However, risks include inbreeding or behavioural limitations in captive birds, and stress, population impacts, and logistical challenges for wild sourcing. Genetically, Scotland's population is of Northern/Boreal lineage (linked to Scandinavian origins), making similar populations (e.g. Sweden/Norway) lower risk, though introducing different lineages could increase genetic diversity if managed carefully. Ecological and behavioural compatibility, disease considerations, and population size/trends are also critical, with larger, stable or increasing populations being preferable donors. Overall, careful assessment—including genomic analysis and disease screening—is essential to ensure suitable, low-risk source populations for successful long-term restoration.
21. Although the genomic picture is incomplete and more work is needed, given the current evidence, it is recommended that if reinforcement were to be considered, then individuals should be sourced from Norway, Sweden (in-situ) and/or an ex-situ population consisting of genetically diverse individuals of the European lineage.

B. Discussion

22. Results from the stakeholder workshop suggested support for reinforcement in Deeside and that the Ballochbuie / Inver / Garmaddie / Invergelder would be the priority site for a potential Capercaillie population reinforcement. Site assessment confirmed that the site scores highly for many of the criteria deemed necessary for Capercaillie, especially brood habitat. For possible locations within the site, the Woods of Garmaddie scored highest. Within the wider area there has been a lot of habitat improvement work for Capercaillie, which is ongoing.
23. Results from the PVA modelling tool from Speyside showed that relatively large-scale efforts—such as releasing up to 300 birds over five years— would achieve only modest improvements compared to removing deer fences and reducing predation pressure through diversionary feeding. It was estimated that ~2,500 birds would need to be translocated to achieve the same results as other forms of management. However, it was noted that smaller, more isolated pockets of Capercaillie, such as those in Deeside, may be characterized by different parameter values than those estimated for Strathspey which may have a bearing on these predictions.
24. Information was gathered about existing captive breeding programmes in the UK and Europe. The UK's captive population, 79 birds, is managed by a small group of five private aviculturists, of which four are actively breeding. There is potential for these aviculturists to be part of future conservation breeding efforts. The European Association of Zoos and Aquaria (EAZA) runs a coordinated breeding programme for Capercaillie, which currently includes 15 institutions holding 66 birds, with breeding centres producing chicks for release projects. This breeding programme could help and form a template for UK management under the EAZA framework.
25. Within captive breeding populations, three rearing methods are used—parent, hand, and foster rearing—each with trade-offs between productivity and behavioural development. European zoos favour parent rearing while UK private breeders rely more on hand and foster methods. Double clutching is used to boost productivity. Successful rearing requires effective parasite control, diet, well-designed enclosures, skilled staff, and reliable equipment. Overall, European facilities tend to provide larger, more naturalistic enclosures that support behavioural development, while enclosure design (raised vs floored) presents a balance between disease control and natural conditions.

C. Conclusions and caveats

26. There was a high level of interest and engagement by land managers in reinforcement in Deeside, and a potential site in Ballochbuie / Inver / Garmaddie / Invergelder was identified, assessed and found to be largely suitable.
27. Results from modelling the Speyside population, showed that deer fence removal and diversionary feeding was more effective than reinforcement. On Deeside both

these measures are ongoing but the population is much smaller and rapidly nearing extinction such that the timescale for potential recovery is extremely challenging. The Deeside population is likely below any 'trigger point', although this has not been calculated.

28. The model does not account for the potential effects of 'genetic rescue' which no data are available, nor for what post survival rates be for any birds released in Deeside. From a 'disaster perspective' (e.g. fire) the Speyside population is highly vulnerable and it may be desirable to seek to secure capercaillie at multiple sites. If the current Speyside population recovers with *in situ* measures (as modelled) then this population could potentially provide birds to translocate to Deeside.
29. Existing private aviculturists, combined with the European Association of Zoos and Aquaria (EAZA) Capercaillie breeding programme could provide a framework for a reinforcement programme. Although the genomic picture is incomplete and more work is needed, given the current evidence, it is recommended that individuals to be used in a reinforcement program to Scotland are sourced from Norway, Sweden (in-situ) and/or an ex-situ population consisting of genetically diverse individuals of the European lineage. It is important to note that if translocations involving captive birds are to occur then an initial preparatory phase (~2 years) to build up the population would be required. This would include enhancement of management facilities, genetic assessments of current captive population and standardising rearing and captive management protocols.

D. Background

The [Capercaillie Emergency Plan](#) recognises that if management actions outlined in the plan are insufficient to reverse population declines, it may be necessary to reinforce the Scottish Capercaillie population with birds from outside the UK. The National Species Reintroduction Forum has advised that any reinforcement be carefully coordinated with ongoing conservation efforts. Phase 1 made a number of recommendations on which the Phase 2 tender was based

Phase 2 tender brief

The Phase 2 tender sought the following outputs:

1. A set of potential translocation sites identified with the Capercaillie Emergency Plan Programme Board and Scientific Advisory Group from the following list prioritised in Phase 1: Deeside; Speyside (adjacent to the existing stronghold); Capercaillie Special Protected Areas (SPAs) outwith the Cairngorms National Park; and other areas of Scotland.
2. A decision-making framework for Capercaillie reinforcement site selection which factors in the Scottish Conservation Translocation Code and is informed by existing data and recognised translocation planning methods, including an expert elicitation workshop, convened by the Cairngorms National Park Authority.
3. Detailed assessment and ground-truthing of ecological conditions and risks for the sites selected using the decision-making framework.
4. Site selection
 - a. A comprehensive report for each site selected using the decision-making framework, evaluating the ecological suitability and associated risks of each site.
 - b. In parallel, the Cairngorms National Park Authority will begin discussions with landowners and managers to explore potential interest in hosting a reinforcement release, and will engage with those responsible for potential sites identified with the Capercaillie Emergency Plan Programme Board and Scientific Advisory Group.
 - c. A programme of local community consultation will also be undertaken by the Cairngorms National Park Authority to gauge support, identify potential concerns, and explore opportunities for co-designing the implementation of any future reinforcement. It is expected that the contractor will work closely with the Cairngorms National Park Authority on delivering this work, including presenting findings and helping to answer questions that arise from communities, and landowners and managers.

5. *A Population Viability Analysis (PVA) to inform reinforcement planning and decision-making. The analysis will provide:*
 - a. *A rationale for a ‘trigger point’ for when to move forward with reinforcement.*
 - b. *Evidence to understand the necessary carrying capacity of a release site, to support final site selection decisions.*
 - c. *Evidence on the number of birds that would be needed to carry out a reinforcement, and what a sustainable survival level would need to be.*
6. *A final report with specific reinforcement information assessed in more detail, including:*
 - a. *Logistics of egg transfer (how long are they viable etc.)*
 - b. *The status of the current UK ex-situ population – numbers and provenance*
 - c. *Status of wider European ex-situ population, especially in EAZA accredited zoos*
 - d. *Feasibility of obtaining derogations on quarantine requirements for importing birds or eggs from Europe*
 - e. *Expert interviews to produce a short review of current knowledge on ex-situ Capercaillie rearing and reproduction, including direct engagement with existing reinforcement and reintroduction projects across Europe, to assess the range of methods and techniques being used and the evidence available on their success*
 - f. *Evaluation of potential in-situ source populations in Europe, informed by consultation with managers of current European reinforcement projects and relevant experts, to identify suitable populations and understand associated management practices and genetic considerations.*

E. Annexes

Annex 1. Phase 2 stakeholder session Friday 16 January 2026

Capercaillie reinforcement feasibility study Phase 2 stakeholder session

Friday 16 January | 10.30am – 12.30pm | Balmoral Estate

Attendees

Adam Smith (Glen Tanar), Andy Davis (FLS), Carolyn Robertson (Park Authority), Claire Smith (RSPB Crannach), Glyn Jones (Balmoral), Helen Gray (RSPB), Ian Hill (Invercauld), Malcolm Nicol (Ballogie), Mark Brazendale (Abergeldie), Mark Nicolson (Mar Estate), Mike Daniels (UHI), Mike Smedley (NatureScot), Paul Chapman (SAC Consulting), Rosalind Bryce (UHI), Ryan Cumming (Abergeldie), Shaila Rao (Mar Lodge), Simon Ritchie (NatureScot, Muir of Dinnet), Xavier Lambin (University of Aberdeen)

Background

The aim of this stakeholder session was to continue work outlined in the Capercaillie Emergency Plan to evaluate the feasibility of reinforcing the Scottish capercaillie population.

Following a stakeholder workshop held in May (2025) to inform Phase 1, the project has moved into its next stage. A Phase 2 contract has been awarded to a delivery team from the University of the Highlands and Islands (UHI), the Royal Zoological Society of Scotland (RZSS), the University of Glasgow, and the University of Aberdeen.

This session focused on progressing the work in more detail, initially with landowners and managers in Deeside, members of the Scientific Advisory Group for the Capercaillie Emergency Plan and the RSPB Capercaillie Advisory Officer, to:

- Identify potential reinforcement sites in Deeside for assessment; and
- Agree the criteria that will be used to assess those sites as part of the feasibility study

During Phase 1, Deeside was identified as the highest-priority area for further investigation from a list of potential translocation sites and is therefore the focus for this more detailed assessment. The full Phase 1 report is available on the Cairngorms National Park website [here](#).

Draft criteria for assessing potential reinforcement sites in Deeside

Copies of a draft criteria table were distributed and discussed within small groups. There was general agreement on additional factors that should be considered. A summary of the discussion points is provided below and the amended table is presented as Table 1 (page 19)

Main discussion points

- It was suggested that the table of criteria could be re-modelled as a decision matrix to guide the research team, and ultimately land managers through an evaluation process. This could begin with the most important criteria and consist of a series of questions to ascertain the suitability of a site.
- It was noted that some criteria are fixed attributes of a site that can't be influenced through management while others are directly related to management decisions e.g. diversionary feeding. It was suggested that any weighting of criteria should reflect this.
- It was noted that suitable habitat is highly likely to cross multiple land-ownership boundaries. It is necessary that site evaluations are done collaboratively to locate the best continuous site conditions.
- Connectivity is not currently included in the table. This should be considered as there is the potential for sites along Deeside to be recolonised. The potential for hens to disperse over long distances was highlighted.
- Connectivity could be assessed in terms of proximity to other capercaillie areas / sites assessed as suitable for capercaillie. It was also recommended to include where a site is in relation to the wider range e.g. centrally or on the edge.
- It was suggested that it may be helpful to include information about how recently capercaillie were lost from the site, as this may be an indicator of current habitat quality. There is potential to also include cause of death for last capercaillie recorded at a site (if known) as this may provide insights into pressure from dogs, predators etc.
- It is recommended that the sex of existing capercaillie is included, with the presence of hens weighted more favourable.
- It was suggested that connectivity and patch size need to be looked at together to identify the most suitable sites. A question was raised about the extent to which capercaillie can / will cross open ground so the significance of this can be evaluated in potential sites. Edge effect should also be considered as a factor. There may be potential to include a spatial ranking for site-based criteria e.g. proximity of good quality habitat to lek sites and brood rearing areas (if the information is available).

