

## The Golden Eagle *Aquila chrysaetos* in the Apennines of the Lazio region (Central Italy): updates on its status

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A significant part (about 20%) of the population of the Golden Eagle *Aquila chrysaetos* in the Central Apennines breeds in the mountains of Lazio. The breeding performance of these pairs has been monitored since the mid-seventies of the last century (Novelletto & Petretti 1980, Allavena *et al.* 1987, Borlenghi 1992, Zocchi 1992, Zocchi & Panella 1996, Borlenghi & Corsetti 1996, 2002, 2004, Borlenghi 2005, Borlenghi *et al.* 2014). Since 2014 this activity was included in the “Monitoring Net of Rupicolous Raptors” of the Lazio region, in accordance with the Birds Directive (2009/147/EC). In recent years we have seen the participation by staff members from the protected areas in the monitoring of these birds. The main purpose of the Golden Eagle breeding monitoring project in Lazio is to obtain all the necessary information to improve the conservation of this species through specific actions.

The area used by this species in Lazio, is estimated at 3,800 km<sup>2</sup> (Borlenghi *et al.* 2014), and corresponds to the main mountainous systems of the region. Breeding pairs are distributed in the Laga Mts, Reatini Mts, Carseolani Mts, Lucretili Mts, Simbruini Mts, Ernici Mts, Mt. Cornacchia Group, Meta Mts, Mt. Cairo group and Lepini Mts. In four other mountainous systems (Mt. Pozzoni, Mt. Giano, Duchessa and Aurunci Mts) it's possible to observe immature pairs, not yet nesting, and/or floaters (Fig. 1). In all these territories the annual monitoring has been carried on in the January-August period.

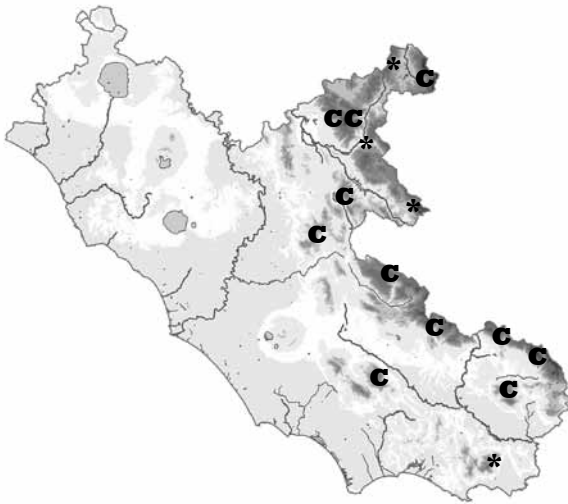
In the first thirteen years of this century the number of breeding pairs in the Lazio Apennines has significantly increased, going from 7 to 11 in 2013 (Borlenghi *et al.* 2014); this situation persisted unaltered until 2016. From the last settlement of a breeding pair (2013) no further territory was occupied. Particularly, there were two failures of reoccupation in two unoccupied historical sites. In May 2015 a pair of adults performed repeated territorial surveys of an old breeding site in the Duchessa Mts and also of-

ten visited a rock cavity. From June onwards this pair was no longer seen. A few weeks later several dogs and foxes were found dead from rodenticide poisoning at the top of the valley (E. Peria *pers. comm.*); a correlation between the disappearance of the eagles and the cases of poisoning is possible. In 2014 and 2015 in another old site in the Mt. Giano a pair of eagles, a sub-adult male and an adult female, performed territorial surveys of the rocky system without breeding. Since then this pair was no longer observed. Although the causes of this second failure are unknown, it seems important to highlight that this site is not within a protected area.

Recently (February 2017), outside the period of this study, one pair was observed in the Sabini Mts (M. Cappelletti, G. Lauretti *pers. comm.*); there is no historical literature information (Di Carlo 1980) from these mountains. The density of the 11 breeding pairs is 2.9 pairs/1000 km<sup>2</sup>. This value is lower when compared to other values recorded from two areas of the Apennines: 3.4-3.6 pairs/1000 km<sup>2</sup> for the Umbria-Marche Apennines (Magrini *et al.* 2013, Angelini *et al.* present volume) and 2.5-4.6 pairs/1000 km<sup>2</sup> for the Northern Apennines (Schiassi *et al.* 2013, Nardelli present volume).

The number of available nests known for the breeding pairs is of 44 (4 nests/pair). Using the geographical distribution of the active nests, the minimum distances (NND) between neighboring territories have been calculated (Watson 2010), obtaining a mean value of 16.2 km ± 5.6 (range: 7-29). This computation takes into account the neighboring pairs from the other regions.

