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Conservation Releases of captive-reared Grouse in Europe What do we know and what do we need? (*)

by
Christiane SEILER[1, 2], Per ANGELSTAM[1], Hans-Heiner BERGMANN[2]

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SUMMARY

Black Grouse, Capercaillie and Hazel Grouse are endangered in several central and west European countries. To augment or re-establish local populations of these species, releases of captive-reared birds have been conducted in many places. Provisional results of some releases were encouraging, but to date, none of these projects is known to have established a viable population. Factors that might cause a release to succeed or fail are still poorly understood. By viewing release projects as individual case studies, the compilation and synthesis of results of several studies should allow quantitative evaluation and determination of those factors that are essential for successful releases.

We studied the feasibility of performing meta-analysis by reviewing published results of 29 documented release projects with Black Grouse, Capercaillie and Hazel Grouse, conducted between 1980 and 2000 in six European countries. In total, more than 5500 captive-reared birds were released within these projects.

Due to lack of comparable information in the published reports, only few factors could be included in statistical evaluation. Among those, the total and the yearly number of birds released and the number of release years were the only significant predictors for project success. The resulting models suggest that annual releases of at least 30 birds are needed for a period of more than 6 years, to reach a 50% probability for survival and reproduction of released birds.

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1 *Grimsö Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences, SE – 73091 Riddarhyttan, Sweden*

2 *University of Osnabrück, Department of Biology/Chemistry, Barbarastr. 11, D – 49069 Osnabrück, Germany*

Despite limitations in the data set, meta-analysis appeared to be a feasible tool for evaluation of grouse releases. To enhance future analyses, however, improved documentation of release projects is needed. We suggest a list of topics that authors should consider when reporting grouse release studies.

Introduction

During recent decades, Black Grouse, Capercaillie and Hazel Grouse have declined dramatically throughout their range (TUCKER & HEATH, 1994). Although not considered to be globally threatened (IUCN, 1996), these species are critically endangered both regionally and locally. Throughout Western Europe, populations have disappeared during the past decades and those remaining, being small and isolated, are threatened with extinction (HAGEMEIJER & BLAIR, 1997). Thus, the three grouse species have been listed in national Red Data Books of several western and central European countries (STORCH, 2000).

Habitat loss and deterioration are assumed to be the major cause for the decline of European grouse species (see review in BERGMANN & KLAUS, 1994; KLAUS, 1996; TUCKER & HEATH, 1994). Thus, much effort is spent to improve habitat conditions in attempts to augment or re-establish local populations (e.g., KLAUS & BERGMANN, 1994).

Until the early 1980s, grouse species were known to be difficult to keep and breed in captivity. During recent years, however, knowledge about raising grouse has grown substantially (ASCHENBRENNER, 1988), and today, Black Grouse, Capercaillie and Hazel Grouse can be reared effectively to supply release projects with the necessary number of birds. Hence, releases of captive-reared grouse have become a frequent tool in projects aiming at grouse conservation (e.g., BERGMANN & KLAUS, 1994).

Provisional results of some release projects with grouse reared in captivity were encouraging: released birds survived several years, settled in the designated area and reproduced successfully (e.g., BERGMANN, 1998). Population size even increased occasionally (e.g., EICHLER & HAARSTICK, 1995). However, none of these release projects is known to have achieved the ultimate objective of a conservational release project, namely to «establish a viable, free-ranging population in the wild» (IUCN, 1996). Furthermore, causes for success or failure of releases still are poorly understood.

Meta-analysis : Why is quantification necessary?

Although release projects share basic principles, the layout of individual projects may differ substantially. Designated release areas, for example, may vary in habitat suitability and size. They may still hold a number of wild birds or the last grouse may have vanished years ago. The number of birds released

within a project may range from a few birds released at one event only up to dozens of grouse released annually for several years. Birds may originate from a single rearing station or be collected from various breeders, thus, being either hand-reared or parent/hen-reared in a variety of manners. They may be released as juveniles or adults, in autumn or spring, and after staying in the releasing aviary for just a few days or several weeks. Birds may be released unmarked or equipped with colour rings or radio transmitters. This in turn may affect the validity of result data.

Due to this variety of potential project layouts, it is difficult – if not impossible - to identify those factors that are essential to successful releases by evaluating single projects. However, viewing the individual release-projects as case studies in a meta-analysis (i.e. compiling and analysing release criteria and results of several studies) should allow quantitative evaluation and identification of the most important factors for success.

