MONITORING OF FOREST RAPTORS IN LOZÈRE AND
THE CÉVENNES NATIONAL PARK:
SHORT-TOED SNAKE EAGLE

Results of 2018

Jean-Pierre & Isabelle MALAFOSSE

The Cévennes National Park

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Another difficult year for the Short-toed Eagels in the Cévennes.The spring 2018 turned into a nightmare for any nature lover. Adverse weather conditions lasting for about three months and a half put the species to the test and also had an affect on the observers' attitude. This year provided us useful lessons about how the species cope with bad weather. K strategists such as the Short-toed Eagle are most likely able to adapt to the changes year after year, and as for observers, unpredictable weather may prevent anyone from getting bored in the field.

I) - Inventory:

Regarding the number of known pairs there was no changes in 2018. Weather conditions did not really help observers discover new pairs, considering the time spent for the monitoring of known ones.

The table below contains the number of pairs and their density in the survey area in 2018.

Biogeographical regions	Certain	Probable	Possible	Total
Cévennes (CEV)	32	9	15	56
Causses (CAU)	32	16	16	64
Aigoual (AIG)	20	23	5	48
Mt Lozère (LOZ)	9	9	14	32
Aubrac (AUB)	2	14	-	16
All total	95	71	50	216

Table n° 1: Number of nesting pairs by regions in the survey area (certain, probable, possible pairs).

Biogeographical regions	certain pairs	probable pairs	possible pairs	total	area (ha)	number of pairs 100km²	ha/number of pairs
Cévennes	32	9	15	56	60 000	9,33	1071
Causses	32	16	16	64	90 000	7,11	1406
Aigoual	20	23	5	48	45 000	10,67	937
Mt Lozère	9	9	14	32	70 000	4,57	2187
ZONE	93	57	50	200	265 000	7,55	1325

Table n° 2: number of pairs and their density in four biogeographical regions in the Cévennes National Park in 2018.

II) - Breeding:

The 76 breeding sites visited in 2018 comprise 41% percent of all known Short-toed Eagle pairs. 65 nests were occupied by at least one bird (80%) while 11 were probably abandoned. The relatively low nest occupation rate (-10% in 2018) may rather be attributed to the adverse observation conditions than the fluctuation in their numbers.

A Table n°3 presents the breeding results broken down to biogeographic regions in relation to all observed pairs. The table contains egg laying, hatching and fledging rates. The numbers of laid eggs, hatched chicks and fledglings as well as the average rate calculated for these three parameters are specified.

Cévennes (18 pairs) - Egg-laying: 10 / 15 = 0,67 - Hatching: 7 / 17 = 0,41 - Fledging: 5 / 18 = 0,28	**Causses (9 pairs)** - Egg-laying: 4 / 9 = 0,44 - Hatching: 3 / 9 = 0,33 - Fledging: 2 / 9 = 0,22
Aigoual (10 pairs) - Egg-laying: 7 / 10 = 0,7 - Hatching: 6 / 9 = 0,67 - Fledging: 2 / 10 = 0,2	**Mt Lozère (9 pairs)** - Egg-laying: 5 / 9 = 0,56 - Hatching: 3 / 9 = 0,33 - Fledging: 1 / 9 = 0,11
	All areas (46 pairs) - Egg-laying: 26 / 43 = 0,6 - Hatching: 19 / 44 = 0,43 - Fledging: 10 / 46 = 0,22

Table n° 3: Details of breeding success of 46 pairs in 2018 in four biogeographical regions. For further details see the text above.

