

## Rock partridge *Alectoris graeca* in Lazio region (Central Italy): Status and Action Plan

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**Abstract** – Regional Agency for Parks (ARP) of Lazio region undertook an investigation on the conservation status and distribution of *Alectoris graeca* in the region to draw up the regional Action Plan for the species. In spring (March-June), surveys of rock partridge were conducted using playback technique in point-counts to obtain the density of rock partridge in each study area; in summer (end of August – early October), a survey was conducted with pointing dogs to establish the breeding success of the species. Data collected in spring were used to develop an habitat-suitability model following the Ecological Niche Factor Analysis (ENFA) technique. The spring and summer surveys highlighted an areale shrinkage of rock partridge in Latium where it is currently confined to some Apennine areas. In these areas rock partridge showed an overall density of 0.86 pairs/km<sup>2</sup>. In summer, groups of rock partridge included, on average, 4.2 juveniles that is a quite low value as compared to the results obtained in other Italian areas. Habitat-suitability model indicates that in the region rock partridge prefers areas with meadow and pastures at high altitude, with quite steep slope, South exposure, rocks and cliffs. The Action Plan detected several actions which can produce positive effects for the conservation of the species.

**Key-words:** *Alectoris graeca*, density, breeding success, habitat-suitability model, Action Plan, Lazio region.

### INTRODUCTION

Rock partridge *Alectoris graeca* shows an unfavourable status in Italy and Europe (BirdLife International 2004, Peronace *et al.* 2012, Dir. 2009/147/CE). Regional Agency for Parks (ARP) of Lazio region in cooperation with the Italian National Institute for Environmental Protection and Research (ISPRA) undertook an investigation on the conservation status and distribution of this species in Lazio. The main aim of the project was to draw up the regional Action Plan for rock partridge in order to correctly manage its populations.

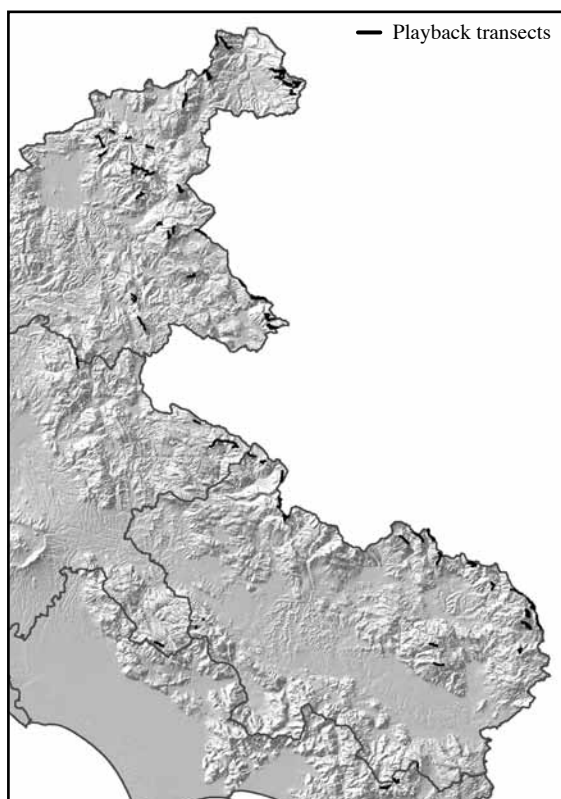
### MATERIAL AND METHODS

Since the summer 2007 to the spring 2009, in the open and rocky habitats potentially suitable for the species, data on the status of rock partridge were collected. In spring, surveys of rock partridge were conducted using playback technique in point-counts during the period (March-June)

in which pairs are territorial (Bernard-Laurent & Laurent 1984, Bernard-Laurent 1994). In the different areas, the dates of census varied according to the climatic conditions and snow cover. Days with strong wind and/or rain were avoided. Censuses were carried out in the first four hours of the morning (Bernard-Laurent & Laurent 1984, Bocca 1990). In each count-point, the call of the species (20'') was broadcasted four times (towards N, E, S, W). Each call was followed by 20'' of listening. Points were placed along 63 transects (Fig. 1).

To obtain the density (pairs/km<sup>2</sup>) of the species in each study area, we assumed that a singing male was paired with a female (Bernard-Laurent & Laurent 1984); therefore 1 point was assigned to a pair or singing male and 0.5 points to an observed individual. In addition, using an optical telemeter (Swarovski Laser Guide 8x30), we established that the maximum distance for species detectability was 200 m as an average of different conditions of species recording. Thus, the investigated surface for each point-count was 12.56 ha.

In summer (end of August - early October), in part of



**Figure 1.** Transects carried out for the spring survey of rock partridge in Lazio region.

the areas where spring point-counts were carried out (see above), a survey was conducted with pointing dogs along 41 transects to establish the breeding success of rock partridge.

Data collected in spring were used to develop an habitat-suitability model following the Ecological Niche Factor Analysis (ENFA) technique (ENFA; Hirtzel *et al.* 2002, 2004). Based on data of species presence, this technique individuates the environmental conditions that promote rock partridge survival. The model was developed using the software BIOMAPPER (Hirtzel *et al.* 2002).

Details of the methods used to conduct the spring and summer surveys and to develop the habitat-suitability model are reported in Sorace *et al.* (2009, 2011).

