SAFETY OF CATCHING ADULT EUROPEAN BIRDS AT THE NEST. RINGERS' OPINIONS

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ABSTRACT

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The nest desertions after catching adults at the nest were analyzed for different breeding stages for 135 European species, basing on data supplied by 250 ringers representing 10 ringing schemes as well as on literature. Practically useful desertion rates were calculated for 66 species, for which material was sufficient enough. Influence of the catching method, duration of trap setting, ringer's behaviour, repeated catching, catching of the second parent, weather, season advancement, and time of day were discussed briefly.

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INTRODUCTION

Modern ecological studies often create the need for ringers to handle the breeding birds. In many cases this can be accomplished safely but there are many species where a particular part of the breeding cycle is more risky than other times. To avoid repetition of mistakes, the experience of workers who encountered such problems could be pooled. It is especially important in species particularly rare (and therefore the subject of conservation-oriented studies) in some countries, but common in others.

There is quite rich literature on methods of catching birds at nest (see references in Bub 1974 & 1991), but generally not much attention was paid to the influence of catching on breeding success.

Recognizing this, Pertti Saurola, the President of EURING, proposed in 1981 to collect the relevant opinions from European ringers and publish them as soon as possible, even if such information were not be quite objective, having been obtained without previously fixed methods of data gathering. Although it was commonly agreed that the problem is really important, the amount of data

gathered by means of a questionnaire sent by the EURING Secretary, Chris Mead, in 1983, was not great. Nevertheless, EURING didn't give up and the next attempts were charged to the Polish ringing scheme. The project was named Safety of Catching Adults at the Nest (SCAN) and in June 1986 I sent to 31 European ringing schemes the instruction of collecting quantitative data from ringers. Having received no single reply, I reported on Plenary Conference of EURING (Greifswald, May 1987) the qualitative data earlier obtained from Finnish ringers by P. Saurola, and the data collected in 1983 by Helgoland ringing scheme. Then again I sent a slightly altered instruction to the schemes, which declared the participation in the project during the Conference. After numerous reminding letters the last materials reached me in September 1990.

The aim of this paper is to summarize the experience gained by European ringers before the project SCAN was launched, supplement it with some literature data, and to encourage the scheduled field experiments in order to state more precisely the conditions of safe adult catching at the nest.

METHODS AND MATERIALS

Data collection

The European ringing schemes, which declared the participation in the project, were sent 3 documents: (1) general information on the project, (2) the questionnaire, and (3) the instructions of filling in the questionnaire. These documents, after translating them from English into national languages, were planned to be sent to individual ringers. It was assumed that each ringing scheme could change the contents of general information, adapting it to the local conditions (especially in respect of encouraging the ringers to send their data). The questionnaire and its filling instruction had to be translated literally (which, however, was not executed in all cases).

The ringers were asked to give the number of adult birds caught at nests (or, in precocial birds, during tending chicks) which deserted or did not desert the nest (chicks) after catching (estimates were acceptable), separately for each species and sex (if identified), and separately for each of seven stages: (1) egg laying, (2) the 1st half of incubation, (3) the 2nd half of incubation, (4) hatching (from starring of the first egg to drying up of the last young) and three stages of the feeding (tending) of nestlings, (5) early, (6) middle, and (7) late. This division of breeding cycle follows the questionnaire by C. Mead in 1983. Because some

ringers did not differentiate between the 1st and the 2nd halves of incubation, additional stage "the whole incubation" was added in the course of data elaboration.

Only the data from the nests checked later should be filled in the questionnaire. It was stressed that such checking ought to be done shortly after catching, to make easier distinguishing of the nest desertion caused by this activity from the one caused by other reasons.

Individuals caught repeatedly during different years ought to be taken into account only once.

The birds trapped outside the nest but at the distance not greater than 1 m, should also be included.

Catching methods should be described, if particularly dangerous or particularly safe for the nest.

The Polish ringers were given the additional questionnaire assigned for the data from the coming seasons and containing more detailed questions, but their material was elaborated only on the basis of the details described above.

Data quality and data interpretation

After receiving the questionnaires it appeared that not all data entries followed the above rules. It was due both to the changes made in instructions by some ringing schemes, and not full compliance with the instruction by the ringers.

Some ringers confined themselves to general statements without any quantitative data, or gave only proportions of desertions without the number of catchings. In the latter case I assumed the lowest possible numbers, i.e. when desertion rate was reported as "over 50%" I assumed 3 desertions and 5 catchings. Incomplete or internally inconsistent data, which could not be interpreted without doubts (i.e. 2% of desertions at a dozen or so catchings), were omitted.

Some of the ringers didn't distinguish between the 1st and the 2nd halves of incubation, giving total data for both these stages jointly. The Radolfzell ringing scheme divided the nestling period into two, instead three, stages. But the materials supplied by its ringers contained only three desertions by parents caught at nestlings, and desertion rate in these stages was not significantly different from the one obtained after the analysis of data delivered by ringers from other ringing schemes. Furthermore, Radolfzell's data from both those nestling stages were relatively not numerous. Thus I added them to the early and late nestling stages respectively.

In the materials from Great Britain the catchings of the same individual in different years were treated as separate events, but usually a number of caught individuals was given. To make these data comparable with those from other countries, I rejected the number of catchings not resulting in nest desertion, which exceeded the total number of caught individuals diminished by the number of catchings ending with the nest desertion. I assumed that repeated catching of the same individual in different years was much less probable when it deserted the nest after catching. However, such treatment of original data could cause some overestimating of the desertion rate (if bird was recaptured many times, but in only one case it abandoned the nest, then solely the latter catching was taken into consideration).

The major part of data from Helgoland ringing scheme was prepared in 1983 as an answer to the questionnaire sent by C. Mead.

Since the reports forming the basis of this paper (except for those obtained by the additional questionnaires from Polish ringers) were collected before the SCAN project has started, the accuracy of the data delivered was different. Some ringers sent the exact data from their field notebooks, others articulated rather their general impressions, generalized in approximate numbers. I made an analysis of the differences between these two types of data for the species with greater material (see Pied Flycatcher, Great Tit and Table 7). I assumed that the unrounded numbers of catchings and desertions did indicate the origin of the data from field notebooks, and the rounded ones showed a posterior estimates. Ringers' information that data were approximated were also helpful here.

Some ringers supplied their questionnaires with extensive descriptions, one of them even added a small elaboration together with a graph (Kittle G35; the method of citing of the project participants is explained below).

Manner of material presentation

The material was delivered by ca 250 ringers from 10 European ringing schemes (Table 1). Each ringer was assigned in this paper an identity note: a letter indicating the country, and a number (Table 2). When referring to the data or opinions of an individual ringer, either his/her name with identity note is given, or the identity note alone (when cited many times in neighbouring parts of the text, or when presenting the significance of differences of desertion rates reported by different ringers, or in Table 3).

Table 1

Contributing ringers, including the ones who supplied project SCAN with general opinion only (without quantitative data), even when not cited in the paper.

Scheme	Country	Number of		
		ringers	species	catchings
Helsinki	Finland	95	114	29 200
London	Great Britain	65	74	15 744
Gdańsk	Poland	35	60	3 870
Helgoland	Germany	17	31	3 900
Radolfzell	Germany	15	27	1 299
Kaunas	Lithuania	10	36	585
Moskwa	Russia	4	35	1 710
Sempach	Switzerland	3	3	99
Sofia	Bulgaria	1	4	104
Riga	Latvia	?	15	803
Total		>246	177	57 314

The main bulk of collected data is presented in Table 3, whereas the rest of them are given in species comments. In the Table there are omitted the species which fulfilled three requirements: lack of desertions, the number of catchings in every stage smaller than 10 and no important information given by any ringer. On the other hand I included in Table 3 also the species absent in ringers' questionnaires but for which information was found in literature.

If not stated otherwise, entries for individual species in Table 3 contained summed data of all ringers. The data for both sexes were pooled together if the difference in desertion rate between them was not significant ($p>0.05$). In some cases, when catchings concerned mainly females and desertion rate for males was not significantly different, the data for males were rejected.

The instruction omitted the problem of catching both parents at a nest. Only few ringers informed that they caught both nest mates. With one exception, the desertion rate in these catchings was not higher than in the cases where there was no information on number of parents caught. This exception was Common Tern (see the species comment). In every case each parent is included in Table 3 separately.

Table 2

Ringers who delivered data, listed according to the country code and ringers' name.

Included are also persons sending general opinion only, even not cited in the paper. Country-specific part of ringer's code is given in parentheses.

Sofia, Bulgaria (B):
D. Nankinov B01,
Helgoland, Germany (D):
P. H. Becker D01, H. Behmann D02, H. Brombach & Leverkusen D03, K. Hein D04, H. von der Heyde D05, K. Hillerich D06, H. Hötker D07, H. Hudde D08, H. Illner D09, F. W. Merkel D10, R. Mönig D11, F. Neuschulz D12, J. Onnen D13, O. Schwerdtfeger D14, W. Winkel D15, M. Wüst D16, H. Zang D17,
Radolfzell, Germany (D):
M. Dallmann D51, M. Hammann D52, H. Löhr! D53, H. Rebstock D54, H. Renz D55, K. Robel D56, O. Samwald D57, E. Schäffner D58, L. Simon D59, A. Soldat D60, F. Stalla D61, J. Straubinger D62, R. Triebl D63, F. Trillmich D64, A. Veitengruber D65,
Helsinki, Finland (F):
E. Aaltonen F01, K. Ahola & T. Karstinen F02, J. Alhainen F03, H. Arppe F04, R. Blomqvist F05, K. Degerstedt F06, H. Ekblom F07, B. Ekstam F08, S. Grönlund F09, J. Haapala F10, R. Haapala F11, J. Haikola F12, H. Hakkarainen F13, J. Halonen F14, M. Hario F15, H. Hemmilä F16, O. Hildén F17, I. Hölsä F18, H. Hongell F19, T. Hyvärinen F20, A. Isaksson F21, L. Iso-Iivari F22, A. Jokinen F23, M. Juntti F24, H. Kämäräinen F25, T. Karjalainen F26, P. Kastari F27, J. Koivu et al. F28, V. Korhonen F29, E. Korpimäki F30, P. Koskimies F31, M. Kuitunen F32, A. Laaksonen F33, A. Laesvuori F34, M. Lagerström F35, E. Lappi F36, T. Larm F37, R. Latja F38, V.-P. Lehtonen F39, H. Lehtoranta F40, L. Leikkonen F41, A. J. Lind F42, P. Linkola F43, H. Lokki F44, T. Lukkarinen F45, J. Matero F46, R. Michelsson F47, J. Miettinen F48, S. Niiranen F49, J. Niittylä F50, P. Nikkanen F51, T. Niskanen F52, T. Numminen F53, M. Ojanen F54, M. Orell & M. Ojanen F55, L. Paavolainen F56, J. Palmgren F57, K. Palo F58,, J. Pihlainen F59, J. Piiroinen F60, M. Pohjoismäki F61, P. Pouttu F62, J. Pursiainen F63, T. Pyyhtiä F64, K. Rannikko F65, M. Rautkari F66, A. Riikonen F67, H. Rönkkö F68, P. Runko F69, J. Ruoho F70, J. Ryssy F71, S. I. Saarinen F72, P. Saurola F73, K. Selin F74, M. Siltaloppi F75, M. Soikkeli F76, T. Solonen F77, G. Stara F78, V. Tarsa F79, J. Taskinen F80, J. Tiainen F81, J. Tittonen F82, J. Tiussa F83, E. Topp F84, P. Topp F85, V. Tuominen F86, M. Ukkonen F87, S. Veistola F88, R. Virkkala F89, H. Virtanen F90, R. Virtanen F91, S. Vuolanto F92, M. Wikman F93, R. Wistbacka F94, O. Ylimaunu F95,
London, Great Britain (G):
C. G. Headlam G01, I. Alexander G02, J. Arnold G03, K. B. Briggs G04, M. de L. Brooke G05, D. Budworth G06, E. D. Cameron G07, M. Canham G08, C. F. Carter G09, N. A. Clark G10, P. J. Clark G11, J. R. H. Clements G12, J. Cobb G13, A. V. Cross G14, R. A. Denyer G15, C. R. du Feu G16, R. Duncan G17,N. E. G. Elms G18, G. C. Evans G19, P. N. Ferns G20, G. Follows G21, H. Galbraith G22, L. J. Graves G23, K. J. Green G24, R. E. Green G25, M. P. Harris G26, D. Hazard G27, C. G. Headlam G01, S. Hinsley G28, R. M. Holmes G29, C. W. Holt G30, D. Jackson G31, W. G. Johnson G32, R. Kenward G33, J. Kirby G34, T. Kittle G35, R. Leverton G36, A. E. Male G37, C. J. Mead G38, E. R. Meek G39, D. R. Mirams G40, J. H. Morgan G41, R. Morton G42, J. R. Mountford G43, D. Norman G44, J. D. Okill G45, B. O'Mahony G46, S. J. Ormerod G47, C. M. Perrins G48, P. F. J. Playford G49, A. Prater G50, P. C. Quin G51, G. S. Riddle G52, A. G. Rogers G53, C. D. Rowley G54, J. Sheldon G55, K. W. Smith G56, I. M. Spence G57, T. J. Stowe G58, D. Walker G59, P. N. Watts G60, A. Webb G61, H. Woodland G62, K. Woods G63, G. A. Wright G64, H. Young G65,
Sempach, Switzerland (H):
A. Labhardt H01, C. Rohner H02, A. Roulin H03,
Kaunas, Lithuania (L):
R. Eidukaitis L01, D. Grikinis L02, A. Jakevičius, K. Vaičiunas L03, P. Kurlavičius L04, K. Lapka L05, S. Matulis L06, L. Raudonikis L07, S. Rumbutis L08, V. Sabaliauskas L09, D. Vinskas L10,
Riga, Latvia (LA0): data compiled by the scheme,
Gdańsk, Poland (P):
P. Bartyzel P01, D. Bobrowicz P02, M. Borowiec P03, P. Cempulik P04, P. Chylarecki P05, A. Czapulak & M. Fura P06, B. Czerwiński P07, M. Goc P08, J. Gromadzka P09, M. Gromadzki P10, M. Jędra P11, K. Józefiak P12, W. Kania et al. P13, W. Kostyrko P14, A. Kruszewicz P15, J. Kurek P16, J. Lachman P17, P. Majewski P18, W. Meissner P19, B. Michno P20, C. Nitecki P21, B. Olech P22, M. Przydryga P23, J. Siekiera P24, M. Sobczak P25, L. Stempniewicz P26, H. Sułek, J. Smykla & B. Czerwiński P27, L. Tomiałojć P28, T. Wesołowski P29, M. Wieloch P30, A. Wiśniewski P31, E. Włochowicz P32, J. Wójciak P33, J. Zawadzki P34, M. Zieliński P35,
Moskwa, Russia (R):
V. V. Bianki R01, B. M. Gubin R02, V. B. Zimin R03,

If desertion rate reported by a ringer differed significantly* from any one given by other person, even in one of breeding stages only, the data of this ringer are placed in Table 3 below the summarized species data, or are discussed in comments. Pied Flycatcher and Great Tit are exceptions here. For those species, only the material from ringers, whose data were presumely based on field notes and contained the extreme values of desertion rate for any of breeding stages, are included in the Table.

