

Expansion of Pygmy Cormorant in central and western Europe and increase of breeding population in southern Europe

Lukasz Ławicki, Leander Khil & Peter P de Vries

Pygmy Cormorant *Phalacrocorax pygmeus* is the smallest of the three cormorant species breeding in Europe (Perrins 1998, Nelson 2005). Its range extends from south-eastern Europe to central Asia (del Hoyo et al 1992). The world population is estimated at 85 000-180 000 individuals (Delany & Scott 2006). In Europe, it breeds patchily in the southern and south-eastern parts, accounting for more than 75% of its global breeding range (BirdLife International 2004). The species occurs mainly in coastal marshes, along rivers and on inland lakes. It breeds in mixed colonies with herons, Great Cormorant *P. carbo*, Glossy Ibis *Plegadis falcinellus* and Eurasian

Spoonbill *Platalea leucorodia* (Perrins 1998, Nelson 2005). After a sharp decline in the 1950s, the population is now increasing. The species has recolonized some of its former traditional breeding sites in the Danube delta, which now supports the largest breeding population in Europe (Schogolev et al 2005).

In 1999, a Species Protection Plan was prepared to halt the decline of Pygmy Cormorant (Crivelli et al 1996). The principal factors for the decline were the degradation and reduced area of suitable breeding habitat, mainly resulting from drainage of wetlands and the regulation of large, lowland rivers. Further, conflicts with fishery

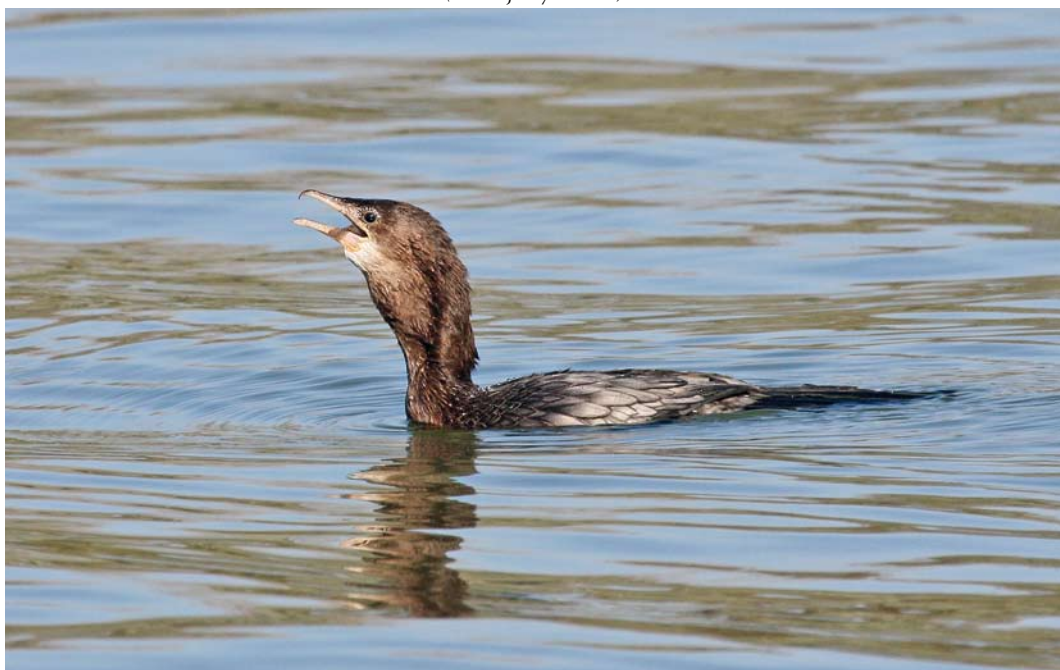
379 Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Baranda, Serbia, 12 August 2007
(Maciej Szymański)





380 Dead and debilitated Pygmy Cormorants / Dwergaalscholvers *Phalacrocorax pygmeus* as result of cold winter weather, Danube river near Vilkov, Ukraine, 5 February 2010 (*Maksim V Yakovlev*)

381 Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Belgrade, Serbia, 11 November 2008 (*Maciej Szymański*)



management include examples (eg, in Greece) of Pygmy Cormorants (especially young birds) drowning in fishing nets set up too close to nesting colonies (Crivelli et al 1996). Moreover, in many countries, fishermen treat Pygmy Cormorants (like other species of cormorants) as a competitor and pest, deliberately scaring the birds nesting in colonies and shooting at them (Danko 1994, Crivelli et al 1996, Kazantzidis & Nazirides 1999, Nelson 2005, BirdLife International 2012a). Also commercial hunting of waterfowl, during which Pygmy Cormorants are killed, is organized in some countries. For example, 83 Pygmy Cormorants were shot in Gilan province in northern Iran between November 2001 and January 2002 (Barati et al 2008). At the wintering grounds in the Middle East, birds are also killed for human consumption. Significant mortality is also caused by very cold and snowy winters: for example, in January 2010, 10s of dead birds were recorded in the Ukrainian part of the Danube delta (Yakovlev & Korzyukov 2010; plate 380). Pygmy Cormorant was placed on the Red List of Globally Threatened Species as 'Near Threatened' (BirdLife International 2004) but in recent years, following its increase in numbers, the category has been reduced to 'Least Concern' (BirdLife International 2012a).