## RESULTS AND DISCUSSION

The spring and summer surveys highlighted an areale shrinkage of rock partridge in Lazio. *Alectoris graeca* is currently confined to some Apennine areas, mainly pro-

tected areas (national parks, regional reserves, etc.) The species was not observed in pre-Apennines mountains (M. Lucretili, M. Cairo) and anti-Apennines mountains (M. Lepini, M. Aurunci), where it was formerly present (see Sorace *et al.* 2009, 2011). In the areas where rock partridge was present, it showed an overall density of 0.86 pairs/km<sup>2</sup> (Tab. 1). The highest values of density were observed on M. Reatini (2.02 pairs/km<sup>2</sup>) and M. Duchessa (1.90 pairs/km<sup>2</sup>) areas, the minimum values on M. Ernici (0.16 pairs/km<sup>2</sup>) and M. Cicolani (0.12 pairs/km<sup>2</sup>; Tab. 1). In summer, groups of rock partridge included, on average, 4.2 juveniles (SD  $\pm$  2.2; N = 11). This is a quite low value as compared to the results obtained in other Italian areas (Tab. 2). Since a reduced breeding success of a species might indicate bad environmental quality of its territories (Van Horne 1983, Boulonier & Danchin 1997, Danchin *et al.* 1998), these data highlight further concern for rock partridge living in Latium.

As far as habitat-suitability model is concerned, the value for Boyce index was  $0.80 \pm 0.36$ ; that is a quite high value indicating reliability of the model and good correspondence between model predictions and the actual localization of collected data. In the region rock partridge preferred areas with meadow and pastures at high altitude, with quite steep slope, south exposure, rocks and cliffs; this is in agreement with the findings of other authors (Fella *et al.* 1994, Cattadori *et al.* 1998, Gilio *et al.* 2003, Pompilio *et al.* 2003, Scalisi & Guglielmi 2004, Viterbi *et al.* 2006).

Based on the different investigations and analyses carried out, partially reported in this contribute, a regional Action Plan for *Alectoris graeca* was drawn up (Sorace *et al.* 2011). The Action Plan detected several actions which can produce positive effects for the conservation of *Alectoris graeca*. Some of these actions aimed to the preservation and improvement of breeding habitats, others to the control of limiting factors (isolation of populations, poaching, genetic pollution).

The Plan highlights also some actions to monitor the demographic parameters of the species, to investigate its sanitary status, to promote genetic analyses and to improve the knowledge on the species ecology.

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**Table 1.** Abundance (ind/km) and density (pairs/km<sup>2</sup>) of rock partridge in different mountain groups of Lazio. Data are reported either for all transects carried out in each area or considering the only transects in which the species was recorded (positive transects).

Area	Positive transects mean (± SD; N)		All transects mean (± SD; nN)	
	ind/km	pairs/km <sup>2</sup>	ind/km	pairs/km <sup>2</sup>
M. Laga	0.84 (± 0.47; N= 4)	1.88 (±1.23; N = 4)	0.56 (± 0.56; N = 6)	1.25 (± 1.36; N = 6)
M. Reatini	1.07 (± 0.82; N = 8)	2.53 (± 2.02; N = 8)	0.85 (± 0.85; N = 10)	2.02 (± 2.07; N = 10)
M. Cicolani	0.34 (N = 1)	0.85 (N = 1)	0.05 (± 0.13; N = 7)	0.12 (± 0.32; N = 7)
M. Duchessa	1.19 (± 0.82; N = 3)	2.53 (± 1.56; N = 3)	0.89 (± 0.89; N = 4)	1.90 (± 1.79; N = 4)
M. Simbruini	0.60 (± 0.13; N = 5)	1.17 (± 0.28; N = 5)	0.43 (± 0.31; N = 7)	0.84 (± 0.61; N = 7)
M. Ernici	0.33 (N = 1)	0.83 (N = 1)	0.16 (± 0.23 N = 2)	0.41 (± 0.58 N = 2)
PNALM	0.79 (± 0.46; N = 6)	1.56 (± 0.97; N = 6)	0.43 (± 0.53; N = 11)	0.85 (± 1.07; N = 11)
<b>Total</b>	<b>0.85</b> (± 0.59; N = 28)	<b>1.87</b> (± 1.40; N = 28)	<b>0.39</b> (± 0.58; N = 63)	<b>0.86</b> (± 1.33; N = 63)

**Table 2.** Breeding success (number of juveniles/clutch) of rock partridge recorded in several Italian areas.

Area	Breeding success (Juv/clutch)	Source
Trentino region	5.1 (N = 35)	Meriggi et al. 1998
Trentino region	4.9 (N = 32)	Cattadori et al. 2003
Valle d'Aosta region	5.5	Priolo & Bocca 1992
Cozie Alps	5-7	Spanò & Bocca 1988
M. Baldo	7.5 (N = 67)	Priolo & Bocca 1992
Brembana valley	3.69-5.01 (N = 156)	Artuso et al. 2003
M. Sibillini	6.4	Renzini et al. 2001
Sicilia region	6.1-9.5	Priolo & Bocca 1992
Lazio region	4.2 (N = 11)	present study

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Coturnice (*Alectoris graeca*)



Chukar (*Alectoris chukar*)