The data previously published are discussed only in comments, except my own (Kania 1989), which after being reordered are included into Table 3. The important ringer's information, not included into the Table due to non-standard division of the breeding cycle or not quantitative appearance, is also discussed in comments.

The species comments are the inseparable supplement to the information given in Table 3. In individual cases they can show the opinion contradictory to that appearing from the Table.

Statistical methods

To define the significance of differences between desertion rate values calculated from data of different ringers, I used the Fisher's Exact Test or, for more numerous data, Chi-squared Test with Yates's correction (Blalock 1977).

The confidence interval of desertion rate, with p=0.05, was used for two purposes: (1) to show variation of mean desertion rate in Tables 3 - 6, where one tail of interval is given, (2) to enable delimitation of safety categories (Tables 3 - 5 and 8 - 9). It was calculated with a help of the method, eliminating the artifact of narrow confidence intervals in case of rate values close to 0 or 1 (Blalock 1977, with substitution of n by n-1):

$$L = 100 * 1.96 * \sqrt{m * \frac{(1-m)}{(n-1)}}$$

where: L - the size of one tail of the desertion rate confidence interval (in per cent, in proportion to number of catchings); n - number of catchings; m - the value nearest to 50% chosen from: the desertion rate calculated from data and either lower or higher confidence limit calculated with 50% desertion rate assumed.

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* see section Statistical methods

This method extends the limits of confidence interval and a real desertion rate is within these limits with probability a little higher than the assumed 0.95. I counted the confidence intervals only for cases with at least 20 catchings and additionally for 7 cases with less catchings (3-12), but with very high desertion rate (57-100%) and calculated lower limit of confidence interval higher than 10.0%.

Both the probabilities and confidence intervals, given in Tables 4-6 for literature data were recalculated in above ways and can be inconsistent with those from original publications.

Safety categories

The values of desertion rates and that of confidence interval limits were summarized for practical use in the field as categories of safety of catching at nest. I arbitrarily distinguished 4 basic categories:

A - safe catching - desertion rate $\leq$ 2.0%

B - moderately dangerous catching - desertion rate 2.1 - 5.0%

C - very dangerous catching - desertion rate 5.1 - 10.0%

D - extremely dangerous catching - desertion rate >10.0%

Exceeding of confidence interval of desertion rate beyond limits of categories is marked with minuses or pluses (for crossing lower or upper category limits respectively, Table 8). Number of minuses or pluses informs how many category limits are crossed by given tail of confidence interval. Lack of any minus or plus informs that the whole confidence interval is comprised within the safety category. In that case the category is denoted with a capital letter. The capital letter is also used when confidence interval extends beyond one of the category limits for distance not bigger then half of that category (exception - category D-, see Table 8). When limits of confidence interval expand beyond both limits of a category or beyond one but for greater distance, the category is denoted with small letter a, b, c, d.

Summing up: only safety categories marked with capital letters can be accepted as unequivocal enough.

Safety categories were determined only when confidence interval was calculated.

RESULTS

The collected data are presented in Table 3. Supplementary information and explanations of the contents of the Table as well as additional data extracted from literature are given in species comments below. They have to be read together with the Table.

Abbreviations used:

p - probability that the difference is insignificant,

n.s. - difference thought to be insignificant ($p > 0.05$),

n - number of catchings,

x/y - *x* desertions for *y* catchings,

bail trap - spring released trap, similar to bow net but covered with camouflage fabric (Mednis & Blums 1976).

Great Crested Grebe *Podiceps cristatus*. Caught during hatching stage may leave with chicks hatched to the moment, abandoning the remaining eggs (Goc P08).

Graubica (1981) reported on catching Grebes during the 2nd half of incubation and beginning of hatching (up to one chick in nest) with bail traps covered with camouflage fabric, set at nest for 1-8 hours. 3 of 22 nests were deserted and in another 3 cases dead adults were found inside closed trap. For 14 nests with traps to which adults did not enter the desertion rate was 64%. According to this author the wire drop-door trap is still more dangerous. In 13 attempts four adults were trapped, but two of them abandoned the nest later and all injured their bill and devastated the nest inside the trap.

Red-necked Grebe *Podiceps grisegena*. Graubica (1981) using wire drop-door trap caught 20 Red-necked Grebes, including 7 pairs (3 individuals were caught twice), without any desertion.

Manx Shearwater *Puffinus puffinus*. A small proportion of incubating adults desert, especially these caught early and handled repeatedly. Catching during the laying and the whole nestling period is safe (Perrins G48).

Table 3

Nest/chicks desertions after catching adults at the nest or with chicks.

Species with <10 catchings in each breeding stage and without any desertion are excluded.
Des. - desertion rate(%)
Cat. - Safety category, see Table 8; Conf int. - 0.95 confidence interval (1.96 x SE). Given only if number of catchings >19, or number of catchings > 2. and lower confidence limit >25%
Nnst - Number of catchings (=nests for cases with one parent caught)
Nrng - Number of ringers who supplied data
First ringer: above - percent of catchings done by ringer with highest catchings number;
below - code of above ringer (see Table 2) or, when more than 1 ringer, number of ringers (e.g. "3p.");
In column "Incubation, whole" data for first ringer is given only when the column contains data supplied for 1st and 2nd half of incubation jointly. Other information are given only when there are entries for both 1st and 2nd halves of incubation.

Species F – female, M – male	Sex	Pages with comments	Laying				Incubation 1st half				Incubation 2nd half			
			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Gavia stellata Red-throated Diver											33.3		9 1	100% G45
Podiceps cristatus Great Crested Grebe		13												
Podiceps grisegena Red-necked Grebe		13												
Fulmarus glacialis Fulmar							50.0		2 1	100% G59	0.0		7 1	100% G59
Puffinus puffinus Manx Shearwater		13	10.0 c - - +	16.4	30 1	100% G26	6.9 c - - +	16.1	29 1	100% G26	6.7 c - - +	15.7	30 1	100% G26
Hydrobates pelagicus Storm Petrel		29												
Phalacrocorax aristotelis Shag			0.0 a + + ÷	9.7	50 1	100% G23	1.8 a + + +	9.6	55 2	91% G26	0.0 a + +	6.9	80 3	63% G26
Ixobrychus minutus Little Bittern							0.0		3 1	100% P04	25.0		8 1	100% P04
Cygnus olor Mute Swan											0.0 a + + +	14.8	28 3	82% G45
Tadorna tadorna Shelduck	F										33.3		6 4	33% 2p.
Aix galericulata Mandarin	F						0.0		2 1	100% G15	0.0		10 1	100% G15
Anas penelope Wigeon	F										20.0		5 1	100% F74
Anas strepera Gadwall	F		100.0		1 1	100% G64	0.0		9 4	44% LA0	14.9 d - - -	13.2	47 3	79% LA0
Hand net, ringer G10		29					0.0		2		0.0		3	
Trap, ringer G10											100.0 D	49.0	5	
Anas platyrhynchos Mallard	F						42.9 D	16.6	35 6	40% G10	5.9 c -	3.5	323 7	62% P18
Hand or hand net, in nest-box, ringer P18	F	29									0.0 a +	3.5	200	100%
Hand net	F						0.0		5 1	100% G10	0.0		12 1	100% G10
Trap	F						88.9 D	34.5	9 1	100% G10	60.0 D	32.0	10 1	100% 610
Anas acuta Pintail	F						100.0		1 1	100% F92	3.2 b - + +	14.6	31 3	87% LA0
Anas querquedula Garganey		29												
Anas clypeata Shoveler		29												
Aythya ferina Pochard	F	29-30					100.0		1 1	100% P26	0.0		12 1	100% P26
Aythya fuligula Tufted Duck	F	29-30	0.0		2 2	50% 2p.	10.5		19 5	42% L09	0.0 a + +	9.4	52 9	33% P26
Aythya marila Scaup	F										0.0		13 1	100% F92

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
								0.0 a+++	17.5	22 1	100% G45	0.0		18 1	100% G45	0.0 a+++	17.0	23 1	100% G45
11.1		9 1										0.0		2 1	100% G54	0.0		18 1	100% G54
6.8 c--+	10.2	59 1		0.0 a+++	18.8	20 1	100% G26	0.0 a++	9.7	50 1	100% G26	0.0 a++	5.9	100 1	100% G26	0.0 a++	9.7	50 1	100% G26
0.7 a++	4.9	135 3		0.0 a++	9.2	54 2	93% G26	0.0 A	1.7	535 5	75% G06	0.0 A	1.7	520 4	77% G06	0.0 a++	7.5	71 2	70% G26
18.2		11 1		0.0		2 1	100% P04	0.0		2 1	100% P04	0.0		1 1	100% P04				
				0.0		1 1	100% G44									0.0		2 1	100% L10
0.0		12 1																	
12.5 d---	11.6	56 4		0.0		11 1	100% LA0												
0.0		5																	
9.5 c +	3.7	358 8		1.2 a++	7.0	83 3	60% P18												
				0.0 a++	9.7	50	100%												
13.6 d---	13.5	44 2	63% G64																
67.7 D	17.9	31 2	61% G64																
6.3 c--+	15.0	32 3		0.0		14 1	100% LA0												
7.7		13 1																	
2.0 a++	6.3	101 10	30% F17	0.0		9 4	56% F19	0.0		3 1	100% F19								
0.0 a+++	14.8	28 2	54% F17																

Species	Sex	Pages with comments	Laying				Incubation 1st half				Incubation 2nd half			
F – female, M – male			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Somateria mollissima Eider	F	30					100.0		1 1	100% F21	1.2 a++	4.3	168 5	71% F74
Melanitta fusca Velvet Scoter	F						0.0		1 1	100% F19	6.3		16 4	38% F92
Bucephala clangula Goldeneye	F	30-31	28.6		7 2	57% F07	12.0 d - - -	12.3	50 6	38% F07	1.8 a+	2.3	454 18	31% F80
Mergus serrator Red-breasted Merganser	F						11.1		9 3	78% F92	6.9 c - - +	16.1	29 7	55% LA0
Mergus merganser Goosander	F		66.7		3 3	33% 3p.	14.3		7 3	57% F07	7.7 c - +	5.5	168 13	60% F50
Accipiter gentilis Goshawk	F	31					10.0		10 1	100% G33	10.0		10 1	100% G33
	M						100.0 D	63.9	3 1	100% G33	100.0		2 1	100% G33
Accipiter nisus Sparrowhawk	F						0.0		15 1	100% F93				
Pandion haliaetus Osprey		31												
Falco tinnunculus Kestrel			0.0		2 1	100% D62	0.0 a+++	10.2	47 1	100% G52	0.0		14 2	71% G52
Falco columbarius Merlin							9.1		11 1	100% G45	0.0 a++	7.8	68 2	76% G45
Lagopus lagopus Willow Grouse		31												
Alectoris rufa Red-legged Partridge											2.2 b-++	10.9	46 1	100% G25
Perdix perdix Partridge	F										9.1		11 1	100% G25
Haematopus ostralegus Oystercatcher		31	11.1		9 1	100% G04	1.8 a+	2.8	331 3	92% G26	1.3 a+	2.4	388 5	79% G26
Burhinus oedicnemus Stone Curlew											25.0		4 1	100% G25
Charadrius dubius Little Ringed Plover		31	0.0		3 1	100% F61	4.2 b - ++	17.6	24 8	29% F65	1.5 a++	8.4	65 11	25% P27
Charadrius hiaticula Ringed Plover		31	0.0		12 2	83% F65	1.3 a++	4.6	153 6	32% G31	0.0 A+	2.6	301 13	39% D02
Charadrius alexandrinus Kentish Plover		31									0.0 a++	7.9	67 1	100% D63
Charadrius morinellus Dotterel	M	31												
Pluvialis apricaria Golden Plover	M						50.0		4 1	100% G20	0.0		3 1	100% G20
Vanellus vanellus Lapwing							16.7		12 5	67% P27	4.2 b-+	5.5	142 9	58% P27
Calidris minuta Little Stint			0.0		12 2	58% P13	0.0 a+++	12.6	35 1	100% P13	0.0 a+++	15.1	27 1	100% P13
Calidris temminckii Temminck's Stint			10.0 c - - +	21.1	20 1	100% F17	0.0		18 2	94% F65	0.0 a+++	16.0	25 4	40% F65
Calidris alpina Dunlin		31	0.0		5 1	100% G31	1.1 a++	6.8	87 2	92% G31	0.0 a++	6.3	90 4	89% G31
Limicola falcinellus Broad-billed Sandpiper														
Philomachus pugnax Ruff							0.0		12 3	67% F65	5.7 c - - +	10.7	53 4	75% LA0
Gallinago gallinago Common Snipe							100.0		1 1	100% G25	10.7 d - - -	17.2	28 2	89% G25
Scolopax rusticola Woodcock							100.0		1 1	100% F06	0.0		3 3	33% 3p.
Limosa limosa Black-tailed Godwit							0.0		1 1	100% P27	7.7		13 3	54% LA0

