

The Lesser Spotted Eagle *Aquila pomarina* in Catalonia (Spain) – Breeding attempt and migration

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Bosch, J. & B.-U. Meyburg 2012: The Lesser Spotted Eagle *Aquila pomarina* in Catalonia (Spain) – Breeding attempt and migration. Vogelwelt 133: 89–97.

To the west of the breeding distribution range of the Lesser Spotted Eagle there are only a few isolated breeding occurrences. In 2011 a breeding attempt was discovered in Catalonia, NE Spain, the first ever recorded on the Iberian Peninsula. The attempt failed, but a broken egg was found on the ground beneath the eyrie. In 2012 the nest site was re-occupied, however probably only by the male of the previous year. In 2008 and 2009 four young eagles from the German satellite tracking project migrated via Catalonia. The probably increased migration of the species on the south-western flyway observed over the past few years probably led to this settlement in Catalonia, and also earlier in France.

Key words: Lesser Spotted Eagle *Aquila pomarina*, Catalonia, breeding attempt, migration, satellite telemetry.

1. Introduction

The Lesser Spotted Eagle (LSE) breeds in Central and East Europe and south-eastwards to northern Iran, and winters in Africa. The breeding range covers the eastern part of Central Europe, western Russia and the Baltic states. In the southeast the LSE is found in the Balkans and throughout Turkey as far as the Caucasus and the South Caspian Plain in Iran (MEYBURG 1994). There is still insufficient information available on the extent of the easterly distribution range in Europe. The species has recently been found somewhat further east in Russia than was earlier believed to be the case. The world population consists of only about 20,000 breeding pairs (MEYBURG 1996, MEYBURG *et al.* 2001).

Today the breeding range of the LSE in Germany is confined to only a very small breeding area in the northeast, in the federal states of Mecklenburg-Western Pomerania (MWP) and Brandenburg, covering some 10,000 km² (MEYBURG *et al.* 2004). The most north-westerly breeding sites are at approximately 12°20' E somewhat east of Rostock. The breeding population in Germany, on the western fringe of the distribution range, is in decline, from 133 pairs in 1993 to 102 in 2007 (minus 23%; MEYBURG *et al.* 2011). In Mecklenburg-Western Pomerania the number of pairs decreased from about 95 in 1992 to about 83 in 2011 and in Brandenburg from about 25 pairs in 2000 to about 22 pairs in 2011.

Previously a breeding population also existed in western and southern Germany. The latter, in the Bohemian Forest in Bavaria during the 19th Century, was undoubtedly part of a population that extended its range across the Czech border (MEYBURG *et al.* 2004).

Not many years ago an isolated population of 3–4 pairs, which has now become extinct, still existed here in the Bohemian Forest in the Czech Republic (ANDERLE 1985, T. BELKA *pers. comm.*). The main population in Germany was, however, always to be found on the North German Plain. An isolated population, which was established around 1980 in Saxony-Anhalt (Hakel forest; STUBBE & MATTHES 1981, STUBBE *et al.* 1991, 2000) increased to four pairs but has in the meantime shrunk to a single pair in 2011, which did not reappear in 2012 (M. STUBBE *pers. comm.*).

In France one pair settled some years ago near the Swiss border (Département Doubs). It was first observed in 1989. In 2004 a breeding attempt was recorded and it bred successfully in 2005 for the first time (MICHELAT 2005), as well as in most of the following years. In 2011 however the female did not reappear. In 2012 the male again remained without a female (D. MICHELAT *pers. comm.*). Additionally, two single males occupied territories in France, one of them in Lorraine for a few years (FRANÇOIS 2007). Another male was recorded in the Department Cote-d'Or (Burgundy) from 1999



Fig. 1: Geographic situation of Catalonia in western Europe. – *Geographische Lage Kataloniens in Westeuropa.*



Fig. 2: Lesser Spotted Eagle nesting area in central Catalonia, 13th August 2011. – Schreiadler- Brutplatz in Zentral-Katalonien, 13. August 2011. Photo: J. Bosch.