With the recovery of the breeding population in southern Europe, a marked increase of extralimital sightings in central and western Europe has been noted in recent decades, especially after 2000. This paper describes this increase in central and western Europe in the first decade of the 21st century compared with earlier data, against the background of the increasing breeding population.

Material and methods

The analysis includes all records of Pygmy Cormorant in central and western Europe after 2000 provided by national rarities committees and obtained from the literature. We have included only records from countries where Pygmy Cormorant does not breed, with the exception of Austria, where it has been breeding regularly only since 2007; since 2009, records from the area of Neusiedler See, Burgenland, where it now regularly breeds, no longer have to be submitted to the Austrian rarities committee (Ranner & Khil 2012). The analysis covers records up to early 2012 but does not include observations from Slovakia, where Pygmy Cormorant occurs regularly in large flocks throughout the year and where several 100s individuals winter (Kudela & Lengyel 2004, Slabeyová et al 2011; see details below). Comparative data before 2000 have been taken mainly

from reports by national rarities committees and other literature. Information on breeding populations in southern Europe was obtained from the literature and unpublished data by ornithologists from different countries.

Records in central and western Europe before 2000

Up to 1999, there were c 75 records in central and western Europe (along with four from Slovakia up to 1980). In the 19th century, the species was recorded at least 14 times in central and western Europe, including c 10 records from Germany and Poland (figure 1). Particularly conspicuous is the influx of 1856. Birds were killed that year in France (one), Germany (three), Poland (small influx to Silesia with at least a few individuals) and Switzerland (one). The large number of records in 1856, at a time when the number of birders was very small, suggests that the scale of the influx was probably much larger. Most of the records up to 1950 refer to birds shot. From 1900 to 1989, there were c 30 records but in the early 1990s numbers increased slightly, mainly in Slovakia, Austria and Poland, although observations in western Europe before 2000 were still very rare. In 1990-99, there were 31 records, including 26 from Austria and Poland (figure 2). In that period, there were one to seven records each year (average three per year; figure 4). By the mid-1990s, the species was wintering regularly in increasing numbers on the Danube river in Austria and Slovakia and it was this increase that probably had an impact on the number of records in subsequent years in western European countries (see details below). Most observations before 2000 were in the autumn and winter (figure 7).

Austria (32 records of 75 individuals)

Naumann (in Bauer & Glutz von Blotzheim 1966) mentioned several records from Neusiedler See from the first half of the 19th century. There are nine records of single individuals before 1980: 1810, 1889, 1920, 1933, 1951, 1961, 1974, 1977 and 1978 (Berg & Samwald 1989). In 1980-89, there were another seven records (21 individuals), with a flock of six on the Danube near Zwentendorf in winter 1989/90 (Ranner et al 1995); 16 further records (45 individuals) originate from 1990-99. The series of nearly annual wintering of up to 11 individuals along the Danube at Tullnerfeld, Niederösterreich, between 1988 and 1999 is noteworthy (Straka 1989, Laber & Ranner 1995, Ranner et al 1995, Ranner 2002, 2003).

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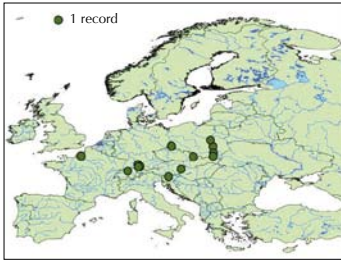


FIGURE 1 Distribution of records of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe in 19th century

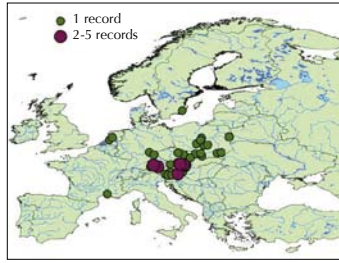


FIGURE 2 Distribution of records of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe in 1900-99

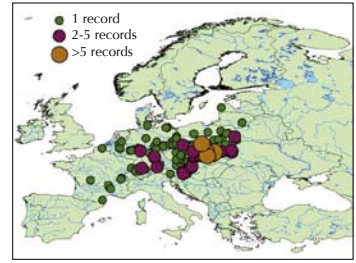


FIGURE 3 Distribution of records of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe in 2000-11

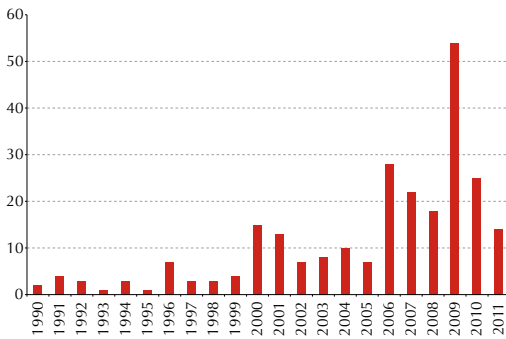


FIGURE 4 Number of records of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe in 1990-2011 (excluding records from Slovakia)