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
1.8	4.4	169		0.0	12.6	35	57%												
a++		5		a+++		2	P18												
4.5	18.7	22	27%																
b-++		5	2p.																
1.9	1.4	898	44%	3.8	16.6	26	42%	0.0		6	50%								
a+		19	F41	b-++		4	F48			3	F80								
7.0	12.6	43	40%	0.0		2	100%												
c--+		8	LA0			1	LA0												
6.4	3.5	326	45%	0.0		1	100%	0.0		2	50%								
C-		15	F41			1	F21			2	2p.								
10.0	21.1	20																	
c--+		1																	
100.0	49.0	5																	
D		1																	
												0.0		1	100%	0.0		3	100%
														1	F44			1	F44
0.0		12	100%																
		1	F28																
0.0	8.4	61						3.7	16.2	27	96%	2.4	7.2	85	73%	0.3	2.3	368	88%
a++		2						b-++		2	F71	b-+		2	F71	A+		3	F30
1.3	7.3	79						0.0		1	100%								
a++		2								1	G39								
1.4	1.5	777	79%	0.0		4	75%												
A+		6	G26			2	G04												
0.2	1.0	1109	90%	0.0	12.8	34	94%	0.0		2	100%								
A		14	F04	a+++		3	LA0			1	F26								
0.4	1.9	505	30%	0.0	18.1	21	57%	0.0		12	83%								
A+		15	D02	a+++		4	D02			2	D02								
0.0		10	100%																
		1	F17																
28.6		7																	
		1																	
5.2	5.4	154		0.0		11	45%												
c--+		10				4	G45												
0.0	5.8	102	61%	0.0		1	100%												
a++		2	P13			1	P13												
0.0	4.5	143	70%	0.0		11	100%	0.0		7	100%	0.0		3	100%				
a+		5	F17			1	F54			1	F61			1	F61				
0.6	4.0	177		0.0	18.8	20	100%												
a+		4		a+++		1	G31												
0.0		10	100%	0.0		1	100%												
		1	F17			1	F70												
4.6	9.2	65		2.0	10.1	51	100%												
b-++		4		a+++		1	LA0												
13.8	17.3	29		0.0		8	100%												
d---		2				1	LA0												
40.0		5	20%																
		5	5p.																
7.1		14		0.0		12	83%												
		3				2	LA0												

Species Sex F – female, M – male	Pages with com-ments	Laying				Incubation 1st half				Incubation 2nd half			
		Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Numenius arquata Curlew		0.0		1 1	100% P33	5.6 c - - +	13.8	36 2	92% F95	3.6 b - ++	15.7	28 2	96% F95
Tringa totanus Redshank	32	0.0		5 1	100% F65	2.3 b-+	5.4	131 4	74% G31	8.8 c - +	4.0	294 13	41% LA0
Ringer G31						3.1 b-+	6.7	97		1.0 a++	6.2	99	
Ringers LA0										18.9 D	8.0	122	
Other ringers		0.0		5 1	100% F65	0.0 a+++	12.8	34 3	53% F54	0.0 a++	7.7	69 10	29% F65
Xenus cinereus Terek Sandpiper		33.3		3 1	100% F65	6.7 c - - +	15.7	30 2	73% F54	0.0 a+++	17.5	22 2	77% F54
Actitis hypoleucos Common Sandpiper						100.0		1 1	100% F19	0.0		2 2	50% 2p.
Arenaria interpres Turnstone						1.9 a+++	10.0	52 4	87% F92	0.0 a+	4.4	149 5	91% F92
Phalaropus lobatus Red-necked Phalarope		0.0		1 1	100% F92	0.0		10 1	100% F92	0.0 a+++	17.5	22 3	91% F92
Larus ridibundus Black-headed Gull	32					25.0 d--	22.5	20 1	100% P21	1.2 A+	1.8	567 3	88% P21
Ringer L08										100.0 D	39.2	7	
Larus canus Common Gull										0.0 a+++	18.1	21 2	52% F74
Larus fuscus Lesser Black-backed Gull	32									1.9 a++	6.2	103 2	97% G20
Ringer G20										0.0 a++	5.9	100	
Ringer F15										66.7		3	
Larus argentatus Herring Gull	32					0.0		2 1	100% P35	5.5 c - - +	6.7	110 3	55% G20
Larus marinus Great Black-backed Gull						30.0		10 1	100% G26	50.0		2 2	50% 2p.
Rissa tridactyla Kittiwake	32									0.0 a+	3.7	185 2	81% G26
Sterna sandvicensis Sandwich Tern										3.3 b -++	15.0	30 1	100% P30
Sterna hirundo Common Tern	32					40.3 D	12.5	62 1	100% D01	2.7 B -	2.1	552 5	91% P30
Sterna paradisaea Arctic Tern										0.0 a++	7.9	66 2	92% F74
Sterna albifrons Little Tern		57.1 D	39.6	7 3	71% D02	12.5		8 2	63% D02	1.8 a+	3.1	282 4	53% P30
Chlidonias nigra Black Tern	32												
Uria aalge Guillemot	33					100.0 D	56.1	4 1	100% G61	0.0 a++	5.9	100 1	100% G26
Alca torda Razorbill						10.0		10 1	100% G59	0.0 a+++	11.2	41 3	73% G26
Cepphus grylle Black Guillemot						50.0		2 2	50% 2p.	0.0		6 2	67% F74
Fratercula arctica Puffin	33	50.0 D	22.5	20 1	100% G26	10.0 c - - +	12.0	50 1	100% G26	10.0 c - - +	12.0	50 1	100% G26
Pterocles senegallus F Spotted Sandgrouse										100.0		2 1	100% G28
Columba oenas Stock Dove		100.0		1 1	100% D06	100.0 D	56.1	4 2	75% G36	20.0		5 4	40% G12
Tyto alba Barn Owl	33	16.7		6 2	83% H03					0.0		1 1	100% G62

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
4.7	9.3	64		0.0		6	100%												
b - ++		3				1	F95												
6.8	3.0	426	46%	5.8	3.4	328	92%												
C -		14	G31	c -		3	LA0												
2.0	4.0	196		0.0	16.0	25													
a++				a+++															
				6.3	3.7	302													
				C -															
0.0	5.7	104	33%	0.0		1	100%												
a++		11	F65			1	F42												
3.8	10.4	52		0.0		6	100%												
b - ++		2				1	F54												
15.4		13	77%	0.0		1	100%					0.0		2	100%				
		3	F17			1	G04							1	F26				
0.5	3.6	201																	
a+		5																	
0.0	6.8	82	61%	0.0		1	100%					0.0		1	100%				
a++		4	F17			1	F19							1	F61				
2.0	1.9	587		0.0	5.9	100	100%					0.0	13.1	33	100%				
a+		3		a++		1	P21					a+++		1	L09				
												0.0	13.1	33					
												a+++							
				33.3		3	100%												
						1	F15												
				33.3		3													
5.4	6.6	112		0.0		1	100%												
c - - +		3				1	F57												
33.3		12																	
		3																	
				0.0		10	100%	0.0	2.0	430	47%	0.0	2.9	260	77%	0.0		10	100%
						1	G26	A		3	G06	A+		2	G06			1	G45
6.5	2.4	614		0.0		8	100%												
C -		6				1	P35												
2.1	3.1	290		0.0		11	73%	0.0		5	100%								
b - +		4				3	D02			1	D02								
3.8	6.6	104		0.0		10	100%	0.0	7.8	68	74%	0.0	5.4	111	45%	0.0	5.9	100	50%
b - ++		2				1	G26	a++		3	G26	a++		3	G26	a++		2	2p.
2.0	10.1	51		0.0		10	100%	0.0	10.5	45	67%	0.0	8.4	61	49%	0.0	10.5	45	44%
a+++		3				1	G26	a+++		3	G26	a++		4	G26	a+++		3	2p.
11.1		9	44%									0.0		2	100%				
		4	F74											1	F21				
10.0	7.9	100		10.0	12.0	50	100%	0.0	5.9	100	100%	0.0	5.9	100	100%	0.0	9.7	50	100%
c - +		1		c - - +		1	G26	a++		1	G26	a++		1	G26	a++		1	G26
55.6	34.4	9						40.0		5	40%	23.1		13	38%	0.0		2	100%
D		5								4	F79			4	D17			1	F41
16.7		18	94%	14.3	21.1	21	90%	0.0	12.3	36	72%	0.0		11	64%	0.0		2	100%
		2	H03	d - - -		3	H03	a+++		5	H03			3	H03			1	H03

Species	Sex F – female, M – male	Pages with comments	Laying				Incubation 1st half				Incubation 2nd half			
			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Bubo bubo Eagle Owl	F	33												
Glaucidium passerinum Pygmy Owl	F		100.0		1 1	100% F35					0.0		2 1	100% D62
Athene noctua Little Owl			6.7 c - - +	15.7	30 1	100% D09	6.3 c - - +	15.0	32 2	94% D09	3.2 b - + +	14.6	31 2	97% D09
Strix aluco Tawny Owl	F+M		0.0		4 2	75% D62	21.4		14 6	36% F43	32.1 D	13.2	56 14	38% F43
	F		0.0		4 2	75% D62	40.0		5 3	40% 2p.	35.5 D	17.9	31 12	29% F48
	M	33									50.0		2 2	50% 2p.
Sex not determinated							11.1		9 3	56% F43	26.1 d -	20.9	23 2	91% F43
Ringer F35	F						0.0		1		71.4 D	37.1	7	
Strix uralensis Ural Owl	F+M		1.3 a + +	7.4	77 4	65% F73	2.5 b - + +	12.1	40 3	75% F37	1.8 a + +	5.8	114 7	26% 2p.
	F	33	0.0 a + +	7.5	72 3	69% F73	0.0 a + + +	12.6	35 2	86% F37	0.0 a + +	6.0	97 6	31% 2p.
	M													
Ringer F71			20.0		5		20.0		5		11.8		17	
Aegolius funereus Tengmalm's Owl	F+M		13.6 D-	6.0	176 13	54% D14	3.4 b - +	3.3	291 17	26% D14	0.8 A+	1.7	604 29	17% 2p.
	F		12.6 d-	6.9	135 11	59% D14	3.0 b - +	3.8	234 15	28% D14	0.2 A+	1.9	467 27	21% F03
	M		13.3		15 1	100% D14	0.0		12 1	100% D14	0.0 a + + +	13.7	31 4	77% D14
Sex not determinated			19.2 d - - -	19.1	26 2	96% F71	6.7 c - - +	12.1	45 2	96% F71	3.8 b - + +	6.5	106 2	98% F71
Caprimulgus europaeus Nightjar	F	33									50.0		4 1	100% G02
Apus apus Swift		33	36.4		11 5	45% F71	16.7 d---	19.7	24 6	50% F71	3.5 b - + +	9.7	57 9	21% F71
Jynx torquilla Wryneck			42.9		7 5	43% F71	0.0 a + + +	18.1	21 3	43% F66	5.6		18 8	28% F71
Dryocopus martius Black Woodpecker			100.0		1 1	100% F62					0.0		2 1	100% F62
Dendrocopos major Greater Spotted Woodpecker							0.0		1 1	100% G56	16.7		6 3	67% G56
Lullula arborea Woodlark	F		50.0		2 1	100% F84	100.0 D	63.9	3 1	100% F84	50.0		4 1	100% F84
Alauda arvensis Skylark		34					0.0		16 1	100% G17	2.3 b - + +	11.5	43 3	81% G17
Riparia riparia Sand Martin		34					0.0 a + +	5.9	100 1	100% D03	0.0 a +	4.1	164 3	61% D03
Hirundo rustica Swallow		34	80.0 D	45.3	5 3	60% D59	14.3 d - - -	17.8	28 4	50% G32	0.0 a + + +	11.6	39 6	38% P23
Delichon urbica House Martin		34	7.1		14 4	71% P24	12.5 d - - -	16.1	32 5	38% P23	2.8 b - + +	13.1	36 7	42% P24
Anthus campestris Tawny Pipit	F													
Anthus pratensis Meadow Pipit							100.0		1 1	100% P33	5.3		19 2	95% G20
Motacilla cinerea Grey Wagtail							100.0		2 1	100% G47				
Motacilla alba Pied/White Wagtail		34					0.0		2 2	50% 2p.	20.0		5 4	40% F06