The purpose of this paper is to test, to what degree such a quantitative evaluation is possible with the data already published on release projects of European grouse species.

Methods & Boundaries

We searched citation databases (CAB International «CAB Abstracts»; ISI «Web of Science»; SilverPlatter «Biological Abstracts»), monographs and proceedings of national and international grouse conferences for records on grouse releases, focusing on projects with captive-reared Black Grouse, Capercaillie and Hazel Grouse conducted in European countries from ca. 1980 to 2000.

We explicitly excluded references on translocations of grouse caught in the wild, because only a few have been conducted so far (e.g., BERGMANN 1998). We did not either collect data on release projects with related species like Pheasant (*Phasianus colchicus* L.) or Grey Partridge (*Perdix perdix* L.) (e.g., BRITTAS *et al*., 1992; HILL & ROBERTSON, 1988). In most cases, these game birds are released in order to increase the hunting stock (e.g., HILL & ROBERTSON,1988; POTTS, 1986; PUTAALA & HISSA 1995) (ROBERTSON 1988). According to GRIFFITH *et al*. (1989) there is strong evidence that releases of game species are more likely to be successful than releases of threatened, endangered or sensitive species.

Factors

To determine factors that are essential for successful releases, we initially listed a number of factors that often were assumed to be relevant, factors concerning e.g., the projects' design, the release areas and release techniques,

the birds released and post-release observations (**Appendix II**). The list was based on IUCN guidelines (IUCN, 1998) and reviews of releases worldwide (e.g., Beck et al. 1994); (BLACK 1991); (FISCHER & LINDENMAYER 2000); (GRIFFITH ET AL. 1989); (SCOTT & CARPENTER 1987); (SNYDER ET AL. 1996) (WOLF ET AL. 1996), comments on grouse releases (e.g.,ASCHENBRENNER 1988) ;(SCHERZINGER1980) and our own experiences with release projects (ANGELSTAM & SANDEGREN 1982); (BERGMANN & NIKLASCH 1995); (KÖLTRINGER-SEILER 2000).

For each release project, we then attempted to collect data on all factors in the list. Those factors, for which sufficient information was available, were used as independent variables in subsequent regression analyses (Statistica, STATSOFT, 2000).

Project results

To describe project outcomes, we defined five hierarchical levels, ranging from «short-term survival», i.e. released birds died within a few weeks or months after release, up to establishment of a self-sustaining, or even expanding, population (**fig. 1**). Outcomes of release projects were assigned to these result levels using the respective authors' judgement.

Because the limited data set did not allow multinomial logistic regression with five levels, we coded the outcome variable (RESULT) to be binary. We defined a project as «successful» if, at least, some released birds survived and reproduced in the wild (see **fig. 1**). Consequently, projects resulting in «short-term survival» and «survival of individual birds» were counted as unsuccessful.

Using this binary definition, 10 release projects were classified as successful and 11 as unsuccessful (see **table I**).

