Anals of West University of Timişoara, ser. Biology, vol II 1999, p. 55 - 80

Contributions to the knowledge of the erratic hyemal flocks of Passeriformes from the Quercus forests in western Romania (I)

Dan Stănescu[1], Stefan Raduly[1], Eva Boroş[2], Monica Papeş[1], Arpad Nyari[1], Gabriel Trandafir[3]

[1]Chemistry-Biology-Geography Faculty – West University of Timişoara; [2]Nicolaus Lenau College; [3]USAMVB, Timişoara

KEY WORDS: line transect census; Passeriformes; association of birds in flocks.

The association of birds in flocks, once the winter has arrived, and the maintaining of this status until spring, when bird flocks split to form pairs, as well as the rituals of reproduction are all biological rhythms so ordinary for people that they are perceived as facts and do not rise a particular interest for study. This certainty associates randomness with the fly of the flock in search for food, search made until the revival of the Nature when the individual can distinguish himself, without the help of the heard, and this because the environment has become *better*, assuring the survival by itself. This is how far the knowledge in this area of study goes. Present day studies - especially over seas ones - approach either the monospecific associations (in order to establish the relations between individuals), the polispecific ones, especially aquatic, or the link between these associations and the abiotic factors. There are few or no studies at all concerning the minor polispecific association of birds from a skirt of a forest, what causes them, etc. In this area of study the interest was focused on the individual phenomena, in detriment of the global one; in fact, the global one actually represents the erratic hyemal flock and it caused a limited approach to this issue.

This paper is an attempt to find answers to some of the multiple questions raised during a four decade period of ornithological observations and attempts to establish – and this is its ***goal*** – *when, how and for what purpose do certain species associate in a flock, how stabile / random are these associations, in which way do they depend on the abiotic factors, which are the parameters that determine a fluctuation in the composition of species or in the number of individuals forming a flock.* It is also important to find out *if these associations are individualistic or anonymous (open or closed), what and how is the spatial exploitation of the tree branches accomplished, when is the number of species high / low in an association,* *which is the ideal relation between the number of species and the number of individuals in a flock, how do the individuals communicate (specific, interspecific, or both ways).* From this point of view, it is important to establish *what is communicated in such associations, how wide is the scale of the used signals and what is their signification.* Finally, other issues are: *the decisive moment of bringing together / separate individuals belonging to a flock, the behavioral dominance, the protection of the association against the predators, the cooperation (specifically graduated or annulled) of the individuals during a predator's attack, etc.*

Due to this amalgam of challenges, which estate the phenomena as multidisciplinary, it is easy to understand that data needed to be analyzed from various prospects, *faunistical, ecological, ethological, ecological-ethological,* but also *bioacustical*. Such an approach to this study, (we may even say complex), faced us with the present situation of having collected a sum of data that could be processed, but also some partial observations, for example those concerning the behavioral links. That is why in the present paper we will reveal only the results of *the faunistical* and *ecological* investigations and afterwards, in time, will complete the missing domains. The ethological studies, as it should be known, are much difficult, laborious and time consuming because the expected event does not happen in accordance with the time of observation, but with the disposition and psychology of the moment of the species, group - in this case the erratic flocks being held in our observation.

The place of observations and the method of study

The tracking, examination, identification, sound recordings and the quantitative and qualitative estimation of the bird populations forming the erratic hyemal flocks were conducted in three forests in the South of the Western Plain (Campia de Vest) of Mures, dominated by the presence of *the oak (Quercus pedunculatus)*, in fact by an *Quecetum-Carpinetum* association. Those three forests were *Padurea Verde* (2200 ha), near Timisoara city, *Padurea Bistra* (2000 ha), 8 km NW of Timisoara, and *Parcul Bazos* (900 ha) 20 km NW of Timisoara.

The investigations took place in the *October – March* period of the years *1985 to 1999*, corresponding to the transition from the *autumnal* to the *hyemal* season and to the *prevernal* one; due to the Mediterranean climate influence, the cold season is more compressed - as extension in time - in the Western part of the country than in the other parts of Romania.

The method of investigation applied was the ***line transect census***, but with modifications concerning especially the limits used for the dominant estimations. Throughout the years of observations, we learned that the distinction threshold taken from the *Braun–Blanche* phytosociological method is irrelevant, arbitrary and causes major errors in zoocenosis studies. All this, and even more in our case, since the object of our study were and are the birds, constantly fluctuating in number, but also in sum of individuals. According to all the above, the degree of individual dominance is estimated as percentage participation of a species individuals, from the total of individuals representing all species *(Schubert, 1991)*. Evaluated this way, the species are defined as *eudominant (36-100% participation from the total), dominant (16-35.9%), subdominant (4-15.9%), redecent (1-3.9%) and subredecent (<1% from the total)*. The limitation of appreciation, caused by its own unilaterally, became evident. That is why we found more applicable the *route method* from *Ferry & Frochot (1958)*, which involved *the kilometric index of abundance (IKA)* calculus of the species related to the percentage participation of the same species. Because this was a botanical method, it was imperiously necessary to introduce another separation factor, and *Korody (1958)* defined the *consumption factor*. Later we reconsidered the concept and redefined it as the *metabolic index* because the surface of the bird body taken into consideration represented in fact the surface energy loss. This involves the species as user, consumer in the ecosystem *(Stanescu & colab, 1998)*[1]. The surface energy loss was calculated before by *Turcek (1951)* and the starting point of its calculus was the specific weight; but the specific weight itself multiplied with the number of individuals from the habitat is a separation factor in respect of total biomass per species. As it can be seen, there have been created premises for a better estimation from the discussed point of view, the method being applied by most ornithologists for many decades in a row *(Korody, 1958,1960; Kohl, 1967; Ion, Valenciuc, 1967; Blondel, Ferry, Frochot, 1970; König and colab., 1972; Blondel, Isemann, 1973; Stanescu, 1971, 1984, 1985, 1998; Paspaleva, Talpeanu, 1975; Simon, 1976, Kovats, 1976)*. But even in this version, the estimation of the dominance degrees have been kept at the point of relativity, the qualificative being established ***not*** according to a calculated limit of differentiation, but as a result of the

[1] For the semantic reasons which lead to the replacement of the word "consumption", see our paper concerning the Tarcu Mountains avifauna *(Stanescu & colab, 1988)*.

scientist's finding / not finding many high values from the total of four *(IKA, frequency, biomass, metabolic index)* at a single species. The rest of detachment degrees have remained to be estimated also from the percentage participation of the individuals, part of a unispecific population related to the sum of the individuals of every species which formed the bird population at the moment of investigation of the ecosystem. The approximate evaluations like *frequent, very frequent, etc*, have been indeed eliminated, the method still keeping a slight degree of subjectivity as a result of the free will of the scientist according to his degree of severity.

This is, we say, the reason for which in studies of accuracy perfecting the method was imperatively required, even the approach of the present paper itself needed a new working orientation. When starting a study in ecology, behavior or ecological behavior, defining the place defining the place of a species in a ecosystem in understanding its intra and interspecific relations, it is necessary to start from understanding the entity under the incidence of all biogenic and abiogenic factors. Therefore the first step in solving a zoocenosis is knowing its general structure and also the place occupied and the role of its components in the entity. For instance, to find out - in a bird population - *the place* and importance of a *single* species we are going to study on further, we have to know the faunistic spectrum in which it integrates. In understanding the laws that govern the erratic bird flocks of Passeriformes, we do not have another starting point. The additions brought to the route method for a better, more efficient and stabile way of distinction, were that we first tried to find those objective limits to permit evaluation. By our estimations, the best way of resolving would be the statistical one; the database consisting of the same: *kilometric index of abundance of a species, frequency, biomass, and the surface of its energy loss*. Lacking in data in this direction, we took in consideration for the biomass of a species the values of *Heinroth (1911)*, and for the determination of the surface of energy loss after *Turcek (1956)* (the annex to our paper contains these data calculated for all the species of our country). Knowing from experience that the calculated values could take on a large scale of variations, a fact that could lead to a impossibility in graphical display, first we resorted to ***logarithming these values***. From the sum of the logarithmed values for each species apart ($\Sigma_{IKA,\%,bio,i.met}$), the sum of the sums of these values is calculated, the number obtained consisting in a starting point in the attribution of the five degrees of representation of a species in a habitat.