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
								100.0		1 1	100% F79	0.0		9 2	67% F37	0.0		5 2	80% F44
				0.0		1 1	100% D62	0.0		8 3	50% F35	0.0		16 4	44% F35	0.0		12 4	75% F35
4.8 b - ++	9.4	63 3		0.0 a+++	14.0	30 1	100% D09	0.0 a+++	13.7	31 2	97% D09	0.0		1 1	100% G54	0.0		1 1	100% G54
32.2 D	10.3	90 20	32% F43	10.4 d - -	8.1	96 13	21% 2p.	1.9 a+	1.8	672 25	20% F02	0.0 A	2.0	444 19	34% F51	0.0 a++	6.2	92 8	65% F73
39.6 D	13.6	53 16	19% F73	11.9 d - - -	10.3	67 10	30% F73	1.7 a+	2.2	470 23	21% F03	0.0 A+	2.8	279 16	26% F35	0.0 a+++	10.5	45 6	67% F73
				0.0		6 2	67% F01	3.3 b -++	9.4	60 6	37% F37	0.0 a+	5.0	126 6	63% F51	0.0 a+++	10.7	44 4	68% F73
20.0 d - -	16.2	35 4	83% F43	8.7 c - - +	19.1	23 3	87% F43	2.1 b - +	5.0	142 3	61% F02	0.0 a+++	11.6	39 4	46% F02	0.0		3 2	67% F02
62.5 D	35.9	8		50.0 D	29.5	12		0.0 a++	6.8	82		0.0 a++	7.4	73		0.0		7	
0.6 A+	1.9	504 8	69% F73	0.0 a+++	10.5	45 7	44% F37	0.0 a+	3.6	197 12	36% F73	0.0 a++	6.7	84 4	83% F73	0.0 a++	7.5	71 2	99% F73
0.0 A	1.8	482 7	73% F73	0.0 a+++	12.6	35 6	57% F37	0.0 a++	6.2	92 10	54% F03	0.0		14 3	71% F03	0.0		1 1	100% F13
								0.0 a++	6.1	95 3	74% F73	0.0 a++	7.6	70 1	100% F73	0.0 a++	7.6	70 1	100% F73
13.6 d - - -	20.4	22		0.0		10		0.0		10									
1.7 a+	1.4	895 30		1.3 a+	2.5	379 21	28% F35	0.3 A+	2.6	311 26	34% F35	0.2 A+	1.9	487 20	36% F30	0.0 a+	3.7	189 8	38% F30
1.1 A+	1.6	701 28		1.3 a+	3.4	239 18	44% F35	0.0 A+	3.0	251 21	41% F35	0.0 A+	2.8	268 17	31% F35	0.0 a+++	11.2	41 5	66% F30
0.0 a+++	10.8	43 4		0.0 a+++	12.6	35 4	57% F30	2.9 b-++	13.4	35 6	46% D14	0.0 a+	4.1	164 4	65% F30	0.0 a+	4.6	138 3	38% D14
4.6 b - +	5.3	151 2		1.9 a++	6.1	105 3	97% F71	0.0 a+++	16.0	25 3	80% F71	1.8 a+++	9.6	55 3	56% F71	0.0		10 2	50% 2p.
				12.5		8 1	100% G02	11.1		9 1	100% G02	7.1		14 1	100% G02	0.0		18 1	100% G02
7.4 c - - +	8.5	81 11		28.6 d -	21.9	21 4	62% F71	18.4 d -	13.3	49 7	41% F71	1.7 a+	2.7	349 11	61% F41	0.5 A+	2.3	373 10	80% F41
2.0 a+++	10.4	49 10	20% 2p.	0.0		6 2	83% F71	14.3		14 4	43% F71	0.0		10 5	50% F06	0.0		1 1	100% P35
33.3		3 2	67% F62					0.0 a+++	11.2	41 2	98% F62	0.0 a++	6.0	97 2	99% F62	0.0		2 1	100% F62
14.3		7 3						0.0		14 3	64% G56	0.0		9 5	22% 4p.	0.0		9 3	56% L07
71.4 D	37.1	7 1						0.0		4 1	100% F84	0.0		4 1	100% F84	0.0		4 1	100% F84
1.7 a+++	9.1	59 3		0.0		4 1	100% G17	6.7 c - - +	15.7	30 4	53% G45	0.0		2 1	100% G44	0.0 a+++	18.8	20 1	100% F17
0.0 A+	2.9	264 3						2.9 b - +	6.4	103 2	97% D03	0.0 a++	5.4	113 2	88% D03	0.0 A	1.6	602 3	83% F71
6.0 c - - +	9.3	67 6		0.0		10 3	50% D62	0.0 a+++	12.1	37 4	76% D59	1.6 a+++	8.6	63 7	71% G32	0.0 a+++	12.1	37 9	32% D59
7.4 c - - +	9.5	68 7		0.0		7 2	71% P24	0.0 a++	9.2	54 7	37% F03	0.7 a++	4.9	134 6	75% F03	0.0 a+	4.1	163 6	49% F03
												0.0		15 1	100% D12				
10.0 c - - +	21.1	20 3						44.4		9 2	67% D07	0.0		5 1	100% G20	9.1		11 2	91% D07
14.3		7 6						0.0		3 2	67% P23								

Species	Sex (F – female, M – male)	Pages with comments	Laying				Incubation 1st half				Incubation 2nd half			
			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Cinclus cinclus Dipper		34	5.0 b-++	20.1	20 1	100% D11	0.0		3 1	100% G46	2.7 b-++	8.1	73 5	67% G42
Troglodytes troglodytes Wren		34	100.0		1 1	100% D51	42.7 D	11.4	75 2	99% D51	11.5 d---	11.9	52 1	100% D51
Prunella modularis Dunnock		34												
Erithacus rubecula Robin		34					51.3 D	15.9	39 1	100% D51	11.1		18 2	94% D51
Luscinia svecica Bluethroat														
Phoenicurus ochruros Black Redstart	F						100.0		1 1	100% P23	14.3		7 2	57% D62
Phoenicurus phoenicurus Redstart Ringer L03		34	100.0		1 1	100% G63	15.0 d---	21.8	20 7	40% F38	7.9 c--+	8.9	76 16	30% G04
							100.0 D	63.9	3		100.0		1	
Saxicola rubetra Whinchat			0.0		1 1	100% H01	0.0		1 1	100% H01	0.0		15 5	33% D54
Saxicola torquata Stonechat							50.0		2 1	100% G14				
Oenanthe oenanthe Wheatear	F	35					100.0		1 1	100% G14	33.3		3 1	100% G14
	M													
Turdus merula Blackbird		35	100.0		1 1	100% P07	66.7		3 2	67% P07	25.0		8 1	100% P28
Turdus philomelos Song Thrush		35									0.0		1 1	100% L07
Turdus iliacus Redwing		35					100.0		1 1	100% L01				
Acroceph. schoenobaenus Sedge Warbler	F	35	0.0		5 1	100% F31	0.0		5 1	100% F31	0.0 a+++	18.8	20 1	100% F31
	M										0.0		5 1	100% F31
Acrocephalus dumetorum Blyth's Reed Warbler	F	35	20.0		5 1	100% F31	0.0		10 1	100% F31	0.0 a++	9.7	50 1	100% F31
	M		0.0		2 1	100% F67					0.0		5 1	100% F31
Acrocephalus palustris Marsh Warbler											0.0		5 1	100% F31
Hippolais icterina Icterine Warbler							50.0		2 2	50% 2p.				
Sylvia nisoria Barred Warbler														
Sylvia borin Garden Warbler		35					100.0		1 1	100% F77				
Sylvia atricapilla Blackcap			0.0		1 1	100% D58								
Phylloscopus trochiloides Greenish Warbler		35												
Phylloscopus sibilatrix Wood Warbler		35-36	0.0		1 1	100% G12					0.0		6 2	83% G50
Phylloscopus collybita Chiffchaff											100.0		1 1	100% D51
Phylloscopus trochilus Willow Warbler	F	36									0.0		1 1	100% F27
	M													
Ficedula albicollis Collared Flycatcher			33.3		6 2	83% D57	8.5 c--+	12.2	47 2	96% D57	2.2 b-++	10.9	46 5	89% D57

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat.	Conf int.	Nnst Nrng	First ringer
7.5	7.2	107	46%	50.0		4	75%	0.0	17.5	22	91%	0.0	8.4	61	57%	0.0	18.8	20	100%
c--+		7	G42			2	G03	a+++		2	G47	a++		6	D11	a+++		1	G47
29.9	8.5	127						0.0		5	100%	0.0		3	100%	0.0	10.2	47	100%
D		2								1	G38			1	G38	a+++		1	D51
												33.3		3	67%				
														2	F83				
38.6	13.1	57						0.0		3	100%	0.0		3	67%	0.0		13	85%
D		2								1	D51			2	B01			2	D51
								0.0		6	100%	0.0		10	100%	0.0	18.8	20	100%
										1	F60			1	F60	a+++		1	F60
25.0		8						0.0		1	100%	0.0		1	100%				
		2								1	P23			1	P16				
9.4	8.0	96		11.1		18	28%	1.9	10.0	52	71%	0.9	5.9	106	38%	0.0	7.2	76	79%
c--+		18				6	F71	a+++		8	F39	a++		10	F12	a++		6	F12
100.0	56.1	4																	
D																			
0.0		16						0.0	18.1	21	48%	0.0	8.6	59	68%	0.0	7.3	74	81%
		5						a+++		3	F60	a++		7	F60	a++		5	F60
								0.0		1	100%	0.0		6	67%				
										1	G14			2	G14				
50.0		4						0.0		7	71%	0.0	4.4	147	88%	0.0		5	100%
		1								2	G05	a+		3	G18			1	G14
												0.0	5.7	103	97%	0.0		1	100%
												a++		2	G18			1	G14
36.4		11		100.0		1	100%	0.0		1	100%	6.5	15.4	31	65%	0.0	18.8	20	100%
		3				1	F70			1	P01	c--+		5	B01	a+++		1	B01
				0.0		1	100%					0.0	18.8	20	100%	0.0	12.6	35	43%
						1	L07					a+++		1	B01	a+++		3	P28
								0.0		7	43%	1.4	5.0	138	72%	1.5	5.1	134	75%
										3	F86	a++		7	B01	a++		5	B01
0.0	16.0	25						0.0	18.8	20	100%	0.0	16.5	24	83%	0.0	18.1	21	95%
a+++		1						a+++		1	F31	a+++		4	F31	a+++		2	F31
												0.0		7	71%	0.0		12	83%
														2	F31			3	F31
0.0	8.5	60		0.0		10	100%	0.0	14.0	30	100%	0.0	14.0	30	100%	0.0	7.6	70	100%
a++		1				1	F31	a+++		1	F31	a+++		1	F31	a++		1	F31
												0.0		10	100%	0.0	18.8	20	100%
														1	F31	a+++		1	F31
								0.0		7	71%	0.0	18.8	20	100%	0.0	18.8	20	100%
										3	F31	a+++		1	F31	a+++		1	F31
								0.0		7	100%	0.0	17.5	22	100%	0.0		2	100%
										1	D05	a+++		1	D05			1	D05
												0.0		5	100%	0.0		5	100%
														1	B01			1	B01
								0.0		7	100%	0.0		15	100%	0.0		19	79%
										1	D58			1	B01			2	B01
				0.0		1	100%	0.0		16	44%	0.0		3	67%	0.0		18	100%
						1	G19			5	G19			2	F63			1	D60
								0.0		10	100%	0.0	17.5	22	50%	0.0		10	100%
										1	F81	a+++		3	F27			1	F81
50.0		2	50%					0.0	13.4	32	94%	0.0	13.7	31	97%	0.0	14.0	30	100%
		2	2p.					a+++		2	F81	a+++		2	F81	a+++		1	F81
								0.0	14.0	30	100%	0.0	14.0	30	100%	0.0	14.0	30	100%
								a+++		1	F81	a+++		1	F81	a+++		1	F81
5.4	7.4	93		0.0		9	44%	0.0		5	80%	0.0		3	100%	0.0		2	100%
c--+		5				3	2p.			2	P07			1	P07			1	P07

Species	Sex F – female, M – male	Pages with com-ments	Laying				Incubation 1st half				Incubation 2nd half			
			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Ficedula hypoleuca Pied Flycatcher	F+M		5.2 C -	2.5	543 24	34% G37	2.1 B -	0.7	3099 36	32% G38	0.5 A	0.5	3145 41	32% G38
Exact data	F		4.2 b-+	3.3	307 18	59% G37	2.8 B-	1.7	782 28	23% F72	1.0 A+	1.4	834 31	36% G49
Estimated data	F		6.4 c - +	4.3	236 6	25% G38	1.9 A+	0.8	2316 8	43% G38	0.3 A	0.6	2308 10	43% G38
Exact data	M						0.0		1 1	100% G49	0.0		3 3	33% 3p.
Estimated data	M													
Ringer F88	F	36	66.7		3		0.0 a++	9.7	50		0.0 a++	8.9	56	
Ringer L03	F		0.0		8		37.5		8		0.0		7	
Ringer P13	F		0.0		15		3.5 b - +	6.2	113		3.5 b - +	5.3	143	
Ringer F56	F		20.0		5		0.0 a++	7.7	69		0.0		16	
Ringer G49	F		14.3 d - - -	15.6	35		0.0 a++	8.1	64		0.0 A+	2.6	304	
Ringer G37	F		0.5 a+	3.9	182									
Ringer F72	F						3.4 b - +	4.6	177					
Parus palustris Marsh Tit		36-37					0.0		1 1	100% G16	0.0		1 1	100% L03
Parus montanus Willow Tit	F+M						36.4		11 3	64% F71	40.9 D	21.0	22 5	59% F91
	F	36-37					36.4		11 1	64% F71	40.9 D	21.0	22 5	59% F91
	M													
Parus cinctus Siberian Tit		36-37					0.0		9 2	56% F88	0.0 a+++	13.4	32 2	56% F88
Parus cristatus Crested Tit		36-37	100.0		1 1	100% L10	0.0		1 1	100% L02	20.0		10 4	50% F91
Parus ater Coal Tit			25.0		4 4	25% 4p.	21.7 d - - -	20.7	23 5	48% F66	2.5 b-++	12.1	40 9	43% D16
Ringer P13		36-37					66.7		3		0.0		1	
Ringer F66	F						0.0		11					
Parus caeruleus Blue Tit	F+M		29.2 D -	20.4	24 9	38% G53	8.4 c - +	4.1	285 19	30% G16	3.4 b - +	3.8	237 21	21% G16
	F		29.2 D -	20.4	24 9	38% G53	8.4 c - +	4.1	285 19	30% G16	3.4 b - +	3.8	237 21	21% G16
	M													
Ringer D16	F						12.5 d - - -	19.2	24		4.7 b-++	12.1	43	
Ringer G13		36-37	100.0		1		0.0 a+++	11.6	39					
Ringer G16	F		14.3		7		4.7 b-++	7.7	85		0.0 a++	9.7	50	
Ringer G32	F										25.0		12	
Ringer G53	F		0.0		9		0.0		10		0.0		4	
Ringer G57	F		100.0 D	27.4	2		4.2 b-++	11.1	48		10.5		19	