Fig. 3: Young Lesser Spotted Eagle a few days after fledging. – Junger Schreiadler kurze Zeit nach dem Flüggewerden. Photo: B.-U. Meyburg.

until 2008 (pers. comm. of S. REEBER, French Rarities Committee, STRENNA 2000, DESSOLIN 2008). Evidently neither male was not joined by female. A probable isolated breeding site was also known in Algeria (ROCHE 1982).

Catalonia is an autonomous community in north-eastern Spain, with the constitutional status of a 'nationality' within Spain. Catalonia comprises four provinces: Barcelona, Girona, Lleida, and Tarragona. Catalonia covers an area of 32,114 km² and has a population of 7,5 Million inhabitants. It is bordered by France and Andorra to the north, Aragon to the west, the Valencian Community to the south, and the Mediterranean Sea to the east (Fig. 1).

LSEs on passage have been increasingly observed in France and Spain, especially at the Straits of Gibraltar (ONRUBIA *et al.* 2011). In 1992, 1993 and 2008–2010 a total of 51 young LSEs were fitted in Germany with satellite transmitters (called Platform Transmitter Terminals, PTTs). Eight birds took a southwesterly migration route over France, four of them via Catalonia (MEYBURG *et al.* 2008, 2011). Their passage and the first breeding attempt in Spain are described here.

2. Study area and methods

2.1 Study area in Catalonia

JB conducted a monitoring study of a Booted Eagle *Aquila pennata* population in an area of approximately 1,600 km², including parts of Bages, Solsonés and Berguedà districts (BOSCH 2003, BOSCH *et al.* 2005, BOSCH *in* ZUBEROGOITIA & MARTÍNEZ 2011). The main land uses are forestry and cereal crops. Forest accounts for about 77.5% of the surface area, comprising 50.7% of forested areas and 26.8% of scrub or without tree coverage. The woodland is predominantly of sub-Mediterranean character, primarily extensive and uniform Corsican Pine *Pinus nigra* woodland with some patches of Scots Pine *Pinus sylvestris* on the shady slopes of the central and eastern parts of the area. Scots Pine woodland is most common at altitudes over 900 m ASL in the north and eastern part of the study area. In the sunlit areas Aleppo Pine *Pinus halepensis* dominates, sharing the habitat with Stone Pine *Pinus pinea* in certain areas. Most Corsican Pine stands are secondary communities which evolved from the historical destruction of the primitive dry and wet sub-Mediterranean vegetation of Portuguese Oak *Quercus faginea* and White Oak *Quercus pubescens* forest in the valleys and the shady hillsides, as well as the Holm Oak woodland *Quercus ilex rotundifolia* on the xerotherm and sunny hill summits. At present, most oak stands are restricted to ecotones and areas with patchy and meagre vegetation, whereas Holm Oak woodland is found on the summits and drier and sunnier areas. Interspersed among these forest formations are cereal crops, intermingled in some areas with Almond *Prunus dulcis* and Olive *Olea europaea* trees and Common Grape Vine *Vitis vinifera*. In recent years some of these crops have been cultivated as cattle fodder, a semi-extensive practice combining fenced pasture and woodland for fattening livestock herds.

2.2 Satellite tracking

In the course of a long term project conducted since 1992 (MEYBURG & MEYBURG 2007, 2009, MEYBURG *et al.* 1995, 2004), in addition to a large number of adult birds a total of 51 young LSEs were fitted with satellite transmitters in north-eastern Germany. These comprised 33 German eagles and 18 birds translocated from Latvia to support the German population (MEYBURG *et al.* 2008, 2011). The latter were second-hatched individuals that, as a consequence of Cainism (MEYBURG 1974, 2002, SCHELLER & MEYBURG 1996), had practically no chance of surviving in their natal nests. They were temporarily hand-reared by humans and then some were placed in wild nests (fostering method; MEYBURG 1968, 1971, 1974, 1977, 1978a,b) and the remainder released into the wild after a stay in a hacking station located some 70 km north of the centre of Berlin (MEYBURG *et al.* 2011). For the technique of satellite tracking of raptors we refer to MEYBURG & FULLER (2007).