Thus, the threshold ***absolute dominance*** is given by all the values located over *the average of the values plus the standard deviation*, the threshold ***dominance***, given by all values located over *the average of the values*, ***subdominance***, by all the values located over *the average of the values minus the standard deviation*, ***auxiliary,*** by the values below *the average of the values minus the standard deviation* and the characteristic of ***accidental*** by all the values situated below *20% of the highest value of auxiliary* (Stanescu & colab., 1998), with an error of 0.05%.

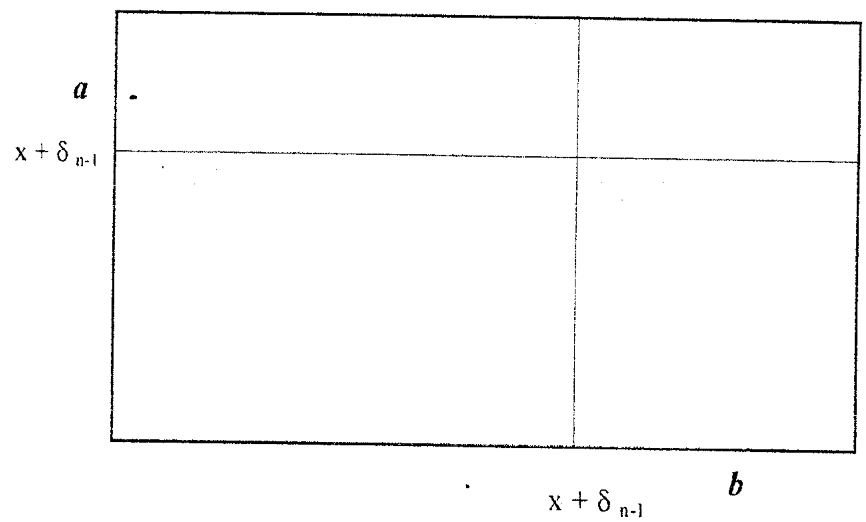

Fig.1

Converting the algorithm presented above with the help of a computer, operation accomplished by *dr.Raduly Stefan* from our informatics lab, spares the observer from the labor of some long calculations, his task being reduced only to introducing data into the program. The listed result shows the list of the species in order of their occupied places in the ecosystem, but does not illustrate the reason of the produced values that separate and characterize these species. The correction and the illustration of this aspect we have solved through a graphical way, the *vertical* and the *horizontal axis* are related on the logarithmic scale by the nomograme principle. The *vertical (OY) axis* represents the → *l_n of the sum of the average individual number of a species + l_n of the biomass of the species* ***(a)*** and the *horizontal (OX) axis* the → *l_n of the sum between IKA and* *frequency (%) + the surface of energy loss, characteristic to each species (**b**).*

$\delta n + (\delta n\text{-}1)$

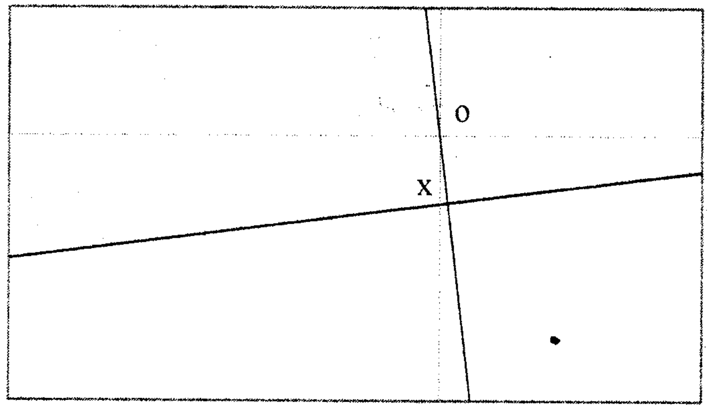

Fig.2.

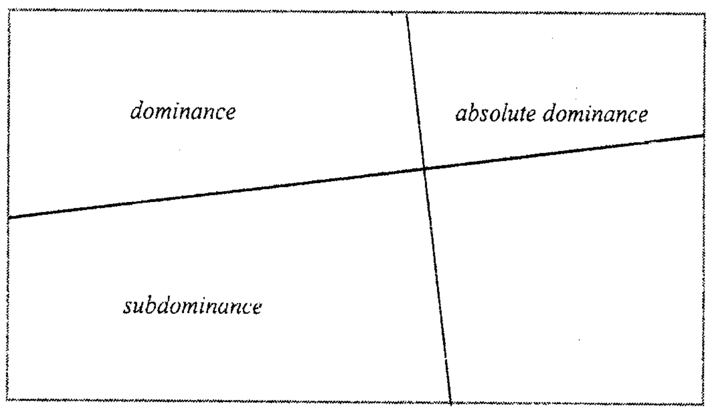

Fig.3.

The limit of the dominance fields is calculated by 1) establishing their origin point, obtained as a result of displaying on the vertical axis the *sum of the averages + the standard deviation* resulted from the combination ***a*** and on the horizontal axis the same for the combination ***b***. The next step 2) consists of displaying - on the vertical axis - the sum between the *average deviation* and *the standard deviation* of ***a*** and on the vertical from the origin point the average resulted from ***a***. From the unification of these points results a straight on which a second straight will be displayed, on which a second straight will be displayed, perpendicular to the first, the perpendicular straight going through the origin point (fig. 2). The four fields now formed represent the limiting areas of the dominance, as shown on fig.

3. Once ***a*** and ***b*** for each species are established, we establish their position in the studied bird population. The position in the graph is in fact nothing else but the expression of the *specific correlation*, between the number of individuals as a numerical displaying but also the biomass on one side, then the frequency of the species with its kilometric index abundance and the species implication in respect of the quality of a consumer on the other side. Because of this, the two delimitation axes of the species representation will occupy various positions in the plane, according to the *degree of equity (Stugren, 1974, 1986)* (fig. 4).

The cause of the mobility of axis is the fluctuation of the average deviation and the standard deviation from the average. If in statistic calculus the two deviation above average make the data processing useless, in our study the uncontrolled dispersion around the average value reveals the high *entropy* of the zoocenosis (ornithocenosis); the opposite situation is proper to a low entropy. This reasoning is obvious in harmony with the two fundamental principles of biocenosis, by *Thienemann (Stugren, 1982): 1. the more variable are the living conditions of a species, the higher is the number of species in that biocenosis, 2. the more abnormal (away from optimal) are the living conditions in the biotop, the poorer in spècies, the richer in individuals of the singular species and, finally, the more characteristic that biocenosis will be.*

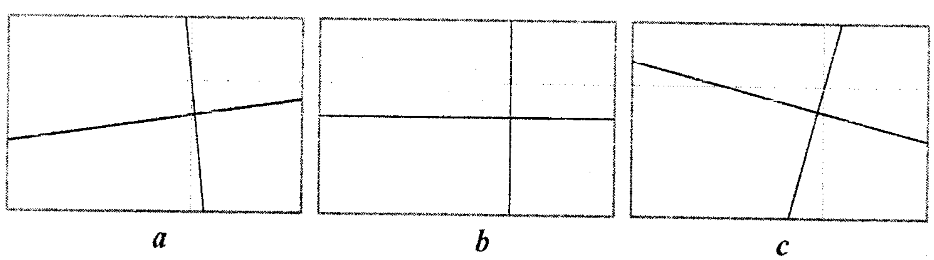

Fig.4. ***a.*** *few individuals, lots of species, high IKA, metabolic index and frequency, efficacious consumers in the ecosystem,* ***b.*** *well-balanced biomass, metabolic index and IKA, a constant number of individuals from a constant number of species (theoretically an ideal situation),* ***c.*** *high biomas and number of individuals, low IKA, few consumers, as number of species, in the habitat.*

Also following from the picture is the place of the species in the dominance field. Thus, some corrections are made to the calculus part of our method, especially to the values situated at the edge of two prevailing values.

The method was tested over a decade in its first form of conceiving, used by some authors *(Kiss, 1999)* with published results. It *is* surely an *ecological method* which might raise some objections by the faunists in the matter of the species composition of an habitat for example, when from the list a passeriform might be missing (accidentally appeared or belonged to a rarity). It is not the case to restate that this is a minor element which becomes unimportant in a study like this one, its influence on the association of birds in the flock or on the individuals' behavior compounding the flock being absolutely absent. A zoocenosis is not characterized by attributes like *randomness*, but - on the contrary - by its antonym extended to *permanency*; this affirmation is not an accidental opinion, it is based on observations. Of course, the method does not exclude completions, adjacent in value (capturing, etc.) with reverberation in the qualitative spectrum of the investigation, but it does not modify, as we said, the ecological interference, therefore the final ecosystemic conclusions. As any other method, the present one can certainly be improved and does not pretend to solve only by itself such complex problems without the implication of all other ecological and ethological methods, for an authentically, viable ending.

