

# Census Techniques for Birds of Prey in Large Areas of Portugal

Luís Filipe Oliveira

## ABSTRACT

AÇOR (Scientific Association for the Conservation on the Birds of Prey) has conducted several censuses of nesting birds of prey, diurnal and nocturnal. These have been done in two protected areas near Lisbon (approximately 100 km<sup>2</sup>/each area).

Their objective was to determine which species were present and the number and location of occupied territories. This was done in order to know which were the main negative impacts and, as a consequence, to propose protection measures. However, there were two problems at the start: the nonexistence of people experienced in this kind of work, and the fact that the work itself had to be done only in one breeding season.

A group was nevertheless organized and has tried a technique which consisted of an aggregation of methods with the purpose of obtaining Species Maps, as it is done in the Territory Mapping Method for passerines.

In the case of diurnal raptors, we think that this technique can be applied to further censuses in larger areas, turning for aid to volunteers. Nevertheless, the results obtained with the owls cannot be considered satisfactory, probably due to the two dominant species.

## INTRODUCTION

Subsequent to the Special Protected Areas Inquiry Report (WWGBP, 1992), the Arrábida Natural Park requested a study to determine the diversity of birds of prey and owls, as well as the number of breeding pairs of each species present in the area. One of the limitations imposed on the research was the fact that field work should be conducted in one single reproductive

period, embracing an area of over 10,000 ha. Since, in Portugal, bird watching has never been a common hobby, there was a further difficulty, namely the organization of experienced field teams. All the participants were volunteers, most of them with little or no experience in bird census.

In the selection of the methodology to be used, the following criteria were considered:

- rapidity (since volunteer work was restricted to week-ends)
- efficiency (maximization of data per field day)
- accuracy
- reproducibility

It was recognized that a vast part of studies referring to birds of prey censusing omitted or did not specify the methodology used. To the specialists, it appears obvious that, due to the conspicuousness of these birds (*vide* Colquhoun, 1940; Bugalho, 1974) and to the similarity of techniques used, it is unnecessary to describe the census procedure. Several publications regarding bird census methodology dedicate only a small section to raptors, being especially directed to passeriforms in particular (*vide* Blondel, 1969; Bibby *et al.*, 1992). In reports of raptor communities studies, some authors are not very informative in reference to the census method utilized (*vide* Veiga, 1984). Also when including the distribution and *status* of the birds, several authors refer only to the ATLAS procedure (*vide* Heredia *et al.*, 1984). Fuller & Mosher (1987) systematized, in a very practical way, the problem of birds of prey census. Nevertheless, the rules are not yet as clearly defined as for the passeriforms. In Portugal, the few produced papers regarding birds of prey communities, do not explore the methodological aspects (*vide* Onofre, *in litt*).

## METHODOLOGY

The procedure of *territory mapping* or *spot-mapping* (*vide* Fuller & Mosher, 1987; Bibby *et al.*, 1992), utilised for songbirds, was selected, due to the objectives and limitations already explained. This method is amply described, especially for songbirds (*vide* Pough, 1950; Enemar, 1959; Ann. 1969; Blondel, 1969; Bugalho, 1974; Telleria, 1978).

An adaptation was made in relation to this mapping technique: instead of counting the number of pairs, territories were enumerated. To obtain the location of each pair's territory, different types of clues were accumulated, forming a picture of contacts established. The delimitation of this collection of points would correspond, in a rough manner, to the territory of each pair (Blondel, 1965). In the particular case of colonial nesting raptors (e. g. *Falco*

*tinnunculus*), the territory demarcation was made for the whole colony, followed by the counting of pairs present.

For practical reasons, the area of study was divided into three regions, one per field team. The following maps (scale 1:25 000) were produced for each region:

### **Diurnal raptors**

- maps of the observation points, similar to the method of point counts without fixed radius (*vide* Bibby *et al.*, 1992);
- map of point call emissions with tape recorder (in the present case only utilized for *Accipiter gentilis* and for *A. nisus*, in dense woods);
- map of pedestrian routes;
- map for specific search of nests (cliffs and pine forests).

### **Nocturnal raptors**

- map of search for nocturnal raptors signs, including direct visual contacts;
- map of point call emissions with tape recorder (in the present case only for *Bubo bubo*, *Asio otus* and *Strix aluco*);
- map of nocturnal listening point locations (especially for *Athene noctua*).

Bugalho (1974), considers raptors as a particular case of large bird census. In this instance, the localization of a territory is decided by the accumulation of clues (courtship displays, transportation of nesting materials, movement associated with feeding the young, etc.). In some circumstances, these clues may indicate the precise location of the nest. According to the same author, this methodology may be considered as a mixed technique.

Several authors recommend the emission of bird calls, using a tape recorder, to stimulate response from males of rare, secretive or patchily distributed birds (Parker III, 1991; *vide* Bugalho, 1974; Gibbs & Scott, 1993; Sliwa & Sherry, 1992). Cesaroli & Pentariani (1992) demonstrated the advantage of playbacks as an aid in locating woodland birds of prey. Fuller & Mosher (1987) stated that broadcasting raptor calls was a mixed technique useful for increasing detections, used for plotting the distribution and obtaining the relative abundance of breeding raptors. The methodology presented in this paper is a combination of different procedures, in accordance with the particular aspects of the species potentially present.