Breeding success in previous years:

1992 = 0,33 (N=15)	1998 = 0,64 (N=33)	2004 = 0,31 (N=64)	2010 = 0,22 (N=50)	2016 = 0,45 (N=44)
1993 = 0,66 (N=15)	1999 = 0,71 (N=38)	2005 = 0,54 (N=48)	2011 = 0,42 (N=50)	2017 = 0,68 (N=44)
1994 = 0,47 (N=17)	2000 = 0,58 (N=59)	2006 = 0,79 (N=42)	2012 = 0,23 (N=52)	**2018 = 0,22 (N=46)**
1995 = 0,78 (N=27)	2001 = 0,57 (N=67)	2007 = 0,56 (N=48)	2013 = 0,41 (N=49)	
1996 = 0,65 (N=37)	2002 = 0.52 (N=62)	2008 = 0,50 (N=56)	2014 = 0,69 (N=52)	
1997 = 0,40 (N=35)	2003 = 0,59 (N=61)	2009 = 0,41 (N=49)	2015 = 0,74 (N=38)	

Average breeding success over 27 years = 0,53 fledgling/pair (N=1199 breeding attempts)

We followed 46 pairs which performed the fifth worse breeding success (0,22 fledgling/pair) since 1992. The years 2010, 2012 and to a lesser degree 1992 and 2004 also had extremely low numbers (for details, see Chart 4). The surveyed four regions showed similar results in 2018 (for details, see Table 3) and the Cévennes was no exception either. The population monitored further south by JP Céret, also shows in 2018 an extremely low reproduction rate of 0,45 fledgling per pair.

The average egg-laying date in 2018: April 24 (N=10)