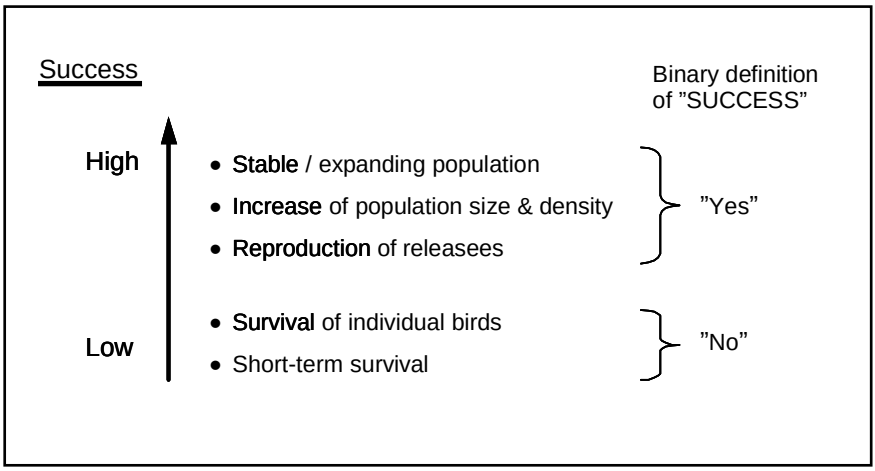

Fig. 1. Hierarchical levels of release success (after Bergmann et al. 2000). For logistic regression analysis, we defined a binary outcome variable indicating whether a project had reached, at least, the level of reproduction of released birds.
* «Survival of individual birds» refers to survival of some releasees until, at least, the following reproduction period after release.
Hierarchie des Auswilderungserfolges (nach Bergmann et al. 2000). Erst wenn ausgewilderte Vögel mindestens bis zur Reproduktionsperiode nach Freilassung überleben und sich erfolgreich fortpflanzen, sind die Voraussetzungen für einen Anstieg des lokalen Bestandes gegeben, der wiederum Vorstufe zur Bildung einer tragfähigen Population ist. Für die Logistische Regressionsanalyse kodierten wir die abhängige Variable «SUCCESS» binär (Auswilderungserfolg: ja / nein); der begrenzte Datensatz ließ eine fünfstufige multinomiale Analyse nicht zu.
Niveaux hiérarchiques du succès d'une réintroduction (d'après Bergmann et al. 2000). Pour l'analyse de régression logistique, nous avons défini la variable indépendante «succès» comme binaire (succès: oui/non). Le set de données limite ne permet pas une analyse multinomiale à 5 degrés. «survie des individus» signifie la survie de certains oiseaux relachés, au moins jusqu'à la période de reproduction suivante après lâcher.

Table I (next page) Release projects of captive-reared Black Grouse, Capercaillie and Hazel Grouse. The project numbers refer to the numbers in the map **(fig. 1)**. The reviewed references are listed in **Appendix I.**
Auswilderungsprojekte mit gefangenschaftsaufgezogenen Birkhühnern, Auerhühnern und Haselhühnern in Europa zwischen 1980 und 2000.
Die Projektnummern entsprechen den Ziffern in Abb.1. Die Referenzen sind gelistet in Appendix I.
Projets de réintroduction de tétras lyres, grands tétras et gélinottes élevés en captivité en Europe entre 1980 et 2000. Les numéros des projets renvoient aux numéros sur la carte fig. 1. Les références utilisées sont listées en annexe (An. I).

Species	Release area	Project#	References (i = indirect reference[1])	Proj. Duration [2] [years]	# Birds released	Project purpose	Rearing method	Marking	Result level	"SUCCESS"
Black Grouse										
	Eider-Treene-Sorge-	1 A	7	1	11	test release	hand & hen	radio collars	short-term survival	yes
	Niederung; D	B	20,21,27i	1	11	test release	"captive"	radio collars	survival ind. Birds	no
		C	27,28	11	362	supplementation	hand & hen	rings or unmarked	reproduction	yes
		D	28,29	1	58	test release	hand & hen	radio collars; rings	survival ind. Birds	no
	Elbe-Weser: Armstorf; D	2 A	13, 14, 32, 38	9	} 863	supplementation	hand & hen	rings	reproduction	yes
	Elbe-Weser: Loxstedt; D	B	4, 38	16		n.a.	hand & hen	rings	reproduction	yes
	Emsland; D	3 A	13i, 38i	n.a.	457[3]	n.a.	n.a.	n.a.	n.a.	
	Gifhorn; D	4 A	26i, 35, 36, 37, 38, 39, 40	11	511	supplementation	hand & hen	radio collars; rings	reproduction	yes
	Wiehengebirge; D	5 A	13i, 39i	n.a.	n.a.	reintroduction	n.a.	n.a.	n.a.	
	Wurzacher Ried; D	6 A	6, 23, 24, 26i, 42	6	249	reintroduction	hen	rings	incr. pop size	yes
		B	22, 42	6	199	test release	hen	radio collars; rings	survival ind. Birds	no
	Kalmthout Heath; B	7 A	43	2	26	test release	captive	radio collars	short-term survival	no
	Parc Nat. de Cévennes;	8 A	30	5	150	reintroduction	hand	rings	survival ind. Birds	no
	Oborniki; PO	9 A	16, 17	1	4	test release	captive	n.a. (no radio collars)	short-term survival	no
Capercaillie										
	Bavarian Forest; D	10 A	2, 25i	8	210	n.a.	hand & hen	rings	n.a.	
	Nationalparc Bav. Forest;	11 A	25	2	56	supplementation	n.a.	n.a.	n.a.	
	Black Forest; D	12 A	23, 24, 44, 45	9	216	reintroduction	captive	rings	reproduction	yes
		B	33, 34	5	59	test release	hen	radio collars	survival ind. Birds	no
	Harz, Lonau; D	13 A	15, 18, 19	20	750	reintroduction	hand & hen	rings	incr. pop size	yes
	Mautern; A	14 A	3i	4	42	n.a.	n.a.	n.a.	n.a.	
	Mitternsill; A	15 A	3i	2	16	n.a.	n.a.	n.a.	n.a.	
	Odenwald; D	16 A	25i	4	129	supplementation	n.a.	n.a.	n.a.	
	Rhön, Salzforst; D	17 A	25i	3	60	n.a.	n.a.	n.a.	n.a.	
	Sauerland; D	18 A	41	12	393	reintroduction	hand vs hen	rings	incr. pop size	yes
	Parc Nat. de Cévennes;	19 A	30, 31	3	50	reintroduction	hand	rings	survival ind. Birds	no
	Oborniki; PO	20 A	16	2	44	reintroduction	hand & hen	n.a. (no radio collars)	incr. pop size	yes
	Zlotów; PO	21 A	16	2	50	reintroduction	hand & hen	n.a. (no radio collars)	survival ind. Birds	no
	Grimsö; SE	22 A	1	1	9	test release	hand	radio collars	survival ind. Birds	no
Hazel Grouse										
	Harz, Zorge; D	23 A	5, 8i, 9, 10, 11, 12	13	611	reintroduction	hand & parent	radio collars; rings	reproduction	yes
		29 proj	45 references		.5596 birds					