Under practical aspect, the birds have been observed with the binoculars, followed by immediate writing down of the species and the number of individuals represented in that moment in the habitat. All the species have been observed under

→ the perspective of the trofical niches exploitation, the individual, group, intra- and interspecific behaviors,

→ the correlation between the abiogen factors (temperature, humidity, degree of sky coverage) and the number of species and individuals associated in an erratic flock,

→ the communication between the flock components, the sounds being recorded with an unidirectional microphone E 265 with preamplification (80-1800 Hz). The recordings have been further proccesed on a computer under the perspectiv of spectral analysis. Some of the sounds which have been analyzed statistically and under the aspect of frequency/amplitude, have been synthesized in order to be rendered in the field. This way, it is possible to study the genomic stability of the song for a species, to find out what is missed from the sound to its audibility distance (due to the atmospherically density fluctuation); the absorption degree of the various tree species' wood also can be estimated and the respond provoked by these synthesized sounds can be recorded.

→ Supposing there is a correlation between *the wing index* (the percentage representing the primaries length from its apex to the tip of the secondaries, from the total length of the wing) and the association of the birds in the flock, we did several dozens of measuring on naturalized birds belonging to the observed species in order to find out the average value of this index per species. The investigated material belongs to the biology department of the faculty and to the Institute of the forestry studies from Timisoara. Theoretically, for the migratory birds the associations become a fact only for the species with identical or close index and this can be a possible cause of association of birds in the erratic flocks.

The results of the research.

The qualitative and quantitative aspect of the bird population associated in the erratic flocks.

Our observations confirm the presence of 20 species which compound the erratic flocks in the autumnal, hiemal and prevernal aspects in the quercinee forests of the western part of the country (table no.1a and 1b). Among the absolute dominants are *Parus major* and *Parus caeruleus*, the forming nucleus of the possible associations.

Tabel 1a

Nr	Species	ln IKA	ln %	ln biom.	ln energ	$\Sigma_{ln\ IKA,\%,B,E}$
1	*Aegithalos caudatus*	-0.16	0.82	6.89	6.16	13.70
2	*Dendrocopos major*	0.31	2.12	9.54	8.08	20.05
3	*Dendrocopos medius*	-2.15	-0.18	6.80	5.44	9.92
4	*Dendrocopos minor*	-4.85	-2.82	3.00	2.00	-2.68
5	*Dryocopus martius*	-2.21	-0.42	8.34	6.44	12.15
6	*Erithacus rubecula*	-0.74	1.11	6.88	5.96	13.21
7	*Garrulus glandarius*	0.23	1.90	10.22	8.51	20.85
8	*Parus ater*	-0.42	-0.52	6.73	5.97	11.76
9	*Parus caeruleus*	2.33	2.99	9.75	8.89	23.96
10	*Parus major*	2.55	3.26	10.29	9.33	25.42
11	*Parus palustris*	-0.71	0.58	6.63	5.74	12.24
12	*Picus canus*	-2.77	-0.87	7.33	5.58	9.26
13	*Picus viridis*	-4.85	-2.82	5.30	3.53	1.16
14	*Pyrrhula pyrrhula*	0.01	1.53	8.56	7.33	17.42

15	*Regulus regulus*	1.68	2.06	8.32	7.72	19.79
16	*Sitta europaea*	0.422	1.96	8.46	7.40	18.24
17	*Troglodytes troglodytes*	-1.52	0.51	5.41	4.72	9.12
18	*Turdus merula*	0.58	2.06	10.03	8.50	21.17
19	*Turdus pilaris*	-4.85	-2.82	4.94	3.30	0.57
20	*Turdus viscivorus*	-4.16	-2.13	5.48	3.88	3.08

The numbers represent the calculated and logarithmated values, respective their sum for the separation factors taken into calculus. The marked box indicates the highest value of the factor corresponding to a species in comparison with the rest of the species, value which justify the given qualificatives: absolute dominant, dominant, etc.

Tabel 1b

Nr	Species	Values	Dominance
1	*Parus major*	25.42	AD
2	*Parus caeruleus*	23.96	AD
3	*Turdus merula*	21.17	AD
4	*Garrulus glandarius*	20.85	D
5	*Dendrocopos major*	20.05	D
6	*Regulus regulus*	19.79	D
7	*Sitta europaea*	18.24	D
8	*Pyrrhula pyrrhula*	17.42	D
9	*Aegithalos caudatus*	13.70	D
10	*Erithacus rubecula*	13.21	D
11	*Parus palustris*	12.24	SD
12	*Dryocopus martius*	12.15	SD
13	*Parus ater*	11.76	SD
14	*Dendrocopos medius*	9.92	SD
15	*Picus canus*	9.26	SD
16	*Troglodytes troglodytes*	9.12	SD
17	*Turdus viscivorus*	3.08	AUX
18	*Picus viridis*	1.16	AUX
19	*Turdus pilaris*	0.57	ACC
20	*Dendrocopos minor*	-2.68	ACC

The limits for establishing the dominance: above $x+\sigma_n=21.05$ *→ absolute dominant, above* $x=13.02$ *→ dominant, above* $x-\sigma_n=4.99$ *→ subdominant, below* **<4.99** *→ auxiliary, 20% from auxiliary =* **0.99** *→ accidental*

The great tit and *the blue tit* are the explorers and exploiters of the distal and middle tree branches, place in which the blackbird are rarely observed. *Turdus merula* looks for food under the tree branches, in the bushes. Among the parameters taken into consideration, the biomass is responsible for the absolute dominance of this species, the other ones having low values in comparison with other species. In this example is underlined the occupied position of a species (blackbird) in the general picture under the qualitative aspect, but does not clarify its affinity for a flock or its permanent participation to the erratic flocks. This fact also can be deducted from the fig. 5 which certifies the real position of *Turdus merula* at the limit between the dominant and absolute dominant, as well as the fact that the dominance of the robin (*Erithacus rubecula*) is placed at the limit between the dominant and subdominant. For this reason and for finding out the matching between species we dendrogramed the same combinations of variables, measured in euclidean distances, to which we added: *the species' participation as number of individuals to the total number of individuals of all species* observed in a season, *the species' score* as a bird permanent or variable observed in the flock[2], the *trofic group* which it belongs to.

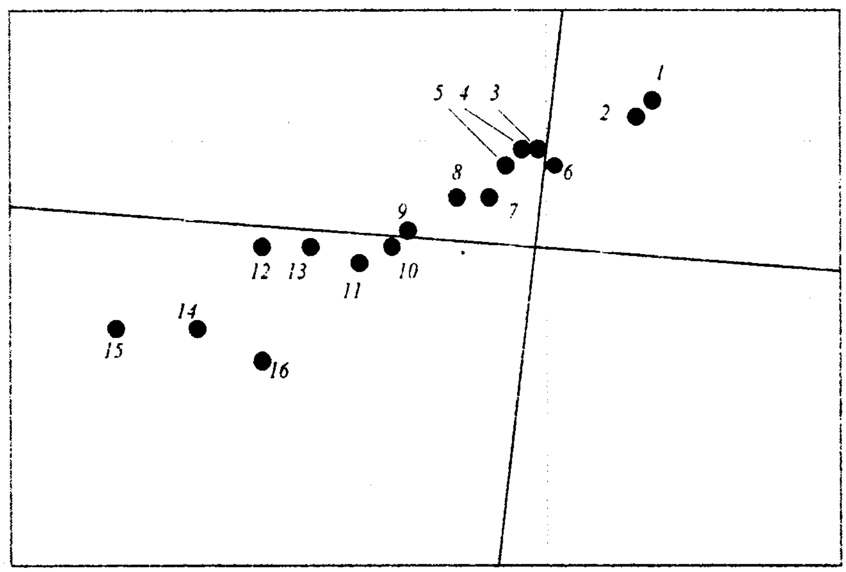

Fig.5 The graphical representation of the dispersion on the fields of dominance for the observed species. The numbers correspond to the species in the order presented in the table 1a. Because the species Turdus viscivorus, Picus viridis, Turdus pilaris and Dendrocopos minor have values close to the premier origin point or away (negative values), the numbers 17, 18, 19, 20 have not been wrote down anymore.

