Die Vogelwarte 30, 1980: 297—301

Dynamics of Coal Tit *(Parus ater)* movements in the alps — an example of pitfall in using capture recapture data

By Christian Frelin

1. Introduction

Bird ringing operations have largely contributed to our knowledge of bird's biology. They have been used to define migration routes and wintering areas (ZINK 1973, PERDECK 1977), survival rates (CAVÉ 1977), migration phenology (for instance DORKA 1966 in a wealth of litterature) and to monitor long term variations in species abundance (WINSTANLEY et al 1974, FRELIN 1974).

Short term capture recapture data may be used to estimate population sizes (YEATMAN & BERTHELOT 1964, SCHERRER & DESCHAINTRE 1970, FRELIN 1971) or migrating populations mean transit times (SCHERRER 1975, FRELIN 1975). In the capture recapture method (PEDERSEN method), a sample of individual is taken from the population investigated, the birds marked and then returned to the population. A second sample is taken which comprises some previously marked birds in proportion assumed to be related to their relative abundance in the natural population. This method depends on the following assumptions: a) Marked birds mix freely with unmarked birds and b) Marking does not affect catchability, i.e. each bird either marked or not has the same probability of being recaught.

Provided these conditions are met, recaptures may be used to monitor the size and behaviour of the population under investigation. The aim of this paper is to test the validity of these assumptions using populations of migrating coal tits between the stations of Bretolet and La Golèze in the Alps. The rational behind these experiments is to compare the behaviour of coal tits inferred from capture recapture data to the behaviour inferred from the double independent sampling of migrating tits performed at the stations of Bretolet and La Golèze.

2. Material and Methods

Migrating tits, including coal tits coming from Switzerland and South Germany migrate through Bretolet Pass, cross the valley of the Dranse de Morzine and reach the pass of La Golèze (VUILLEUMIER 1958, FRELIN 1971). Extensive ringing operations performed at the two stations provide a wealth of informations about the phenology of coal tit movements (SCHERRER 1972, WINKLER 1974, FRELIN 1975). In this paper we will consider only that two independent samplings of the migrating populations are performed at the two stations. Although the catching potentialities at the two stations are different (LEBRETON 1968, SCHERRER 1967, and this paper), we believe that the comparison of daily numbers of captures at both stations may be used to define accurately some aspects of movement phenology. This is possible because of a) the high degree of standardization in the capture technique achieved at both stations, b) the continuously operating activities at both stations with constant catch effort and c) the short distance (4 km) separating the two stations which minimises the influence of varying meteorological conditions and possible dilution of migratory flow.

Another way of obtaining related informations is to consider the recoveries at La Golèze of tits previously ringed at Bretolet. We consider that if both approaches independently yield similar informations about migration phenology, the assumption underlying the PEDERSEN method will be verified and alternatively if different results are obtained, the validity of these assumption may be questionned.

Although these experiments may have been conducted on other species as well, coal tits were chosen because all data were derived from a single autumn, 1972, during which an important invasion was recorded.

3. Results

Figure 1 compares the daily variations in capture numbers at Bretolet and la Golèze. Two periods may be distinguished. Before September 23, 1972 (arrow), migration was observed as successive waves at both stations. A good synchronization of these waves at the two stations is clearly visible in figure 1 so that daily captures at Bretolet and La Golèze are significantly

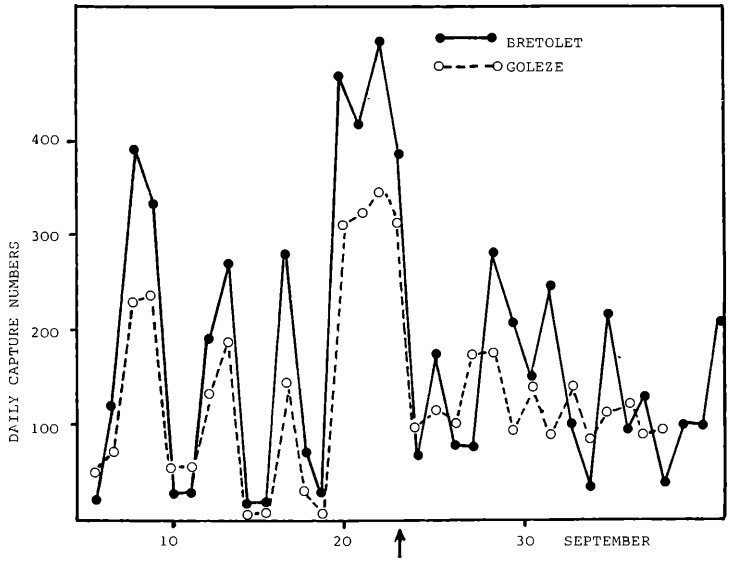

Fig. 1: Compared variations in the daily capture numbers of Coal tits at Bretolet (●—●) and La Golèze (o-o) during the 1972 invasion.