[1] indirect ref. = project mentioned by other author

[2] assumed to equal #release years

[3] calculated from figures given in references

Project

We defined a project as a distinct release program that is characterised by its purpose: reintroduction, supplementation or test release. The term reintroduction describes «an attempt to establish a species in an area that once was part of its historical range, but from which it has been extirpated or become extinct» (IUCN, 1998). Supplementation, in contrast, is defined as a release of individuals where a population of conspecifics persist. In our article, we use these definitions proposed by IUCN-The World Conservation Union, but explicitly refer to releases of captive-reared, not translocated, birds. Translocation is the «deliberate and mediated movement of wild individuals […] from one part of their range to another» (IUCN, 1998), regardless if it comprises reintroduction or supplementation.

A test release is a project that is performed to gather detailed information about suitability of release methods and post-release behaviour or survival rate of birds. In contrast to conservation releases (reintroduction, supplementation), test release projects are rather short-termed and do not primarily aim at re-establishing a population, at least not with the birds released within the project itself. A test release may precede or accompany a conservation release program.

Results

In our literature survey, we found 45 publications about release projects with captive-reared Black Grouse, Capercaillie and Hazel Grouse in Europe (**table I**). Most of the articles (64%) were published in national or international conference proceedings.

The publications covered 29 release projects performed in 23 different study areas within six European countries (**fig. 2**). There were 14 projects with Black Grouse (9 areas), 14 projects with Capercaillie (13 areas) and one Hazel Grouse project. In total, 5596 captive-reared grouse were released.

Amount and quality of data provided on release procedures and project outcome varied considerably among publications. Information on project outcome, for example, was available for only 21 projects, and for seven out of the 29 projects, we could not retrieve any direct reference at all, i.e., they were only mentioned by other authors (see «indirect references», **table I**). Thus, data available for further meta-analysis was limited substantially.

For only five factors out of those listed in **App. II** we could gather enough data to include them as independent variables in statistical analysis: the species released (SPECIES), the number of birds released (#BIRDS), the number of release years (#YEARS), the purpose of the project (PURPOSE), and information on whether releasees were marked individually (MARK) (**table II**).