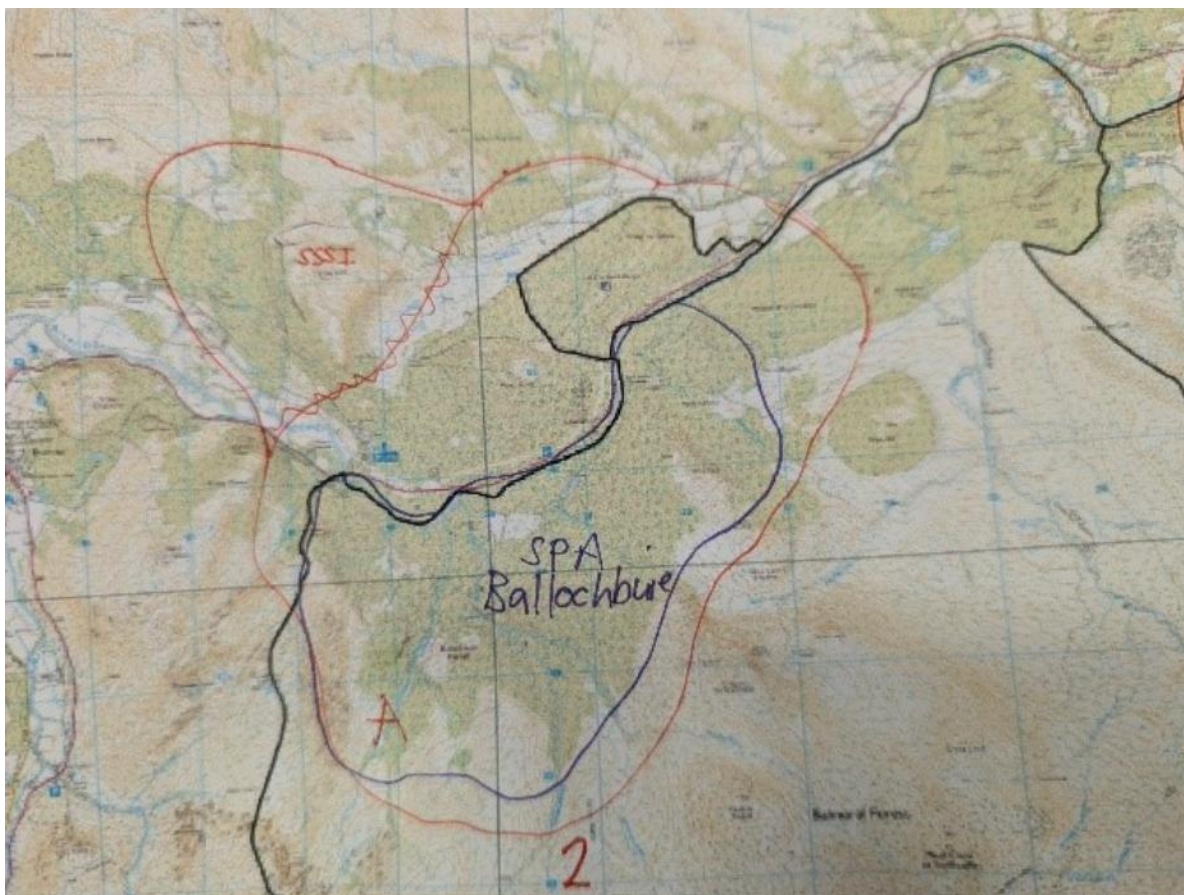
- Habitat preferences were discussed e.g. the use of broad-leaved forest in Cantabria, and the possibility that capercaillie could occupy habitat in Scotland outside of pine woods. There were questions raised in relation to broad-leaved versus coniferous and commercial plantations versus semi-natural habitats. An observed preference for larch was noted. It was generally thought that forests/woodlands with greater diversity would be positive for capercaillie and continuous cover woodland is beneficial.
- The structure of ground vegetation is important as well as species diversity. Diverse plant species (including cotton grass, blaeberry and bog willow) are likely to support good insect diversity. A point was made about the potential value of invertebrate abundance surveys/data to be included as part of site assessments. It was highlighted that rather than bog cotton being a criterion, we should be thinking about forest bog habitat that contains flowering bog cotton (as opposed to pinewood with cotton grass that exists higher up glens).
- A criterion on forest structure could be included and assessed as good/moderate/poor, with good structure including thickets of juniper or fallen dead wood.
- Root plates and fallen trees provide dust baths for birds that may reduce parasite load. It was noted that an overall blaeberry sward height of 20-25cm or less is preferable so the stated optimal vegetation height may need modification.
- The predation criterion should distinguish between avian and mammalian predators.
- Future management plans / intentions need to be considered within the list of criteria. These should be inclusive of any plans for recreational access, including mountain biking activity as this is felt to be the main form of disturbance in some capercaillie areas in Deeside. Consideration to be given of whether a ranger service is present to promote responsible access.
- There was a question as to whether deer management should be specifically considered as a criterion or whether it's sufficient to capture this indirectly through habitat measures. Questions were posed about what level of deer management would be optimal for capercaillie.
- Ticks were raised as a potential issue, given their high prevalence in some woodland areas.
- There was a comment about the suggested approach to assessing the presence of marked fences. There are different types / levels of fence marking with full length markers, closely spaced, being much better than partial marking. This should be captured in the assessment. The issue of fences acting as barriers to bird movement should be considered.

Identifying potential reinforcement sites in Deeside for assessment

Both discussion groups converged on the same set of general, potential reinforcement sites, with one group indicating significantly larger site boundaries. Some participants took the view that no sites are currently ready for reinforcement, so the general ranking of sites is in terms of their potential readiness at this stage.

‘Ballochbuie / Inver / Garmaddie / Invergelder’

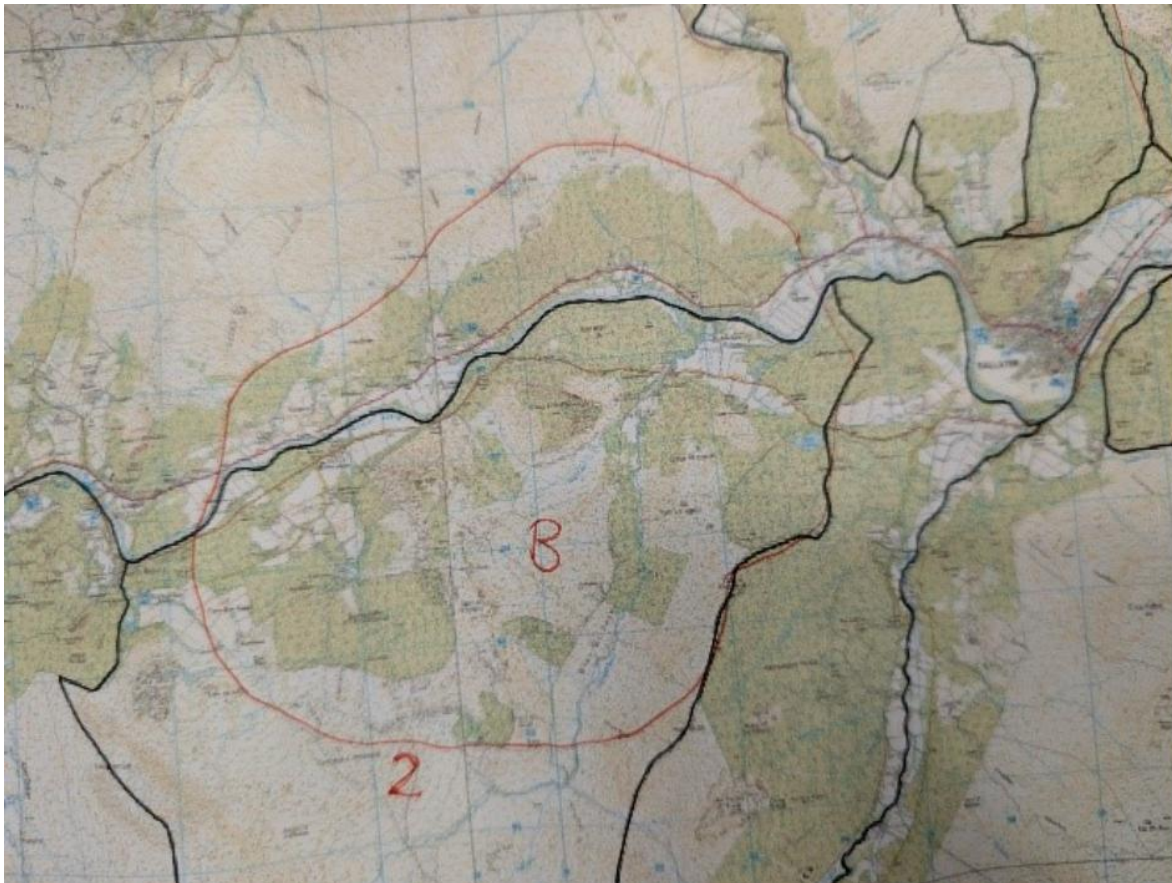
There was consensus among the group that the site with greatest potential includes the Ballochbuie SPA within Balmoral Estate, Invergelder and the FLS Inver forest block. This would also take in part of Invercauld Estate. This proposal recognised the substantial and ongoing capercaillie habitat management work in the area, the presence of capercaillie and suitable deer management. This area encompasses the Creag Clunie and The Lion’s Face SSSI on the north side of the Dee. In the Ballochbuie site, visitors tend to stay on core paths so there is lower recreational pressure.



Boundaries of the ‘Ballochbuie / Inver / Garmaddie / Invergelder’ potential reinforcement site as drawn by stakeholders during the session.