[2] For each identification in the flock per gone through rout, the species was wrote down with one point.

The structure of the flock

The technique used above lets us see the separation of the birds in to distinct groups from which the first, formed by 8 species, represents the qualitativc formula of the permanent erratic hiemal flock; the second group contains the accidental companions of the first one, with decreasing affinity for it as the euclidean distances of linkage increase. The dendrogramm perfectly reflects the field situation, *Parus caeruleus* and *Parus major* being always seen together in the flock too. They are almost always joined by *Regulus regulus*, the triad illustrating in fact the picture most often seen of the erratic flock in a Quercus forest from the western part of the country.

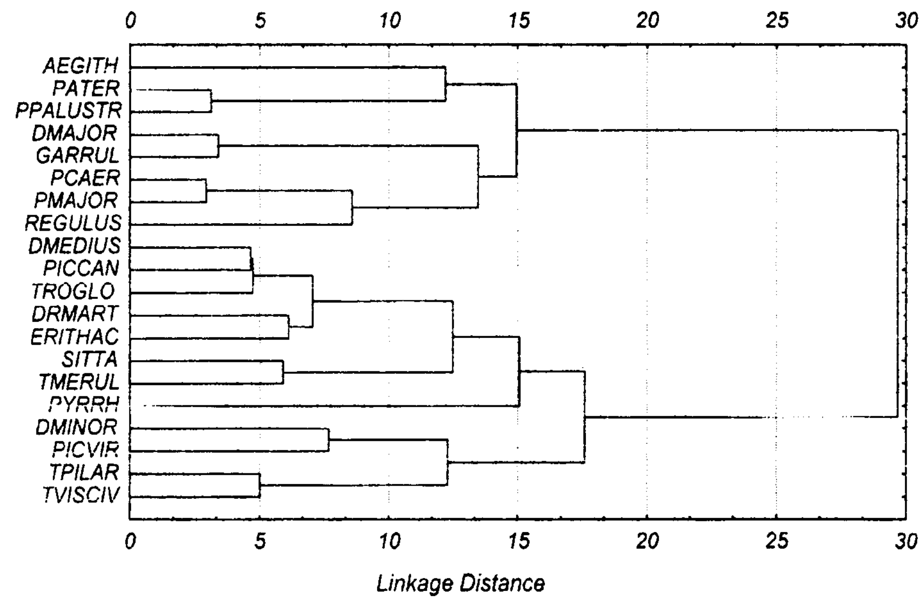

Fig.6. The dendrogramm of the bird species association in the erratic flocks.

The tree species are numerically well represented and *Regulus* gained only the dominant qualification, and this because of its faint presence as biomass (one individual weighs 8-9 g); the correction is made by introducing the values into the graph (fig.5). This nucleus of species (fig.6) is completed, in a gradually decreasing weight but at equal values, by *Parus palustris* and *Parus ater*, *Dendrocopos major* and *Garrulus glandarius*, and finally by

Aegithalos caudatus. The jay, an omnivore corvid with a high intelligence quotient, exploits the flock as food source indicator even though the following of the small birds may be just a simple result of its imitation capability. Anyway, his role is similar to a sentinel's by announcing the terrestrial and aerial enemies.

The influence of the environmental (abiogen) factors on the formation of the flock.

Our observations during autumn and winter have demonstrated a dependence of the flocks to temperature, precipitation and degree of sky coverage or sun intensity, a fact that lead us to presume a certain correlation between the average of the values of the abiogen factors and the number of species, respective the number of individuals. The data[3] submited to calculus have confirmed the supposition, leading us to the following recognition:

- the temperature associated to the degree of sky coverage has a big influence on the number of species compounding a flock. At a medium degree coverage of 60% and a temperature of -1°C, the number of species is 8, species resuming to the ones that form the basic nucleus: *Parus major, P. caeruleus, Regulus regulus, P. palustris, P. ater, Garrulus glandarius, Dendrocopos major* and *Aegithalos caudatus*. The correlation is tight, fact that results from the circular graph of the calculated values (fig.7 and 8). It can be clearly observed from fig.7 that, with the rising of the temperature, the number of species rises to 9, the added species being one of the accompanying birds from the second group of birds, following the dendrogramm.

- the same values, temperature and degree of sky coverage, being calculated together with the total number of individuals of all the species from a flock reveals a new strong correlation: at s 60% (±20%) sky coverage and a temperature of -1°C (with a tolerance of a few degrees), the number of individuals forming a flock oscillates around 100 members (fig.8). This new correlation is even better illustrated by the linkage of temperature, number of species and number of individuals (fig.9).

---

[3] The values for temperature, precipitation, degree of sky coverage corresponding to the days when the observations were made, were taken from the Meteorological Station from Timisoara.

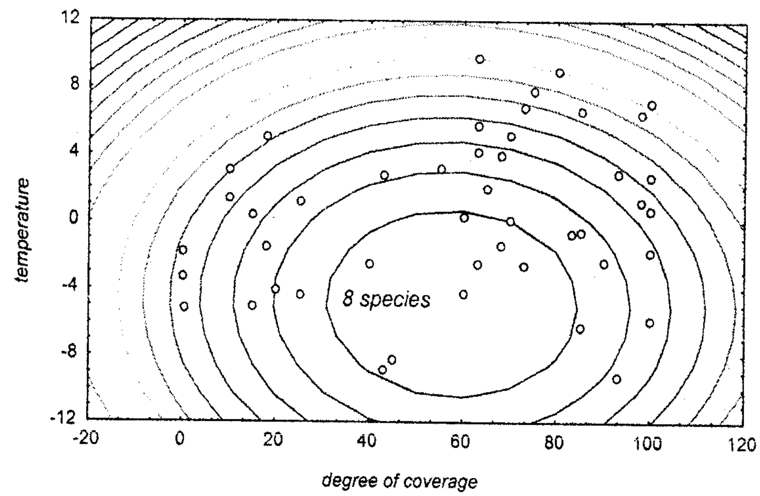

Fig.7. The correlation temperature, degree of coverage, number of species in the ecosystem.

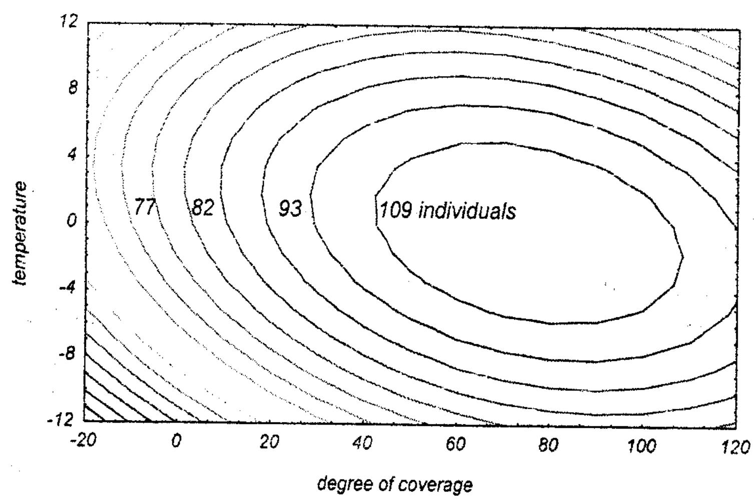

Fig.8. The correlation temperature, degree of coverage, total number of individuals in the ecosystem.

We obtained the same result by calculating the distribution frequency of the species' number and individuals of all species in the ecosystem over the hole period of observation (fig.10).

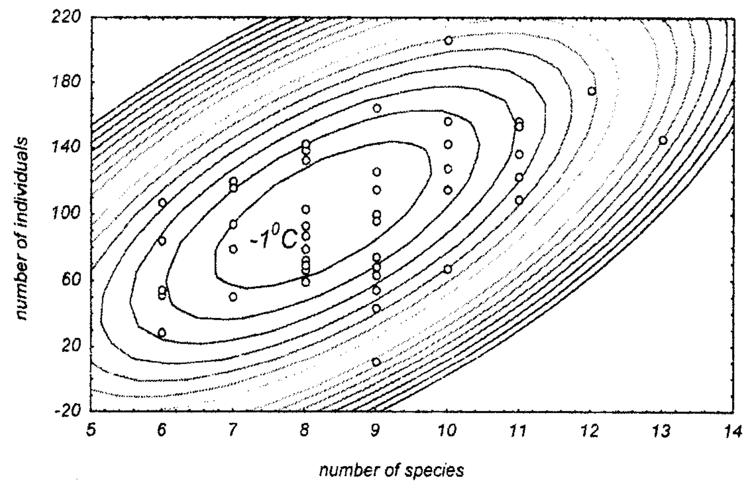

Fig.9. The correlation temperature, number of species and number of individuals.