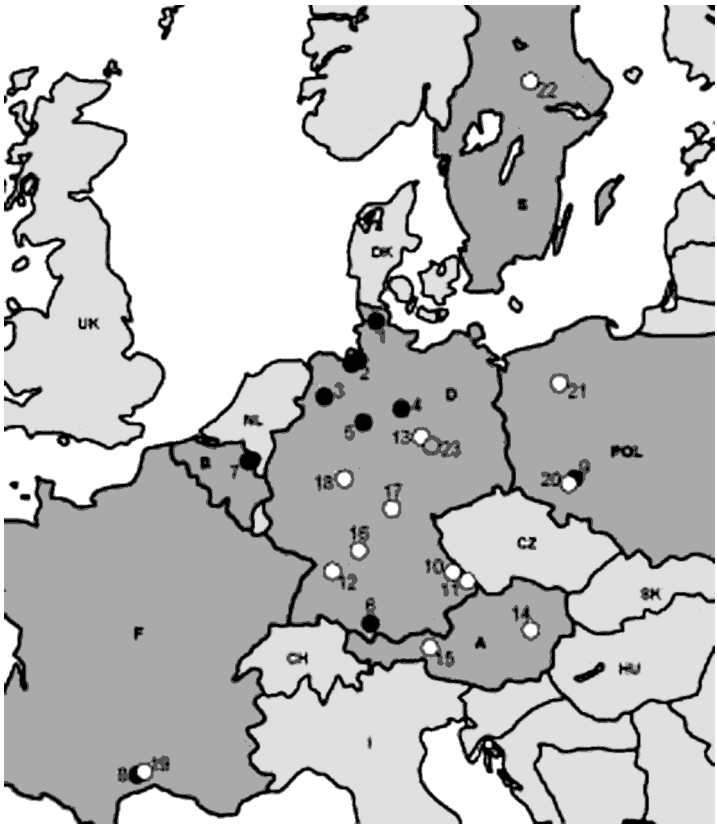

Fig. 2. Locations of release areas for Black Grouse (black circles), Capercaillie (open circles), and Hazel Grouse (grey circle). The numbers beside the circles refer to project numbers given in **table I**.
Lage der Auswilderungsgebiete.Birkhuhn (schwarz), Auerhuhn (weiß), Haselhuhn (grau).Die Ziffern entsprechen den Nummern der Projekte in ***Tabelle I****.*
Localisation des zones de lâchers de Tétras lyres (cercles noirs), Grand tétras (cercles blancs) et Gélinottes (cercles gris). Les nombres à côté des cercles renvoient aux numéros des projets donnés tableaux I.

Additionally, we calculated the average number of birds released per year (#BIRDS/YEAR).

With these variables and the interaction variable #BIRDS*#YEARS, we performed univariate logistic regressions, each with the project outcome (RESULT) as dependent variable.

The variables #BIRDS, #YEARS and #BIRDS/YEAR turned out to be the only significant predictors for project success, explaining 60%, 62% and 25% of the respective model's variation (**table III**).

Table II. Variables for logistic regression analysis.
Variablen der Logistischen Regressionsanalyse.
Variables de l'analyse par régression logistique.

	Factors	NDefinitions/	Categories
PV	SPECIES	29	Black Grouse; Capercaillie; Hazel Grouse
	#BIRDS	27	Total number of birds released
	#YEARS	27	Number of release years
	PURPOSE	23	Reintroduction; Supplementation; Test release
	MARK	19	Rings; Radio collars
	#BIRDS/YEAR	26	Average number of birds released per year
	#BIRDS*#YEARS	26	Interactionvariable
OV	RESULT	21	SUCCESS Yes: Reproduction of releasees & Increasing population No: Short-term survival & Survival of individual birds

PV = predictor variable, OV = outcome variable

Table III. Variables significantly associated with «SUCCESS» of release projects, according to logistic regression analyses. (Chi-Square p-value, McFadden's Rho-Squared).
Unabhängige Variablen, die nach den Ergebnissen der Logistischen Regression signifikant mit Auswilderungserfolg assoziiert sind.
Variables indépendantes significativement associées au succès d'un lâcher d'après les résultats de la régression logistique.