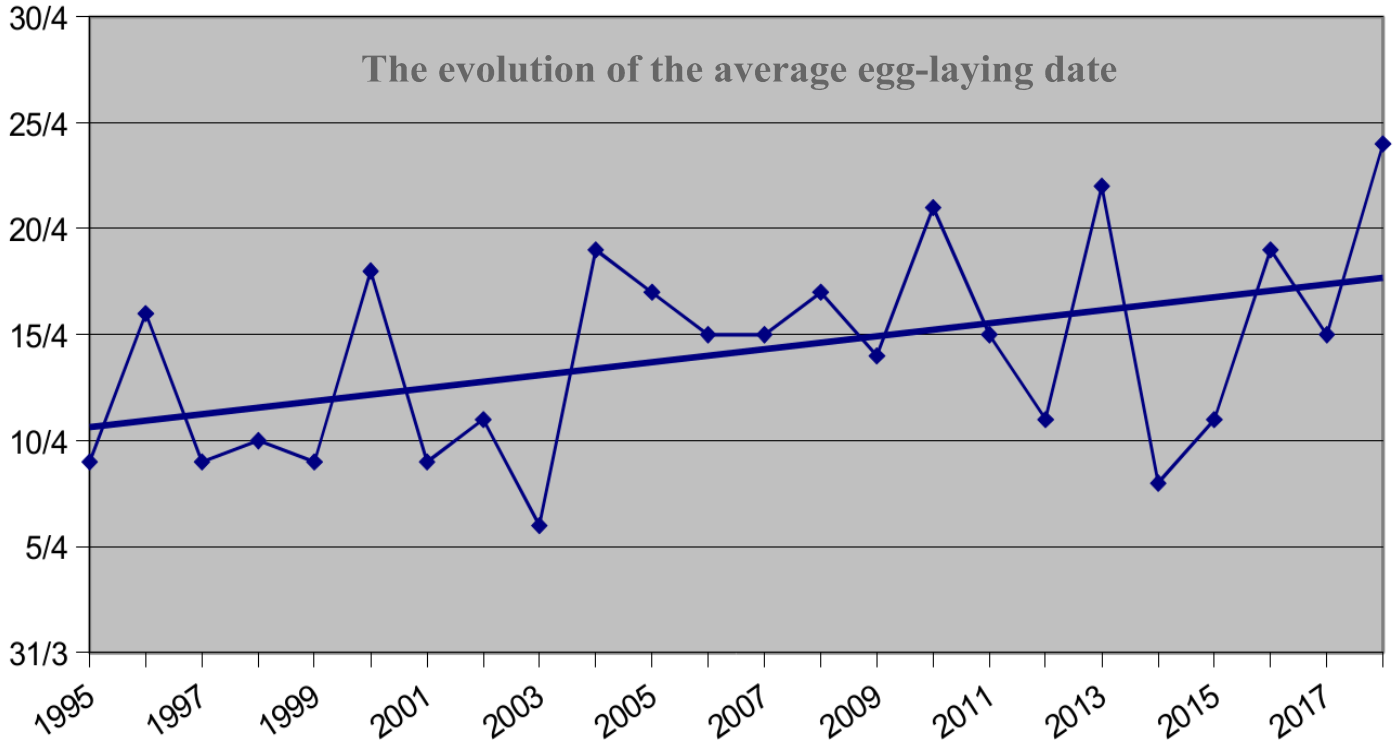

Chart n° 1: Changes of the average egg-laying date in the past 24 years. Overall average date is April 15 (N=508).

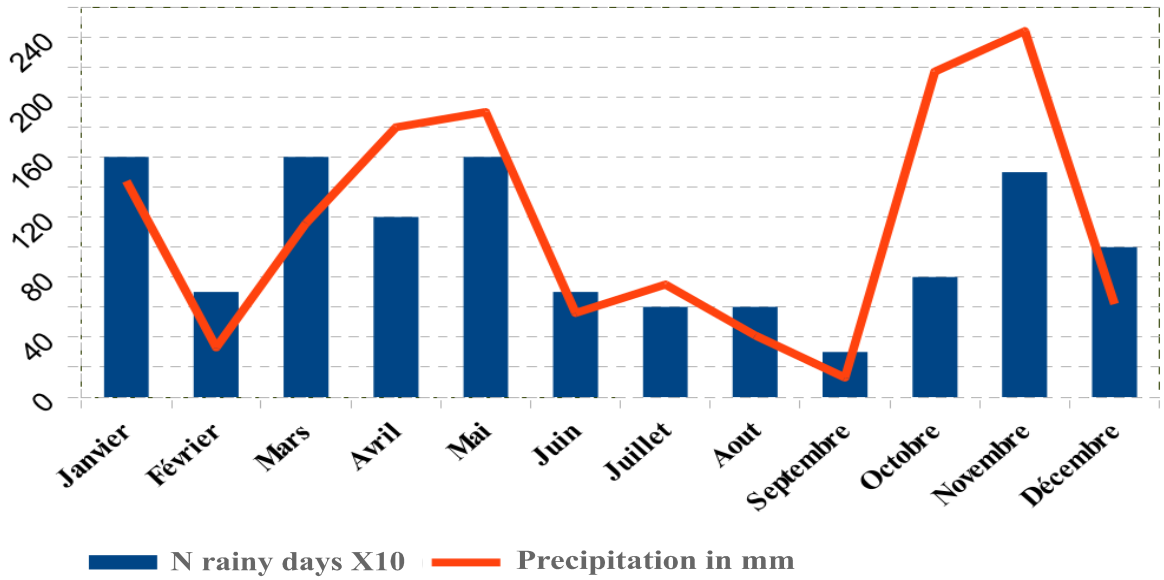

Chart n° 2: Precipitation (mm) and number of rainy days (multiplied by 10) in 2018 (Saint Étienne du Valdonnez 48).

The other specific character of 2018 was high rate of nesting failures. 40% of the pairs did not nest at all.

Females could not gather enough energy to lay the egg during March and April due to unfavourable weather. Only 2003 and 2013 may be comparable to this year regarding egg-laying results (see Chart 3).

Majority of the females laid the egg in late April (delayed or reclutch?) on the 24th on average (Chart 1). The bad weather lasted until mid-June (Chart 2) and the fatality rate was very high at hatching and during the chick raising phase (Chart 3). Predation increased significantly among the latest breeding pairs.