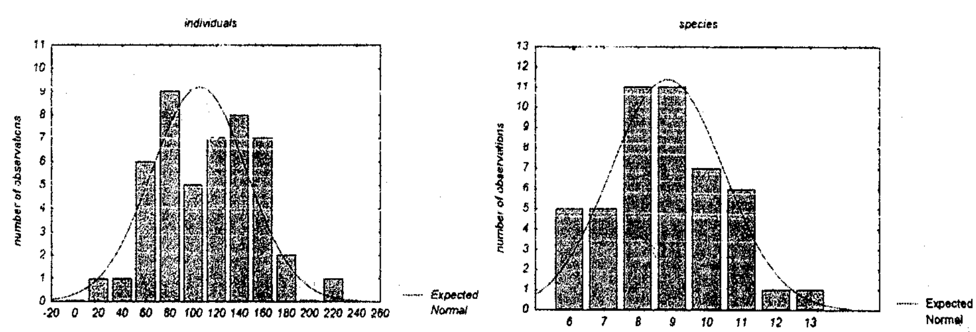

Fig.10. The distribution frequency of the species' number and individuals in the ecosystem.

The formation of the flock and the wing index

It is known that the birds' fly has various sorts and is tightly related to the shape of the wing; it is also known that during migration polispecific associations are characteristic only to those species that own an identical or, at least, very close wing index. *(Herzog, 1968; Schuz, 1971; Gatter, 1976; Kai Curry-Lindahl, 1982)*. The good flyers have a high index, the poor ones have a low one; even a specificity of this index can be sustained. In the context of our research we considered this index also suggestive for the explanation of thc erratic flock composition and we calculated it by conducting several hundreds of measuring on naturalized birds.

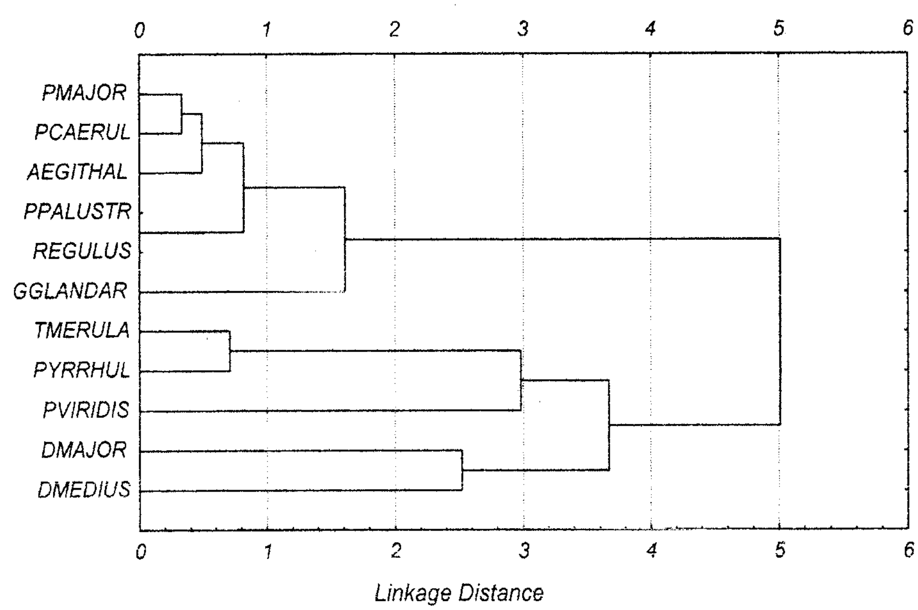

Fig.11. The similarity degree of the wing index (IA) for some of the species of the erratic winter flocks.

From the dendrogramm of values (fig.11) a linkage results again, identical to the one from the field, and once more a separation in a nucleus of birds, like the one considered stabile after the precedent reasoning, and a second one formed by the accessory birds. From the tits, *Parus major* and *P. caeruleus* have an almost identical index (20.81, respective 20.77), *P.palustris* $\rightarrow$ 20.05, *Aegithalos caudatus* $\rightarrow$ 20.35, the standard deviation being under 0.50 for all; the same for *Regulus regulus* $\rightarrow$ 20.04, followed by *Garrulus glandarius* with WI=19.70. In all cases the values are oscillating around the value of 20. The closest values are represented by *Regulus regulus* and *P. palustris*. All the other species have WI>22, in fact between

22 *(Turdus merula)* and 33 *(T. pilaris)*. The presence of the blackbird *(T. merula)* in the tit flocks, even though not the same food niche is exploited, may be explained by this point of view. From this point of view, we actually assist to a flock formation made up by species that are poor flyers, characteristically to the forest ecosystem, with the same or similar trofic spectrum - or with a larger one (omnivore) - that also includes the insectivore (carnivore), particular to most of the nucleus' components.

Conclusions:

The erratic flocks formed in the winter by the passeriformes total 20 species for the quercinee forests in western Romania. Among them, only 8 are stabile species in the flock, represented by tits → *Parus major, Parus caeruleus, Parus palustris, Parus ater, Aegithalos caudatus*, goldcrests → *Regulus regulus*, woodpeckers → *Dendrocopos major* and jays → *Garrulus glandarius*. The proper nucleus, the forming nucleus of the flock is probably assured by *P. major* and *P. caeruleus*, to which *Regulus regulus* is associated. The tits belong to the local populations, and this is a conclusion based on the isolation of the forests in an agricultural dominance (agroecosystem), a characteristic of the studied areas. However, the neighboring areas are exploring by the birds; *Regulus* populations descend from the hill and mountain areas situated at over 100 km distance, probably as a result of a better trofic offer and of the mild climate, characteristically to the mediterranean winters.

The fact that in the base flock have been identified 8 species is argued by the communion of the birds' morpho-anatomic particularity reflected in the wing index; thus, the change of place by the tree branches happens in the same rhythm and under the incidence of the same behavioral spectrum. The environmental factors have an evident influence this way, the temperature of -1^{0}C indicates the same identity and number for the qualitative composition of the flock. Also now, the number of individuals participating at the food search is situated around the value of 100, the lowering of the temperature meaning not a qualitative change of the flock, but a quantitative one. At the temperature of -10^{0}C, the species spectrum is the same, only the individuals' number has decreased. To the 8 species, there are added in favorable conditions (temperature, luminosity) a part of the species that are included in table 1a and 1b, the total number of the registered species being the result of the identifications made in all these years of observations. However, we must not overlook that birds are *animals of light (Lichttiere) (Schüz, 1971)*, that they have an intense metabolism which presumes an adequate feeding; this fact oblige them to find the necessary food during the winter in a short period of time, time being conditioned by the shortening of the photoperiod. In this way the formation of the flocks appears once again as a favorable solution towards the trofic element, the search in a group having a higher success rate than in a isolated manner.

Concluding we can say that in the western part of the country the erratic flocks are formed at temperatures between -1^0C and +1^0C and a sky coverage of 60% in the majority of the cases, from 8 species and 100 individuals, association assured also by the almost identical wing index and the affiliation to the same trofic group of the birds that form them up.

In the present paper there is also explained a new modality of applying the route method, a method which was modified and improved in the direction of eliminating relative estimations in conferring the dominance degrees and of finding out rigorously the threshold of separation in this sense.

Bibliography:

Blondel J., Ferry C., Frochot B. (1970): *La methode des indices punctueles d'abundance (IPA) ou des relevés d'avifaune par Station d'ecte.* Alauda 38. Paris p.55-71

Blondel J., Isenmann P. (1973): *L'evolution de la structure des peuplements de Laro-Limicoles nicheurs de camargue.* Terre et Vie 27. Paris. P.62-84

Ferry C., Frochot B. (1958): *Un methode pour denombrer les oiseaux nicheurs.* Terre e Vie 12., Paris. p.85-102.

Gatter Wolf (1976): *Feldkennzeichen ziehender Passeres.* Die Vogelwelt, No 6,Jhrg.97

Heinroth O., Heinroth M. (1911): *Die Vögel Mitteleuropas* vol.I,II,III, Berlin

Herzog K. (1968): *Anatomie und Flugbiologie der Vögel.* Gustav Fiscger Verlag Stuttgart.

