POLSKA AKADEMIA NAUK
INSTYTUT ZOOLOGII

ACTA ORNITHOLOGICA

Tom XIV Warszawa, 20 XII 1974 Nr 29

Ludwik TOMIAŁOJĆ

The influence of the breeding losses on the results of censusing birds

Wpływ strat w lęgach na wyniki liczenia ptaków

Влияние гнездовых потерь на результаты учета птиц

[with 1 figure]

Abstract. Difficulties met with in estimating numbers of birds breeding at high densities or in colonies are discussed. The author points out that the census of nests does not offer a reliable basis for an estimation of breeding pairs because of the breeding losses. This problem is discussed in relation to various populations of the Woodpigeon. Taking into consideration the influence of the breeding losses, the author suggests shortening the most suitable time period for censusing the breeding birds.

"Recommendations for an international standard for a mapping method in bird census work" (I.B.C.C. 1969) contain a reservation that the method may be applied mainly to the territorial and non-colonial Passerines and groups with passerine-like dispersion. Thus, the recommendations are not a complete instruction how the breeding bird census is to be carried out. In practice, the majority of investigators endeavour to count also birds with non-uniform and semi-colonial distribution, such as Starling (*Sturnus vulgaris* L.), Tree Sparrow [*Passer montanus* (L.)], pigeons and doves, *Columbidae*, all *Carduelinae*, most of the waders, *Charadriidae*, etc. We are forced to do so, in order to obtain the fullest possible data on the total bird communities.

For this reason, the investigator usually endeavours to estimate the number of these species on the basis of the number of nests found or families seen with fledglings (e.g. recommendations of PETERS, 1963 and LENZ, 1971). In practice, we do not limit ourselves by counting only the males, but try to note and use all observations, such as silent birds, females, birds alarmed, birds carrying

nest material, families with young and nests found. We prolong the stay at the census plot up to 3 hours per 10 hectares; we use the results of previous controls in order to detect the inconspicouous and often overlooked birds, such as Dunnock, [*Prunella modularis* (L.)], Robin [*Erithacus rubecula* (L.)], Song Thrush (*Turdus philomelos* Br.), both Treecreepers (*Certhia* sp.), which were seen at this place previously. All these increase the effectiveness of single visits (see Tomiałojć, 1968). Similarly many alternatives are quoted by Lenz (1971). For economy of time and accuracy of estimation, the general application of the above remarks seem to be justified.

I do not think, however, that a full obligatory standard of procedure could be worked out, because it is very difficult to consider all the possible circumstances occurring in various habitats. As an example, I will show with the Woodpigeon (*Columba palumbus* L.), how different situations can occur even within one species.

I should like to show how incomplete and deceptive are some estimates based even on the number of nests found. I neglect here the problem of difficulties of detecting them. I admit that all nests of a species in certain circumstances can be found. The problem is to what degree the number of existing nests reflects the number of pairs trying to breed in the study area.

My basic material, collected during 5 recent years, refers to the Woodpigeon. This species has a small nesting territory, which is not its feeding territory. The activity area of a single bird lies within a 15 km radius from the nest.

The breeding populations of the Woodpigeon were studied in the central and peripheral parks of two towns in southwestern Poland. These were Legnica, with about 100,000 inhabitants and Wrocław, with over 500,000 people. In 1972, additionally, I controlled a rural area of 11 sq. km near Wrocław's built-up area, embracing 50 hectares of mid-field parks and small woods.

The sample plots were controlled in 10-day intervals and by searching each tree I tried to discover all the nests. The nests were plotted on the map, together with the species of tree, the nest's location, altitude and so on. These data were very useful during later controls. Nests were observed through binoculars and not inspected by hand. In such a way, I learned the fates of over 2,000 nests in habitats in various stages of urbanisation, and only 35 nest (in 1972) in the mid-field parks and woods near Wrocław.

Between these habitats the population density of the Wood pigeon was so different, that for the estimate of breeding pairs various methods had to be used. The density in the central-town park in Legnica reached about 157 pairs per 10 ha and in a central-town park in Wrocław it was up to 71 pairs per 10 ha. In Legnica even up to 6 occupied nests were sometimes situated in the same tree. With such a density a count of individual birds and their call was impossible and one had to count the nests only.

On the other hand, the density of breeding pairs in the rural areas near Wrocław was from 1 pair per 10 ha in small woods to 8 pairs per 10 ha in mid-

-field parks near villages. In this particular case, the best estimation of number of pairs proved to be the use of mapping method complemented by the search for nests of which only about 70 per cent were found.