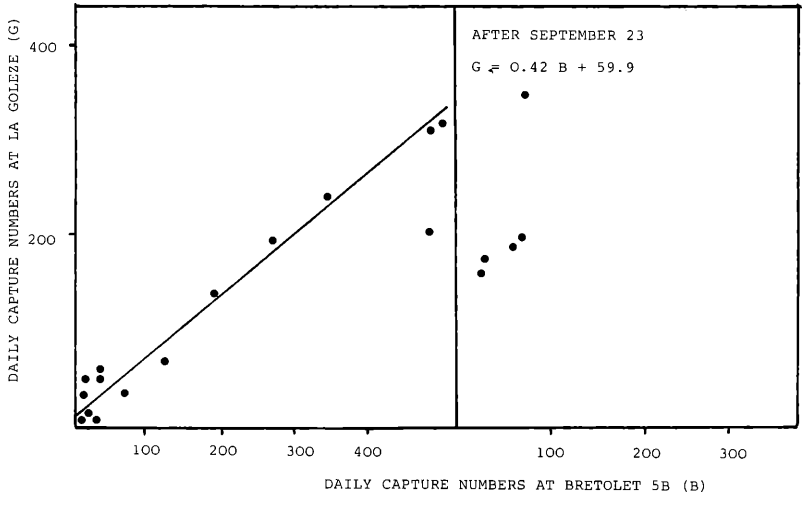

Fig. 2: Correlation between daily capture numbers of coal tits at Bretolet and La Golèze. Two periods have been distinguished.

correlated (Figure 2 A). The regression equation indicates that the catching effort was more important at Bretolet and by extrapolation Figure 2 A shows that the absence of migratory movement at Bretolet implies no captures at La Golèze. This clearly indicates that most coal tits migrating through Bretolet will reach La Golèze on the same day (i. e. mean transit time is less than one day). An alternative hypothesis may be that the mean transit time is higher than one day, that many tits may rest in the valley between the two stations and that the factors which trigger migratory movements are identical for populations of coal tits before Bretolet and after Bretolet.

Table 1: Coal tits ringed at Bretolet and recaught at La Golèze during successive invasions. The per cent tits leaving the valley separating the two stations and the mean transit time were computed as described by SCHERRER (1972).

Days after capture	1967—1969	1972	Before 23. 9. 72	After 23. 9. 72	All data combined	% tits leaving the valley
0	38	11	5	6	49	30
1	30	22	11	11	52	45
2	20	7	3	4	27	43
3	13	2	2	0	15	42
4	6	3	1	2	9	43
5	5	1	1	0	6	50
6	2	1	1	0	3	50
7	1	1	1	0	2	75
8	1	0	0	0	1	100
N	116	48	25	23	164	
Mean transit Time (days)	1.59	1.50	1.80	1.17	1.57	

From September 23 on, the intensity of migratory movement decreased, although it is still constituted of successive waves at Pretolet. These waves are less marked at La Golèze and were no more synchronized with those recorded at Bretolet. As a consequence the daily captures at La Golèze are independent of the daily captures at Bretolet as shown by the low coefficient of correlation. Thus whatever was the number of migrating tits at Bretolet, the valley between the two stations played a buffering role, absorbing the variations in influx of tits from Bretolet. This means that the mean transit time of coal tits should increase after September 23, and may suggests a slowing down in migratory excitation.

These conclusions, i. e. a short mean transit time which increased abruptly at the end of migratory period were tested using capture recapture data.

In 1972, 48 coal tits ringed at Bretolet were recaught at La Golèze. Considering together the three last invasions (1967, 1969 and 1972), a total number of 164 controls was obtained. In contrasts only 2 coal tits ringed at La Golèze in 1972 were recaptured at Bretolet on the same autumn; thus indicating a net movement of the migratory population from Bretolet to La Golèze. Table 1 shows the days after capture of ringing recoveries for the invasions of 1967 plus 1969 and of 1972 before and after September 23. Three conclusions were reached from this table.

1. The days after capture of ringing recoveries was strickingly similar for the different invasions. The mean transit time between Bretolet and la Golèze, computed as described by SCHERRER (1972) was 1.59 days in 1967—1969 and 1.50 days in 1972. These values are markedly higher than one.

2. Mean transit times were shorter after September 23 and not longer as expected. This observations, already reported (FRELIN 1975) was also noticed for the 1967 and 1969 invasions (SCHERRER 1972).