‘Abergeldie’

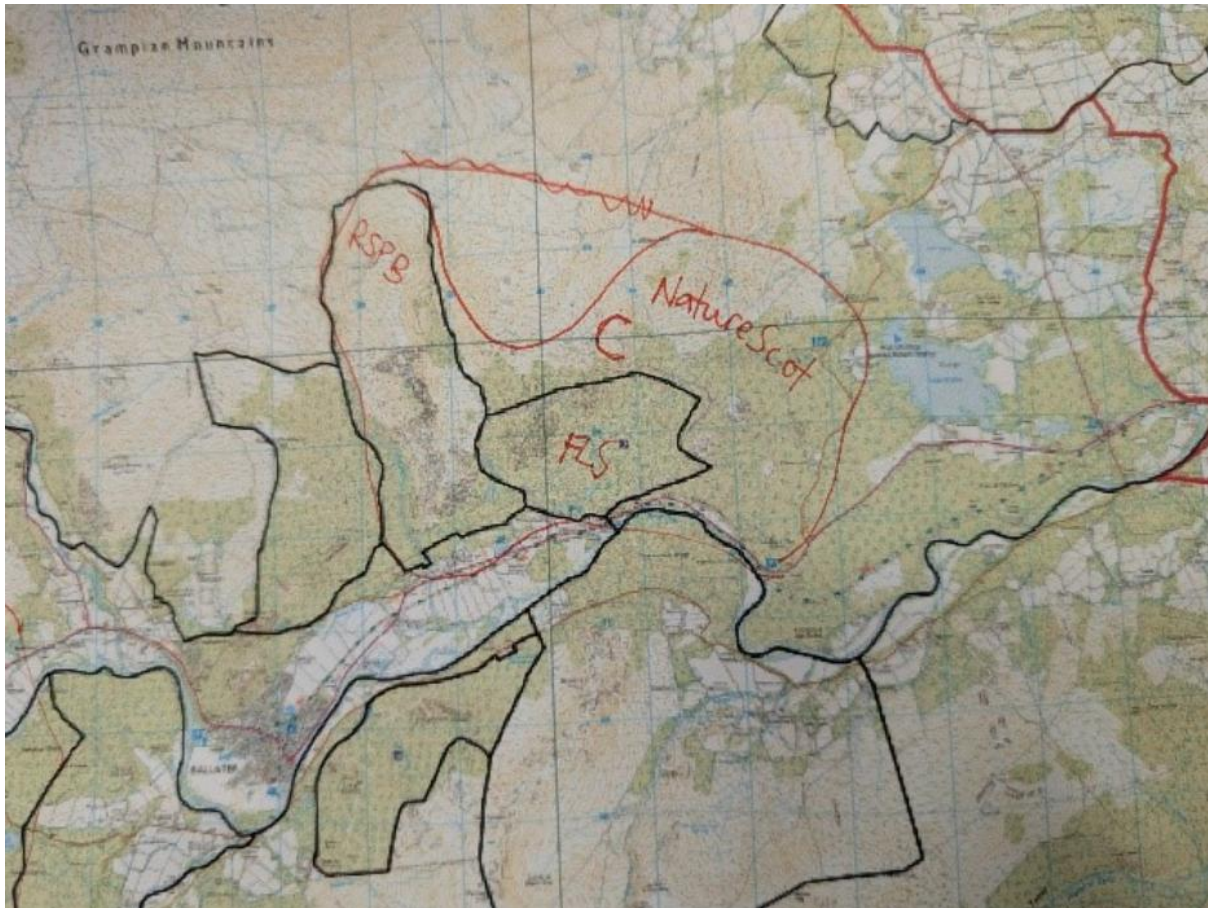
A site centred on Abergeldie was also considered to have good potential. One group indicated that this site would have a boundary just to the west of Ballater, while the second group indicated a much larger area, including the Cambus o’ May area (which was considered a separate potential site by the first group). There is active habitat management ongoing to the south of this site, so the suitability of this site will increase over time.



Boundaries of the ‘Abergeldie’ potential reinforcement site as drawn by stakeholders during the session.

‘Cambus o’May / Muir of Dinnet / Crannach’

This site would include land belonging to FLS, RSPB and NatureScot. In general, the sites are considered subject to relatively low recreational disturbance (with the exception of the area surrounding Cambus o’May). There are good quality areas of bog and capercaillie are present.



Boundaries of the ‘Cambus o’May / Muir of Dinnet / Crannach’ potential reinforcement site as drawn by stakeholders during the session.

‘Mar Lodge / Mar Estate’

There are no capercaillie on this site but good areas of suitable habitat exist. Some concerns were raised about the drying out of sphagnum reducing the presence of bog habitat on Mar Estate. There was a comment that preparatory habitat management would be more expensive due to the current thickness of the vegetation understory. An advantage of this site, would be the provision of connectivity to the Speyside capercaillie population. In general, there is good potential for dispersal of birds to multiple sites in Deeside.

‘Glen Tanar / Birse / Ballogie / Finzean’

Capercaillie records are increasingly limited around Birse, Ballogie and Finzean which make up the eastern edge of the capercaillie range in Deeside. Habitat management for capercaillie on Glen Tanar Estate may be upscaled as part of the Capercaillie Emergency Plan and is expected to improve site conditions over time. Glen Tanar was identified as a key area linking birds at the eastern edge of the Deeside range with the central population around the Ballochbuie area. Although some parts of Glen Tanar experience high levels of recreational activity, there remains a substantial amount of ‘quiet space’ suitable for capercaillie. Overall, whilst Glen Tanar was considered to have potential as a reinforcement site it was felt that more centrally located areas within Deeside may offer released capercaillie greater opportunities to breed with the existing population and for wider dispersal.



Boundaries of the ‘Glen Tanar / Birse / Ballogie / Finzean’ potential reinforcement site as drawn by stakeholders during the session.

Next steps

There was a general discussion about how to approach site assessments. It was proposed that land managers should be involved in field visits, and that site walkovers with them would be productive. A suggestion was made that the transects used for the National Capercaillie Survey could be used as a framework. Establishing the size of suitable habitat will be important, and dispersal data should be used to establish how areas of open ground will influence the population.

Other aspects for consideration include ensuring that site visits take place as early as possible to avoid disturbance to capercaillie. Where relevant, the team will seek to use the Capercaillie Sightings and Signs app, which is managed by the RSPB. Site assessment should include a focus on potential habitat management improvements to enable sites to become more suitable for reinforcement should the decision be made to proceed.

The project team will update the site assessment criteria based on the outcomes of the workshop. The next stage will be the design of a site assessment strategy which will focus on areas within the 'Ballochbuie / Inver / Garmaddie / Invergeldier' potential reinforcement site. If time allows, the assessment may also extend to a second potential reinforcement site. There will be continued engagement with stakeholders and land managers in Deeside to develop the site assessment.

Annex 2. Site assessment

CAPERCAILLIE REINFORCEMENT FEASIBILITY STUDY – PHASE 2

Site assessment

This site assessment sought to answer the following questions:

1. Which area should be the focus of a potential reinforcement?

The Capercaillie Emergency Plan Programme Board recommended focusing on Deeside at their meeting on 16 December 2025.

2. Which criteria and weighting to use to assess sites?

Criteria were discussed at a stakeholder workshop with land managers in Deeside on January 16th 2026 (see Annex 1) and by subsequent feedback. It was agreed to focus on key habitat criteria for Capercaillie, especially for brood habitat. Twelve specific habitat focussed criteria were identified and seven wider area criteria, Table 1 and Figure 1. Workshop participants did not feel that any of the criteria should be deemed more important than others, so no weighting was applied.

Table 1. Criteria assessed

Plot based			
Criteria	Criteria		
Class (score)	High (3)	Medium (2)	Low (1)
Tree canopy	Open canopy, frequent flight paths	Some open canopy, some flight paths	Dense canopy, few flight paths
Vegetation structure	Very diverse thickets, juniper and fallen trees	Some thickets and / or some fallen trees	Single layer understory
Blaeberry cover	50% / heather non-dominant	10-40% / mainly heather	<10% / heather dominant
Bog cotton	Frequent patches	Some patches	None
Vegetation height	20-25 cm throughout	Patches of 20-25cm	Most > or < 25cm
Chick access	Frequent paths / clearings	Some paths / clearings	No paths / clearings
Dust baths	Frequent root plates / soil patches	Some root plates / soil patches	No root plates / soil patches
Ant nests	Frequent	Some	None
Fences and marking	No fences	Fences marked	Fences unmarked
Disturbance	No paths	Quiet path	Busy path
Water availability	Frequent pools / water	Some pools / water	No pools / water

Low ticks from deer	Low level of deer signs	Moderate level of deer signs	High level of deer signs
Location based			
Patch size	3-400 ha suitable habitat / good connectivity	1-300 ha suitable habitat / some connectivity	< 100 ha suitable habitat / isolated
Existing caper	Male and female present	Males only	none
Disturbance	No near car parks		Car park close by
Ranger service	All year	Seasonal	None
Gamebird releases	None	Nearby	Close by
Cattle	Present		None
Predator management	Diversionary feeding		None

Figure 1. Examples of ‘high’ scoring criteria a) for ‘tree canopy’ – open canopy with frequent flight paths, ‘blaeberry cover’ - >50% and ‘vegetation height’ – 20-25cm throughout; b) ‘vegetation structure’ - very diverse thickets Juniper and fallen trees



a)



b)

3. Which site(s) to look at within Deeside?

At the stakeholder workshop on January 16th 2026 there was consensus that the site with greatest potential took in the Ballochbuie SPA within Balmoral Estate, Invergelder and the FLS Inver forest block, here termed the ‘Ballochbuie / Inver / Garmaddie / Invergelder’ site. It was recognised that within this proposed area and immediate surrounds:

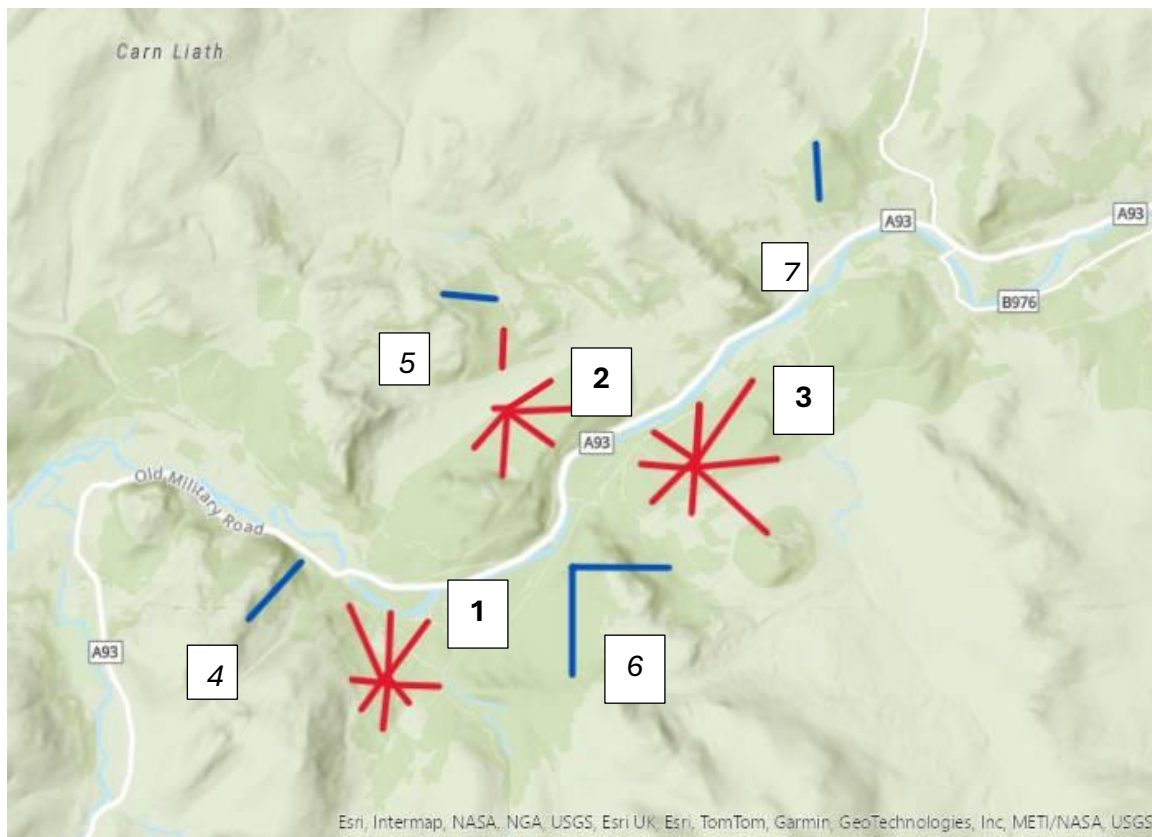
- Capercaillie still persist;
- Substantial Capercaillie positive habitat management work has taken place, and is ongoing;
- Active deer management for woodland objectives is underway;
- Recreation pressure is considered manageable as visitors tend to keep to main paths;

- e. The site is strongly positioned with respect to the potential for birds to expand west to the ‘Mar Lodge / Mar’ site and eastwards to the ‘Abergeldie’; ‘Cambus o’May / Muir of Dinnet / Crannach’ and ‘Glen Tanar / Birse / Ballogie / Finzean’ sites.

4. *What could be potential release locations within the Ballochbuie / Inver / Garmaddie / Invergelder?*

A meeting and walkover the site was held with land managers from the three landholdings – Balmoral Estate, Invercauld Estate and Forest Land Scotland on the 6th February 2026 and three potential release locations were identified. These are ‘1. Ballochbuie West’; ‘2. Meall Alvie’ and ‘3. Woods of Garmaddie’, Figure 1. These locations were considered optimal in terms of habitat quality, accessibility for a translocation initiative and relatively low disturbance levels.

Figure 2. Location of sample transects. Transects followed compass points radiating from the three locations in red. Additional sample transects are in blue.



1. Ballochbuie West; 2. Meall Alvie; 3. Woods of Garmaddie; 4. *Charter’s Chest*; 5. *Balloch Plantation*; 6. *Ballochbuie Central* and 7. *Parliament Knowe*.

Methods

Fieldwork was carried out in February 2026 to avoid any disturbance to potential breeding caper during March. Plots were assessed along N, NE, E, SE, S, SW, W, NW compass bearing transects radiating from each of the three locations: 1. Ballochbuie West; 2. Meall Alvie and 3. Woods of Garmaddie for approximately 1 km or until a significant habitat barrier was encountered. At 50m intervals along each transect line a GPS co-ordinate was taken and the area within a 10m radius from the observer was assessed against the 12 plot-based criteria. Each criteria was recorded as 'high', 'medium' or 'low', and given a score of 3, 2 or 1 respectively. To assess the wider area, additional locations were also sampled by transects at 4. Charter's Chest (SW); 5. Balloch Plantation (W); 6. Ballochbuie Central (E and S) and 7. Parliament Knowe (S). For each location an average score per plot for all criteria was calculated.

The seven site-based criteria were assessed for each of the three potential locations in liaison with land managers.

Results

A total of 514 plots were assessed with approximately 120 plots for each of the three potential locations, with additional plots surveyed on the transects within the wider area, Table 2.

Of the three potential locations the Woods of Garmaddie had the highest overall average score. It also had the highest average individual scores for six of the twelve criteria: vegetation structure; blaeberry cover; vegetation height; access for chick movements; low human disturbance, and the joint highest for low deer and tick presence. Ballochbuie West had the second highest average score, and was also the highest for six other criteria: open tree canopy; bog cotton; dust baths; ants nests; lack of fences and water availability. Meall Alvie was third, scoring joint highest for one criteria: low numbers of deer signs associated with ticks.

Table 2. Average scores for each location for habitat criteria. Highest score for each criteria for the three potential locations is highlighted in green

Location	No. of plots assessed	Open tree canopy	Vegetation structure	Blaeberry cover	Bog cotton	Vegetation height	Chick access	Dust baths	Ant nests	Lack of fences or marked	Low disturbance	Water availability	Low ticks from deer	AVERAGE SCORE
1. Ballochbuie West	123	2.8	1.3	1.7	1.4	1.8	2.3	1.6	1.2	3.0	2.6	1.5	2.5	23.7
2. Meall Alvie	118	2.7	1.4	1.5	1.0	1.5	2.1	1.3	1.0	2.9	2.6	1.1	2.9	22.4
3. Woods of Garmaddie	120	2.7	2.2	2.7	1.2	2.6	2.9	1.4	1.0	2.9	2.8	1.2	2.9	26.2
4. Charter's Chest	32	3.0	1.5	2.3	1.0	2.3	2.4	1.5	1.1	2.9	2.8	1.2	2.8	24.7
5. Balloch Plantation	23	2.9	1.4	1.7	1.0	1.4	3.0	1.2	1.0	3.0	3.0	1.1	2.0	22.6
6. Ballochbuie Central	79	3.0	1.3	1.2	1.0	1.0	3.0	1.8	1.1	2.9	2.9	1.2	1.2	21.4
7. Parliament Knowe	19	2.9	1.7	1.7	1.1	2.1	2.4	1.4	1.2	3.0	3.0	1.5	2.0	23.8
8. ALL PLOTS	514	2.8	1.6	1.9	1.2	1.9	2.5	1.4	1.1	2.9	2.7	1.3	2.6	23.9
Rank		2	8	6.5	11	6.5	5	9	12	1	4	10	3	

For all the plots assessed, including those in the wider area, the highest average scores were for the criteria: lack of fences / marked fences; open tree canopy; low deer and ticks; low disturbance and access for chicks to move around. The lowest average scores for criteria across the whole site were for the lack of ant nests; bog cotton; water availability; dust baths and vegetation structure.

For location-based assessment criteria Ballochbuie West scored high for five criteria: patch size, existing caper, ranger service; no game bird releases diversionary feed and for a sixth, cattle grazing is coming soon. Meall Alvie scored high for three criteria: patch size, low disturbance and no game bird releases. Woods of Garmaddie scored high for five criteria: patch size, low disturbance, ranger service; no game bird releases diversionary feed and for a sixth, cattle grazing is coming soon, Table 3.

Table 3. Classification of criteria for location based criteria

1. Ballochbuie West			
Patch size	3-400 ha suitable habitat / good connectivity	1-300 ha suitable habitat / some connectivity	< 100 ha suitable habitat / isolated
Existing caper	Male and female present	Males only	none
Disturbance	No near car parks		Car park close by
Ranger service	All year	Seasonal	None
Gamebird releases	None	Nearby	Close by
Cattle	Present	<i>coming soon.....</i>	None
Predator management	Diversionary feeding		None

2. Meall Alvie			
Patch size	3-400 ha suitable habitat / good connectivity	1-300 ha suitable habitat / some connectivity	< 100 ha suitable habitat / isolated
Existing caper	Male and female present	Males only	none
Disturbance	No near car parks		Car park close by
Ranger service	All year	Seasonal	None
Gamebird releases	None	Nearby	Close by
Cattle	Present		None
Predator management	Diversionary feeding		None

3. Woods of Garmaddie			
Patch size	3-400 ha suitable habitat / good connectivity	1-300 ha suitable habitat / some connectivity	< 100 ha suitable habitat / isolated
Existing caper	Male and female present	Males only	none
Disturbance	No near car parks		Car park close by
Ranger service	All year	Seasonal	None
Gamebird releases	None	Nearby	Close by
Cattle	Present	<i>coming soon.....</i>	None
Predator management	Diversionary feeding		None

Discussion

It was agreed to focus on Deeside; within Deeside on the ‘Ballochbuie / Inver / Garmaddie / Invergelder’ site; and within this site to look at three focus locations: 1. Ballochbuie West; 2. Meall Alvie and 3. Woods of Garmaddie. The suitability of habitat – particularly brood habitat – for was assessed for twelve agreed criteria without weighting. Of the three sites assessed the two in Ballochbuie scored highest with the Woods of Garmaddie the highest scoring overall.

Across the wider area many of the criteria scored highly including for the criteria: lack of fences / marked fences; open tree canopy; low deer and ticks; low disturbance and access for chicks to move around. The wider area scored lowest for the lack of ant nests; bog cotton; water availability; dust baths and vegetation structure. These findings reflect previous work which found Deeside comparatively low on water and bog cotton. However, there were also higher numbers of Capercaillie in the past in the area when these criteria were the same and other criteria were lower particularly deer fences; high deer numbers and lack of blaeberry. Extensive work over the last few decades have reduced the deer population, increased the canopy suitability and blaeberry cover across the area.



Annex 3. Technical Report: A Population Viability Analysis (PVA) to inform reinforcement planning and decision-making

Please use the link below to read the report:

[Annex-3.-Technical-Report-A-Population-Viability-Analysis-PVA-to-inform-reinforcement-planning-and-decision-making.pdf](#)

Annex 4. Logistics of population reinforcement

All information provided below relates to part 6 of the Phase 2 Reinforcement Feasibility Study and was led by Royal Zoological Society of Scotland's (RZSS) Conservation Manager (David Barclay) in collaboration with RZSS WildGenes Programme Manager (Dr Alex Ball), RZSS Head of Conservation & Science (Dr Helen Senn) and Independent UK Aviculturist Specialist (Gavin Harrison). The information provided has been compiled following expert analysis (genetics), direct communication with Capercaillie specialists, World Pheasant Association (WPA) members, Chair of WPA Conservation Breeding Advisory Group (CBAG), Government Veterinary Advisor, European Association of Zoos and Aquaria (EAZA) Capercaillie Breeding Programme Coordinator, individual zoo members of EAZA experienced in Capercaillie management / breeding and all known experienced private breeders / holders of Capercaillie in UK. Information was recorded during a combination of site visits, online meetings, phone calls and email communication.