3. Results

3.1 Breeding

In the morning of 31st July 2011 in a nesting area of Booted Eagles *Hieraetus pennatus* a raptor calling “kyack” was heard nearby, repeating the call for a few seconds. A few minutes later a dark bird of prey flew approximately twenty metres above the tree canopy, repeating the same call. With the use of binoculars it was identified as a LSE. This bird was very dark and moulting the outer rectrices and primaries. The LSE continued flying over the area approximately half an hour, soaring higher and higher and displaying. It was photographed on this occasion. Fifty minutes later a nest was located in a Corsican Pine and beneath it, on ground, two pieces of eggshell remains were found. The absence of dropping remains under the nest and the fact that the nest was partially tilted suggests a reproductive failure probably due to the effect of wind or heavy spring rains in a very exposed tree top. This may have caused the egg to fall to the ground to be taken by predators. Another possibility is that it was infertile and ultimately abandoned by the female and taken by other avian predators causing fragments to fall from the nest. Equally possible is that an egg laid with a thin shell may have been broken during incubation and was ejected from the nest by the female. In Peregrine Falcons *Falco peregrinus* very thin-shelled eggs could no longer be incubated and often showed a weak pink pigmentation instead of the usual brown spots. They were often found broken beneath the nest (WEGNER *et al.* 2005). It is clear from an inspection of the broken eggshell that the egg had cracked and that no chick had hatched. The two pieces of the eggshell were glued together (see Fig. 5) and measured approximately 61 mm in length (estimated reading) by 50.8 mm breadth (real measurement). These measurements correspond to the data given by MEYBURG (1970) and CRAMP & SIMMONS (1980) in relation to LSE eggs. The eggshell is



Fig. 4: Lesser Spotted Eagle from above near the nesting area, 1st May 2012. – *Schreiadler von oben in der Nähe des Nistplatzes, 1. Mai 2012.* Photo: J. Bosch.

very thin in relation to the size of the egg with a thickness of only 0.31 mm. The eggshell was identified as an almost unmarked LSE egg similar to a Greater Spotted Eagle *Aquila clanga* egg, a species that lay eggs slightly larger than the LSE, but the photos of the birds in flight leave no doubt about its owner. The eggshell remains available for future DNA analysis.

The diameter of the nest tree measured 27.7 cm. at 1.30 m from ground level. The nest is at 9.8 m above ground level and is approximately 110 cm long, 55 cm wide and 50 cm deep, measurements that correspond to those given by MEYBURG (1973) and CRAMP & SIMMONS (1980). There is a second nest some 10 m distant also built of branches and pine needles. This nest has a



Fig. 5: The eggshell of the Lesser Spotted Eagle found beneath the nest, 30th October 2011. – *Die unter dem Schreiadlerhorst gefundene Eischale.* Photo: J. Bosch.

rounded shape and measures approximately 50 cm in diameter and 30 cm deep.

This area consists of extensive and shady woodland of Corsican Pine with a northern outlook where in the 2011 season four species of forest-dwelling raptors co-existed: The Northern Goshawk *Accipiter gentilis* was bred 168 m away from the LSE. The Short-toed Eagle *Circaetus gallicus* had its eyrie only 82 m distant. The Booted Eagle eyrie was not located. These three species bred successfully in 2011, the Goshawk rearing two chicks and the Booted Eagle and Short-toed Eagle each one nestling.

This area was visited again on 7th, 13th, 21st and 29th August 2011. Except for 13th August 2011, when one LSE flew mid-morning and was ferociously mobbed by a Booted Eagle until it had flown far off. The LSE displayed cautious behaviour and remained in the tree canopy on the other days, calling only occasionally during the course of the morning. The visits were each of approximately four hours, from 08:30 until 12:30 hrs. On 18th and 25th September, when the breeding area was revisited, no birds were to be seen.

In the spring of 2012 the nesting area was reoccupied. Between 6th April and 5th May 2012 the breeding area was visited on 6th, 9th, 11th, 15th, 22nd and 29th April and 1th to 5th May, at roughly the same time of day as during the 2011 season. During the visits the LSE was seen displaying with undulating flights and vibrating wing beats over the breeding area (Fig. 4).