In order to compare the results obtained in both types of habitat, it was necessary to determine how many pairs tried to breed in the urban parks. The fate of nests shows that the percentage of destroyed ones was essentially different. Here are the figures referring to the 1st brood:

a) in central-town parks — 10–20 % nests destroyed after 10 days;

b) in parks with fewer visitors, situated on the periphery of the town — 25–60 % nests destroyed;

c) in rural parks and woods — about 70 % destroyed after 10 days;

These differences are statistically significant. Consequently, if we wish to estimate the number of breeding pairs of the Woodpigeon on the basis of existing nests, we should consider a correction for significant differences in brood losses. On a given census day, a part of the breeding pairs do not have nests because they have not yet started breeding (the peak for Woodpigeon is between 20th and 30th May), or the earliest young of the first brood have already left the nest and the pair has not yet started the new nest (this is possible after 15th May), or the pair has lost the first nest and has not yet built a new one. This last case deserves special attention.

The interval between the loss of the nest and the construction of a new one, is at least 3–5 days with the Woodpigeon. If the losses in an urban park amount to 16 % within ten days, then about 4–6 % will refer to pairs which at our nest census visit will not yet have constructed a new nest. Thus in the Legnica park, where 269 nests were found on 36 hectares at the peak, the number of pairs should be 4–6 % higher, which gives at least 280–285 breeding pairs.

If we wish to estimate the number of pairs of Woodpigeon in a rural area also on the basis of the number of occupied nests, than with losses amounting to c. 70 per cent per 10 days, the necessary correction should be as high as 15–20 per cent.

The above objections do not refer to the most common case of species with large territories (type A according to M. NICE'S classification), when nests found can be plotted on a map together with other information on the bird's presence. This would be an alteration of the mapping method.

But high population densities, which make it difficult to couple the observations with individual pairs, occur also with other species (see PETERS, 1963). Such a density resembles the colonial breeding. For example: Collared Turtle Dove [*Streptopelia decaocto* (FRIV.)] — up to 70 pairs per 10 ha, Starling — 80 pairs per 10 ha and 7 nesting holes in the same tree, Blackbird (*Turdus merula* L.) — up to 60 pairs per 10 ha Greenfinch [*Carduelis chloris* (L.)] — 25 pairs per 10 ha and so on.

Undertaking the quantitative studies, we should consider this difference between the number of nests and the number of pairs, caused by the brood

losses. According to LACK (1954), with birds building open nests, 50 per cent of nests on average are destroyed before young birds have left them. Even with birds nesting in tree-holes the losses amount to c. 33 per cent. As we have seen with the Woodpigeon, even with the same species the losses may be very different in various habitats. In urban areas these losses are 40-50 per cent per brood, but in the mid-field woods and parks may be as much as 94 per cent. These figures allow us to imagine the disorder which might occur during the breeding time (Fig. 1). We should remember also that many species with a similar biology to Starling, pigeons or *Carduelinae*, are less faithful to a nesting territory, and will often abandon it after the nest is destroyed.

It is therefore advisable that when we base our calculation only on the number of nests found, the counts should be repeated several times. Then the controls allow us to estimate the amount of losses. These data will show how great is the under-estimation of the results caused by the reasons stated above. This recommendation refers to all colonial birds too.

We should remember these differences, which occur with the different species, when comparing or summarising the results obtained by different methods. Here is an example. The number of breeding pairs of the Chaffinch (*Fringilla coelebs* L.), we can fix by the standard method, based on the number of mapped territories. It contains equally the successful pairs and the ones whose nests were lost, or even when one partner was killed. This number is often treated as comparable with the number of pairs of Starlings, which is usually estimated by counting holes with crying young (e.g. LENZ, 1971). But, since the losses with Starling amount to 20 per cent on average, and may be as high as 50 per cent, the number of pairs will be underestimated and not comparable with the number of pairs of the Chaffinch. The complementary broods of Starling are completely impossible to couple with particular pairs recorded previously, as the complete territory is lacking. The complementary broods are difficult to discriminate from the broods of delayed pairs, and from the second brood as well.

I think, therefore, that with the Starling, the singing males are to be counted too, and the final result should be calculated from both values, i.e. the number of singing males and number of successful broods.

Starting a quantitative study we must clearly realise what information we intend to obtain. Either the number of pairs, which start to breed, or the number of pairs which successfully finish their broods, is our aim. Currently we often compromise, or we consider both situations, depending on the species. Our decisions are subjective and, what is worse, we often forget these differences.

In respect to this problem, the most suitable time for investigation is important. In some anthropogenic habitats a part of the population of a given species start breeding very early, already in March. For this reason some authors recommend to start counting early. In my opinion, it is not advantageous, for the following reasons. The birds starting so early are:

a) only a small fraction of the population;

b) suffer very high losses, because the nests are easily detectable;

c) in the case of a destroyed nest, or after rearing successfully and early brood, they may breed again still within the breeding period of the main part of population, and so may be counted twice.