For the nocturnal raptors, since it was impossible to establish precise limits of their territories, the three regions were subdivided into sectors. Each

sector was visited only once (small stops registered on the map, similar to Point Counts) during the study. This procedure was extremely efficient for *Athene noctua*.

In each field visit, the teams recorded the data obtained on their respective maps (Visit Map — Bugalho, 1974). At the conclusion of the field trip, the information was transferred to Maps of Species (Matos, 1977). All the field work was carried out during 1993.

To avoid overlapping of territories, an error quite common in situations of high density of birds, the “Validity Test” (Blondel, 1965) was utilized, registering simultaneous calls. Territories partially included in the study area were considered as corresponding to marginal pairs (*vide* Matos, 1977; Oliveira, 1991). It was assumed that each marginal pair was equivalent to 1/2 pair. The same conversion factor was used in the case of territories occupied by only one individual (similar to the Apparently Occupied Nest-Site — Bibby *et al.*, 1992).

The equipment used included binoculars and telescopes. In the case of tape recorders, a radio cassette-recorder SONY CFS-W308, with a maximum power output 5,2 W (2 x 2,6 W) was utilized.

## RESULTS

In the Arrábida Natural Park (Fig. 1), eight species of diurnal birds of prey were identified (a total of 22 breeding pairs) and four species of nocturnal raptors (78 breeding pairs).

Diurnal		Nocturnal	
<i>Hieraaetus fasciatus</i>	1.5	<i>Athene noctua</i>	57
<i>Hieraaetus pennatus</i>	1	<i>Bubo bubo</i>	1
<i>Circaetus gallicus</i>	0.5	<i>Strix aluco</i>	11
<i>Buteo buteo</i>	2.5	<i>Tyto alba</i>	9
<i>Accipiter nisus</i>	0.5		
<i>Falco peregrinus</i>	2		
<i>Falco subbuteo</i>	0.5		
<i>Falco tinnunculus</i>	13.5		

**Figure 1. Location of Arrábida Natural Park (Portugal).**

An estimate was made of 121 pairs, corresponding to the 12 species of raptors that nest in this Natural Area.

A density of 20 pairs/100 km<sup>2</sup> for diurnal birds of prey was established. For nocturnal raptors, a density was determined of 112 pairs/100 km<sup>2</sup>.

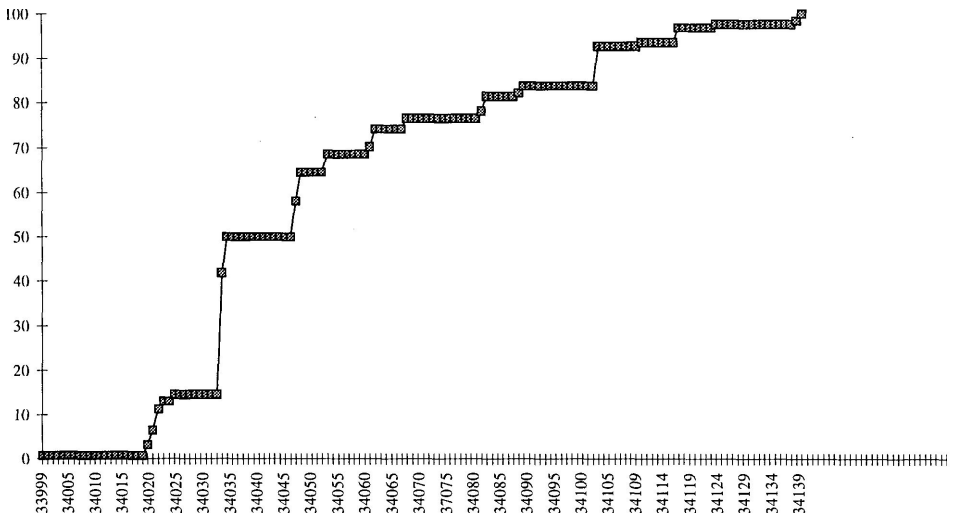
Further, the following parameters were calculated:

Diversity Index	Shannon-Wiener	1.80
Eveness Index	J'	0.50

A graphic of the accumulated relative frequency was elaborated (Fig. 2). It was considered that contact was established with a pair, when one of the members was observed for the first time. The curve thus obtained is similar, in principle, to the Efficacy Visit Coefficient (Bugalho, 1974) and gives an idea of the efficiency attained with successive visits.



**Figure 2.- Accumulated Relative Frequency of Raptors in Arrábida (1993, Portugal)**



## CONCLUSIONS

This paper summarises what can be assumed from the first work of this kind conducted in Portugal. It is considered that the main objectives of the study were attained.