During these flights the LSE was occasionally mobbed by the Booted Eagle pair as well as by Common Buzzards *Buteo buteo* and Short-toed Eagles. The LSE observed during this period appeared to be the same bird (confirmed by the trailing edge of the wings in photographs taken at the time). After this period, from 13th May to 30th June 2012, the breeding area was

visited on 13th, 16th, 19th and 26th May and 10th June. The behaviour had changed very radically with the bird leading a very secluded life, calling only occasionally from the nest site. Only on 10th June only, near the Goshawk nest, a LSE was observed at high altitude, calling and vibrating its wings. This bird was photographed, but due to the great distance the individual could not be identified.

On 1st July the nest site was revisited. No birds were observed and there was no whitewash beneath the nest to indicate that it contained young birds. However, on the edge of the nest a moulted primary feather and dry oak leaves were found. The other nest had also been repaired with twigs and pine needles. Four more visits were made on 22nd July, 8th and 27th August and 2nd September. On 22nd July some whitewash was found on the ground a few metres from the nest, indicating the presence of at least one bird. On the other days there was no evidence of the presence of any bird. With Booted Eagles it is not uncommon for the birds to leave the nest area after a breeding failure, returning only occasionally to roost at night (own data). On 2nd September a very dark LSE-shaped eagle was observed at a great distance some 18 km northeast of the nest area. It headed out of sight to the northeast after being mobbed by a small raptor.

In the 2012 breeding season other forest-dwelling raptors were also found with active nests in the area, namely Eurasian Sparrowhawk *Accipiter nisus* and Common Buzzard at 340 m and 1200 m distance respectively from the LSE nest. Of all the forest raptors in the area only the Short-toed Eagle and the Eurasian Sparrowhawk successfully bred in 2012, the remainder of broods failing probably as a result of a very dry winter, a rainy early spring and an extremely dry late spring and summer.



Fig. 6: Migration route of the young LSE with transmitter No. 94742 through Catalonia. – Zugroute des jungen Schreiadlers mit Sender Nr. 94742 durch Katalonien.

3.2 Migration

Four of the young LSEs with satellite transmitters took a south-western route from Germany, passing through Catalonia in 2008 and 2009 (MEYBURG *et al.*, unpublished). We received a total of 76 GPS fixes in addition to about the same number of Doppler/Argos fixes from these birds. For the c. 290 km long route through Catalonia three birds took two days and one bird only one day. The fastest recorded speed was 106 km/h, undoubtedly during a fast gliding phase.

LSE with transmitter No. 94742

This young German eagle was fitted with a satellite transmitter by BUM as a fully-feathered nestling in a nest (approx. 53°N/14°E) some 70 km north of the centre of Berlin on 26th July 2009. The solar-powered transmitter provided not only precise GPS locations, but also data on flight height, speed and direction. As with the other three transmitters, it was programmed to transmit a GPS fix every hour as long as it was adequately re-charged through its solar panels. At the time of fitting the transmitter the bird weighed 1,150 g. It was therefore a male. At the end of the post-fledging dependent period the young eagle left the breeding area at midday on 14th September.

After its passage through Germany and France the bird crossed the French-Spanish border in the Pyrenees, 60 km from the Mediterranean coast, at 15:30 hrs on 24th September 2009. It spent the night in woodland (42°06'N/ 2°12'E) near Montesquiu in Catalonia at just 800 m ASL, which it reached before 17:00 hrs. The next morning it departed from the night roost before 07:00 hrs. During the morning of 25th September 2011 it passed in approximately 40 km distance to the LSE nesting area in central Catalonia. After covering a stretch of 183 km, the bird spent the night at 850 m ASL (40°24'N/ 4°58'E) in the hills near Balneari de Cardo. The next morning it began migrating shortly after 08.00 hrs and crossed the southern border of Catalonia shortly before 10:00 hrs, some 10 km distant from the coast (Fig. 6).