Model	Variable	N	log-Likelihood-Ratio	df	p	Rho†
1	#BIRDS	20	17.042	1	<0.001	0.619
2	#YEARS	21	17.605	1	<0.001	0.606
3	#BIRDS/YEAR	20	6.970	1	0.008	0.253

Regression equations / Regressionsgleichungen:

Model 1: p ("SUCCESS") = exp (-3.257 + 0.018 * #BIRDS) / (1 + exp (-3.257 + 0.018 * #BIRDS))
Model 2: p ("SUCCESS") = exp (-3.923 + 0.671 * #YEARS) / (1 + exp (-3.923 + 0.671 * #YEARS))
Model 3: p ("SUCCESS") = exp (-2.856 + 0.093 * #BIRDS/YEAR) / (1 + exp (-2.856 + 0.093 * #BIRDS/YEAR)

Due to the limited dataset and the high correlation of the predictor variables #BIRDS and #YEARS ($r \approx = 0.91$, $n=26$, $p<0.001$), adding further parameters by stepwise analysis did not improve the models. Although any combination of the three significant parameters resulted in a significant model (e.g., model with #BIRDS, #YEARS and #BIRDS/YEAR: $X \approx = 17.089$, $df = 2$, $p<0.001$), none of these models differed significantly from the univariate ones. In addition, for all multivariate models, the contribution of the single parameters became insignificant. Thus, we decided to use the three univariate models for further evaluation.

The results of the regression analyses are easiest understood by first solving the equation for #BIRDS. Using a probability of p=0.5 for success, for example, this equation results in 180 birds representing the threshold between likely successful and likely unsuccessful projects (curve in **fig. 3**). A number of 180 birds may be released in a variety of manners, ranging from setting free all 180 birds at once, to – theoretically - annual releases of one bird for each of 180 years. It is intuitively understood, however, that only a certain range is practicable and, in fact, likely to be successful. Now, solving the equations for #YEARS and #BIRDS/YEAR accordingly yields 50% boundaries of about six years (dotted line **fig. 3**) and 31 birds per year (dashed line **fig. 3**), respectively.

Thus, our analyses suggest that release projects are likely to succeed (i.e., per definition, reach the level of «reproduction of releasees»), if more than 30 birds are released annually for a period of at least six years.

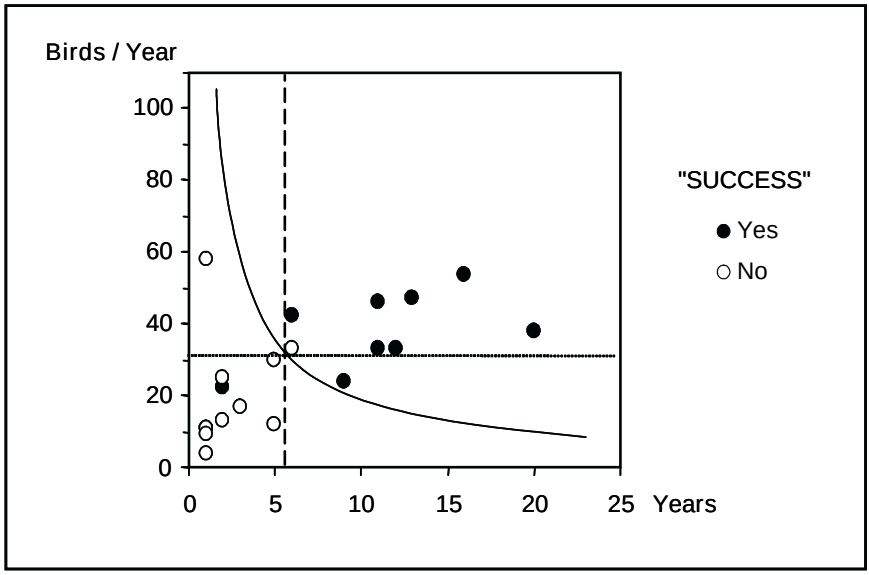

Fig. 3. Relationship between the number of release years, the number of birds released per year and the observed results of release projects. The lines represent 50% probability of release «SUCCESS» for the parameters #YEARS (dashed line), #BIRDS/YEAR (dotted line) and #BIRDS (curve), based on the logistic regression equations.
Ergebnisse der Auswilderungsprojekte (Erfolg: ja / nein) in Abhängigkeit von der Anzahl Auswilderungsjahre und der Anzahl freigelassener Vögel pro Jahr. Die Linien in der Grafik repräsentieren die jeweiligen Werte für eine 50%ige Wahrscheinlichkeit von Reproduktion der ausgewilderten Vögel, basierend auf den Logistischen Regressionen der Parameter «Anzahl Vögel» (Kurve), «Anzahl Jahre» (gestrichelte Linie) und «Anzahl Vögel pro Jahr» (gepunktete Linie).
Résultats des projets de réintroduction (succès oui/non) indépendamment du nombre de lâchers et du nombre d'oiseaux lâchés par année. Les lignes du graphique représentent les valeurs pour 50% de probabilité de reproduction des oiseaux lâchés, sur base de la régression logistique des paramètres «nombre d'oiseaux» de la régression logistique des paramètres «nombre d'oiseaux» (courbe), «Nombre d'années» (ligne tiretée) et «nombre d'oiseaux par an (ligne pointillée).