36 pairs were unsuccessful laying-eggs in 2018. Twelve cases were unidentified while the reasons in the other 25 cases were as follows:

- Not breeding : 12
- Pair related : 1
- Nest desertion : 1
- Disturbance : 4
- Predation : 7

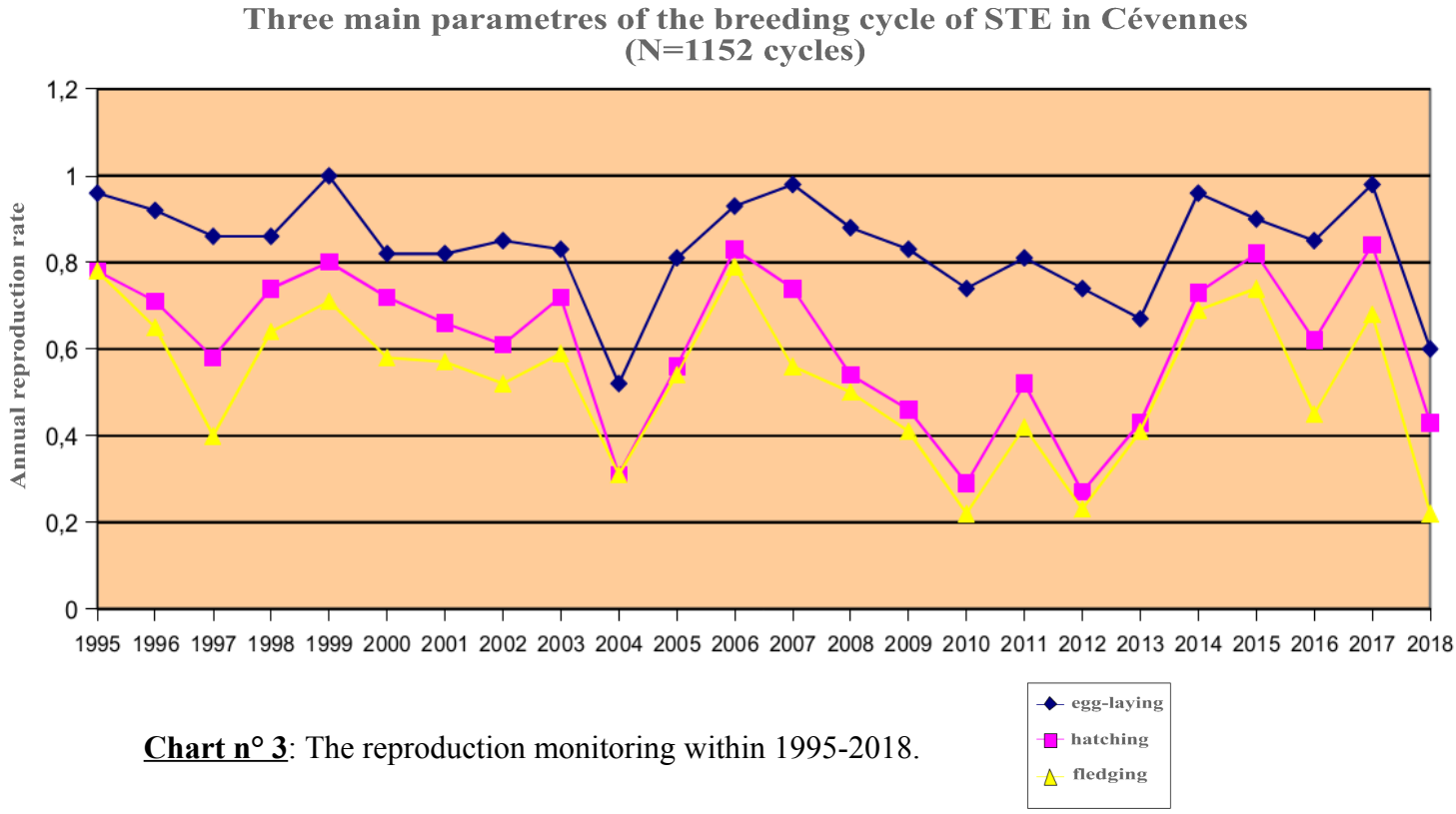

Chart n° 3: The reproduction monitoring within 1995-2018.