In 2016, the presence of immature eagles within the territorial pairs was 9.1%. Tab. 1 shows data and breeding parameters relative to 2016, of the last five years (2012-2016) and to previous periods or studies. Data from 2016 registered a productivity of 0.36 which represents a low value compared to the reference value (0.50) for the Cen-



**Figure 1.** Distribution of the Golden Eagle in the Apennines of Lazio; C: breeding pairs; \*: presence of the species.

tral Apennines (Chiavetta 2001, Borlenghi 2011). The reasons are due to the large number of nesting failures (50%), in one case there has been a repeated disturbance by a military helicopter, while for the remaining cases the reasons are still unknown. The average values of the last five-year period, indicating an average productivity of 0.58 (coherent with the long-period value: 0.54), are even more indicative. The same consideration holds for the average number of young per successful pair (1.11); this value is a little higher than the long period one (1.08). The marked discrepancy between annual, medium and long term data confirms the elevated variability of the breeding parameters

of this species over different years (Fasce & Fasce 1984, 1992, Watson 2010).

In Lazio the Golden Eagle is considered “endangered” (EN) (Calvario *et al.* 2011) and the eleven breeding pairs are particularly threatened and suffer from limiting factors in addition to the ones already known for the species. Two pairs (18%) of breeding eagles live in the Reatini Mts (Mt. Terminillo), for which a project of high environmental impact has been presented, the extension of the ski slopes. Another threat affects another six pairs (55%), i.e. human disturbance near the breeding sites: motocross, inconsiderate wildlife photography, hang glider, trekking, canyoning, climbing etc. One further threat, detected in recent years, is caused by helicopters flying near occupied cliffs; this threat concerns three pairs (27%). Finally, there is a long-term limiting factor affecting the home range of five pairs (45%): caused by spontaneous reforestation. This factor concerns the eagle’s hunting territories in low or medium elevations (range: 700-1500 m a.s.l.).

In conclusion, the status of the Golden Eagle in the Apennines of Lazio shows a positive trend in the medium period (2000-2016); however no increase was noticed during the last three years (Fig. 2), although there are available territories (4-5) where this species is constantly observed. Sometimes the dynamics of occupation or reoccupation of free sites is not easy to understand, because, although the presence of suitable breeding sites and food availability (Newton 1997), a difficulty has been noted, which is caused through human activities, especially outside the protected areas, since in Lazio only 47% of the home ranges are inside protected areas for more than 70% of their extension. More comprehensive studies on this

**Table 1.** Breeding parameters.

Breeding parameters	Values for the 2016 season	Mean values for the last five years (2012-2016)	Historical values
controlled pairs (a)	11	/	/
laying pairs (b)	8	/	/
successful pairs (c)	4	/	/
fledged young (d)	4	/	/
two fledglings (e)	0	/	/
productivity (d/a)	0.36	0.58	0.54*
breeding success (d/b)	0.50	0.82	0.77 **
young per successful pair (d/c)	1.00	1.11	1.08*
% two fledglings (e/c)	0%	11%	8%*
% laying pairs (b/a)	73%	71%	63%**
% successful pairs (c/a)	36%	52%	50% *

\* thirty-year  
\*\* previous studies

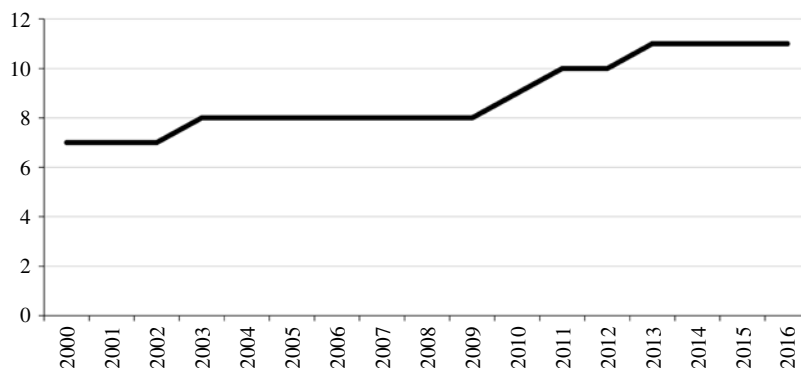


Figure 2. Trend in the number of the Golden Eagle's pairs in the Apennines of Lazio in the 2000-2016 period.

subject could contribute to improve the status of conservation of this species.

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