Ion I., Valenciuc N.(1967): *Caracteristicile densității păsărilor din livezile cu pomi de la bucium-Iași.*Anal.Stiințifice ale Universității Al.I.Cuza. Iasi tom XII fasc.2.p.247-253

Kai Curry-Lindahl (1982): *Das große Buch vom Vogelzug.* Paul Parey Verlag Berlin u. Hamburg.

Kiss Andras (1999): *Avifauna din zonele umede ale Banatului.* Ed. Mirton Timişoara.

Kohl St. (1967): *Studiu ornitocenologic în apropierea Reghinului.* Studii şi Materiale II. Muz.Jud. Tg.Mureş. p.1-12

König H şi colab. (1972): *Mitteilungen der Interessengemeinschaft Avifauna Deutschlands der Biologischen gesellschaft Deutschlands.* No 5. Berlin. p.3-104

Korody Gal J. (1958): *Compoziţia calitativă şi cantitativă a populaţiilor de păsări din grădina botanică din Cluj între anii 1958-1959.* Studia Universitatis Babes-Bolyai. Serie II. Fasc.2. Biologia. Cluj.p. 153-170

Korody Gal J. (1958): *Studii ornitologice în câteva tipuri de păduri de foioase din Transilvania.* Studii şi cercetări de Biologie. Acad. Rom. Cluj., vol 3-4 p.

Kovats L.(1976) : *Cercetări cantitative efectuate asupra păsărilor pe malul Crişului Repede în aval de Oradea.* Nymphaea IV. Oradea. P.227-259

Paspaleva M., Tălpeanu M.(1975): *Etude quantitative et qualitative des peuplements d¦oiseaux nicheurs dans un forêt de chenês.* Travaux du Museum d'Hist. Naturelle Gr. Antipa. Buc.vol XVI. P. 265-280

Schubert R. (1991): *Lehrbuch der Ökologie.* Gustav Fischer Verlag Jena

Schüz E.(1971): *Grundriß der Vogelzugskunde.* Paul Parez Verlag Berlin u. Hamburg

Schwertfeger F. (1965): *Ökologie der Tiere – Demökologie.* Paul Parey Verl. Hamburg und Berlin

Simon D. (1976): *Contribuţii la cunoaşterea dinamicii populaţiilor de păsări insectivore şi rolul acestora în sistemul de combatere a dăunătorilor pădurii.* Braşov, Teză de doctorat.

Stănescu D. (1971): *Ornitofauna parcului Sub-Arini din Sibiu. Analiza calitativă şi cantitativă a populaţiilr de păsări.* Studii şi Comunicări de Stiinţe Naturale. Nr.16 Muzeul Brukenthal Sibiu., p.247-284

Stănescu D., Nyari A., Papeş M. (1998): *Preliminary data concerning the estival faunaf Tarcu Mountains.* Lucrările prezentate la simpozionul internaţional "Cercetarea interdisciplinară zonală" România-Yugoslavia-Ungaria,Ed.II. 11-12 dec.1997, Timişoara. P.251-260

Stănescu D., Weber P., Bereş I., Mihăileanu A. (1985): *Analiza calitativă şi cantitativă a populaţiilor de păsări din Pădurea Letea – Delta Dunării.* Delta Dunării, studii şi comunicări de ecologie. I. Tulcea, p.89-101

Stănescu D., Weber P., Mihăileanu A. (1984): *Analiza calitativă şi cantitativă a populaţiilor de păsări de pe litoralul Mării Negre în dreptul vărsării braţului Sf.Gheorge.* Studii şi Comunicări de Stiinţe Naturale. Nr.26. Muzeul Brukenthal Sibiu., p.363-368

Stugren B. (1974, 1986): *Grundlagen der allgemeinen Õkologie* Gustav Fischer Verlag Jena u. Stuttgart

Turcek F.J. (1951) *On the stratification of the avian population of the Querceto-Carpinetum forest communities in southern Slovakia.* Sylvia 13-3. Praga.p.23-35

Turcek F.J. (1956): *Zur Frage der Dominanz in den Vogelpopulationen.* Waldhygiene 8. Würzburg.p. 249-257

Annex

The weight (in grams) and the surface of energy loss (metabolic index)(in cm^2) for the bird species of Romania.

	gr.	cm^2
Acanthis cannabina cannabina (L.)1758	18	6.6
Acanthis flammea cabaret (Muller)1776	15	6.1
Acanthis flammea flammea (L.)1758	15	6.1
Acanthis flavirostris flavirostris (L.)1758	18	6.9
Accipiter gentilis gentilis(L.)1758	1100	106.6
Accipiter nisus nisus(L.)1758	200	34.2
Acrocephalus agricola brevipennis Severtzov 1872	11	4.9
Acrocephalus arundinaceus arundinaceus (L.)1758	35	10.6
Acrocephalus dumetorum Blyth.	11	4.9
Acrocephalus paludicola (Vieill.)1817	11	4.9
Acrocephalus palustris (Bechst.)1798	13	5.5
Acrocephalus schoenobenus (L.)1758	12	5.2
Acrocephalus scirpaceus scirpaceus(Herm.)1804	15	6.1
Aegithalos caudatus caudatus(L.)1758	9	4.3
Aegolius funereus funereus(L.)1758	150	28.2
Alauda arvensis arvensis L.1758	35	10.6
Alcedo atthis atthis (L.)1758	35	10.6
Alcedo atthis ispida L.1758	35	10.6
Anas acuta acuta L.1758	800	86.2
Anas clypeata L.1758	650	75.0
Anas crecca crecca L.1758	300	44.8
Anas penelope L.1758	750	82.6
Anas platyrhynchos platyrhynchos L.1758	1200	112.9
Anas querquedula L.1758	400	54.3
Anas strepera strepera L.1758	760	83.3
Anser albifrons albifrons (Scop.)1769	2400	179.3
Anser anser rubirostris(Swinhoe)1871	3500	230.5
Anser erythropus(L.)1758	2000	159.7
Anser fabalis brachyrhynchus Baillon 1833	3300	221.6
Anser fabalis fabalis(Lath.)1787	3650	237.1
Anser fabalis rossicus Buturlin 1933	3650	237.1
Anthropoides virgo(L.)1758	2500	181.2
Anthus campestris campestris (L.)1758	24	8.3
Anthus cervinus (Pall.)1811	15	6.1
Anthus preatensis pratensis (L.)1758	18	6.9
Anthus spinoletta spinoletta (L.)1758	22	7.8
Anthus trivialis trivialis (L.)1758	18	6.9
Apus apus apus(L.)1758	40	11.7
Apus melba melba(L.)1758	50	13.6
Aquila chrysaetos chrysaetos(L.)1758	5000	292.4
Aquila clanga Pall.1811	2200	169.2
Aquila heliaca heliaca Savigny 1809	3100	212.6
Aquila pomarina pomarina C.L.Brehm 1831	1300	119.1
Ardea cinerea cinerea L.1758	1800	148.0

Ardea purpurea purpureaL.1766	1700	142.4
Ardeola ralloides(Scop.)1769	290	43.8
Arenaria interpres interpres(L.)1758	110	23.1
Asio flamnmeus flammeus(Pontopp.)1763	400	54.3
Asio otus otus(L.)1758	300	44.8
Athene noctua noctua(Scop.)1769	160	29.5
Aythya ferina(L.)1758	900	93.2
Aythya fuligula(L.)1758	680	77.3
Aythya marila (L.)1761	900	93.2
Aythya nyroca(Guldenst.)1770	700	78.8
Bobycilla garrulus garrulus (L.)1758	50	13.6
Botaurus stellaris stellaris (L.)1758	750	82.6
Branta bernicla bernicla(L.)1758	1600	136.8
Branta leucopsis(Bechst.)1803	1650	139.6
Branta ruficollis(Pall.)1769	1500	131.0
Bubo bubo bubo(L.)1758	2300	174.2
Bucephala clangula clangula(L.)1758	955	97.0
Burhinus oedicnemus oedicnemus(L.)1758	400	54.3
Buteo buteo buteo(L.)1758	800	86.2
Buteo lagopus lagopus (Pont.)1763	980	98.7
Calandrella cinerea brachydactyla(Leisl.)1814	20	7.4
Calcarius lapponicus lapponicus (L.)1758	60	15.3
Calidris alba(Pall.)1764	60	15.3
Calidris alpina alpina(L.)1758	50	13.6
Calidris canutus canutus(L.)1758	155	29.0
Calidris ferruginea(Pont.)1763	50	13.6
Calidris minuta(Leisl.)1812	38	11.3
Calidris temminckii(Leisl.)1812	33	10.3
Caprimulgus europaeus europaeus L.1758	69	16.8
Caprimulgus europaeus meridionalis Hart.1896	69	16.8
Carduelis carduelis balcanica Sachtleben 1919	16	6.6
Carduelis carduelis carduelis (L.)1758	16	6.6
Carduelis chloris chloris (L.)1758	28	9.2
Carduelis spinus (L.)1758	15	6.1
Certhia brachydactyla brachydactyla C.L.Brehm 1820	10	4.6
Certhia familiaris familiaris L.1758	10	4.6
Charadrius alexandrinus alexandrinus L.1758	40	11.7
Charadrius dubius curonicus Gmel.1789	40	11.7
Charadrius hiaticula hiaticula L.1758	15	15.3
Chlidonia niger niger(L.)1758	65	16.2
Chlidonias hybrida hybrida(Pall.)1811	65	16.2
Chlidonias leucopterus(Temm.)1815	65	16.2
Ciconia ciconia ciconia L.1758	4000	252.0
Ciconia nigra(L.)1758	4000	252.0
Cinclus cinclus aquaticus Bechst.1803	50	13.6
Cinclus cinclus cinclus (L.)1758	50	13.6
Circaetus gallicus gallicus(Gmel)1788	2000	159.7
Circus aeruginosus aeruginosus(L.)1758	750	82.6
Circus cyaneus cyaneus(L.)1766	540	66.3
Circus macrourus(Gmel.)1771	310	45.8
Circus pygargus(L.)1758	280	42.8