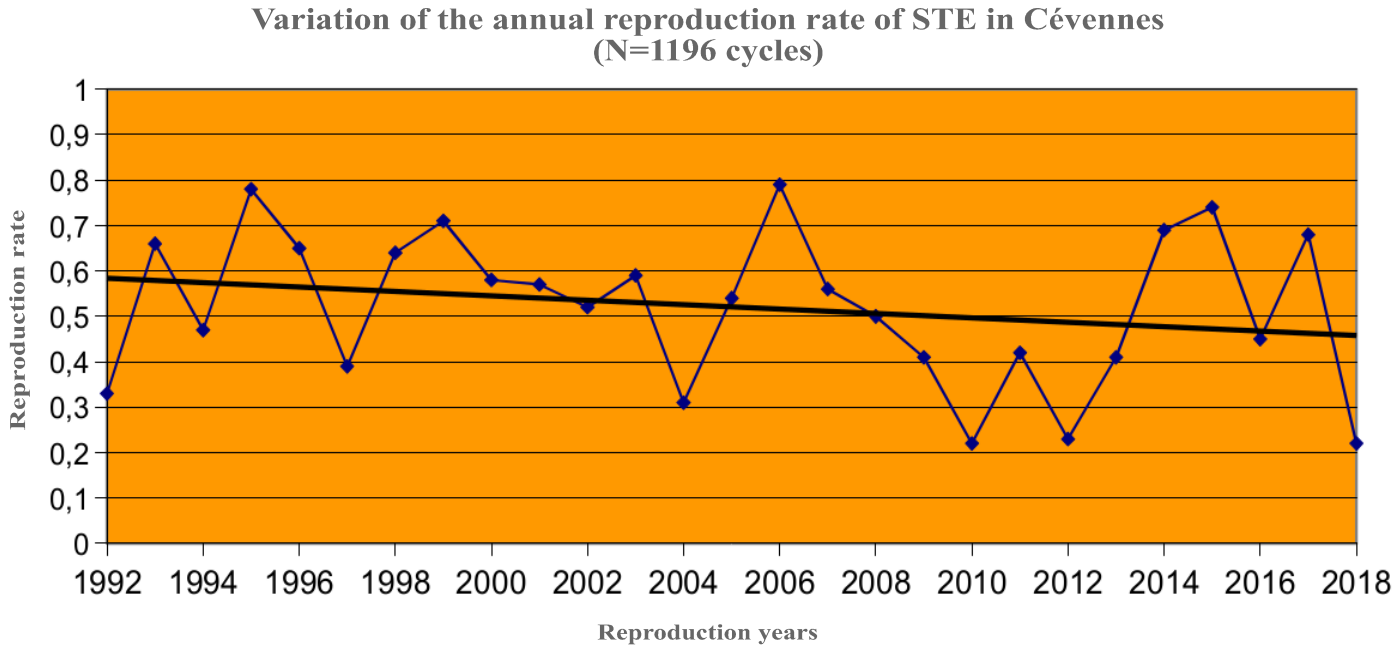

Chart n° 4: Variation of the annual reproduction rate of STEs in Cévennes within 1992-2018, calculated as numbers of fledglings divided by numbers of pairs who have occupied their breeding sites.

III) – Diet of juveniles in the area:

This year, we found remains of only a few prey animals and we did not set up hides for making such observations. Only five additional prey items could be added to the list we published last year.

Colubridae	280	
Aesculapian Snake	53	
Green Whip Snake	86	(1)
Grass Snake	16	
Montpellier Snake	37	(1)
Vperine Snake	3	
Southern Smooth Snake	1	
Smooth Snake	3	
Snake. (spp)	81	(2)
Aspic Viper	36	
Ophidia (sp)	18	
European Green Lizard	21	
Slow Worm	21	
Hedgehog	7	
European Mole	2	(1)
Vole (spp)	5	
European Water Vole?	3	
European Hare (young)	1	
European Rabbit (young)	1	
Rodentia (spp)	13	
European fire-bellied toad	3	
Toad	4	
Aves	7	
Total	**422**	**(5)**

Table n° 4: Food remains within 1991-2018 (N=422). Prey remains found in 2018 are in parentheses.