Discussion

By compiling and analysing data from published accounts on European grouse release projects, we found three factors to be significant predictors for project success: the total number of birds released within a project, the yearly number of birds released, and the number of release years. Despite limitations in the data available from publications on grouse releases, we were able to define thresholds for these variables, beyond which a release project was likely to reach a defined level of success. Thus, this study demonstrates meta-analysis to be a feasible tool for evaluation of European grouse releases.

In reviews of releases of captive-reared and translocated animals worldwide (GRIFFITH *et al*. 1989) and translocations of American prairie grouse species (SNYDER *et al*. 1999), the authors likewise found positive relation of a project's success with both project duration and number of individuals released. However, they additionally identified factors, such as good habitat quality, soft release technique, and release in spring, as significant contributors to successful project outcome.

Due to limitations in the data on European grouse projects, we could only include the most basic variables in our analysis. Information on other factors (e.g. rearing methods, pre-release training of the birds, habitat quality, cause of decline of former population) that might also be essential to predict outcomes of projects, was usually not available from the published reports. Different rearing methods (i.e. hand-reared and hen-reared), for instance, and their suitability for grouse that are to be released, are often discussed among grouse conservationists (e.g., ASCHENBRENNER, 1988; BERGMANN & KENWARD, 1990; SCHERZINGER, 1980; STARLING, 1991). By contrast, authors of the release reports hardly ever mentioned the rearing method of their birds and only seldom considered it as a possible cause for project failure.

To allow future enhancement of meta-analysis, documentations of grouse releases need to be improved, both quantitatively and qualitatively. We suggest a number of topics which authors generally should provide information on when reporting grouse release studies (**Appendix II**).

Methodological discussions of release procedures, however, should not obscure the fact that, to date, releases of captive-reared European grouse have failed in establishing a single self-sustaining population. Particularly with regard to the high numbers of birds released within the recent 20 years (2901 Black Grouse, 2084 Capercaillie, 611 Hazel Grouse) results of the European grouse release projects appear poor.

Releases of captive-reared animals tend to have low success rates: in a worldwide review on release projects with captive-reared mammals and birds, 38% of the projects were reported as successful by the respective pro-

ject managers (GRIFFITH *et al*. 1989). An even lower proportion of bird reintroduction projects (11% = 7 projects) was judged successful by BECK *et al*. (1996).

There is evidence that translocations of birds caught in the wild are more likely to succeed than releases of captive-reared birds (GRIFFITH *et al*. 1989). With effort comparable to the European grouse release projects, for example, the translocations of prairie grouse (SNYDER *et al*. 1999) reached significant increases in population size or established self-sustaining populations.

When judging releases as conservation measures one has to take into account that release is a «long-term proposition» posing «unique problems» for each species (WILSON & PRICE 1996). To find the most promising conservation methods for European grouse, communication of project layout and results in a comparable manner applies to both in translocations and releases of captive-reared birds, no matter if a project succeeds or fails. Not only are release projects to be planned and performed thoroughly; scientific evaluation of release methods and outcomes is indispensable, if release is to become a viable tool in grouse conservation.

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Appendix I

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The numbering of references refers to the numbers given in **table I**.

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Appendix II

Topics to be considered when reporting grouse releases

1. General information

- Species [Black Grouse / Capercaillie / Hazel Grouse]
- Location of release area

2. Releases

- Years in which birds were released
- Total number of birds released
- Number of birds released at a time (numbers for each year)

3. Environmental conditions

- Habitat conditions [excellent / good / fairly good / poor]
- Suitable habitat: continuous / fragmented? Total size?
- Local population: past population trend? Extinct? When?
- How many birds persisted before first release?
- Major reasons for decline of wild population? Are these reasons still valid?
- Any habitat management? Before and/ or during release?

4. Origin of released birds

- Reared in captivity or caught wild?
- If captive-reared: hen- / hand-reared? If both: how many of each type?
- Age of birds at release?