LSE with transmitter No. 84379

This young German eagle was fitted with a tag as an almost fully-feathered nestling (1,300 g) on 19th July 2008. The nest (approx. 53°58' N/ 12°22' E) was located at the northwest fringe of the species' distribution range some 20 km southeast of Rostock in Mecklenburg-Western Pomerania. Fixes of the young bird were received on a number of occasions after fledging in the proximity of the nest. It left the breeding area at midday on 22nd September 2008.

After passage through Germany and France it crossed the border in the Pyrenees, 50 km distant from the Mediterranean coast, at 13:00 hrs on 1st October 2008. Its speed at this time was 46 km/h at a height of 1,130 m ASL. After one night roost it reached the coast 20 km west of Barcelona at midday of 2nd October (Fig. 7). Up to this point all measured flight heights were above 1,000 m ASL. It then migrated rapidly in parallel to the coast at heights between 500 to 700 m ASL. It spent the night of 2nd/3rd October in a small wood 5 km southwest of Tortosa, where the last fix was made at 08:00 hrs. The next day it covered a distance of 310 km to a location near Murcia.

LSE with transmitter No. 94746

This bird was a translocated Latvian eagle that was reared in and released into the wild from the hacking station north of Berlin (53° N/48° E). It left the station on 6th August 2009 and began migration on the morning of 11th September.

The French-Spanish border was crossed shortly after midday on 25th September some 25 km distant from the Mediterranean coast (Fig. 8). The first night in Catalonia was spent on the western outskirts of Girona at a height of 85 m ASL (41°58'N/2°46'E). From then on the eagle kept to the coastline. At 12:00 hrs it passed some 11 km to the north of the centre of Barcelona.



Fig. 7: Migration route of the young LSE with transmitter No. 84379. – *Zugroute des jungen Schreiadlers mit Sender Nr. 84379.*



Fig. 8: Migration route of the young LSE tagged with PTT transmitter No. 94746. – *Zugroute des jungen Schreiadlers mit PTT-Sender Nr. 94746.*

The next night roost was made after covering a stretch of 185 km at a height of 440 ASL (41°35' N/ 56°14' E), 25 km to the west of the city centre of Tarragona. It left the roost before 06:00 hrs. Shortly before 11:00 h the bird crossed the southern border of Catalonia, and flew on always maintaining a distance of not less than 10 km from the coast.

LSE with transmitter No. 94759

This bird was also a translocated Latvian eagle that was also released into the wild from the hacking station. The bird left the station between 10:00 and 11:00 hrs on 10th September 2009. On 24 September it crossed the French-Spanish border at a distance of 25 km from the Mediterranean coast (Fig. 6). The first fix in Cata-



lonia at 12:00 hrs registered the highest flight height (1,637 m ASL, i.e. 1,475 m above ground) and the highest speed (106 km/h). No more than two hours later the eagle reached the coast northeast of Barcelona. It spent the night in the mountains at a height of 300 m ASL, some 32 km west of the city centre of Barcelona. After a flight of 245 km the second night roost was already beyond the Catalanian border, which was crossed shortly after 13:00 hrs. As none of these birds with transmitters were tracked back to the breeding grounds, no data on the return migration routes is available.

4. Discussion

The exceptional breeding attempt in Catalonia is the first case known to us to occur south of the Pyrenees on the Iberian Peninsula, about 675 km from the only breeding pair in France that bred for several years. The distance from the western border of the breeding range in northeast Germany is about 1,500 km.

The occupation of these new breeding sites in Catalonia and France is probably a result of more birds using the south-western route via the Straits of Gibraltar to Africa. Whether this recently discovered western Mediterranean migration route (ONRUBIA *et al.* 2011, MEYBURG *et al.* unpubl.) is new or has just been overlooked in the past is not clear. It is possible that in the past at least some LSEs have not been identified at the Straits of Gibraltar. Nevertheless it seems that the number of migrants taking the south-western route may have increased in recent years. This route suggests a case of mirror-image vagrancy,

where if we take a north-south axis from a departure site (e.g. release point in eastern Germany), the birds that choose the “right” route will fly south-eastwards in the direction of the Bosphorus and the Middle East, and the birds that take the “wrong” or opposite direction will go to the southwest, towards Gibraltar, invariably maintaining the timing, distance and other aspects of the migration.