IV) Monitoring of ringed birds:

Observation of ringed birds in 2018

This year, we observed only one ringed individual in our study area. It was a territorial male. He turned 22 years old this year (23cy) and he still breeds in the very same area ever since. After occupying his territory with his mate he, just like several other pairs, did not start breeding. The site is at 1050 metre asl. and weather conditions were really bad with frequent fog, rain and snow.

V) Genetic analysis:

This year, we provided Olivir Lourdais, scientist at CNRS in Chizé and Cécile Ribout who works at a biological research lab, a collection of feathers of Short-toed Eagle chicks from the period between 2002 and 2015 under the auspices of CRBPO.

The collection of the first 100 feathers analysed in 2002 enabled us to identify the sex of the chick using the biometric method (Jalby et al. 2012*). The first DNA analysis was carried out by Henri Le Turc at the Montpellier University.

Nowadays, we have another 281 additional samples to identify the sex ratio among the chicks of Short-toed Eagles in the region. We plan to publish an article in the Alauda journal after we processed the data.

*JALBY V., MALAFOSSE J.P., NORE T., WINK M. -2012. Détermination, par la biométrie, du sexe des poussins chez deux espèces de Rapaces Circaetus gallicus et Buteo buteo. Alauda 80 (3), 2012 : 187-202.

V) – Behaviour and stories:

We recorded three cases of predation this year. In two cases Golden Eagled *Aquila chrysaetos* were the fate of the Short-toed Eagles while in another case an Eagle Owl *Bubo bubo* was the perpetrator:

Case 1: Thérése Nore and I had followed a Golden Eagle nesting and saw the female arriving to the nest at 14:15 on June 24, 2018 to feed the chicks.

She delivered a prey which the chick tried to grab immediately. Only when it lifts its head we realize that the prey is a chick. When the eaglet facing us with the prey in its beak we recognize the Short-toed Eagle chick about 10-15 days old from a very late breeding attempt. The hick drags the prey deep into the nest to consume it. Not much for the eaglet, but a great loss for us, its from most likely a pair we have been following this year somewhere nearby.

The closest Short-toed Eagle pair nests on the ridge west from here. This year they failed however, it is not clear whether because of the Golden Eagles or not. We saw before an older (four weeks old) Short-toed Eagle chick in a Golden Eagle nest earlier in the Tarn canon in June, 1982.

It is for sure that a Short-toe Eagle chick must be an easy prey for the larger eagle considering the regular position of the nest.

Case 2: It occurred on April 15 in an area where a pair of Golden Eagles nested. We already wrote about an immature Golden Eagle making an attempt to catch a Short-toed Eagle in our 2010 report, however, it ended with no success, luckily the Short-toed Eagle survived. This time, however, the experienced adult eagle did not miss (see photos 1 and 2).

This, somewhat longish text is an extended version of the email we sent out to our friends that night. We hope “raptologists” forgive us this style filled with emotions but such observations are few and far between, therefore it is hard to exclude the excitement we felt in the heat of the moment.

„On April 23, as the sun had warmed up the hillside across the valley, and reptiles crawl out for bathing in it. Consequently, Short-toed Eagle are being lured to the site soon. My friend, Emeric and I have started our observation of the eagles' nest at around lunch in a leisurely fashion. The pair built their new nest on a Douglas pine last year, quite far from their usual nesting site.

It's observable fairly comfortably from the other side of the valley. The female is incubating but she pays attention to every movement in the area. She stood up at 12:25 to turn the eggs.