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
1.6	0.4	6744	30%	1.7	2.2	475	42%	0.6	0.4	4281	47%	0.3	0.4	4282	47%	0.3	0.6	2390	33%
A		48	G38	a+		23	F55	A		35	G38	A		28	G38	A		20	F55
1.9	1.0	1616		0.0	5.7	104	44%	3.2	3.3	284	25%	1.2	3.2	252	28%	0.0	5.4	112	45%
A+		48		a++		16	D65	b-+		20	G49	a+		14	P13	a++		8	P13
1.5	0.5	5124	39%	1.5	3.2	260	77%	0.5	0.7	1970	51%	0.3	0.7	1831	55%	0.4	1.0	1210	41%
A		12	G38	a+		2	F55	A		5	G38	A		7	G38	A		5	F55
0.0		4		0.0		9	67%	0.9	3.4	228	73%	0.0	2.0	435	51%	0.0	5.7	105	41%
		3				4	G49	a+		10	G49	A		13	G49	a++		8	P13
				5.0	20.1	20	100%	0.2	0.8	1610	62%	0.2	0.8	163	61%	0.3	1.2	915	33%
				b-++		1	G38	A		4	G38	A		6	G38	A		5	3p.
0.0	5.6	106		0.0		1		0.0		8		0.0		8		0.0		1	
a++																			
20.0		15						0.0		1									
3.5	3.6	256		0.0		1		5.3	10.1	57		2.9	8.4	70		0.0	9.7	50	
b - +								c - -+				b-++				a++			
0.0	6.6	85						0.0		1		0.0		1		0.0		1	
a++																			
0.0	2.3	368		0.0		6		1.4	7.9	71		0.0	11.8	38					
A+								a++				a+++							
0.0		2						0.0		1	100%	0.0	10.3	46	76%	0.0		1	100%
		2								1	L10	a+++		3	P29			1	P13
39.4	17.2	33		0.0		3	100%	12.1	11.3	58	67%	4.7	5.4	150	51%	0.4	1.8	542	74%
D		7				1	F23	d - - -		4	F23	b-++		11	F23	A+		10	F55
39.4	17.2	33		0.0		3	100%	17.9	18.2	28	86%	2.7	8.1	73	55%	0.0	3.0	250	80%
D		3				1	F23	d - - -		3	F23	b-++		7	F23	A+		6	F55
								0.0		18	83%	3.8	10.3	53	68%	0.0	3.1	243	82%
										2	F23	b-++		4	F23	a+		5	F55
0.0	11.2	41		0.0		3	100%	0.0	16.5	24	63%	0.0	7.2	76	55%	0.0	8.9	56	54%
a+++		2				1	F22	a+++		2	F88	a++		4	F89	a++		5	F17
25.0		16	31%	16.7		12	58%	4.5	18.7	22	45%	0.0	9.3	53	38%	2.2	6.9	90	44%
		6	2p.			2	F23	b-++		4	F23	a++		6	F91	b-+		8	F55
6.5	7.6	93	32%	0.0		13	38%	0.0	2.6	299	87%	0.0	5.5	109	37%	0.0	4.1	163	43%
c- -+		11	F17			5	D62	A+		11	D53	a++		11	F81	a+		11	F17
50.0		4						0.0		3		0.0		6		0.0		4	
5.6	1.8	922	43%	2.6	7.8	77	19%	3.8	4.1	213	23%	1.8	4.4	167	24%	0.0	2.1	395	76%
C -		27	F17	b-++		15	G16	b-+		20	2p.	a++		21	F81	A+		14	F17
5.6	1.8	922	43%	4.0	10.8	50	30%	4.8	5.0	167	30%	1.1	6.7	89	22%	0.0	6.2	92	54%
C -		27	F17	b-++		9	G16	b - +		13	2p.	a++		16	F81	a++		9	F17
				0.0		1	100%	0.0		7	43%	2.3	11.3	44	45%	0.0	2.8	277	90%
						1	F85			3	2p.	b-++		7	F81	A+		5	F81
7.5	9.6	67		12.5		8		12.0	12.3	50		5.6		18		0.0		9	
c- -+								d- - -											
				0.0		3		0.0		17		0.0		3					
3.0	5.4	135		0.0		15		0.0		8		0.0		1					
b-+																			
0.0		14		0.0		3		0.0		5		0.0		2					
6.0	9.3	67		0.0		3		0.0		1		0.0		1					
c- -+																			

Species F – female, M – male	Sex	Pages with comments	Laying				Incubation 1st half				Incubation 2nd half			
			Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer
Ringer F06	F										0.0 a+++	14.0	30	
Ringer F66	F						30.0 d -	22.5	20					
Parus major Great Tit	F+M	36-39	38.1 D	8.5	134 14	25% F72	20.7 D	3.0	803 28	31% D08	16.5 D	2.9	714 37	24% D16
Exact data	F		24.7 D	10.8	77 10	44% F72	17.8 D	3.9	432 19	23% D16	13.5 D -	3.9	384 27	45% D16
Estimated data	F		56.1 D	13.0	57 4	53% F71	24.0 D	4.6	371 9	68% D08	20.0 D	4.7	330 10	40% D08
Exact data	M													
Estimated data	M													
Ringer F72	F		8.8 c - -+	14.9	34		14.1 d - -	10.3	71					
Ringer L03	F		66.7		3		58.3 D	29.1	12		0.0		2	
Ringer D16	F		0.0		6		9.9 c- +	7.8	101		9.8 c - +	5.6	173	
Ringer G57	F		83.3 D	42.8	6		17.4 d - - -	20.3	23		62.5 D	35.9	8	
Ringer P13	F						31.6 D	11.2	76		16.4 d -	10.4	73	
Sitta europaea Nuthatch		39									0.0		9 3	56% G38
Certhia familiaris Treecreeper	F+M		68.0 D	20.0	25 2	60% D14	28.3 D	13.4	53 3	94% F32	4.2 b - +	2.3	574 8	89% F32
	F		77.8 D	23.7	18 2	56% F32	28.8 D	13.6	52 2	96% F32	4.2 b - +	2.3	574 8	89% F32
	M		42.9		7 1	100% D14								
Ringer F32	F		100.0 D	30.6	10		30.0 D	13.9	50		3.5 b - +	2.3	510	
Ringer F34	F						0.0		2		14.0 d - - -	13.7	43	
Certhia brachydactyla Short-toed Tree Creeper			50.0		6 1	100% D14								
Lanius collurio Red-backed Shrike														
Nucifraga caryocatactes Nutcracker														
Corvus monedula Jackdaw							20.0		5 2	60% F62	100.0		1 1	100% F06
Sturnus vulgaris Starling		39	10.0 c - - +	21.1	20 3	85% D64	2.7 b-++	8.0	74 4	96% D64	6.7 c - -+	12.1	45 9	51% D64
Ringer D64	F		0.0		17		0.0 a+++	16.0	25		0.0		17	
Ringer L10	F		100.0 D	27.4	2						12.5		8	
Passer domesticus House Sparrow		39-40	25.0		4 1	100% F67	0.0		10 1	100% F67	0.0		2 1	100% G16
Passer montanus Tree Sparrow		40	28.6		7 2	57% F31	66.7 D	28.6	12 4	58% F31	23.1		13 3	46% 2p.
Carpodacus erythrinus Scarlet Rosefinch											12.5		8 3	75% F63
Emberiza rustica Rustic Bunting		40									0.0		1 1	100% F87
All species (including ones excluded from the Table)					1347 96				6638 132				12002 173	

Incubation whole				Hatching				Nestlings early				Nestlings middle				Nestlings late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
								0.0 a++	9.7	50									
16.0 D	1.6	2217 43	32% F17	13.3 D-	4.2	339 17	32% F71	12.5 D-	2.6	753 32	29% F91	2.4 B-	1.1	1434 32	28% F55	0.8 A	0.5	3224 23	62% F55
15.8 D	2.7	816 43		6.7 c--+	8.8	75 9	63% D16	16.7 D	4.4	342 14	46% P13	4.5 b-+	3.5	287 12	47% P13	2.1 b-+	3.5	238 8	66% P13
16.1 D	2.0	1401 12	50% F17	15.2 D	4.9	264 8	42% F71	12.0 d--	7.1	125 7	40% D08	1.7 a+	2.0	532 8	38% 2p.	0.8 A	1.0	1215 7	82% F55
								0.0		14 3	57% P13	4.8 b-++	12.3	42 4	67% P13	0.0 a++	6.6	85 4	87% P13
								30.0		10 3	50% F27	2.3 b-+	3.4	258 5	78% F55	0.7 A	0.9	1395 5	72% F55
50.0 D	27.2	14																	
9.9 c+	4.3	274		6.4 c--+	11.7	47		14.2 d-	7.1	134		6.8 c--+	8.9	74		7.1 c--+	16.5	28	
29.0 D	17.6	31		50.0		4		100.0		1		0.0		1					
24.2 D	7.5	149						21.7 D	7.2	157		4.4 b-++	5.7	135		1.9 a++	4.6	158	
				0.0		2 1	100% G38	6.7		15 3	53% G38	0.0		3 1	100% G38	0.0		7 2	86% D53
6.2 C-	2.4	627 9		0.0 a++	9.1	55 4	91% F32	3.1 b-+	6.7	97 7	52% F32	1.5 a+	2.4	407 9	49% F32	0.0 a+	3.6	196 7	60% D14
6.2 C-	2.4	626 8		0.0 a++	9.1	55 4	91% F32	3.6 b-++	7.5	84 7	60% F32	2.6 b-+	4.8	156 8	43% D14	0.0 a+	5.0	125 5	50% D14
								0.0		13 3	54% D14	0.9 a+	3.4	231 5	65% F34	0.0 a++	7.6	70 5	79% D14
5.9 C-	2.5	560		0.0 a++	9.7	50		0.0 a++	9.7	50		0.0 a++	9.7	50		0.0 a++	9.7	50	
13.3 d---	13.3	45		0.0		1		0.0		6		9.1		11		0.0		2	
								16.7		12 2	83% D14	4.2 b-++	11.1	48 3	90% D14	0.0 a++	8.7	58 1	100% D14
								0.0 a+++	11.8	38 3	68% D05	0.0 a++	6.0	96 4	60% D05	0.0 a+++	14.0	30 5	33% 2p.
								100.0		1 1	100% F79	0.0		7 1	100% F79	0.0		1 1	100% F19
33.3		6 3		0.0		1 1	100% L01	0.0		3 2	67% L01	0.0		14 2	79% F62				
4.2 b-++	6.1	119 12		3.7 b-++	10.2	54 1	100% D64	14.8 d---	18.2	27 7	37% F06	0.0 a++	9.2	54 5	74% F81	0.0		18 10	22% L10
0.0 a+++	11.0	42		0.0 a++	9.4	52													
																0.0		4	
0.0		12 2		0.0 a+++	18.8	20 1	100% F67	0.0		11 1	100% F67	0.0 a+++	16.0	25 4	60% F67	0.0		8 1	100% F48
44.0 D	19.9	25 4		0.0		1 1	100% G16	8.3		12 3	83% F31	0.0		16 3	63% F31	0.0		10 1	100% F31
								0.0		1 1	100% F14	0.0		14 3	71% B01	0.0		10 1	100% B01
												0.0		5 1	100% F87	0.0		14 2	64% F87
		22674 195				2710 113				9118 142				11157 133				10308 102	

Table 4

Nest desertion after catching adult ducks with hand net versus bail trap during last 6 days of incubation (data from Table 14 & 15 in Mednis & Blums 1976). Heading explanations - see Table 3.

Species	Catching method	Incubation										Hatching					Successful catching with hand net (%)
		1st half					2nd half										
		Desertion (%)	Conf int. (%)	Cat.	Nnst	p	Desertion (%)	Conf int. (%)	Cat.	Nnst	p	Desertion (%)	Conf int. (%)	Cat.	Nnst	p	
Anas querquedula Gargney	hand net	5.3	8.4	c - - +	76	n.s.	0.0	6.0	a++	96	< 0.001	0.0	18.1	a+++	21	n.s.	50
	bail trap	0.0			2		27.8	16.5	D	36		6.6	5.6	c - - +	152		
Anas clypeata Shoveler	hand net	0.0	10.2	a+++	47	0.002	0.0	8.0	a++	65	n.s.	0.0			3	n.s.	33
	bail trap	26.3	23.1	d - -	19		4.1	4.9	b - +	169		2.2	11.1	b - ++	45		
Aythya ferina Pochard	hand net	0.0			12	n.s.	0.0			15	n.s.	0.0			1	n.s.	15
	bail trap	15.6	16.6	d - - -	32		10.2	3.3	d -	441		1.5	3.8	a++	202		
Aythya fuligula Tufted Duck	hand net	3.8	5.7	b - +	131	<0.001	0.0	6.1	a++	94	0.002	0.0			8	n.s.	30
	bail trap	24.8	8.3	D	125		10.8	2.7	d -	659		4.0	3.8	b - +	247		

Storm Petrel *Hydrobates pelagicus.* Sensitive at all stages (Flegg & Glue 1979).

Gadwall *Anas strepera.* Catching ducks at nest with hand net does not seem to be dangerous (Clark G10, Wright G64 - one desertion for four catchings during laying and incubation), whereas using traps (manually released - G10 or curtain and funnel ones - G64) was very harmful ($p = 0.001$ for hand net versus trap catching by G10 and G64 during laying and incubation).

Mallard *Anas platyrhynchos.* Catching of incubating ducks by hand (in nest box, Majewski P18) or by hand net (Clark G10, Wright G64, P18) did not do much harm, whereas using nest-traps (manually released traps - G10; curtain and funnel traps - G64) led to many desertions (differences for pooled G10 and G64 data between hand nets versus trap catching are significant: $p = 0.003$ for both the 1st and the 2nd halves of incubation and $p<0.001$ for the whole incubation period). Setting of the trap, to which ducks did not came, caused desertions in at least 50% of 28 Mallard nests (G64).

Gargney *Anas querquedula* and **Shoveler** *Anas clypeata.* Mednis & Blums (1976) found a difference in desertion rate between individuals caught by hand net versus bail trap (Table 4). Difference between bail versus drop-door traps for Shoveler was not significant (Table 5).

Table 5

Nest desertion after catching adult ducks with bail versus drop-door traps during incubation (data from Table 2 in Blums et al. 1983). Heading explanations - see Table 3.

Species	Catching method	Desertion (%)	Conf int. (%)	Cat.	Nnst	p
Anas clypeata Shoveler	bail trap	5.0	3.7	b-+	278	n.s.
	drop-door trap	0.0	12.8	a+++	34	
Aythya ferina Pochard	bail trap	7.1	2.3	C-	708	0.01
	drop-door trap	4.0	2.0	b-+	707	
Aythya fuligula Tufted Duck	bail trap	9.7	1.9	C+	1122	0.001
	drop-door trap	4.1	3.0	b-+	368	

Pochard *Aythya ferina* and **Tufted Duck** *Aythya fuligula.* According to Mednis & Blums (1976) catching performed during the last 6 days of incubation were less harmful with hand net than with bail traps, though only a small proportion of netting was successful (Table 4). On the other hand these authors revealed for Tufted Duck caught with bail traps in the same place during two seasons, that in

the year with normal number of nest-raptors none of 53 nests was deserted, whereas as many as 26% of 50 ones in the year with high raptors number. Blums *et al.* (1983), when comparing bail traps with drop-door traps found the latter safer for both species (Table 5). They reported 1 desertion for 21 Pochards caught with drop-door traps left overnight for 10-14 hours. Mednis & Blums (1976) claimed that catching with bail traps on late nests led more often to desertion than catching on early nests (Table 6). They also found differences in desertion rate between nest placed in various habitats. The catching with bail traps was more harmful when performed on hard-soil lake island than on floating plant material. However the authors suggested that rather skill of ringers than habitat differences was source of this variation.