Clangula hyemalis(L.)1758	750	82.6
Coccothraustes coccothraustes coccothraustes (L.)17	55	14.5
Columba oenas oenas L.1758	270	41.8
Columba palumbus L.1758	500	63.0
Coracias garrulus garrulus L.1758	140	27.1
Corvus corax corax L.1758	1250	115.7
Corvus corone cornix L.1758	550	67.1
Corvus frugilegus frugilegus L.1758	500	63.0
Corvus monedula(L.)1758	210	35.3
Coturnix coturnix coturnix(L.)1758	100	21.5
Crex crex(L.)1758	180	31.9
Cuculus canorus canorus L.1758	100	21.5
Cygnus cygnus(L.)1758	12000	660.4
Cygnus olor(Gmel.)1789	18000	865.4
Delichon urbica urbica (L.)1758	21	7.6
Dendrocopos leucotos (Bechst.)1803	60	15.3
Dendrocopos major major (L.)1758	80	18.6
Dendrocopos medius medius (L.)1758	60	15.3
Dendrocopos minor buturlini Hart.1912	20	7.4
Dendrocopos minor hortorum(C.L.Brehm)1831	20	7.4
Dendrocopos syriacus (H&Ehr.)1833	65	16.2
Dryocopus martius martius (L.)1758	300	44.8
Egretta alba alba(L.)1758	2000	159.7
Egretta garzetta garzetta (L.)1766	400	54.3
Emberiza calandra calandra L.1758	32	10.1
Emberiza cia cia L.1758	21	7.6
Emberiza cirlus cirlus L.1766	25	8.6
Emberiza citrinella citrinella L.1758	32	10.1
Emberiza hortulana L.1758	25	8.6
Emberiza melanocephala Scop.1769	35	10.6
Emberiza scheniclus intermedia Degl.1849	18	6.9
Emberiza scheoniclus pyrrhuloides Pall.1811	18	6.9
Emberiza schoeniclus schoeniclus (L.)1758	18	6.9
Eremophila alpestris flava(Gmel.)1789	40	11.7
Erithacus rubecula rubecula (L.)1758	16	6.3
Eudromias morinellus(L.)1758	120	24.3
Falco columbarius aesalon Tunst.1771	200	34.2
Falco naumanni Fleischer 1818	200	34.2
Falco peregrinus peregrinus Tunst.1771	950	96.6
Falco subbuteo subbuteo L.1758	270	41.8
Falco tinnunculus tinnunculus L.1758	200	34.2
Falco vespertinus vespertinus L.1766	200	34.2
Ficedula albicollis albicollis (Temm.)1815	14	5.9
Ficedula hypoleuca hypoleuca (Pall.)1764	14	5.9
Ficedula parva parva (Bechst.)1794	11	4.9
Fringilla coelebs coelebs L.1758	25	8.6
Fringilla montifringilla L.1758	24	8.3
Fulica atra atra L.1758	800	86.2
Galerida cristata cristata L.1758	45	12.6
Gallinago gallinago gallinago(L.)1758	150	28.2
Gallinago media(Lath.)1787	190	33.0

Gallinulla chloropus(L.)1758	250	39.7
Garrulus glandarius glandarius(L.)1758	170	30.7
Gavia arctica arctica(L.)1758	2500	181.2
Gavia immer(Brunn.)1764	3600	234.9
Gavia stellata stellata(Pont.)1763	1700	142.4
Gelochelidon nilotica nilotica(Gmel.)1789	210	35.3
Glareola nordmanni Nordmann 1842	47	13.0
Glareola pratincola pratincola(L.)1766	47	13.0
Glaucidium passerinum passerinum(L.)1758	67	16.5
Grus grus grus(L.)1758	5000	292.4
Haematopus ostralegus ostralegus L.1758	500	63.0
Haliaeetus albicilla(L.)1758	3500	230.5
Hieraaetus pennatus(Gmel.)1788	840	89.0
Himantopus himantopus himantopus(L.)1758	310	45.8
Hippolais icterina (Vieill.)1817	15	6.1
Hippolais pallida Linderm.1843	14	5.9
Hirundo rustica rustica L.1758	19	7.1
Hydroprogne tschegrava(Lepechin)1770	640	74.3
Ixobrychus minutus minutus(L.)1766	150	28.2
Jynx torquilla torquilla L.1758	37	11.1
Lanius collurio collurio L.1758	30	9.6
Lanius excubitor excubitor L.1758	65	16.2
Lanius excubitor homeyeri Cab.1873	65	16.2
Lanius minor minor Gmel.1788	40	11.7
Lanius senator senator L.1758	41	9.6
Larus argentatus cachinnans Pall.1811	1200	100.0
Larus canus L.1758	350	49.7
Larus fuscus fuscus L.1758	1100	106.6
Larus genei Breme 1840	330	47.8
Larus marinus L.1758	2150	166.0
Larus melanocephalus Temm.1820	1200	100.0
Larus minutus Pall.1776	120	24.3
Larus ridibundus L.1766	250	39.7
Larus sabini Sabine 1819	250	39.7
Limicola falcinellus falcinellus(Pont.)1763	33	10.3
Limosa lapponica lapponica(L.)1758	290	43.8
Limosa limosa limosa(L.)1758	340	48.7
Locustella fluviatilis (Wolf)1810	20	7.4
Locustella luscinioides luscinioides (Savi)1824	19	7.1
Locustella naevia naevia (Bodd.)1783	20	7.4
Loxia curvirostra curvirostra L.1758	40	11.7
Loxia leucoptera bifasciata (Brehm)1827	40	11.7
Loxia pytyopsittacus Borkh.1793	40	11.7
Lullula arborea arborea(L.)1758	35	10.6
Luscinia luscinia (L.)1758	23	8.1
Luscinia megarhynchos megarhynchos C.L.Brehm 1831	23	8.1
Luscinia svecica cyanecula (Meisn.)1804	21	7.6
Luscinia svecica svecica (L.)1758	21	7.6
Luscinia svecica volgae (Kleinaschm.)1907	21	7.6
Lusciniola melanopogon melanopogon Temm.1823	11	4.9
Lymnocryptes minimus(Brunn.)1764	80	18.6