3. The percentage of ringed coal tits leaving the valley each day is constant at about 40% and is independent of the length of stay. Thus ringed coal tits behave as if they have a constant probability of leaving the valley each day.

These results are in complete contradiction with the previous results.

4. Discussion

The data presented here clearly indicate that the behaviour inferred from capture recapture data differed markedly from the behaviour inferred from the double independent sampling performed at Bretolet and La Golèze. If most tits would stop between the two stations, and would leave the valley with a probability of about 40% per day, then daily captures at Bretolet and La Golèze would no longer be correlated. Further more the net difference in behaviour around September 23 inferred from the comparison of daily captures was not observed in capture-recapture data. This means that capture-recapture data do not faithfully represents the behaviour of migration coal tits.

Two hypothesis may account for this difference. First catchability may be strongly reduced after ringing and then recovers slowly. In other words recently ringed coal tits would avoid mist nets, thus resulting in a greatly underestimated number of coal tits recaptured on the same day. Repeated observations of birds just being caught and ringed does not support this hypothesis.

Another hypothesis is that ringed tits did not mix freely with the unbanded population. Unbanded coal tits at Bretolet may have sufficient migratory excitation to continue their journey at least to La Golèze. As a consequence most of them could cross the two passes on the same day, hence the correlation between daily captures at both stations. Ringing could lead to a temporarily depressed migratory excitation; hence ringed coal tits would stop precociously and behave just like coal tits between two migratory journeys.

In any case, the data presented here clearly caution about the use of short term recoveries.

5. Summary

The behaviour of migrating populations of coal tits (*Parus ater*) in the Alps during the 1972 invasion was studied using two different approaches. First variations in daily captures recorded at the two alpine stations of Bretolet and La Golèze (4 km apart) were compared. Secondly we used recoveries at La Golèze of birds ringed at Bretolet to estimate mean transit times between the two stations.

These two independent methods, which should in principle yield indentical results gave rise to very different conclusions. The most likely interpretation of this discrepancy is that ringing caused a transient reduction in migratory excitation. These results stress the difficulty of using short term recapture data.

6. Zusammenfassung

Dynamik von Zugbewegungen der Tannenmeise *(Parus ater)* in den Alpen - Beispiel für eine „Interpretations-Falle" bei Verwendung von Fang/Wiederfang-Daten.

Das Verhalten wandernder Tannenmeisen-Populationen während der 1972er Invasion in den Alpen wurde auf zwei getrennten Wegen untersucht. Zum einen wurden die Unterschiede in den täglichen Fangzahlen zwischen den beiden 4 km voneinander entfernten alpinen Stationen „Bretolet" und „La Golèze" miteinander verglichen. Zum anderen wurden die bei La Golèze erbrachten Wiederfänge von Tannenmeisen, die vorher bei Bretolet beringt worden waren, herangezogen, um die zwischen den beiden Kontrollen im Mittel verstrichene Zeit zu bestimmen. Diese zwei voneinander unabhängigen Untersuchungsmethoden, die im Prinzip eigentlich einander entsprechende Ergebnisse hätten liefern müssen, gaben für recht verschiedene Folgerungen Anlaß. Die wahrscheinlichste Erklärung für die festgestellte Diskrepanz ist, daß durch die Beringung die Zugerregung vorübergehend herabgesetzt wird. Die Befunde machen deutlich, welche Schwierigkeiten bei der Verwendung kurzzeitiger Wiederfang-Daten auftreten können.

7. Literature

Cave, A. J. (1977): Pitfalls in the estimation of age dependent survival rates of birds from ringing and recovery data. Die Vogelwarte, 29: 160—171. • Dorka, V. (1966): Das jahres- und tageszeitliche Zugmuster von Kurz- und Langstreckenziehern nach Beobachtungen auf den Alpenpässen Cou/Bretolet. Orn. Beob. 63: 165—223. • Frelin, C. (1971): Caractères phenologiques de la migration des Mésanges bleues *(Parus caeruleus)* au Col de La Golèze. L'Oiseau et RFO 41: 63—78. • Jd. (1974): Etude des variations d'effectifs de petits migrateurs capturés au col de La Golèze de 1966 à 1973. Le Jean Lé Blanc 13: 51—60. • Jd. (1975): Comportement invasionel des Mésanges noires *(Parus ater)* et espèces apparentées au Col de La Golèze en 1972. L'Oiseau et FRO 45: 41—64. • Lebreton, P. (1968): La migration d'automne du Rouge gorge *(Erithacus rubecula)* au Col de La Golèze (Haute Savoie). Alauda 36: 36—51. • Perdeck, A. C. (1977): The analysis of ringing data: pitfalls and prospects. Vogelwarte 29,