Table 6

Nest desertion after catching adult Pochard and Tufted Duck with bail trap in different periods (data from Table 15 & 16 in Mednis & Blums 1976). Heading explanations - see Table 3.

Species	Catching period	Incubation						Hatching		
		1st half			2nd half					
		Desertion (%)	Nnst	p	Desertion (%)	Nnst	p	Desertion (%)	Nnst	p
Aythya ferina Pochard	May	14.3	7	n.s.	3.7	134	0.02	0	75	n.s.
	1-20 June	16.7	24		11.5	261		2.2	91	
	>21 June	0	1	n.s.	21.7	46	n.s.	2.8	36	n.s.
Aythya fuligula Tufted Duck	May	0	4	n.s.	0	25	n.s.	0	2	n.s.
	1-20 June	24.4	82		6.9	350		0	83	
	>21 June	28.8	39	n.s.	16.5	284	<0.001	6.2	162	0.05

Eider *Somateria mollissima.* Majewski (P18) in Canada found nest success of Eiders caught during laying or in the 1st half of incubation significantly lower than that of ducks not caught. According to Hario (1983) desertion rates for 0-4, 5-10 and 11-26 days of incubation were 89% (16/18), 20% (3/15) and 8% (1/13) respectively. The difference between first two periods is significant ($p = 0.001$), between two last - not.

Goldeneye *Bucephala clangula.* Degerstedt (F06) considered that only Goldeneyes which do not try to escape from nest when man approaches can be caught safely. Females escaping then tend to desert nest after catching. Leikkonen (F41) advises to put the adult after ringing to the nest box and keep it in darkness for 3 minutes, covering the hole. Differences in the way of catching are probably

important, as desertion rate during the 2nd half of incubation range for various ringers from 0% (0/143 - Taskinen F80, 0/111 - Runko F69) to 11% (3/28 - Niittylä F50) and 17% (2/12 - Kastari F27), and are significant (e.g. F69/F50 - p = 0.01, F69/F27 - p = 0.002).

Goshawk *Accipiter gentilis.* Goshawks reported in Table 3 were trapped with noose and additionally disturbed by other research activity (Kenward G33).

Osprey *Pandion haliaetus.* During incubation bal-chatri traps were used (Koivu *et al.* F28). In U.S. catching during incubation is safe (Saurola F73). F28 also caught without any harm 77 females and 40 males during middle and late nestling stages, mainly with bow net.

Willow Grouse *Lagopus lagopus.* Myrberget (1983) mentioned desertion of 4 nests by hens caught in the last week of incubation. He did not give the number of females caught, but as he had 480 successful nests under observation and wrote "During the final week of the incubation period, the hens were caught on their nests, using nets" - 1-2% desertion rate for that period can be presumed.

Oystercatcher *Haematopus ostralegus.* Catching at nest is generally safe (Clark G11, Perrins G48). But there are individuals not entering the trap and deserting nest if trapping attempt lasts too long (Briggs G04, Harris G26). Oystercatchers can injure bill on wire of the trap (G11).

Little Ringed Plover *Charadrius dubius.* A nest with clutch completed on previous day was deserted when after successful morning female trapping and unsuccessful half-hour trapping of the male, he was eventually trapped the same day at 16 h (Sułek, Smykla & Czerwiński P27; case not included in Table 3). See Ringed Plover.

Ringed Plover *Charadrius hiaticula* and **Kentish Plover** *Charadrius alexandrinus.* In both species as well as in the Little Ringed Plover trapping of adults brooding chicks is more risky than of those incubating eggs (Walters 1984).

Dotterel *Charadrius morinellus.* Desertion rate 36% for the 1st and % for the 2nd half of incubation, without information on number of catchings, was reported by Galbraith G22.

Dunlin *Calidris alpina.* 10-20% of Dunlin from subspecies *schinzii*, caught during laying or first 5 days of incubation, deserted nest; later there was not any desertion (Soikkeli F76 - 200 catchings during all stages).

Redshank *Tringa totanus*. The reasons for differences in desertion rate among various ringers ($p < 0.001$ for LA0 and Jackson G31, the 2nd half of incubation) could be connected with the length of time of leaving trap at the nest. G31 left trap seldom for more than 40 minutes, occasionally up to 1 hr. in good, warm weather. He reported up to 25% desertions in studies done by other persons, leaving traps out for several hours. G31 wrote that 2 from his 4 desertions were after heavy rainstorm soaking the nest not incubated under trap.

Black-headed Gull *Larus ridibundus*. Gulls breeding at the edge of a colony are more sensitive and should be trapped only after two weeks of incubation whereas gulls from the centre of a colony - after 10 days (Nitecki P21). Both Michno (P20) and P21 used bail trap covered with fabric, as gulls caught in trap with net (bow net) were more frightened and sometimes broke their eggs (Nitecki 1985). Trapping during incubation is safer when both parents are in colony (ca 8 - 11 and 17 - 20 hrs), as after catching one of them, its mate takes care of the eggs (Nitecki 1985). The differences between L08 and both other ringers are significant ($p < 0.001$).

Lesser Black-backed Gull *Larus fuscus* and **Herring Gull** *Larus argentatus*. Harris (G26) estimated 20% desertion rate for combined sample of Lesser Black-backed and Herring Gulls, for both the 1st and the 2nd halves of incubation (50 gulls trapped in each). It is significantly higher than the rate calculated for other ringers' data ($p<0.001$ for Black-backed and $p=0.03$ for Herring Gulls). The difference for the 1st half of incubation between G20 and F15 is significant ($p<0.001$).

Kittiwake *Rissa tridactyla*. From 20 adults caught at nest with chicks no one deserted the nest even though 15 were provided with tail-mounted transmitter (Wanless 1992).

Common Tern *Sterna hirundo*. Becker (D01) reported difference in desertion rate between nests with one versus both parents trapped during the 1st half of incubation (35%, 34 nests and 57%, 14 nests respectively), but that was not significant ($p = 0.14$). From 21 adults caught in Canada during last few days of incubation, no one deserted the nest though half of them were provided with leg-attached transmitter (Morris and Burness 1992).

Black Tern *Chlidonias nigra*. Most adults caught by bow nets at the beginning of incubation deserted the nest; at some nests both parents were caught (Priklonskij *et al.* 1962).

Guillemot *Uria aalge*. According to Harris (G26) it is not the desertions, but falling off the eggs and chicks that make threat. He suggests to abandon trapping, except for an important research and only when trapped Guillemots and their neighbours have eggs or small chicks (a few days old). Within at least a part of the colony there is a period lasting ca 10 days, when in most nests there are eggs or small chicks (G26).

Puffin *Fratercula arctica*. Desertion rate given in Table 3 is a rough estimate, as repeated disturbance greatly increased the risk (Harris G26).

Barn Owl *Tyto alba*. Roulin (H03) reported desertion after disturbance at nest, without catching: 3 out of 17 cases during incubation, 1 out of 15 during hatching, whereas not one during egg laying (n = 3), early (n = 9) and middle (n = 6) nestling stages. A different conclusion was drawn by Taylor (1991) who demonstrated insensitivity of the species to frequent nest visits by an experienced researcher. He also found that the attachment of a radio transmitter to the tail was harmless for reproduction success of all 6 pairs treated (males carried transmitters from pre-laying period, females - from hatching).

Eagle Owl *Bubo bubo*. Most adults were caught by trap with middle or big nestlings inside, 1-30 m off the nest (Larm F37, Lokki F44).

Tawny Owl *Strix aluco*. The difference between F35 versus others during hatching is significant ($p < 0.001$).

Ural Owl *Strix uralensis*. Some females caught before laying did not desert the nest (Saurola F73). When a male is caught by trap attached to the nest-box with the female and nestlings closed inside, extra food should be provided to them before and after catching, as to get the male takes a long time and causes great disturbance (Saurola 1987). The difference between F71 and other ringers during the 2nd half of incubation is significant ($p = 0.02$).

Nightjar *Caprimulgus europaeus*. Any disturbance during laying caused desertions in ca 50% cases (Alexander G02). Some of desertions included in Table 3 could not result from catching (G02).

Swift *Apus apus*. Both late-nestling-stage desertions were the result of catching by D56 (desertion rate - 15%, n = 13). According to Flegg & Glue (1979) sensitive at all stages. Swift was the only species with desertion rate significantly ($p = 0.005$) higher for the later stage (hatching) than for the earlier one (the 2nd half of incubation).

Skylark *Alauda arvensis*. Both early-nestling-stage desertions were result of catching by G20 (desertion rate - 33%, n = 6).

Sand Martin *Riparia riparia*. Nets put in front of nests should not be used longer than 2-3 hrs (Brombach & Leverkusen D03).

Swallow *Hirundo rustica*. Catching with mist-nets set some metres in front of the nest or with hand net at nest is safe, whereas catching by hand is not (the ringers did not specify what stage the statement concerns - compare with the opinion of G40 below); nets should not be used longer then 3 hrs (Brombach & Leverkusen D03 ->1000 adults caught during 15 years).

During the early and middle nestling stages Swallows roosting in the breeding building can be caught safely with hand net after dazzling with torch-light. In this period brooding adult can also be safely taken by hand. After ringing it should be replaced on the nestlings, with the hand holding gently to it for a few seconds to let it settle (Mirams G40 - 20 years of experience).

House Martin *Delichon urbica*. Catching with mist-nets set some metres (Stalla D61: 1-4 m) in front of nest is safe in all stages (Brombach & Leverkusen D03 ->1000 adults caught, D61 - 2000 adults). Nets should not be used longer than 3 hrs (D03). The only four desertions during the 1st half of incubation resulted from catching by one ringer, who extracted adults after widening the entrance (desertion rate 50%, n = 8); thus without his data the desertion rate for the stage is 0.

Pied/White Wagtail *Motacilla alba*. An unsuccessful attempt to catch female at nest by hand in the middle of incubation resulted in desertion (Przydryga P23).

Dipper *Cinclus cinclus*. Ormerod (G47) suggests not to catch incubating adults by hand, as it poses a threat to eggs. Also birds caught with hand net, when leaving nest rapidly, dislodge eggs occasionally (G47). Dippers are particularly prone to desertion on streams of low pH, i.e. on poor quality territories (G47). Adults should not be caught at nest with nestlings older then 13-14 days, as the latter easily escape out (Mönig D11). The safest method is to catch Dippers when feeding nestlings, using mist-net set some distance from the nest (G47).

Wren *Troglodytes troglodytes*. The 1st half of incubation stage was widened by Dallmann (D51) to the 10 first days of incubation (average duration of incubation is 16 days - Cramp & Simmons 1988). He caught them with mist-nets set near the nest.

Dunnock *Prunella modularis*. During the whole nestling period catching is safe (Zimin R03, n = 50).

Robin *Erithacus rubecula*. Dallman (D51) widened the 1st half of incubation stage to the 10 first days of incubation (average duration of incubation is 14 days - Cramp & Simmons 1988). He caught birds with mist-nets set near the nest. Zimin (R03, n = 500) considered catching during the whole nestling period safe.

Redstart *Phoenicurus phoenicurus*. The difference between L03 and other ringers during the 1st half of incubation is significant (p = 0.001). The only two nestling-period desertions resulted from my catching (P13, n = 3, the difference with others is significant - p = 0.001). The desertion rate during laying, incubation and early nestling stages varies from site to site (Mead G38).

Wheatear *Oenanthe oenanthe*. The nests examined before or during laying were often deserted even though no attempt was made to catch the adult (Cross G14). Wheatears caught by bow net with bait (mealworm), set as close to the nest as possible, resumed feeding of nestlings 1-30 minutes after release and sometimes continued it when their mate was in the trap (Elms G18).

Blackbird *Turdus merula*. The only two middle-nestling-stage desertions resulted from catching performed at the end of summer (Piironen F60). Zimin (R03, n = 100) considered catching during the whole nestling period safe.

Song Thrush *Turdus philomelos*. According to Zimin (R03, n = 100) desertion rate for the whole nestling period was 15%. It is much higher than reported by other ringers.

Redwing *Turdus iliacus*. The only nestling-period desertions resulted from catching performed at the end of summer (Piiroinen F60). Zimin (R03, n = 100) considers catching during whole nestling period safe.

Sedge Warbler *Acrocephalus schoenobaenus*. Zimin (R03, n = 100) considered catching during the whole nestling period safe.

Blyth's Reed Warbler *Acrocephalus dumetorum*. Zimin (R03, n = 70) considered catching during the whole nestling period safe.

Garden Warbler *Sylvia borin*. The only desertion - when netting was done quite near the nest (Solonen F77). In nets set a couple of meters off the nest catching is safe through incubation and nestling stages (F77, n = 80).

Greenish Warbler *Phylloscopus trochiloides*. During the whole nestling period catching is safe (Zimin R03, n = 80).

Wood Warbler *Phylloscopus sibilatrix*. Two males tape-lured into mist net during pre-laying period deserted the nest (Prater G50). Zimin (R03, n = 70)

considered catching during whole nestling period safe. In the period starting 2-3 days before hatching and ending 3-4 after it, the catching of females with hand net or by hand resulted in "nearly no desertions" (Wesołowski 1981) i.e. less than 5% desertions (Wesołowski P29, n = 100).

Willow Warbler *Phylloscopus trochilus*. Zimin (R03, n = 500) considered catching during the whole nestling period safe.

Pied Flycatcher *Ficedula hypoleuca*. Differences between the exact data (based on field notations) and estimates made afterwards are significant only for the early nestling stage ($p < 0.001$). Nevertheless the estimates by F55, who reported 800 catchings and 8 desertions for each nestling stage, heavily influenced summarized reporting rate for the middle and late nestling stages. Without the data from that ringer respective values of desertion rate would be 0.1% (n = 3482) and 0.0% (n = 1590).

The significance of the differences between extreme values of desertion rate calculated from exact data sets presented in Table 3 are: laying: G37/F88 and G37/G49 - $p < 0.001$; the 1st half of incubation: F56/P13 and F56/F72 - n.s., F56/L03 - $p < 0.001$, F72/L03 - $p < 0.001$, P13/L03 - $p = 0.002$; 2nd half of incubation: G49/P13 - $p = 0.005$; nestling stages - all difference n.s.