Introduction

Conservation translocation efforts utilizing captive bred individuals for release have become more common in recent years, especially for species with fragmented or depleted wild populations. In the UK recent species recovery projects using captive bred animals include Water voles, *Arvicola amphibius*, Wildcats, *Felis silvestris*, European beaver, *Castor fiber*, and Red-billed chough, *Pyrrhocorax pyrrhocorax*, to name a few. In Europe Western Capercaillie (*Tetrao Urogallus*) translocation recovery projects are also becoming more common with at least 8 active projects in 2026 (Croatia, Poland x 3, Czechia, Germany, Spain, France). Of these projects 7 out of 8 have dedicated breeding centers and include the use of captive bred individuals for release (at least to some extent) highlighting the potential value of the captive population as a source.

This report provides a detailed overview of key factors that have the potential to influence Capercaillie reinforcement using both wild and / or captive birds including, egg transfers, management, quarantine, rearing methods and genetic assessments. It also provides a summary of the status of the captive (ex-situ) populations within UK and Europe along with recommendations for ongoing captive management that could support future reinforcement if deemed necessary.

a. Logistics of egg transfer

For this report, egg transfer is defined as the deliberate movement of eggs, both wild and / or captive, from one location to another to support species recovery. Historically this technique has been utilised for several species and for various purposes including head starting (e.g. Black-Tailed Godwit, *Limosa limosa*), conservation breeding (e.g. California condor, *Gymnogyps californianus*) and as a tool to increase genetic diversity or improve wild reproduction (e.g. Great Indian Bustard, *Ardeotis nigriceps*). Although this practice is not considered common place for Capercaillie it has been used for both transfer of eggs to support captive breeding (UK and EU) and for transferring wild sourced eggs for conservation breeding for release projects (Spain). In Spain eggs from a local population were used thus limiting transfer time.

It is important to note that whilst the process is possible, for both wild sourced eggs and captive eggs, there are multiple pathways for such transfers, each presenting their own set of challenges. These pathways are summarised in Table 1.

Table 1: Summary of transfer pathways for eggs (wild and captive)

Egg Transfer pathway	Description
Wild (EU) - Wild (Scot)	Involves the removal of eggs from wild Capercaillie nests from European range countries for transfer to wild Capercaillie nests in Scotland
Wild (Scot) – Wild (Scot)	Involves the removal of eggs from wild Capercaillie in Scotland for transfer to wild Capercaillie nests in other Scottish subpopulations
Wild (EU) – Captive (UK)	Involves the removal of eggs from wild Capercaillie nests from European range countries for transfer to captive breeding facilities in the UK to support conservation breeding for release
Wild (Scot) – Captive (UK)	Involves the removal of eggs from wild Capercaillie nests in Scotland for transfer to captive breeding facilities in the UK to support conservation breeding for release
Captive (EU) – Captive (UK)	Involves the removal of eggs from captive breeding facilities in Europe for transfer to captive breeding facilities in the UK to support conservation breeding for release
Captive (UK) – Captive (UK)	Involves the removal of eggs from captive breeding facilities in UK for transfer to other captive breeding facilities in the UK to support conservation breeding for release
Captive (EU) – Wild (Scot)	Involves the removal of eggs from captive breeding facilities in Europe for transfer directly into wild nests in Scotland

Transfer management

With regards to the transfer of eggs there are specific challenges dependant on the stage of development. For all Capercaillie incubation is started when the last egg is laid, with clutch sizes averaging ~8 eggs. The full incubation period for Capercaillie eggs is 28 days. “Stored” eggs i.e. where incubation has not been started, are more resilient to temperature and transfer duration. Such eggs can be transferred without the need for dedicated temperature controlling equipment (e.g. travel incubators) assuming temperature extremes are avoided (maintaining ~16 degrees) and can survive a transfer duration of ~5-7 days before need for incubation. Eggs that have had incubation started (either naturally or artificially) are at greater risk from temperature change and transfer duration. To reduce such risks incubated eggs should be transferred immediately to travel incubators to ensure the necessary temperature can be maintained. Transfer of any eggs should always be carried out with great care and with protective transfer equipment to minimise disturbance and reduce damage risk.

Egg removal

Knowledge of nests and behaviour of females prior to egg removal is also of great importance as this helps determine the stage of egg development. In wild populations monitoring of nests and females is likely more challenging however could be achieved with dedicated field teams and use of cameras (trail or CCTV). In captive facilities monitoring of nests and females is a standard activity for all holders / breeders, often with good record keeping of specific data (e.g. dates, egg counts, behaviour etc). Where productivity can be an objective, removal of the first clutch of eggs for hand rearing, thus encouraging the female to lay a 2nd clutch (double clutching) is commonly practiced. Implementing the same strategy for wild populations is in theory possible but likely carries significantly greater risk, especially for depleted / fragile populations.

Risk

It is important to note that for nesting Capercaillie disturbance around the nest site, in particular removal / replacement of eggs, can carry significant risk. Extreme situations could cause females to abandon nests either temporarily or permanently thus compromising the survival of eggs / chicks. It has also been observed that female Capercaillie have deliberately pushed foreign eggs out of the nest, i.e. those that have been transferred from another nest. Consideration as to when eggs should be removed during clutch development is also important as removal of eggs before the final egg is laid could also add risk. For any egg transfers expertise in egg handling, management and where necessary artificial rearing are critical. Skills for successful Capercaillie reproduction and management can take years to develop for new staff. Table 2 provides an overview of the risks, benefits and challenges with each egg transfer pathway.

Table 2: Risk, benefits, challenges to various egg transfer scenarios (wild & captive)

Egg Transfer Pathway	Risks	Benefits	Challenges
Wild (EU) - Wild (Scot)	Uncertainty over incubation phase Disturbance to nests / females Higher disease risks Damage to eggs Harm to source population if unsuccessful	Increased genetic diversity	Source Gov approval needed Resources / cost Knowledge & monitoring of source populations

Egg Transfer Pathway	Risks	Benefits	Challenges
Wild (Scot) – Wild (Scot)	Uncertainty over incubation period Disturbance to nests / female Damage to eggs Harm to population if unsuccessful	Increase genetic diversity across sub-populations	Gov approval needed Knowledge & monitoring of source populations
Wild (EU) – Captive (UK)	Uncertainty over incubation period Disturbance to nests / female Damage to eggs Harm to population if unsuccessful	Increase captive genetic diversity in captive population Greater control for successful rearing Insurance against loss of new genes	Source Gov approval needed Resources / cost Knowledge & monitoring of source populations
Wild (Scot) – Captive (UK)	Uncertainty over incubation period Disturbance to nests / female Damage to eggs Harm to population if unsuccessful	Increase captive genetic diversity in captive population Greater control for successful rearing Insurance against loss of new genes	Source Gov approval needed Knowledge & monitoring of source populations
Captive (EU) – Captive (UK)	Disturbance to nest / female Damage to eggs	Increase captive genetic diversity Greater control for successful rearing Insurance against loss of new genes More control to double clutch	Transfer costs Unknown genetic status in captive population

Egg Transfer Pathway	Risks	Benefits	Challenges
Captive (UK) – Captive (UK)	Disturbance to nest / female Damage to eggs	Control for successful rearing Creation of new breeding pairs without movement of birds More control to double clutch	Some transfer costs Unknown genetic status in captive population
Captive (EU) – Wild (Scot)	Disturbance to nest / female Damage to eggs	Potential increase captive genetic diversity More control to double clutch	Transfer costs Unknown genetic status in captive population

b. The status of the UK ex-situ population.

Historically Western Capercaillie have not been held in large numbers in UK Zoological collections. Data from the global Zoological Information Management System (ZIMS) shows that from the 1970s to 2017 there are records of Capercaillie being held at 7 different institutions. These include RZSS Highland Wildlife Park 1974-2017, RZSS Edinburgh Zoo 1983-1992, Beale Wildlife Park 1990-2000, Camperdown Wildlife Park 1996-2000, Paignton Zoo 1987-1994, Scottish Deer Centre 2002-2021 and Cotswolds Wildlife Park 1992-1998. While not exhaustive this represents the main holding institutions in the UK in the last 50 years with no birds currently held by any UK zoo.

Similarly to zoological institutions private aviculturist have struggled with Capercaillie largely due to their challenging management and susceptibility to parasites and disease. There are however still a small number (5) of experienced private holders in the UK that are actively managing and breeding Capercaillie. This being the only managed captive UK population. Of the 5 private holders 2 are based within Scotland and 3 are based in England. Meetings (via phone call) were carried out with 4/5 of these holders between Jan – March 2026. Site visits were also carried out to both Scottish holders to view breeding facilities. Communication with the 5th holder was had however this was limited to brief email exchange.

Population summary

Based on all available data and interviews, there is an estimated UK population of ~79 (~16 male / 63 female) Capercaillie that are managed solely by private (non-zoo) holders. This population is spread across 4/5 holders, as one holder had no birds at the time of data collection. Around 60% of this population is held at holder 2. Data relating to population status, enclosure and breeding status is summarised in Table 3. For holder 2 an estimated population (i.e. no. of birds) was provided by the holder directly whereas for holder 4 and estimation was made based on discussion with other holders that have collaborated with them.

Table 3: Overview of UK Capercaillie captive population

Details	Holder 1	Holder 2	Holder 3	Holder 4	Holder 5
No. birds (Male.Female)	2.5	~8.42	3.8	Unknown – estimated at ~3.8	0
Breeding status	Active	Active	Active	Active	N/A
Preferred rearing method	Hand rearing	Foster rearing & hand rearing	Hand rearing	Unknown	Foster rearing
Experience moving eggs	Yes	Yes	No	Unknown	No
Experience double clutching females	Yes	Yes	Sometimes	Unknown	Unknown
Enclosure type	Floored indoor & outdoor	Raised floor outdoor	Floored indoor	Floored	Unknown
Enclosure substrate	Sand / grass	Plastic grates	Sand	Unknown	Unknown
World Pheasant Association member	Yes	No	No	Unknown	No
Part of established breeding programme	No	No	No	No	No

Breeding programme status / association membership

Of the 5 Capercaillie holders in the UK, 1 was a member of the World Pheasant Association (WPA) and currently holds the position of chair for the WPA Conservation Breeding Advisory Group (CBAG). None of the holders are part of an established breeding programme however of the 4 holders interviewed all were open to explore this if a programme was established.