Sonderheft: 33—44. • Scherrer, B. (1967): Activités Ornithologiques au Col de La Golèze en 1966. Le Jean le Blanc 6: 29—58. • Jd. (1972): Migration et autres types de déplacements de la Mésange noire *(Parus ater)* en transit au Col de La Golèze. Terre et Vie 26: 54—97, 257—313. • Scherrer, B., & A. Deschaintre (1970): Evaluation de l'effectif d'une colonie d'Hirondelles de rivage par la methode des captures et recaptures. Le Jean le Blanc 8: 77—84. • Vuilleumier, F. (1963): Factors concentrating fall migrants at an Alpine Pass. Proc. XIIIth Internat. Orn. Congr. 485—492. • Winkler, R. (1974): Der Herbstdurchzug von Tannenmeise, Blaumeise und Kohlmeise (*Parus ater, caeruleus* und *major*) auf dem Col de Bretolet. Orn. Beob. 71: 135—152. • Winstanley, D., R. Spencer, & K. Williamson (1974): Where have all Whitethoat gone? Bird Study 21: 1—15. • Zink, G. (1973): Der Zug europäischer Singvögel. Ein Atlas der Wiederfunde beringter Vögel. Vogelwarte Radolfzell.

Anschrift des Verfassers: Centre d'Etudes Ornithologiques de Bourgogne, Faculté des Sciences, 21-Dijon (France). Adress for correspondance: 3 rue A. Mortier, 06000 Nice (France).

Die Vogelwarte 30, 1980: 301—305

Die Geschlechtsbestimmung des Teichrohrsängers (*Acrocephalus scirpaceus*) anhand der Kloakenform und des Brutflecks

Von Holger Kuschert

1. Einleitung

Auf die Möglichkeit der Geschlechtsbestimmung am lebenden Vogel anhand der Form der Kloake und des Brutflecks weisen verschiedene Autoren hin (u. a. Bub 1969, Drost 1938, Mason 1938, Svensson 1975). Von besonderem Interesse ist diese Art der Geschlechtsbestimmung bei Vögeln ohne sexualdimorphe Gefiederfärbung oder sonstige Unterschiede in morphologischen Parametern. Hierzu gehört — zumindest das Gefieder betreffend — auch der Teichrohrsänger *Acrocephalus scirpaceus.* Wie sich Kloake und Brutfleck zwischen Mai und September, also in der Zeit sexueller Aktivität und auf dem Zuge, entwickeln und inwieweit aufgrund ihres Zustandes auf das Geschlecht geschlossen werden kann, soll in dieser Arbeit aufgezeigt werden.

2. Material und Methode

Die untersuchten Teichrohrsänger wurden zusammen mit O. Ekelöf in den Jahren 1974, 1976 und 1977 jeweils von Mai bis September im Schilfgürtel der unteren Treene bei Friedrichstadt (54.22 N, 9.05 E) gefangen. Bei den Fänglingen wurden Brutfleck und Kloake durch Anblasen des Bauchgefieders sichtbar gemacht und ihr Zustand in folgender Weise protokolliert:

Kloake: „I" = ♀-Kloake, d.h. ohne erkennbare Vorwölbung und „Falte" an der vorderen Basis (siehe Abb. bei Bub 1969 und Svensson 1975); „II" = Entstehender oder sich rückbildender Kloakenzapfen mit deutlicher Vorwölbung und „Falte"; „III" = ♂-Kloake, d.h. ausgeprägter Zapfen von etwa 3 mm Länge mit „Falte".

Brutfleck: „I" = Kein Brutfleck, das mediane Apterium ist voll mit Dunen besetzt; „II" = entstehender oder zumausernder Brutfleck, d.h. auf dem medianen Apterium stehen nur noch wenige Dunen bzw. es ist mit Blutkielen und/oder wachsenden Federn versehen; „III" = das mediane Apterium ist frei von Dunen, der Brutfleck vollständig ausgeprägt.

Da Drost (1938) die Gültigkeit des Merkmals „Kloakenform" bei der Geschlechtsbestimmung durch Sektion u.a. bei Teichrohrsängern bestätigt fand, wurden von uns Vögel mit einer Kloake des Stadiums II und III in Kombination mit Brutfleck I als ♂, Vögel mit einer Kloake des Stadiums I nur in Verbindung mit einem Brutfleck II und III als ♀ betrachtet. Erneute Sektionen zur anatomischen Geschlechtsbestimmung wurden nicht durchgeführt.