Tits *Parus* spp. Some ringers gave information on handling adult tits after ringing. They were freed at some distance from the nest or put at nest, sometimes with covering the hole for a while. However I have not found any significant difference comparing the desertion rates reported by the ringers treating adults in those two ways. It was also not found in an experiment with Great Tits having eggs or up to six days old nestlings. 62 females were ringed then and released 100 m from the nest (with eyes covered from the moment of capture - Graczyk 1975) whereas other 177 were placed back on nest (Kania 1989).

Females and males of all the species, but especially Great, Blue and Coal Tits should not be caught on eggs and nestlings less then 7-8 days old (Winkel D15). I do not know what level of desertion rate Winkel considered acceptable, but referring to the data given in Table 3, it looks that at least Blue and Coal Tits catching can be performed earlier, especially in optimal circumstances (see also the comment on Great Tit and Discussion).

Tits, for which ringers did not determined the sex, were assumed to be female, if caught at nest during laying or incubation, because in the cases of known sex no male was reported to be caught during those periods.

Crested Tit *Parus cristatus*. The only two desertions at the late nestling stage resulted from catching by D53, who caught all together 7 adult Crested Tits (the difference from F55, who caught the highest number of Crested Tit at this stage, is significant - p = 0.01; 0/40). See Tits *Parus* spp.

Blue Tit *Parus caeruleus*. Perrins (G48) estimated a comparatively high desertion rate - 10% for the summed incubation and hatching stages (n = "hundreds"). See Tits *Parus* spp.

Great Tit *Parus major*. One of the most sensitive of all hole-nesters. Only Perrins (G48) estimated a comparatively low desertion rate - 5% for the summed incubation and hatching stages (n = "hundreds"). For laying and incubation, significantly higher values of the desertion rate were reported by ringers estimating it afterwards compared to those supplying actual data. For the nestling stages relations were reverse, though differences were mostly not significant (Fig. 1). In males there was not any significant difference in that respect.

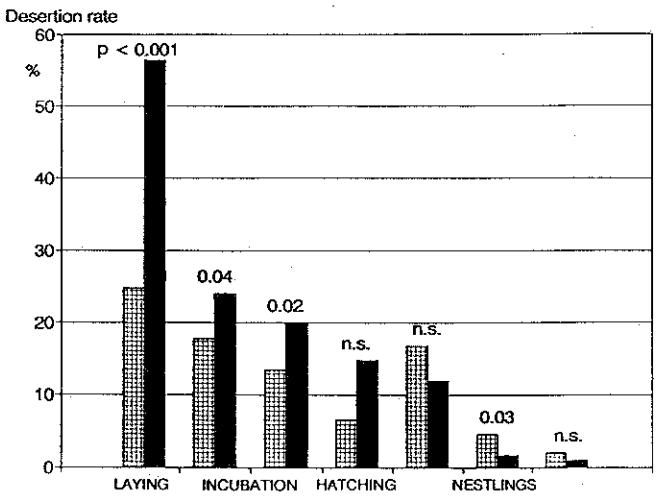

Fig. 1. Desertion rate for Great Tit females noted in field (hatched) or estimated a posteriori (black). Data from Table 3.

Tearing off the feathers always lead to desertion (Wüst D16). Catching in places where nest boxes were often inspected was quite safe (D16). Also catching with mist-net set ca 5 m away from the nest proved safe (Tiussa F83).

Catching of a female at nest resulted in a decrease in food amount delivered to nestlings comparable to an hour of heavy rain, that is 5% of daily food intake in good areas or 15% - in marginal habitat (Keller & van Noordwijk in prep.).

My own data, published earlier (Kania 1989), are included in a rearranged form in Table 3 and summarized below. Significance measures (p) marked with an asterisk differ from the ones given in the original publication, as they were calculated there with the proportional difference significance test, incorrectly diminishing p value when proportions were not close to 50%. Incubating females did desert their nests in different rate in two various nest-box areas (14%, n = 43 and 29%, n = 103; $p = 0.08^{*}$), more frequently after 17 hr. (43%, n = 47) than between 12 and 17 (21%, n = 62, p = 0.02) and before 12 (3% n = 46, p for the difference from the latter period = 0.07). The desertion probabilities after catching brooding females decreased sharply after the nestling wing length exceeded 12 mm (5-6th day of life). Females caught on smaller nestlings deserted the nest in 22% of cases (7% before 12 hr., 29% - later, p = 0.005). If the nestlings were bigger, desertion rate was 2-3%. During incubation the replacement clutches were deserted more often (55%, n = 11) than the non replacement ones (22%, n = 90, p = 0.05). 26 females caught at first and second nests (when both were with eggs or small nestlings) in the same season, did not show different probability of desertion of the second nest than the first one. Incubating females more frequently deserted nests at ambient temperature between 20 and 22°C than at the lower temperature (p = 0.02). The frequency of nest desertion by brooding females was independent of air temperature when the nestlings were small. Females caught on larger nestlings deserted the nest significantly more often when the ambient temperature was below 12°C. Young females, caught on 1-6 days old nestlings deserted nest more often, when catching and handling lasted longer than half an hour ($p = 0.04^{*}$). The difference was not significant for older nestlings and for old females. Females touched with finger in order to read their ring number but not caught did not desert the nest (n = 19). From 110 nests in which only males were caught, two nest desertions occurred, both on a very cold day, when birds were handled by an inexperienced person. The most important practical hints derived from that paper: Great Tit catching at nest hardly caused desertion if nestling

wing length exceeded 12 mm and air temperature was higher than 12°C. When nestlings were smaller, desertions occurred in few percent of cases if catching and handling of nestlings and their parents took up to half an hour and was done before noon. Incubated nests were deserted, on average, in less than 10% of cases when the females were caught before 15 hr., but desertions were twice as frequent at the start of incubation as at the end.

The significance of the differences between extreme values of desertion rate calculated from exact data sets presented in Table 3 are: laying: F72/L03 - $p = 0.04$; the 1st half of incubation: F72/L03 and F72/D16 - 0.002, L03/D16 - $p < 0.001$; 2nd half of incubation: D16/G57 - $p < 0.001$, D16/P13 - n.s., G57/P13 - $p = 0.01$; hatching and nestling stages - all difference n.s. See Tits *Parus* spp.

Nuthatch *Sitta europaea*. A female in the 1st half of incubation, frightened during nest-box opening but not caught, deserted the nest (Bartyzel P01). The only Nuthatch which deserted small nestlings was caught at dusk (Straubinger D62).

Starling *Sturnus vulgaris*. According to Gromadzki (P10), who caught 50-100 Starlings at each stage, adults easily deserted nest during laying, incubation and first half of nestling period. He also claimed that Starlings deserted nests still more often in places with frequent human presence. Karpovich (1962) had 92% desertions during laying ($n = 13$); 23% during incubation ($n = 35$) and 2% in nests with nestlings ($n = 181$). Berndt (1939) caught females in nest-boxes during incubation and early nestling stage at night without any desertions. He started catching after sunset and ceased it before 1 a.m. Before climbing to the nest the hole was corked with a piece of cloth attached to a stick. After putting ringed female on nest, entrance was again closed with a piece of cloth with string hanging down. The nest-boxes were open quietly by pulling the string after at least 2 hours, but not less than a half an hour before dawn.

House Sparrow *Passer domesticus*. According to Kruszewicz (P15) House Sparrows caught during laying nearly always desert nest; catching is certainly harmful when done during incubation, sometimes harmful during hatching and in early nestling stage; only catching on middle nestlings is thought to be safe enough, and on big nestlings - quite safe. From 68 House Sparrows caught during laying, incubation or on 1-5 day old nestlings, 36% deserted nest

(Pinowski*et al.* 1972). Flegg & Glue (1979) considered the species sensitive at all stages.

Tree Sparrow *Passer montanus*. As House Sparrow (P15). 90% caught during incubation, hatching and early nestling stage deserted nest (Zang D17, n = 20). Adults caught at night on first brood nestlings did not desert the nest, but probably chose another nest-box for second brood (Kittle G35). According to Flegg & Glue (1979) Tree Sparrows are sensitive at all stages.

Rustic Bunting *Emberiza rustica*. Catching should not be done during nest-building or egg-laying (Ukkonen F87).

DISCUSSION

There are a number of opinions among ringers on how to catch adults safely at the nest. Some of them are quoted below. However it must be remembered that their prevalence does not guarantee their truth, not only for all, but even for any species. These opinions could be accepted as definitely true only after experimental verification.

Usefulness and extent of the collected data

The data analysed in the paper contain a mixture of exact observations noted in the field and estimates made afterwards, sometimes based on impressions gained through many years of field work.

In most of the analysed cases the desertion rate did not reveal significant differences in the exact and estimated data (see Table 7 and Pied Flycatcher), with the exception of the Great Tit (Fig. 1). From my own experience I know that it is possible also for a man with many year's experience to arrive at a wrong opinion. After catching together with some colleagues 449 Pied Flycatcher females (more than 75% myself) I was convinced that they almost never deserted nest. However, according to the field notes, 14 of them did. Thus estimates differing considerably from the results of other persons, though they can exactly describe exceptional situations, should be dealt with cautiously (see Blue and Great Tits). Nevertheless, summarized data obtained from several ringers, usually enable at least a general orientation how dangerous the catching at nest can be for the species in question.

The collected data proved to be much too scanty for the exact determination of safety degree of catching in a majority of species. It can be illustrated by the analysis of confidence interval (containing actual desertion rate with probability

0.95) for the incubation stages, during which catching at nest is easiest for most species. There were 148 species with any data concerning the 1st or the 2nd half of incubation. The dimension of one tail of the confidence interval in at least one of those two stages was not bigger than 2 % in only 3 species, it fell between 2 and 5 % in 14 species and was between 5 and 10 % - in 8 species. Only for Great Tit it was possible to determine in all stages the safety categories unequivocally, i.e.

Table 7

Comparison of the desertion rates calculated from data of particular ringers exactly noted in field or estimated afterwards, for some species with more numerous material.
Heading explanations - see Table 3

Species	Stage	Kind of data	Desertion (%)	Nnst	Nrng	p
Bucephala clangula Goldeneye	2nd half of incubation	exact	1.0	314	13	n.s.
		estimated	3.6	140	5	
Strix aluco Tawny Owl	early nesting stage	exact	2.6	495	20	0.06
		estimated	0.0	177	5	
Aegolius funereus Tengmalm's Owl	2nd half of incubation	exact	0.2	420	23	0.05
		estimated	2.2	184	6	
Parus caeruleus Blue Tit	1st half of incubation	exact	7.5	161	14	n.s
		estimated	9.7	124	5	
	2nd half of incubation	exact	5.6	126	216	n.s
		estimated	0.9	111	5	

with confidence interval going beyond category border only in one direction and not more than to half of the dimension of that category. Unequivocally safe (categories A and A+), in at least one of two incubation stages, was catching in only 4 species, whereas unequivocally very dangerous or extremely dangerous (categories D, D-, d-, C, C+, c+ and C-) - in 13 species (see also Table 8).

Table 8

Number of species with different safety categories in various breeding stages

Safety categories		Desertion rate(%)	Limits of 0.95 confidence interval of desertion rate		Breeding stages								
					Laying	Incubation			Hatching	Nestlings			Total
			lower	upper		1st half	2nd half	whole*		early	middle	late	
Safe catching	A	0.0 -2.0		0.0 -2.0			1	2		3	3	3	12
	A+			2.1 -3.0			3	3		2	2	4	14
	a+			3.1 -5.0		1	6	2	2	2	3	4	20
	a++			5.1 - 10.0	2	3	12	3	4	4	19	12	59
	a+++			10.1 - 100.0		5	10	2	9	15	12	15	68
Moderately dangerous catching	B	2.1 - 5.0	2.1 - 5.0	2.1 - 5.0									
	B-		0.6 - 2.0	2.1 - 5.0		1	1				1		3
	b-		0.0 - 0.5	2.1 - 5.0									
	b- +		0.0 - 2.0	5.1 - 10.0		2	3			3	1	1	10
	b- ++		0.0 - 2.0	10.1 - 100.0	1	3	11	1	3	2	2		23
	B+		2.1 - 5.0	5.1 - 6.5									
	b+		2.1 - 5.0	6.6 - 10.0									
	b++		2.1 - 5.0	10.1 - 100.0									
Very dangerous catching	C	5.1 - 10.0	5.1 - 10.0	5.1 - 10.0									
	c- -		0.0 - 2.0	5.1 - 10.0									
	c- - +		0.0 - 2.0	10.1 - 100.0	4	6	7	3	1	1	1		23
	C-		2.6 - 5.0	5.1 - 10.0	1			3					4
	c-		2.1 - 2.5	5.1 - 10.0			1		1				2
	c- +		2.1 - 5.0	10.1 - 100.0		1	2						3
	C+		5.1 - 10.0	10.1 - 12.5									
	c+		5.1 - 10.0	12.6 - 100.0									
Extremely dangerous catching	d- - -	10.1 - 100.0	0.0 - 2.0			6	3		1	2			12
	d- -		2.1 - 5.0			1			1				2
	d-		5.1 - 7.5						1	1			2
	D-		7.6 - 10.0		2				1	1			4
	D		10.1 - 100.0		5	11	3	2					21
Unknown**	?	0.0 - 100.0	0.0 - 100.0	0.0 - 100.0	42	61	75	11	51	50	59	48	379
Total					57	101	138	32	75	86	103	87	679

*only for data given for both halves of incubation jointly, excluding totals given for 1st and 2nd halves separately.

**for cases with number of catchings <20 and lower limit of confidence interval <10.1%.

Table 9 presents the summary of Table 3 and quantitative information from literature, referred to in the species comments. The species included were chosen a little bit arbitrarily as the ones with the data of practical use.

It has to be realized that the information given in Table 3 and Table 9 shows actual safety of catching at nest only in the circumstances experienced by the ringers who supplied the material. In different conditions, particularly when special catching methods are used, desertion rates can be quite different. Usually when it is not certain what the impact of disturbance on eggs or nestling survival will be, catching should be performed firstly in the conditions of diminished threat (in the last stages of breeding, during good weather, in proper time of the day). If such catchings do not lead to nest desertions, an attempt can be made to catch in less optimal conditions. One desertion can be just accidental, however after the second desertion the catching performed in the given circumstances has to be stopped. When the conditions of safe catching are known for a species, experiments with extension of limits of safe catching should be left to the most experienced researchers, who need to catch birds also in less than optimal circumstances to collect the data for investigations important enough to put nest at some risk.