Management experience

All UK holders have extensive experience in the management and breeding of Capercaillie and / or other Galliformes with two of the holders having more than 30yrs experience alone with the species. From available information the most prolific UK breeder in recent years was Holder 2. Data provided indicated that ~150 birds were

successfully reared in one breeding season from a small number of birds, highlighting the potential for high productivity. These UK holders hold a wealth of expertise, experience, knowledge and skills that should be seen as highly valuable to future captive breeding of Capercaillie.

c. The status of the wider European ex-situ population (especially EAZA accredited zoos).

Within the European Association for Zoos and Aquaria there is an established breeding programme (European Ex-situ Programme – EEP) for the Western Capercaillie currently managed by EAZA member Sainte Croix Zoo, France. The EAZA breeding programme has the following objectives:

- support population restoration projects in regions where European Galliformes have disappeared or are declining
- provide genetically viable, healthy and behaviourally suitable individuals for reintroduction programmes, in accordance with IUCN guidelines
- structure and harmonise husbandry practices for the species
- improve reproductive performance across the network
- serve as a knowledge-sharing platform between EAZA zoos, specialised breeding centres, NGOs (WPA, Aviornis) and European conservation programmes
- maintain insurance populations for threatened subspecies or locally extinct populations.

With regards to data collection for the European population online meetings were held with experienced Capercaillie breeders from Bern Zoo, (Switzerland) and with the EAZA EEP Breeding Programme Coordinator from Sainte Croix Zoo (France). Following these meetings RZSS hosted the breeding programme coordinator on a 2-day visit to Scotland (appendix 1) where additional meetings were held to discuss the European population status, Capercaillie management and reproduction, population genetics and collaboration with European breeding for release projects. The visit was completed with a short site visit to Capercaillie habitat in Badenoch & Strathspey with RZSS Conservation Manager (David Barclay) and University of Highlands and Islands Researcher (Mike Daniels).

EAZA Population Summary

Data collected from the Zoological Information Management System (ZIMS) and from direct communication with the EAZA EEP Breeding Programme Coordinator shows there are a total of 15 European zoological institutions holding Western Capercaillie with a total population of 66 birds (30 male & 36 female). There are no zoological institutions in the UK holding the species.

Of these 15 holders there are 2 key breeders that are EAZA members, Bern Zoo and Sainte Croix Zoo, who in 2025 produced a total of 33 chicks. The EAZA breeding programme is currently supporting European breeding for release projects with several

transfers of captive birds to dedicated Capercaillie breeding centres. Further details on the EAZA population are shown in Table 4.

Table 4: Summary of current EAZA Breeding Programme population

Details of EAZA population	
Total population (M.F)	66 (30.36)
Number of holders	15
Population reproductive status	Breeding
Number of breeding institutions (2025)	5
Chicks available in 2025*	65
Number of chicks for transfer to release projects	24
Primary rearing method	Parent rearing
Secondary rearing method	Hand rearing

*Includes Western Capercaillie chicks bred at Valsemana breeding centre (Spain) as part of EEP population

Capercaillie management guidance

As part of the EAZA EEP Breeding Programme several key documents and presentations are available within the zoo community relating to Capercaillie management. These include established best practice husbandry guidelines, presentations, annual breeding reports and a report detailing conditions and criteria for the implementation of releases using captive birds.

European breeding centres

Although no visits or meetings were held with European breeding centres during this work some data was recorded from the EAZ EEP Breeding Programme Coordinator following several site visits of his own and collaboration (i.e. provision of birds, review of facilities) with several release projects.

Table 5: Summary of European breeding centres

Breeding centre details	Source	Estimated population (no. birds)	Release strategy	Active releases
Poland	Wild & captive	~20+	Born to be free / soft release	Yes
Germany	Wild & captive	~10 birds	Soft release	Yes
Czechia	Captive (possibly wild too)	~10-20+ birds	Soft release	Yes
Spain	Captive	Unknown	Soft release	Yes
Croatia	Unknown	Unknown	Unknown	Yes

d. Feasibility of obtaining derogations on quarantine requirements for importing birds or eggs from Europe.

The following information has been summarised following meetings with a Scottish Government Veterinary Advisor and the EAZA EEP Breeding Programme Coordinator.

All animal transfers, wild or captive, must ensure they are following all necessary national and international legislation and regulations. By default, animals transfers will often require some element of quarantine to ensure disease risk (toward native wildlife and people) is managed effectively, this applies regardless of whether the transfer is carried out to support species recovery or captive management. In some cases, this may involve a short isolation period with minimal disease screening whilst others may require a more extensive isolation period, with a higher level of containment and repeated disease screening. With regards specifically to disease risk management this will often require a Disease Risk Assessment (DRA) that reviews all potential pathways (i.e. wild to wild, wild to captive etc) of transfers and the associated risks and mitigations that can be applied. There are however situations where, dependant on the species or purpose of the transfer, specific derogations may be given to minimise the impact of quarantine. Examples could include species that are highly stressed and may not cope well with extended periods in quarantine facilities thus increasing mortality risk.

In the UK several examples of such derogations have previously been approved for various species, most notably Sea Eagle (*Haliaeetus albicilla*) and Spoon-billed Sandpiper (*Calidris pygmaea*). In the case of the Sea eagle, a derogation was approved for a wild sourced chick where management and disease screening of the individual were permitted to be carried out in a temporary in-situ quarantine enclosure. This approach reduced disturbance and imprinting on humans whilst allowing acclimatisation to the release environment. In the case of Sandpiper, a derogation was approved for wild sourced eggs where incubation and hatching were carried out in a

controlled quarantine facility with testing carried out on failed eggs / deceased chicks only, thus avoiding excessive disturbance to (e.g. during disease sampling) to other fertile eggs.

In Europe several derogations have been approved for Capercaillie transfers both from the wild to captive breeding centres and for direct wild to wild release. For the French project a derogation was approved for no quarantine with wild-to-wild transfers (direct release) requiring quick disease screening tests carried out in the source country (Norway) for West Nile disease and Avian Influenza only. Samples are then tested during the transfer period with birds released if negative. In 2 years of transfers 16 birds were transferred with no disease issues. Similar derogations have also been approved for Capercaillie projects in Poland. Birds that test positive for disease are euthanised. It has been suggested that for wild-to-wild transfers of Capercaillie the quicker birds can be released post-transfer the greater probability for survival. Table 6 provides an overview of the likely requirements for all transfer routes and the possibility for derogations.

Table 6: Overview of quarantine, DRA and derogation requirements for transfer routes

Transfer scenario	Potential quarantine requirements without derogation	Disease risk	Disease risk assessment needed	Probability for reduced quarantine derogation*
Wild to wild (birds)	Dedicated quarantine – 30 days	High	Yes	Low
Wild to captive (birds)	Dedicated quarantine – 30 days	High	Yes	Medium
Captive to captive (birds)	Dedicated quarantine – 30 days	Low	No	High
Wild to wild (eggs)	n/a	High	Yes	High
Wild to captive (eggs)	Isolation / quarantine incubator – 30 days	Medium	Yes	Medium
Captive to captive (eggs)	Isolation / quarantine incubator – 30 days	Low	No	High

*Although the probability for each transfer route has been proposed based on available information / discussions these could be subject to change where extensive mitigations measures in implemented.

Derogation request

Any derogation request for Capercaillie transfers from Europe would likely be submitted by the central import team for the Animal and Plant Health Agency (APHA) and Scot Gov. Such a request should also include the APHA Import & Export veterinary advisor and Scot Gov veterinary advisors.

The request should detail a proposal for reduced quarantine requirements based on the sensitivity of Capercaillie to stress and thus potential higher mortality during / post-

transfer. A detailed disease screening protocol should also be prepared and included with particular focus on notifiable diseases. Proposed source countries for any wild birds should also be provided. With regards to source and disease risk there could be potential for a lower risk from countries where previous imports have already taken place (e.g. Sweden / Norway).

e. A short review based on expert interviews of current knowledge on ex-situ Capercaillie rearing and reproduction, assessing the range of methods and techniques and the evidence on success.

Information and data on rearing techniques and reproduction success summarised below were collected during interviews with both UK private breeders and members of the European breeding programme. No rearing or reproduction reports / guidance materials were available from the UK captive breeding community however the EAZA EEP Breeding Programme shared several reports that include best practice husbandry guidance, annual breeding reports and conditions and criteria for the implementation of releases using captive birds.

Social structure (captive breeding)

Social structure for breeding Capercaillie was consistent across both private and zoo breeders. Recommended breeding groups generally consisted of a single male housed with 2-3 females (in some cases more). Males were often restricted to one area of the enclosure with females having small passage holes (17cm) from their enclosure into the males for mating. Separation from the male post mating was common to reduce risk of disturbance / damage to eggs from male.

Double clutching

Double clutching is a process whereby Capercaillie hens will naturally, in the event of losing the first clutch, lay a 2nd clutch in the same breeding season. In captivity this process can be triggered artificially by removal of the first clutch (e.g. for hand / foster rearing) to encourage a 2nd clutch. This approach is commonly used if productivity is the objective as it increases the number of eggs available for rearing.

Rearing methodology

In captivity there are 3 main rearing methods used for captive reproduction of Capercaillie each with their own advantages and disadvantages.

Parent rearing – eggs are left with female for natural incubation and rearing by parent.

Hand rearing – eggs are removed and hatched in incubators with chicks reared by human management

Foster rearing – eggs are removed from Capercaillie nests and placed under non-Capercaillie species (e.g. domestic hens, other grouse species) that incubate, and rear chicks.

An overview of the advantages / disadvantages of each method is shown in Table 7.