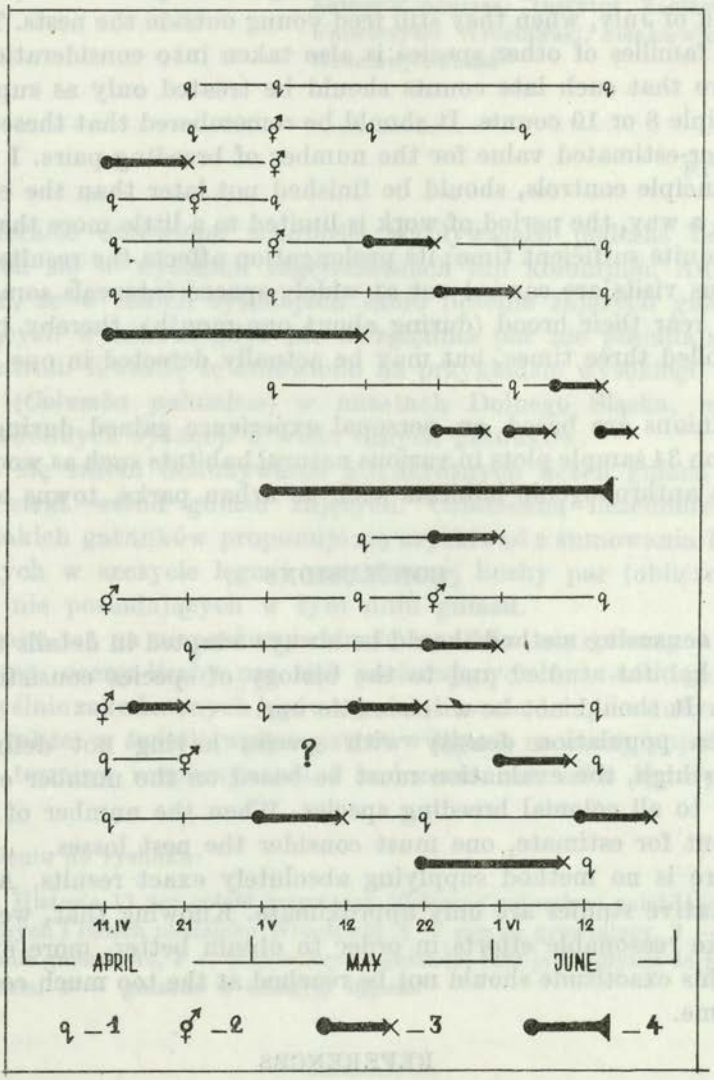

Fig 1. The history of the 17 pairs of the Woodpigeon (*Columba palumbus*), breeding in mid-field parks and woods near Wrocław. The symbols mean: 1 — cooing male, 2 — pair showing nesting behaviour, 3 — date of the discovery of the nest, time elapsed until its destroying or abandoning, 4 — successful nest.

These objections determine the best time to begin counting in western Poland, as about 10th April in human settlements and about 20th April in woodland.

Similar remarks refer to the time of final counts. Some authors (for example LENZ, 1971) recommend to count some species as Icterine Warbler [*Hippolais icterina* (VIEILL.)], Spotted Flycatcher [*Muscicapa striata* (PALL.)], etc. up to the end of July, when they still feed young outside the nests. The number of observed families of other species is also taken into consideration.

I believe that such late counts should be treated only as supplementary to the principle 8 or 10 counts. It should be remembered that these late counts give an under-estimated value for the number of breeding pairs. I believe also that the principle controls, should be finished not later than the end of June.

In such a way, the period of work is limited to a little more than two months. This is quite sufficient time; its prolongation affects the results unfavourably. If census visits are carried out at widely-spaced intervals some pairs may successfully rear their brood (during about one month), thereby being potentially controlled three times, but may be actually detected in one or two controls only.

My opinions are based on personal experience gained during field-work carried out on 34 sample plots in various natural habitats such as woods, marshes etc., and in anthropogenic habitats such as urban parks, towns and villages.

CONCLUSIONS

1. The censusing method should be always adapted in details to the requirements of habitat studied and to the biology of species consisting the bird community. It should not be a schematic one.

2. When population density with species having not definite feeding territories is high, the evaluation must be based on the number of nests. The same refers to all colonial breeding species. When the number of nests is the basic element for estimate, one must consider the nest losses.

3. There is no method supplying absolutely exact results. All results of our quantitative studies are only approximate. Knowing that, we are obliged to undertake reasonable efforts in order to obtain better, more exact results. However, this exactitude should not be reached at the too much cost the investigator's time.