Table 9

Categories of safety of catching adults at the nest for species with data arbitrarily accepted as sufficient for at least rough safety estimation. Data from Table 3 and from literature (in parenthesis). Category definitions - see Table 8. Asterisk - also during middle and late nestlings stages catching can be dangerous (categories B- & b).

Species	Laying	Incubation			Hatching	Nestlings early
		1st half	2nd half	whole		
Red-necked Grebe				(a)		
Shag	a++	a+++	a++	a++	a++	A
Gadwall - hand net				(a)		
Gadwall - trap			D			
Mallard - hand/hand net		a+		b-+		
Mallard - trap		D	D			
Gargney - hand net		(c+--)	(a++)		(a+++)	
Gargney - bail trap			(D)		(c--+)	
Shoveler - hand net		(a+++)	(a++)			
Shoveler - drop-door trap				(a+++)		
Shoveler - bail trap		(d--)	(b-+)	(c-+)	(b-+)	
Pochard - hand net		(a+)				
Pochard - drop-door trap				(b-+)		
Pochard - bail trap		(d---)	(d-)	(d-)	(a++)	
Tufted Duck - hand net		(b-+)	(a++)			
Tufted Duck - drop-door trap				(C+)		
Tufted Duck - bail trap		(D)	(d-)	(D)	(b-+)	
Eider		(D)	a++		a+++	
Goldeneye		d---	a+	a+	b-++	
Goosander			c-+	C-		

Goshawk		D					
Kestrel		a+++		a++		b-++	*
Merlin			a++				
Willow Grouse			(a)				
Oystercatcher		a+	a+	A+			
Little Ringed Plover		b-++	a++	A	a+++		
Ringed Plover		a++	A+	A+	a+++		
Kentish Plover			a++				
Lapwing			b-+	c--+			
Little Stint		a+++	a+++	a++			
Temminck's Stint	c--+		a+++	a+			
Dunlin		a++	a++	a+	a+++		
Ruff			c--+	b-++	a+++		
Common Snipe			d---				
Curlew		c--+	b-++	b-++			
Redshank		b-+	c-+	C-	c-		
Redshank - ringer G31			a++		a+++		
Redshank - ringers LA0			D		C-		
Terek Sandpiper		c--+	a+++	b-++			
Turnstone		a+++	a+	a+			
Red-necked Phalarope			a+++	a++			
Black-headed Gull		d--	A+	a+	a++		
Lesser Black-backed Gull			a++				
Kittiwake			a+			A	
Common Tern		D	B-	C-			
Arctic Tern			a++				
Little Tern	D		a+	b-+			
Guillemot		D	a++	b-++		a++	
Puffin	D	c--+	c--+	c-+	c--+	a++	
Stock Dove		D					
Little Owl	c--+	c--+	b-++	b-++	a+++	a+++	
Tawny Owl			D		d--	a+	
Ural Owl	a++	b-++	a++	A+	a+++	a+	
Tengmalm's Owl	D-	b-+	A+	a+	a+	A+	
Swift		d---	b-++	c--+	d-	d-	
Woodlark		D					
Sand Martin		a++	a+	A+		b-+	
Swallow	D	d---	a+++	c--+		a+++	
House Martin		d---	b-++	c--+		a++	
Dipper	b-++		b-++	c--+		a+++	
Wren		D	d---	D			
Robin		D					
Redstart		d---	c--+	c--+		a+++	
Sedge Warbler			a+++			a+++	
Blyth's Reed Warbler			a++			a+++	
Collared Flycatcher		c--+	b-++	c--+			
Pied Flycatcher	C-	B-	A	A	a+	A	
Willow Tit			D			d---	*
Siberian Tit			a+++			a+++	
Crested Tit						b-++	*
Coal Tit		d---	b-++	c--+		A+	
Blue Tit	D-	c-+	b-+	C-	b-++	b-+	
Great Tit	D	D	D		D-	D-	*
Treecreeper	D	D	b-+	C-	a++	b-+	
Starling	(D)	b-++	c--+	(d-)	b-++	d---	
House Sparrow	(D)	D	(D)	D	(D)	(D)	
Tree Sparrow	(D)	(D)	(D)		(D)	(D)	

Sources of variation in the desertion rate reported by different ringers

In some cases various ringers reported quite different desertion frequencies (see e.g. Goldeneye and in Table 3: Redshank, Black-headed and Lesser Black-backed Gulls, Tawny Owl, Redstart, Pied Flycatcher, Tits). Also the opinions on the influence of frequent disturbance of breeding birds by man (by a researcher, making multiple observations or catchings, as well as by a member of the public) on tendency to nest abandonment, are very different. Some people think that frequent nest inspections familiarize bird with man and decrease desertion rate. Others claim that a repeated disturbance makes birds more frightened and more prone to desert the nest; still others - that it is meaningless (see Manx Shearwater, Barn Owl, Great Tit, Starling). Diversity of opinions may reflect differences in the behaviour of a researcher (Kania 1989, Winkel D15, see also Pochard), or birds. The latter may be affected by many factors: weather and time of day (Kania 1989, D15), position of the nest in colony (see Black- headed Gull), habitat (see Dipper, Great Tit), predator pressure (see Tufted Duck), etc.

How the analysed data inform about impact of catching at the nest on adults and their reproduction

Threats to the nest, connected with human disturbance, were listed by Major (1990) as below: (1) nest desertions, (2) eggs robbery by a predator from the nest deserted by a flushed parent, (3) killing of nestlings, chased into the neighbouring territory, by a conspecific (in colonial birds), (4) damaging of eggs by frightened parents, (5) possible attraction of predators to nest (leaving a scent-trail, treading a path, destroying plant cover, provoking the parents to behave in a way attracting predators, actual leading of predators to the nest). In wetland colonies there is also a danger of soaking the chicks escaping to water. All those threats are connected with every nest inspection, but they are greater when the disturbance is stronger, as is the case during catching adults at the nest.

The method of data collecting generally did not reveal other negative results of adult catching, than death of eggs or nestlings.

Nest abandoning by one parent can be undetected if its mate takes care of the nest through many days and the researcher is satisfied with observation of incubation or living nestlings a day or two after catching. Nestlings fed by the remaining parent can be undernourished and though sometimes are able to

fledge, they have small chances to survive to the next breeding season or to have any breeding success.

Catching at nest can still have a more indirect impact on the fate of the bird and its future reproduction. For instance it can lead to the change of the territory in the next breeding attempt (see Tree Sparrow).

General suggestions how to reduce desertion rate

Catching method. Choice of the proper catching method can be substantial. Sometimes the method, faciliating an easy and quick catching of the parent, is more dangerous to nest or bird, than the other, less effective ones, as it is generally with catching during incubation versus catching in the middle of the nestling stage.

In some conditions catching Swallows by hand is more dangerous than doing it with nets set near the nest. In several duck species catching by hand or with hand net proved to be safer than trapping (Table 4). On the other hand drop-door traps were less harmful for ducks than bail traps (Table 5), unlike in Great Crested Grebe. It seems that bail traps, covered with dark fabric, are less dangerous than the ones covered with net (called then bow nets) (see Black-headed Gull). For many waders, kidney-shaped funnel traps, in which birds undertake incubation, are safer than drop-door traps, flushing off the bird intending to sit on eggs. However some waders enter the former much less willingly.

If there is danger of damage to eggs during catching, they can be replaced by dummy eggs (Briggs G04) and kept in insulated place, to diminish cooling rate.

In some traps, especially those wire covered, the caught birds can injure themselves during attempts to escape (see Great Crested Grebe, Ducks, Oystercatcher).

Duration of trap setting. Not only catching, but also setting the trap on nest, when the adult does not enter it for a longer time, can result in clutch abandonment (Lapwing - Clark G11, Ringed Plovers and Dunlins - Jackson G31, see also Great Crested Grebe, Mallard, Oystercatcher, Redshank). Briggs G04 and G31 proposed for waders 40 minutes as a maximum time of waiting for the adult to enter the trap in usual conditions, but in good, warm weather, for Ringed Plovers, Dunlins and Redshanks G31 proposed up to 1 hour. On the other hand, Blums *et al.* (1983) left the duck traps overnight for up to 14 hrs. (see Pochard).

Catching and handling of Great Tit females, caught on small nestlings, should not last more than half an hour (Kania 1989).

A ringer's behaviour. The bird should always be handled quickly and with caution (see Great Tit). Ringers without extensive experience in catching and handling common species should not start with the rare or threatened ones.

There is a common belief that approaching to the nest should be performed loudly, to give birds the time to prepare for the threat, which should diminish the shock after catching.

Ringers differ in opinion on manner of releasing box-nesters after handling. Some put birds gently at the nest, sometimes keeping the hole closed for a while. Others carry out birds and free them at some distance from the nest (see Goldeneye, Swallow, Tits). Experiments carried out on Great Tit did not prove any difference between both manners, but additional investigation should be helpful.

Threat from predators can be diminished with restoring nest surroundings to earlier appearance. Eggs should be covered with down or plant materials in those species which usually do it before leaving nest (e.g. in ducks, grebes), and wiped, if dirtied with faeces (Mednis & Blums 1976). For ducks the above authors suggest making an additional cover from above, by bending the neighbouring plants and adding some others cut in vicinity.

Nest-box shape. Orell & Ojanen F55 claimed that box nested Passerines deserted less often deep and narrow boxes than shallow and wide ones.

Repeated catching. In some species adults can be caught many times. E.g. Jackson (G31) found out for Dunlins, Redshanks and Ringed Plovers that numerous (up to 10) catchings at the same nest on different days were not harmful, even though some individuals were caught several times. Nevertheless it has to be realized that it is not without an effect on the incubation process or nestling development (see Great Tit), and that generally even the less sensitive species can abandon nest after too many disturbances occurring in a short period (see Little Ringed Plover).

Catching of the second parent. In many species catching of one parent provokes the other to take quickly care of the nest. Thus if the first bird is not released immediately after handling, catching of its mate can be easier. However, taking both parents one after another prolongs the time when the nest is unattended. If the threat from predators is high (i.e. in colonies of intraspecifi-

cally aggressive birds - see Black-Headed Gull) or there is a danger of quick cooling of eggs or nestlings, acting in such a way can be harmful to the nest. It is safer to try catching the second bird on another day, though sometimes both parents can be caught in quick succession (see Wheatear).

W e a t h e r . Bad weather can rush returning of the adult to nest, but causes quicker cooling of eggs and nestlings and decreases food availability (see Redshank, Great Tit). In such conditions sensitivity to negative effects of catching increases.

S e a s o n a d v a n c e m e n t . There is an opinion that catching is safer as breeding is more advanced, with an exception of hatching being more dangerous than the 2nd half of incubation (e.g. Flegg & Glue 1979, but see Ringed Plover). The analysis of the collected data confirmed the first part of that opinion. With one exception there was not any case of significantly higher desertion rate in any breeding stage than in that preceding it. The exception - the desertion rate in Swift, higher during hatching than in the 2nd half of incubation, is the only direct support to the second part of the above opinion. Though in all other species there was lack of any significant difference, the desertion rate was higher in the 2nd half of incubation than during hatching in 57 species and lower - in only 13 species.

There are also opinions, that catching success increased just before hatching, when adults returned to nest especially quickly (Ringed Plovers, Dunlins and Redshanks in less than 5 minutes, whilst after over half an hour at the start of incubation - Jackson G31).

At least in some species sensitivity to disturbance is greatest during nest building, after nest completing but before egg laying and also just before starting the nest building. Catching bird then (e.g. lured with tape recorder) can result in leaving the territory.

In spite of a nearly complete lack of desertion during the late nestling stage, catching performed in last days before fledgling can be dangerous. Frightened nestlings can leave the nest prematurely, reducing their survival chances.

Desertion rate can be bigger in late broods than in earlier ones (see Table 6 and Blackbird, Redwing) and in replacement rather than not replacement (see Great Tit).

Time of day. In some species an increase in the desertion rate was found in the afternoon and evening (see Great Tit, Nuthatch). In colonial birds catching can be safer at the time when both parents are in the colony (see Herring Gull).

Birds very sensitive to catching during the day can be sometimes successfully caught during the night (see Starling, Tree Sparrow).

SUGGESTIONS FOR FURTHER INVESTIGATIONS

As it was shown above, there is a need for further investigations into the impact of catching adults at nest on their behaviour and breeding success. The data could be collected either during any studies requiring catching adults or in specially designed experiments, also using voluntary work of amateur ringers. In any such investigations at least the method of catching and releasing bird, time of catching and handling, time of day and ambient temperature should be noted. For the species with biparental care it would be substantial to check if the individual just caught went back to his duties at the nest.

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The ringers who supplied data, are listed in Table 2.

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ERRATA

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Erithacus rubecula Robin		35
Luscinia svecica Bluethroat		
Phoenicurus ochruros Black Redstart	F	
Phoenicurus phoenicurus Redstart Ringer L03		35

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Species	Sex F – female, M – male
Ficedula hypoleuca Pied Flycatcher	F+M
Exact data	F
Estimated data	F
Exact data	M
Estimated data	M

Nestlings middle				late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
0.3 A	0.4	4282 28	47% G38	0.3 A	0.6	2390 20	33% F55
1.2 a+	3.2	252 14	28% P13	0.0 a++	5.4	112 8	45% P13
0.3 A	0.7	1831 7	55% G38	0.4 A	1.0	1210 5	41% F55
0.0 A	2.0	435 13	51% G49	0.0 a++	5.7	105 8	41% P13
0.2 A	0.8	~~462~~ 1631 6	61% G38	0.3 A	1.2	915 5	33% 3p.

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Parus montanus Willow Tit	F+M
	F

Incub: 1st half			Incubation whole		
36.4	11 3	64% F71	39.4 D	17.2	33 7
36.4	11 3	64% F71	39.4 D	17.2	33 7

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Species	Sex F – female, M – male
Ringer F06	F
Ringer F66	F
Parus major Great Tit	F+M

Nestlings middle				late			
Des. Cat.	Conf int.	Nnst Nrng	First ringer	Des Cat..	Conf int.	Nnst Nrng	First ringer
2.4 B-	1.1	1434 32	28% F55	0.8 A	0.5	3224 23	62% F55

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All species (including ones excluded from the Table)	1347 96	6638 ~~4306~~ 132

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Table 4

us bail trap ~~during last 6 days of incubation~~ (data from Table 14 & 15 in Mednis &