Table 7: Summary of risks, benefits and challenges with each rearing method

Rearing method	Risks	Benefits	Challenges
Parent	Higher mortality (climatic exposure, parasitic load, poor parenting) Disturbance from other birds Increased predation / disturbance risk (rats, stoats)	Greater behaviour competency Predator awareness Reduced resources Resistance to disease Promote further parent rearing	Space requirement Natural enclosure with good substrate
Hand rearing	Reduced behavioural competency	Greater productivity (double clutch) Controlled environment Less disturbance risk	Resource / costs Time intensive Husbandry skills needed
Foster rearing	Cross contamination / disease from domestic hens Reduced behavioural competency Higher mortality (climatic exposure, parasitic load, poor parenting) Disturbance from other birds Increased predation / disturbance risk (rats, stoats)	Greater productivity (double clutch) Some behavioural development Improved parental reliability	Space requirement Additional disease control / biosecurity

Rearing method (UK private vs EU Zoos)

Based on available information from both the UK private breeders and European zoo breeders there is a clear difference in the balance of rearing methods used. Whilst figures in Table 8 have been estimated (given some institutions use multiple approaches) they are given as an indicator to emphasise a greater role of parent rearing within the European zoo community. No birds from UK private holders are used for release projects however several birds are provided annually from European zoos to European release projects, likely accounting for the greater representation of the parent rearing methodology. A review of enclosures from both private and zoo breeders suggests that the parent rearing methodology lends itself to a larger, more natural enclosure design, which was limiting with UK private holders.

Table 8: Estimated breakdown (%) of rearing methods UK vs EU

Rearing method	UK (private breeders)	EAZA (zoo breeders)
Parent rearing	0 %	50%
Hand rearing	40 %	50%
Foster rearing	60 %	0%

Key criteria for successful rearing

Table 9 summaries key criteria that were identified from breeders that contributes to successful rearing of captive Capercaillie.

Table 9: Review of key management criteria identified by breeders

Criteria	Risks	Mitigation
Parasite control	Parasite / bacteria load (e.g. <i>Clostridium perfringens</i>), from contaminated environment, account for a significant level of mortality in birds	Disease management protocol focused on high welfare standard and reduction of stress
Diet	Poor diet can contribute to multiple health issues e.g. obesity and reduced gut development. Reduced natural feeding behaviour.	Detailed diet plan focused on high fibre / low protein pellet with lots of natural browse, fruits.
Enclosure design	Poor substrate choice and cleanliness can increase disease risk. Poor design / shelter can increase exposure to poor weather. Poor natural features limit natural behavioural development (e.g. perches)	Enclosure design following European breeding programme guidance. Provision of recommended substrate, natural features, predator control and space

Criteria	Risks	Mitigation
Staff experience	Impacts reproductive success. Increases mortality risk with poor husbandry. Lack of observation skills. Lack of rearing skills.	Collaboration with experienced breeders (UK & Europe). Follow recommended husbandry guidance. Develop clear protocols for management, rearing.
Equipment	Compromises rearing success.	Use of recommended equipment (e.g. incubators) that have been tried and tested. Awareness of limitations of equipment and proper use.

Enclosure design

From discussions, site visits and sharing of images it is apparent there is a significant variation in the design, construction and quality of breeding enclosures across all holders. From available information the quality, naturalistic elements and space appear to be consistently greater within European zoos and European breeding centres than it is within private UK breeders. Some examples of enclosure images are shown in appendix 2-4.

Across all holders there was consistency with two main approaches regarding design of enclosures, which related to whether the flooring was raised or not. Some enclosures used a raised mesh / grate floor whereas other enclosures were floored and used a predominately sand substrate. Advantages and disadvantages to both are summarised in table 10.

Table 10: Summary of advantages and disadvantages to enclosure design

Details	Raised enclosure	Floored enclosure
Parasite burden risk	Lower	Higher
Natural flooring	No	Yes
Predator control	Higher	Lower
Overall space	Lower	Higher
Ability to separate birds	Yes	Yes

From a welfare perspective it is not straight forward to determine which approach is best as both have clear advantages and disadvantages. The logic for raised enclosures, in this case coupled with mesh or plastic slated flooring, is to allow faeces to fall through thus reducing contact / contamination with the birds and in turn reducing risk of parasitic load. Conversely floored enclosures are often able to provide more space and access to natural enclosure elements (e.g. branches, grass, sand etc). Whilst breeding success was recorded for both approaches' enclosure welfare, and ethical concerns could be raised, dependant on overall size and quality.

An important feature for all enclosures was areas of shelter for the birds either in full or partially, this being particularly important for outdoor enclosures. Enclosure design for any future breeding for release project should be well planned and designed in such a way that promotes positive behavioural development including exposure to natural resources, natural diet, perching and cover whilst taking into account the challenges and risks relating to parasitic loads from substrates and faeces contamination.

f. Identify suitable in-situ source populations and associated management practices and genetics.

There are multiple considerations to make when selecting source populations for a translocation program, including genetic, welfare, disease risk, behavioural, ecological and logistical as well as the potential negative impacts on the source population (IUCN/SSC 2013). For any animal where there is also an ex-situ population, one of the first decisions is whether the translocation source should consist of in-situ, ex-situ or a combination of both.. In Europe, the Capercaillie is a species that is kept by both private breeders and within zoo collections, the latter being managed by the European Ex-situ Programme (EEP) coordinator. Some of the positives and negatives of ex-situ and in-situ sourcing are summarised (Table 11). Only international in-situ sources are considered, after it was agreed at the stakeholder workshop (on the 22/05/2025) that all Scotland locations are too fragile to be donors.

Table 11: Considerations of ex-situ and in-situ sources for Capercaillie translocations

Consideration	Ex-situ (Captive)		In-situ (Wild)	
	Positive	Negative	Positive	Negative
Impact on source	Double broods can be created so impact can be minimal. They are already an insurance population.	Decline in size if too many individuals are taken.	Could reduce competition in dense populations or used to remove disruptive birds.	Decline in size if too many individuals are taken. Disrupt family groups or breeding leks. Loss of breeding individuals if adults taken.
Genetic diversity	Likely consists of birds from multiple wild origins so potentially genetically diverse.	Unknown genetic diversity status. Captive populations are at risk of inbreeding.	Multiple populations to choose from which will have a range of genetic diversity levels.	Not all populations have been assessed for genetic diversity.

Consideration	Ex-situ (Captive)		In-situ (Wild)	
	Positive	Negative	Positive	Negative
Genetic ancestry	Northern/Boreal lineage (pers comm) is same as current Scottish population	Robust genetic assessment not been performed	The majority of wild populations in Europe are of the Northern/Boreal lineage, which is the same as current Scottish population.	Not all are of the Northern/Boreal lineage (although may harbour more diversity). There are some of unknown lineage.
Animal welfare	Eggs could be transported in place of adults. Lower stress levels in adults around humans. Families released together.	Cost of large enclosures.	Eggs could be transported in place of adults, however more difficult to obtain.	Potential risk to adults during capture and high stress levels during process. Families potentially separated.
Disease risk	Routine vet checks. Exposed to local diseases (dependent on enclosure location).	Potentially naïve to wild diseases.	Familiar with diseases in wild.	Unknown for many populations. High variance in risk between populations.
Behavioural	Eggs could be raised and learn behaviours from adult Capercaillie.	Naïve to predators	Adults would already exhibit behaviours required in the wild. Experience of predators.	If using eggs, could cause abandonment of nests.
Ecological	Can acclimatise to local environment, dependent on enclosure location.	Wild ecology can be difficult to replicate, e.g. Diet can lead to digestive tract issues.	Can choose source population with similar ecology to Scotland.	Variable ecology depending on source location.

Consideration	Ex-situ (Captive)		In-situ (Wild)	
	Positive	Negative	Positive	Negative
Logistical	Birds can be bred and reared close to release site.	Large area of land and enclosures required.	Build large international support network.	Permits, border crossings and long distant transport are barriers to movement.

There are positives and negatives of both in-situ and ex-situ sourcing of birds, with both providing different opportunities for a translocation program. Considering the majority of the in-situ considerations are highly dependent on the population location, some key aspects of wild Capercaillie populations relevant to the above considerations have also been summarised. Details for all range states that currently have populations of Capercaillie in Eurasia (Table 12) have been incorporated and the key aspects of each consideration summarised:

Impact on source

Sourcing birds from large populations that are increasing in size will likely minimise the relative impact on the source population. The most recent IUCN red list population assessment for Europe (Birdlife International 2021) has been used to record the population size and growth status for each country. A colour system has been used to highlight potential source impact from low (green), through medium (amber) to high (red).

Genetic considerations

Multiple genetic studies have been conducted on Capercaillie populations across Eurasia, with the main finding that there are two major genetic mitochondrial clades, often termed Northern/Boreal and Southern/Iberian (Segelbacher & Piertney 2007; Bajc et al. 2011; Klinga et al. 2015). As their names suggest, the northern haplotype is most commonly found in the northern range countries and the southern haplotype in the southern range countries, mainly Iberia and the Balkans (Bajc et al. 2011, Ball & Ritchie-Parker 2023), with countries in the centre of Europe have a mix of these clades. Fewer studies have been conducted on nuclear DNA, which is the majority of the genome and provides more accurate assessment. The studies that have been conducted, support divergence along a South-West – North-East axis. The Iberian group being the most distinct (Cantabrian and Pyrenees) at one end and the Finnish/Russian populations the most distinct at the other end. The other European populations show high similarity and with signatures of the other lineages to varying degrees (Ball & Ritchie-Parker 2023; Escoda et al. 2024).

The population currently in Scotland is likely descended from birds of Swedish/Norwegian descent after a successful reintroduction occurred in the 1830s (Stevenson 2007). Genetic analysis has confirmed that they are of the Northern/Boreal mitochondrial lineage and the European nuclear cluster (Ball & Ritchie-Parker 2023),

matching that of Sweden/Norway. When taking genetic considerations into account, genetic diversity levels of the donor and recipient populations as well as genetic compatibility need to be considered. As the population in Scotland has genetic diversity levels at the lower end, its diversity would be increased by sourcing individuals from any other European population. However genetic diversity can be increased to a greater extent by selecting a source that has a different lineage to the recipient. Increasing genetic diversity in a population is important for its long-term viability as it increases potential to adapt to challenges in the future (Frankham et al. 2002).

Genetic diversity has to be balanced against genetic compatibility, currently sourcing individuals from the European lineage holds the lowest risk for compatibility, as it is the lineage already present in Scotland. However, there is evidence that populations of mixed lineages exist in the wild, suggesting there is compatibility between lineages, however fitness consequences of this are unknown. Considering this balance locations have been highlighted as lower risk if they match the current Scottish population, i.e. Northern/Boreal mitochondrial clade and have the European nuclear lineage and those as medium risk with the other two lineages (Iberian and North-Eastern). Populations without genetic information are included, and it is advised that a genetic assessment is conducted prior to consideration of any source.

Subspecies classifications for Capercaillie based on del Hoyo Birds of the World (del Hoyo 1994) have been included. Prior to genetic information this was used to delineate populations, but as can be seen it does not always align with the genetic evidence. It is provided here for comparison and for readers more familiar with these classifications.