A male Short-toed Eagle arrived at 12:40 from behind her following the ridge. She keeps watching the light raptor which scans the ground tirelessly below him. He noticed the new neighbours already but it is his land where he has been hunting for years without anything to worry about. It is only a matter of few minutes when he stoops down on a snake. I can see him on the target after the dive.

The female Golden Eagle has followed the whole action from the nest and I can almost feel her impaling gaze. She gets up and takes off to meet the intruder. At that moment I feel that it is the end for the smaller raptor. She is moving smart slowly gliding until the last moment when switches to a fast, short stoop. She grabs the Short-toed Eagle from behind and slams him to the ground while her claws dig deep in his flesh. The attack caught the Short-toed Eagle off guard and now hardly making an attempt to defend himself, the sheer power of the eagle and the surprise take effect. The Short-toed Eagle's head emerges and for an instance it seems as if his yellow eyes would beg for mercy while the eagle stares at him. This moment seems to last forever then the female Golden Eagles flies back to the nest. The Short-toed Eagle's head sank, he has probably died just now. It is over, 13:00."

The Golden Eagle has not eaten a single piece of the Short-toed, it is difficult to call it a predation. It is rather a territorial behaviour of defence towards a big raptor potentially dangerous and whose presence is not tolerable for the eagle so close to its nest. Predation or not, for the Short-toed Eagle the result is the same and it is very likely that this adult male would have transported this prey to a female hatching. Given the importance of the feeding role of the males during the incubation period, it is certain that his death has led to the loss of the egg and the failure of reproduction for that pair.

Case 3: Cause of death: Eagle Owl.

There is no more chance for that particular Short-toed Eagle pair which had failed due to nest falling year after year. Last year, we reported the case of that juvenile Short-toed Eagle for which we built an artificial nest after the original fell of the tree. This year, the pair had returned and built a new nest on the very same Scottish pine like last year. The nest seemed to be good, however, this time an Eagle Owl caused trouble in their lives. When we checked the nesting in August, we found the remains of an older Short-toed Eagle chick a bit further from it. We concluded that it fell victim to a bird of prey and when we found a feather of an Eagle Owl all doubts regarding the predator's identity was removed (see photos 3 and 4). Birds of prey regularly leave traces of their presence behind when a larger prey may resist. We found such signs in cases of Goshawk *Accipiter gentilis* attacks.

Photos n° 1 & 2: Female Golden Eagle kills the Short-toed near her nest. Lozère 15/04/2018.

Photos n° 3 & 4: Feathers of the Eagle Owl and juvenile ST Eagle. Lozère 15/08/2018.

en vol *13 .V . 00*

et
tombant
des nues ,
en pleine
nature
lorsqu'il parade
en vol
- une esthétique folle –
la voilure
vrillée au bout ,
étrangement
tendue
et la tête
et le cou
avec
des cris d 'espace ,
ces aboiements
sifflés
avec tant
de blanc
et de grâce !

Jean Bonnet

Photo n° 5: This pair of Short-toed Eagles photographed by Gilles Balança illustrates Jean Bonnet's poem. I let you guess who is the male and who is the female.

The monitoring in 2018 was carried out with the collaboration of:

- for Causse : L. **CAUSSADE**, M. **CHENARD**, B. **LAMARCHE**, E. **MARTIN**, H. **PIC**, H. **SARRAN**.

- for Aigoual : N. **BRUCE**, G. **COSTES**, B. **DESCAVES**, G. **KARCZEWSKI**, J.L. **PINNA**, B. **RICAU**, C. **ROMBAUT**.

- for Cévennes : J. **BOYER**, R. **BARRAUD**, I. **HENRY**, E. **HERAULT**, T. **NORE**, V. **QUILLARD**.

- for Mont Lozère : A. **AVESQUE**, B. **DEFRESNES**, D. **HENNEBAUT,** M. **JAMIER**.

Tel: 04-66-48-05-47

Mail: malafossejeanpierre@orange.fr

Jean-Pierre & Isabelle MALAFOSSE

Route de Bassy

48 000 St Etienne du Valdonnez