Fig. 9: Migration route of the young LSE with PTT transmitter No. 94759. – *Zugroute des jungen Schreiadlers mit PTT Nr. 94759.*

Such behaviour has been recorded in several species of North American passerines (DE SANTE 1973, 1983a, 1983b, DIAMOND 1982, McLAREN 1981, PATTEN & MARANTZ 1996, ROBERTSON 1980) and also in some Eurasian warblers and ducks.

It must however be mentioned, that some LSEs also migrate south through Italy and Greece (Peloponnese) (MEYBURG *et al.*, unpubl.). Spring migrants have been recorded in Tunisia and Italy in low numbers (AGOSTINI 2005, GIORDANO 1991). No such records are known to us from Greece (Peloponnese) and Spain.

This migration direction is probably a result of behaviour of a part of the juvenile bird population, acting under instructions of a genetic component (NEWTON 2008).

As the breeding range of the LSE previously extended perhaps westwards to France (MERLET 1969, VIELLIARD 1969, DUBOIS *et al.* 2000), a south-westerly migration route could still be genetically programmed if we assume that the Gibraltar migration route was previously customary for the western breeding population.

If they survive, these birds probably follow the same south-western route year after year establishing wintering areas yet unknown and far away from the rest of the population that follows the south-eastern route via the Bosphorus, as suggested by several cases of young LSEs satellite-tracked from Germany to West Africa (MEYBURG *et al.*, unpubl.). Apparently some very few surviving individuals establish new breeding areas far away from the normal breeding range if they find suitable habitat during return migration. This behaviour is widespread in long-distance migrants such the LSE and could be a dispersion or expansion mechanism of habitual wintering and breeding ranges, although LSEs



Fig. 10: Adult male LSE with 30 g solar-powered GPS satellite transmitter. – *Adultes Schreiadler-Männchen mit 30g-Solar-GPS-Satelliten-Sender.*
Photo: B.-U. Meyburg.

are known to start breeding usually very close to their birthplace, especially males (MEYBURG *et al.* 2005). Migration via the south-western route makes possible a resettlement of breeding areas that have been abandoned for centuries. This is the case in France and most recently in Catalonia. It is similar to the resettlement of the Loire Valley (France) by the Osprey *Pandion haliaetus* (THIOLLAY & WAHL 1998). These individually identified Ospreys recorded as breeding in the Loire valley are of German origin.

Acknowledgements: We would like to thank C. Meyburg for the maps and D. Conlin for correcting the English of the manuscript as well as all those who helped to fit the transmitters to the birds. We also thank the authorities in the federal states of Brandenburg and Mecklenburg Western-Pomerania for the permission to mark the eagles with PTTs.

5. Zusammenfassung

Bosch, J. & B.-U. Meyburg 2012: Der Schreiadler *Aquila pomarina* in Katalonien (Nordost-Spanien) – Brutversuch und Durchzug. Vogelwelt 133: 89–97.

Westlich des geschlossenen Brutverbreitungsgebietes des Schreiadlers gibt es nur wenige Einzelvorkommen. Im Jahr 2011 wurde erstmals ein Brutversuch auf der Iberischen Halbinsel in Katalonien im Nordosten Spaniens festgestellt, der jedoch nicht erfolgreich verlief. Ein zerbrochenes Ei konnte unter dem Horst geborgen werden. Im Jahr 2012 war der Brutplatz wieder besetzt, allerdings nur vom (wahrscheinlich

letztjährigen) Männchen. 2008 und 2009 zogen vier junge Adler des deutschen Satelliten-Telemetrie-Projektes durch Katalonien. Der in den letzten Jahren zunehmend festgestellte Zug auf der südwestlichen Route zur Meerenge von Gibraltar hat wahrscheinlich zu dieser Ansiedlung in Katalonien und auch einem zeitweisen Brutvorkommen in Frankreich (2004–2010) geführt.

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Manuskripteingang: 20. Mai 2012
Annahme: 6. Dez. 2012

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