5. Pre-Release

- Were birds trained in any way prior to release? [natural food / predators / roosting]
- Were birds acclimatized to the release area prior to release? Release aviary? How long?
- Were releasees chosen according to age / sex / physical condition / flying ability, …?

6. Release

- Season of year [spring / autumn]

7. Post-Release

- Were birds provisioned after release (e.g., fed)?
- Were birds monitored after release? Marked? Radio-tracked?
- If monitored: Anecdotal / systematic observations? [Once per year (display count) / occasionally / regularly (how often?)]

8. Results

- How many birds survived first year after release?
- How many died / disappeared?
- Reproduction of released birds? Evidence? [eggs / fledged young / juveniles / unmarked adult birds]
- Increase in population size/ density?
- What caused the individual birds' death (proximate cause)? [Predation/ Accident/ Starvation]
- Reason for losses of birds (ultimate cause)? [High predator density / Low habitat quality / Poor bird behaviour]
- If birds of different rearing conditions were used: report results separately!

9. Future plans

- Are further releases planned?
- If yes: are there plans for changes in methods?

9. Records

- List of reports / publications

RESUME : Evaluation de critères en vue de lâchers : est-ce possible ?

Le Tétras lyre, le Grand Tétras et la Gélinotte des bois sont des espèces sérieusement en danger dans plusieurs contrées de l'Ouest européen. Pour étoffer ou réinstaller les populations locales de ces espèces, des lâchers d'oiseaux élevés en captivité ont fréquemment été tentés. Considérant chaque tentative ou projet comme un cas d'étude, il est permis de penser qu'une compilation et une synthèse des résultats de plusieurs essais pourraient fournir une évaluation quantitative des méthodes utilisées.

Nous avons étudié la faisabilité d'une telle méta-analyse en passant en revue les résultats publiés de 30 lâchers bien documentés de tétraonidés, réalisés entre 1980 et 2000 dans six pays européens. Au total, plus de 5500 oiseaux élevés en captivité furent relâchés dans le cadre de ces programmes.

Il apparaît que, au vu de la pauvreté en informations comparables dans les rapports publiés, quelques critères seulement ont pu faire l'objet d'une évaluation. Pour permettre une méta-analyse, une documentation améliorée est nécessaire. Nous proposons un ensemble de critères à prendre en compte lors de tells études de repeuplement, pour améliorer le développement et l'instrumentation de stratégies effetives pour la reconstitution d'espèces menacées de tétraonidés.

ZUSAMMENFASSUNG : Können Charakteristika von Auswilderungsprojekten beurteilt werden?

Birkhuhn, Auerhuhn und Haselhuhn sind in vielen westeuropäischen Ländern in ihrem Bestand gefährdet. Um lokale Populationen dieser Arten zu erhalten oder wieder anzusiedeln, wurden in einigen Gebieten gefangenschaftsaufgezogene Vögel freigelassen. Betrachtet man einzelne Freilassungsprojekte als Fallstudien, könnte die Synthese der Resultate mehrerer Projekte helfen, den Beitrag verschiedener Methoden zum Erfolg eines Projektes quantitativ zu bewerten.

Wir untersuchten die Durchf¸hrbarkeit einer solchen Meta-Analyse anhand der publizierten Resultate von 30 dokumentierten Freilassungsprojekten, die zwischen 1980 und 2000 in sechs europäischen Ländern durchgeführt wurden. Insgesamt wurden im Rahmen dieser Projekte mehr als 5500 gefangenschaftsaufgezogene Rauhfußhühner freigelassen.

Die Zusammenstellung zeigte, daß nur für einige der Kriterien eine quantitative Analyse möglich war, da es in den publizierten Berichten oft an vergleichbarer Information mangelte. Für eine auf den Daten der Fallstudien basierende Meta-Analyse ist eine Vervollständigung der Dokumentationen notwendig. Um die Entwicklung und Anwendung effektiver Strategien zum Schutz gefährdeter Rauhfuflhuhnarten zu verbessern, schlagen wir einen Kriterien-Katalog vor, der bei der Berichterstattung ¸ber Ansiedelungsprojekte verwendet werden sollte.

Schlüsselwörter:Birkhuhn,Auerhuhn,Haselhuhn,Europa, Gefangenschaftsaufzucht, Auswilderung, Meta-Analyse