Ecological considerations

General classifications of the climate in each country based on the Koppen-Geiger system have been included. On the European continent there is a general West-East cline in precipitation and temperature oscillations, with those in the Southwest exhibiting a more temperate climate and those in the Northeast with an increasingly continental climate. Scotland has a temperate climate with some continental like regions on the highest altitudes such as the Cairngorms plateau.

Behavioural considerations

The largest factor here is likely to be between ex-situ and in-situ sources. As a precocial species a lot of behaviour is innate, however there are some studies highlighting the importance of parental care, regarding predator avoidance behaviour (Merta et al. 2015). Therefore, the predator complex in the source population is likely important. Considering the reduced number of predator species in Scotland compared to mainland Europe, it's unlikely there will be any in-situ populations naive to the predators found in Scotland. The most common predators of Capercaillie in Scotland (red fox, pine marten and crows) are found across Europe (Fletcher and Baines, 2020, Summers et al. 2004).

Disease risk considerations

There are very few studies on disease in wild Capercaillie populations, with a plan to address this outlined in the current Capercaillie emergency plan. The current genetic evidence shows that the birds in Scotland today were likely translocated from

Sweden/Norway. According to historical documents this occurred in the 1830s, prior to current veterinary standards and so it can be assumed that they also arrived with the parasites and diseases of their donor population. It is therefore advised that lowest risk source from a disease transfer perspective currently is Scandinavia as the birds in Scotland are likely already exposed to these same diseases.

Genetic recommendations

It is advised that any source populations to be considered for translocations to Scotland should undergo a genomic assessment. As shown in Table 12 there are some locations without current genetic information. The ex-situ Capercaillie population also does not currently have a genomic assessment and it is advised that one is completed before using it as a source. It is also advised that a genetic sample is obtained from any bird that is used in a translocation, which is subsequently submitted for preservation in a national biobank.

Although the genomic picture is incomplete and ideally more work is needed, given the current state of knowledge, it is recommended that individuals to be used in a reinforcement program to Scotland are sourced from Norway, Sweden (in-situ) or an ex-situ population consisting of genetically diverse individuals of the European lineage.

Table 12. Evaluation of In-situ source populations in mainland Eurasia, a colour system is used to denote positive to negative (green->amber->red) aspects associated with key considerations for translocations to Scotland.

Source population	Population size (pairs) ¹	Population trend ²	Genetic lineage (mtDNA)	Genetic lineage (nuDNA)	Subspecies (Tetrao urogallus ssp)	Climate (Köppen–Geiger)
Albania	70–140	Increasing	-	-	T. u. major	Temperate/Continental
Andorra	11-70	-	Both	Iberian	T. u. aquitanus	Temperate/Continental
Austria	10000-12500	Stable	Northern	European	T. u. major	Continental
Belarus	4200-4500	Stable	Northern	-	T. u. major T. u. pleskei	Continental
Bosnia and HG	600-1000	Decreasing	Both	-	T. u. major	Temperate/Continental
Bulgaria	1000-1200	Decreasing	Both	European	T. u. rudolfi	Temperate/Continental
Croatia	50-100	Decreasing	Northern	-	T. u. major	Temperate/Continental
Czechia	90-200	-	Northern	-	T. u. major	Continental
Estonia	1300-1600	Decreasing	Northern	-	-	Continental
Finland	202000-676000	Decreasing	Northern	Northeast	T. u. Karelicus T. u. lonnbergi T. u. urogallus	Continental
France – Pyrenees	2400-3600	Stable	Both	Iberian	T. u. aquitanus	Temperate/Continental
France – others	200-260	Decreasing	Both	-	T. u. major	Temperate/Continental
Germany	750-1000	Decreasing	Northern	European	T. u. major	Temperate/Continental
Greece	150-180	-	-	-	T. u. rudolfi	Temperate/Continental
Italy	1800-2500	-	-	European	T. u. major	Temperate/Continental
Kosovo	30-60	-	-	European	T. u. major	Temperate/Continental
Latvia	1900-2000	Stable	-	-	-	Continental
Lithuania	300-400	Stable	-	-	T. u. major	Continental
North Macedonia	0	Stable	-	-	T. u. major	Temperate/Continental
Montenegro	810-1100	Increasing	Both	-	T. u. major	Temperate/Continental

Source population	Population size (pairs) ¹	Population trend ²	Genetic lineage (mtDNA)	Genetic lineage (nuDNA)	Subspecies (Tetrao urogallus ssp)	Climate (Köppen–Geiger)
Norway	40000-50000	Fluctuating	Northern	European	T. u. lonnbergi T. u. urogallus	Continental
Poland	260-320	Increasing	Northern	European	T. u. urogallus	Continental
Romania	2500-6000	-	Both	-	T. u. rudolfi	Continental
Russia	280000-480000	-	Both	Northeast	Multiple	Continental
Serbia	250-390	Decreasing	Northern	-	T. u. major	Temperate/Continental
Slovakia	300-420	Decreasing	Northern	-	T. u. major	Continental
Slovenia	550-600	Decreasing	Northern	-	T. u. major	Temperate/Continental
Spain – Pyrenees	370-430	Decreasing	Both	Iberian	T. u. aquitanus	Temperate/Continental
Spain - Cantabrian	180-220	Decreasing	Southern	Iberian	T. u. cantabricus	Temperate
Sweden	244000-458000	Stable	Northern	European	T. u. urogallus	Continental
Switzerland	380-480	Stable	Northern	-	T. u. major	Temperate/Continental
Ukraine	800-1000	Decreasing	-	-	T. u. rudolfi T. u. major T. u. pleskei	Continental

¹ Taken from the red list assessment by Birdlife International 2021; ² The short term trends recorded in the red list assessment (Birdlife International 2021)

Final Recommendations

Activity	Details	Benefits
Egg transfer	Restricted to captive “stored” eggs.	Temperature control during egg transfer. No risk to wild population. Ability to increase genetic diversity.
Breeding programme management	Develop UK programme managed under BIAZA / EAZA framework	Ability to increase population with new zoo holders / breeders. Increase collaboration with private breeders in UK Collaboration with current European EEP. Long term insurance policy for species Established member responsibilities
Best Practice Guidance	Develop captive management best practice guidance	Define standards for Capercaillie management / breeding. Improve consistency in husbandry (in particular pre-release management). Improve disease management, Improve reproduction success.
Genetic testing	Conduct genetic testing for UK captive population	Improve knowledge on provenance. Ensure target sub-species / population (boreal). Assess genetic diversity.
Breeding for Release Strategy	Develop breeding for release strategy including facility design, breeding plan, release method	Set expectations for scale of captive breeding support. Define timelines for reproduction. Set standards for breeding / pre-release facility plans
Sourcing (wild & captive)	Genomic assessments	Improve knowledge of European populations and suitability as source for recovery. Improve population management and sustainability of population as long term source.
Biobanking	Sample collection all translocated birds	Retention of genetic material for ongoing research. Improve knowledge of European population structure. Potential future genetic recovery.

With regards to capercaillie recovery efforts across Europe there appears to be no clear “one size fits all” strategy. Despite many projects focusing on predator removal and translocations (wild and / or captive) there is significant variation in the scale of actions and specific methods used, both in-situ and ex-situ. Individuals project plans must be adapted to local conditions, challenges, threats and restrictions whilst following the guidance from the IUCN on Reintroduction of Galliformes for Conservation Purposes (WPA & IUCN, 2009).

Despite the variation with individual strategies one common feature to most projects has been the use of captive bred birds to support reinforcement / reintroduction efforts. This approach often includes the use of dedicated conservation breeding centres where birds are bred, reared and prepared prior to release. Analysing the outcome of such projects, in order to compare methods, review challenges and monitor success or failure is challenging to due inconsistent data availability. From data that is available, and direct communication with species specialists, there is one common theme with the use of captive birds which is that most, if not all, projects will experience high mortality rates of released birds.

Release projects between 1983 - 1992 in the Spanish Pyrenes showed for birds released at three months of age only 16% survived to one year, with predation accounting for 50% of the mortality (Fernandez-Olalla *et al*, 2012). More recent modelling work based on data from these projects examined the impact of releasing 15, 30 and 45 adult captive bred birds per year with a suggested 17% survival. This modelling work showed that although predator removal (as a standalone in-situ action) could help stabilise the population the only effective strategy for population growth would be a combination of predator removal and release of birds, with higher numbers (45 per year) having the greatest impact (Fernandez-Olalla *et al*, 2012).

Data is also available from a review 11 release projects carried out in Germany since 1954, where captive birds accounted for 83% of all releases. Here, annual releases ranged from 6 – 44 birds per projects with a total of 3,086 birds released. From these 11 projects only 2 were considered successful (i.e. where average population size remained stable for at least 5 years after the end of release), with 5 regarded as failing and 4 unknown (Siano & Klaus, 2026). It is however worth noting that of the 11 projects only 2 were active in the last 20 years where 2/3 regarded a success, perhaps indicating an improvement of methods over time.

Whilst available data clearly shows that capercaillie translocation recovery efforts are not only complex but a long-term endeavour where mortality will be a common feature, it also shows the potential value of captive bred birds to complement and support in-situ actions.

Evidence shows that released captive bred birds can adjust to natural conditions including activity, movements and foraging (Merta *et al*, 2016). However key questions remain for any project looking to incorporate captive breeding actions, including:

- How can individuals born ex-situ be effectively prepared for release in the wild?
- Which release protocols maximise post-release survival?
- How can success rates be interpreted without introducing biases linked to release conditions or individual histories?
- How can strategies be compared when contexts, methods and populations differ?

(A. Kohler, pers comms, 2026)

There are many factors that have the potential to influence both the success of captive breeding (e.g. rearing methods, diet, parasitic treatments, husbandry, enclosure etc) and the survival of released birds (e.g. pre-release management, release method, number of birds, release age, release season etc). As a result, any project that includes a captive breeding component should develop a clear (ex-situ) management protocol informed by past successes and challenges with other breeding centres, established breeding programmes, private breeders and species specialists that specifically details both captive breeding and release methodologies and is adapted to fit local conditions. If such a plan can be developed then captive bred birds could act as a valuable support tool to in-situ actions, for populations that are at serious risk of extinction.

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Appendix 1: RZSS Conservation Manager David Barclay, Head of Conservation & Science Dr Helen Senn, WildGenes Programme Manager Dr Alex Ball hosting visit from EAZA EEP Breeding Programme Coordinator



Appendix 2: Example images of enclosures used by some UK private breeders.





Appendix 3: Example images of enclosures used by some European Zoo breeders.



Appendix 4: Image of European breeding centre
Tetrijeb breeding centre - Croatia