The general method applied in this study combines a group of specific techniques (point counts, emission of calls using tape recorders, etc.), on a common base of Territory Mapping. From the experience gained, the following conclusions were drawn in regard to the methodology utilized:

- *Advantages*

- rapidity and efficiency in the collecting of data;
- minimization of errors committed by participants (*vide* Bibby *et al.*, 1992), allowing for the formation of large teams;
- adaptability to differing situations, since each specific technique can be more or less emphasized in accordance with the existent conditions;

This methodology may be utilized in raptors monitoring plans, whenever the personnel and/or the budget available is insufficient.

- *Disadvantages*

- impossibility of determining the total number of pairs for nocturnal raptors, especially in cases of high density;
- difficulty in territory demarcation for some species;
- the time consumed searching for traces of nocturnal raptors, in places such as old buildings, disused quarries, tree trunks and so on.

## REFERENCES

- ANN. 1969** - Recommendations for an internacional standard for a mapping method in bird census work. *Bird study*, 16: 249 - 254.
- BIBBY, C. J.; BURGESS, N. D.; HILL, D. A. 1992** - Bird census techniques. Academic Press Inc. Londres.
- BLONDEL, J. 1965** - Étude des populations d'oiseaux dans une garrigue méditerranéenne: description du milieu, de la méthode de travail et exposé des premiers resultats obtenus à la période de reproduction. *La Terre et la Vie*, 4: 311 - 341.
- BLONDEL, J. 1969** - Méthodes de dénombrement des populations d'oiseaux. In *Problèmes d'Écologie: l'échantillonnage des peuplements animaux des milieux terrestres* (M. Lamotte & F. Bourlière, Eds.), 97 - 151. Ed. Masson. Paris.
- BUGALHO, J. F. 1974** - Métodos de recenseamento de aves. Separata das Publ. da DGSFA, vol XLI. Lisboa. 108 pp.
- CESAROLI, M. & PENTERIANI, V. 1992** - Effectiveness of censusing woodland birds of prey by playback. *Avocetta* n° 16: 35 - 39.

- COLQUHOUN, M. K. 1940** - Visual and auditory conspicuousness in a woodland bird community: a quantitative analysis. *Proc. Zool. Soc. London*, 110: 129 - 148.
- ENEMAR, A. 1959** - On the determination of the size and composition of a passerine bird population during the breeding season. *Var Fagelvärld*, 18 suppl. 2: 1 - 114.
- FULLER, M. R. & MOSHER, J. A. 1987** - Raptor survey techniques. Pages 37 - 65, in B. A. Giron Pendleton, B. A. Millsap, K. W. Cline, and D. M. Bird, eds. *Raptor Management Techniques Manual*. Natl. Wildl. Fed., Washington, D. C.
- GIBBS, J. P. & SCOTT, M. M. 1993** - Call-response surveys for monitoring breeding waterbirds. *J. Wildl. Manage.* 57 (1): 27 - 34.
- HEREDIA, B., DELIBES, J., ESPINA, J. & MAÑEZ, M. 1984** - Distribucion y status de las falconiformes en las zonas superiores a 1.000 m de la provincia de Madrid. *Rapinyaires Mediterranis II*: 190 - 208.
- MATOS, L. F. 1977** - Aplicação de censos à avifauna da Tapada de Mafra (Nov. 75 - Nov. 76). Relatório de estágio do curso de biologia F.C.L.
- OLIVEIRA, L. F. 1991** - Estudo preliminar da avifauna de uma zona da Serra da Arrábida. Col. Natureza e Paisagem, 9. Ed. SNPRCN. Lisboa.
- ONOFRE, N., PALMA, L. & ANDRADE, F. (in litt)** - Primeiros dados sobre uma comunidade de rapinas de um montado de sobre de planície. In 5ª Conferência Internacional sobre Rapinas Mediterrânicas, Évora, 1986.
- PARKER III, T. A. 1991** - On the use of tape recorders in avifaunal surveys. *Auk*, Vol. 108: 443 - 444.
- POUGH, R. H. 1950** - Comment faire un recensement d'oiseaux nicheurs? *La Terre et la Vie*, 1950: 203 - 217.
- SLIWA, A. & SHERRY, T. W. 1992** - Surveying wintering warbler populations in Jamaica: point counts with and without broadcast vocalizations. *The Condor*, 94: 924 - 936.
- TELLERÍA, J. L. 1978** - Introduccion a los metodos de estudio de las comunidades nidificantes de aves. *Ardeola*, 24: 19 - 69.
- VEIGA, J. P. 1984** - Composicion específica, densidad de poblacion y mecanismos de estructuracion en una comunidad de rapaces de montaña mediterranea. *Rapinyaires Mediterranis II*: 177 - 188.
- WWGBP (GTMR) 1992** - Relatório do inquérito às Áreas de Protecção Especial (Continente e Regiões Autónomas). Campanha do GTMR "Vamos Proteger as Rapinas". Não publicado. 6pp.

Luís Filipe Oliveira  
AÇOR - Apº 105, 2775  
Carcavelos, Portugal