REFERENCES

INTERNATIONAL BIRD CENSUS COMMITTEE. 1969. Recommendations for an international standard for a mapping method in bird census work. Bird Study, **16**: 248–255.

LACK D. 1954. The natural regulation of animal numbers. Oxford.

LENZ M. 1971. Zum Problem der Erfassung von Brutvogelbestanden in Stadtbiotopen. Vogelwelt, **92** (2): 41–52.

PETERS D. S. 1963. Ökologische Studien an Parkvogeln. Biol. Abhandl. **27/28**: 1–44.
TOMIAŁOJĆ L. 1968. Podstawowe metody badań ilościowych awifauny lęgowej obszarów zadrzewionych i osiedli ludzkich (Fundamental methods of the quantitative research of the breeding avifauna on wood coverd areas and in settlements). Notatki orn. **9**(1/2): 1–20.

Accepted for publication: 11 I 1974.
Author's address: Instytut Zoologiczny, Uniwersytet Wrocławski, Sienkiewicza 21, 50–335, Wrocław, Poland

---

STRESZCZENIE

W referacie omówiono trudności wypływające podczas liczeń ptaków gnieżdżących się w wysokich zagęszczeniach lub kolonijnie. Autor dochodzi do wniosku, że w takich sytuacjach samo liczenie zajętych gniazd nie daje zadowalających wyników, gdyż nie uwzględnia par nie posiadających gniazd w dniu kontroli. Kwestię tę omówiono na przykładzie wysokiego zagęszczenia grzywaczy (*Columba palumbus*) w miastach Dolnego Śląska, wskazując na istnienie podobnych sytuacji u wielu innych gatunków.

Zaleca się zatem dokonywanie kilkakrotnych liczeń gniazd i obliczenia wysokości strat wśród gniazd zajętych. Ostateczną liczebność gniazdowej populacji takich gatunków proponuje się uzyskiwać z sumowania liczby gniazd odnotowanych w szczycie lęgu i przybliżonej liczby par (obliczonej ze strat lęgowych), nie posiadających w tym dniu gniazd.

Wskazano też na nieporównywalność wyników uzyskiwanych dla różnych gatunków, np. oceny liczby par zięb posiadających terytoria lęgowe, z oceną liczby pomyślnie zakończonych lęgów szpaka (liczenie dziupli z dużymi młodymi). Omówiono także, w świetle wpływu strat w lęgach na oceny populacji ptasich, optymalne terminy rozpoczynania i kończenia cenzusów lęgowych.

Objaśnienia do rysunku:

Rys. 1. Historia 17 par gołębi grzywaczy (*Columba palumbus*) gnieżdżących się w parkach śródpolnych i lasach niedaleko Wrocławia. 1 — samiec gruchający, 2 — para wykazująca zachowanie gniazdowe, 3 — data odkrycia gniazda, czas jaki upłynął do jego zniszczenia lub opuszczenia, 4 — gniazdo z udanym lęgiem.

РЕЗЮМЕ

Автор обсуждает трудности, которые возникают при учете птиц гнездящихся в высокой степени концентрации или в колониях и приходит к выводу, что сам учет занятых гнезд не дает удовлетворительных результатов, так как не охваты-

вает те пары, которые не имеют в день учета гнезд. Этот вопрос рассмотрен на примере вяхиря (*Columba palumbus*) плотность которого в городах Нижней Силезии высока; такая же ситуация наблюдается у многих других видов.

Рекомендуется в связи с этим учет гнезд производить несколько раз, учитывая убытки в количестве занятых гнезд. Как окончательную величину гнездовой популяции таких видов предлагается считать величину полученную путем суммирования числа гнезд, зарегистрированных в разгар гнездового периода, и приблизительного числа пар (высчитанного на основании гнездовых потерь), которые не имели гнезд в день учета.

Автор указывает на то, что результаты полученные на разных видах, несравнимы, например, оценка числа пар зяблика, имеющего гнездовую территорию, с оценкой численности удачно выведенных птенцов скворца (учет дупел со старшими птенцами). Обсуждены также с точки зрения влияния потерь в кладках на оценку численности популяции оптимальные пределы начала и окончания гнездового периода.

Подписи к рисунку:

Рисунок 1. История 17 пар вяхиря (*Columba palumbus*), гнездящихся в перелесках и лесах в окрестности Вроцлава. (1) — воркующий самец, (2) — пара, поведение которой указывает на гнездование, (3) — дата обнаружения гнезда, время прошедшее до его уничтожения или оставления, (4) — гнездо с успешно выведенными птенцами.