Lyrurus tetrix tetrix(L.)1758	1200	112.9
Melanitta fusca fusca(L.)1758	1500	131.0
Melanitta nigra nigra(L.)1758	1150	109.8
Melanocorypha calandra calandra(L.)1758	28	9.2
Melanocorypha leucoptera(Pall.)1811	28	9.2
Melanocorypha yeltonensis(J.R.Forster)1786	28	9.2
Mergus albellus L.1758	650	75.0
Mergus merganser merganser L.1758	1550	133.9
Mergus serrator L.1758	1250	115.4
Merops apiaster L.1758	60	15.3
Milvus migrans migrans(Bodd.)1783	900	93.2
Milvus milvus milvus(L.)1758	1500	131.0
Monticola saxatilis (L.)1766	65	16.2
Montofringilla nivalis nivalis (L.)1766	40	11.7
Motacilla alba alba L.1758	20	7.4
Motacilla cinerea cinerea Tunst.1771	20	7.4
Motacilla flava beema(Sykes)1832	17	6.6
Motacilla flava cinereocapilla Savi.1831	17	6.6
Motacilla flava feldegg Mich.1830	17	6.6
Motacilla flava flava L.1758	17	6.6
Motacilla flava lutea (Gmel.)1774	17	6.6
Motacilla flava thunbergi Billb.1828	17	6.6
Muscicapa striata striata (Pall.)1764	15	6.1
Neophron percnopterus percnopterus(L.)1758	1900	153.4
Netta rufina (Pall.)1773	1100	106.6
Nucifraga caryocatactes caryocatactes(L.)1758	180	31.9
Nucifraga caryocatactes macrorhynchos Brehm.1823	180	31.9
Numenius arquata arquata(L.)1758	850	89.7
Numenius phaeopus phaeopus(L.)1758	410	55.2
Numenius tenuirostris Vieill.1817	380	52.5
Nycticorax nycticorax nycticorax(L.)1758	550	67.1
Oenanthe hispanica melanoleuca (Guld.)1775	32	10.1
Oenanthe isabellina (Temm.)1829	32	10.1
Oenanthe oenanthe oenanthe (L.)1758	32	10.1
Oenanthe oleschanka pleschanka (Lepechin)1770	32	10.1
Oriolus oriolus oriolus(L.)1758	72	17.3
Otis tarda tarda L.1758	14000	716.1
Otis tetrax L.1758	900	93.2
Otus scops scops(L.)1758	145	27.8
Oxyura leucocephala(Scop.)1769	755	82.9
Pandion haliaetus haliaetus(L.)1758	1600	136.8
Panurus biarmicus russicus(C.L.Brehm)1831	14	5.9
Parus ater ater L.1758	10	4.6
Parus caeruleus caeruleus L.1758	13	5.5
Parus cristatus cristatus L.1758	10	4.6
Parus lugubris lugubris Temm.1820	11	4.9
Parus major major L.1758	18	6.9
Parus montanus borealis Selys-Longch.1843	12	5.2
Parus palustris palustris L.1758	12	4.9
Passer domesticus domesticus (L.)1758	30	9.6
Passer hispaniolensis hispaniolensis (Temm.)1820	30	9.6

Passer montanus montanus (L.)1758	25	8.6
Pelecanus crispus Bruch 1823	13000	672.1
Pelecanus onocrotalus L.1758	11000	564.1
Perdix perdix perdix(L.)1758	400	54.3
Pernis apivorus(L.)1758	800	86.2
Phalacrocorax aristotelis(Payr)1826	1700	142.4
Phalacrocorax carbo sinensis(Blumenbach)1798	2500	181.2
Phalacrocorax pygmaeus(Pall.)1773	700	78.8
Phalaropus fulicarius(L.)1758	59	15.1
Phalaropus lobatus(L.)1758	41	11.9
Phasianus colchicus L.1758	850	89.7
Philomachus pugnax(L.)1758	200	34.2
Phoenicopterus ruber roseus Pall.1811	3500	230.5
Phoenicurus ochruros gibraltarensis (Gmel.)1789	17	6.6
Phoenicurus phoenicurus phoenicurus (L.)1758	16	6.3
Phylloscopus bonelli orientalis (C.L.Brehm)1855	8	4.0
Phylloscopus collybita collybita (Vieill.)1817	8	4.0
Phylloscopus sibilatrix (Bechst.)1793	8	4.0
Phylloscopus trochilus trochilus (L.)1758	8	4.0
Pica pica pica(L.)1758	270	36.4
Picoides tridactylus alpinus C.L.brehm 1831	65	16.2
Picus canus canus Gmel.1788	190	33.0
Picus viridis viridis L.1758	200	34.2
Platalea leucorodia leucorodia L.1758	1900	153.4
Plectrophenax nivalis nivalis (L.)1758	30	9.6
Plegadis falcinellus(L.)1766	600	71.1
Pluvialis apricaria altifrons(C.L.Brehm)1831	200	34.2
Pluvialis squatarola(L.)1758	340	48.7
Podiceps auritus auritus(L.)1758	380	52.5
Podiceps cristatus cristatus(L.)1758	1200	112.9
Podiceps griseigena griseigena(Bodd.)1783	700	78.8
Podiceps nigricollis nigricollis C.L.Brehm 1831	300	44.8
Podiceps ruficollis ruficollis(Pall.)1764	150	28.2
Porzana parva(Scop.)1769	55	14.5
Porzana porzana(L.)1766	100	21.5
Porzana pusilla intermedia(Herm.)1804	40	11.7
Prunella collaris collaris(Scop.)1769	38	11.3
Prunella modularis modularis (L.)1758	19	7.1
Puffinus puffinus yelkouan(Acerbi)1827	380	52.5
Pyrrhula pyrrhula pyrrhula (L.)1758	40	11.7
Rallus aquaticus aquaticus L.1758	150	28.2
Recurvirostra avosetta L.1758	350	49.7
Regulus ignicapillus ignicapillus (Temm.)1820	6	3.3
Regulus regulus regulus (L.)1758	6	3.3
Remiz pendulinus pendulinus (L.)1758	11	4.9
Riparia ripaeria riparia(L.)1758	15	6.1
Rissa tridactyla(L.)1758	400	54.3
Saxicola rubetra (L.)1758	20	7.4
Saxicola torquata (L.)1766	20	7.4
Scolopax rusticola L.1758	330	47.8
Serinus serinus L.1766	13	5.5

Sitta europaea cesia Wolf 1810	24	8.3
Somateria mollissima mollissima(L.)1758	2500	181.2
Stercorarius parasiticus(L.)1758	500	63.0
Stercorarius pomarinus(Temm.)1815	500	63.0
Sterna albifrons albifrons Pall.1764	47	13.0
Sterna hirundo hirundo L.1758	140	27.1
Sterna sandvicensis sandvicensis Lath.1787	300	44.8
Streptopelia decaocto decaocto(Friv.)1838	190	33.0
Streptopelia turtur turtur(L.)1758	150	28.2
Strix aluco aluco L.1758	500	63.0
Strix uralensis Pall.1771	900	84.7
Sturnus roseus (L.)1758	76	17.9
Sturnus vulgaris balcaniscus But & Harms.1909	80	18.6
Sturnus vulgaris vulgaris L.1758	80	18.6
Surnia ulula ulula (L.)1758	900	84.7
Sylvia atricapilla atricapilla (L.)1758	20	7.4
Sylvia borin borin (Bodd.)1783	14	5.9
Sylvia communis communis Lath.1787	13	5.5
Sylvia curruca curruca (L.)1758	12	5.2
Sylvia melanocephala melanocephala (Gmel.)1789	18	6.9
Sylvia nisoria nisoria (Becgst.)1795	30	9.6
Syrrhaptes paradoxus(Pall.)1773	80	18.6
Tadorna ferruginea(Pall.)1764	1400	125.1
Tadorna tadorna(L.)1758	1300	119.1
Tetrao urogallus urogallus L.1758	4100	255.6
Tetrastes bonasia rupestris(C.L.Brehm)1831	470	60.5
Tichodromia muraria muraria(L.)1766	21	7.6
Tringa erythropus(Pall.)1764	140	27.1
Tringa glareola L.1758	65	16.2
Tringa hypoleucos L.1758	45	12.5
Tringa nebularia(Gunn.)1767	210	35.3
Tringa ochropus L.1758	80	18.6
Tringa stagnatilis(Bechst.)1803	130	25.7
Tringa totanus totanus(L.)1758	130	25.7
Troglodytes troglodytes troglodytes (L.)1758	8	4.0
Turdus iliacus iliacus L.1766	80	18.6
Turdus merula merula L.1758	100	21.5
Turdus philomelos philomelos C.L.Brehm 1831	76	17.9
Turdus pilaris L.1758	140	27.1
Turdus torquatus alpestris(C.L.Brehm)1831	130	25.7
Turdus viscivorus viscivorus L.1758	120	24.3
Tyto alba guttata(C.L.Brehm)1831	330	47.8
Upupa epops epops L.1758	70	17.0
Vanellus gregarius(Pall.)1771	340	48.7
Vanellus spinosus L.1758	260	40.7
Vanellus vanellus(L.)1758	260	40.7