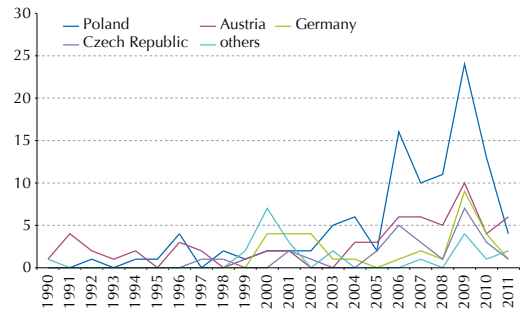


FIGURE 5 Number of records of Pygmy Cormorant *Phalacrocorax pygmeus* in Austria, Czech Republic, Germany, Poland and countries further west in central and western Europe in 1990-2011

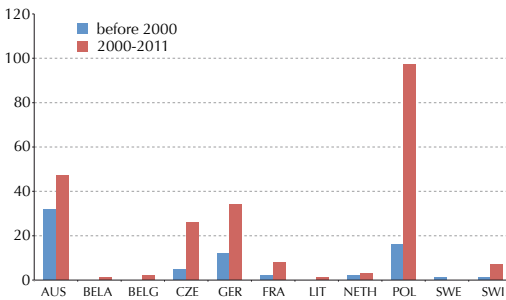


FIGURE 6 Increase in number of records of Pygmy Cormorant *Phalacrocorax pygmeus* in various European countries before 2000 and in 2000-11. AUS=Austria, BELA=Belarus, BELG=Belgium, CZE=Czech Republic, GER=Germany, FRA=France, LIT=Lithuania, NETH=Netherlands, POL=Poland, SWE=Sweden, SWI=Switzerland

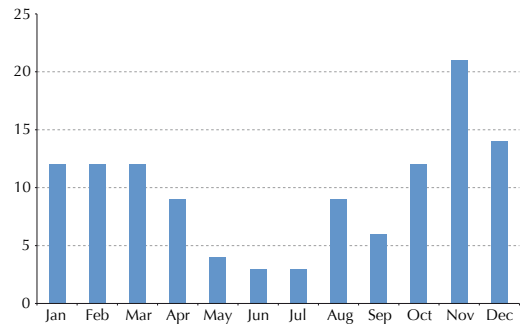


FIGURE 7 Monthly distribution of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe before 2000. For individuals remaining longer at same locality, day of arrival is used.

Czech Republic (5)

Records are from 30 September 1951 (shot), 27 May 1959, 17 July 1981, 22 June 1997 and 16 October 1998 (shot) (Nečas & Černý 1953, <http://fkcs.cz/druhypo/phapyg.html>). There are older records from the 19th century, with specimens in the collections of Schwab. However, these collections are seriously deficient (misidentified specimens, erroneous locations); none of these 19th century records have been accepted (<http://fkcs.cz/druhypo/phapyg.html>).

France (2)

On 5 November 1856, a young female was shot at Dieppe, Seine-Maritime, and one was observed at Arles, Bouches-du-Rhône, on 24–25 March 1990 (Dubois et al 2008).

Germany (c 12 records of c 35 individuals)

In the 19th century, four individuals were shot: 2 November 1856, 16 November 1856, 1856 (month/date unknown) and October 1857 or 1862. Subsequently, one was shot in 1907 and one observed from 5 July to 2 December 1933. From November 1957 to December 1959, there were a few observations in Bayern, with the largest flock of 13 at Ismaninger Teichgebiet on 22 September 1958 (Bauer & Glutz von Blotzheim 1966).

Netherlands (2)

The first for the Netherlands was on 23–24 January 1999, when one (possibly first-winter) was observed at Montfoort, Utrecht; on 12 June 1999, an adult was recorded at Oostvaardersplassen, Flevoland (Ebels et al 2000, van der Vliet et al 2000).

Poland (16 records of 21+ individuals)

Up to 1999, there were 16 records, including at least six from the 19th century: 1852, 1856 (at least 5), 1861, 1864 and 1899; all records relate to birds collected. After a gap of nearly 100 years, the species was found on the Jezioro reservoir on 7 June 1992 and has been seen regularly since. Further sightings were in 1994 (2), 1995 (1), 1996 (4), 1998 (2) and 1999 (2) (Tomiałojć & Stawarczyk 2003).

Slovakia (5 before 1983)

The first record is from April 1926, when one was shot near Senné. Subsequent records were on 30–31 August 1931 (shot), 29 April 1950 (shot), 30 September 1951 (shot) and 17 July 1981 (Danko 1994, Kúdela & Lengyel 2004). Since 1983, the species has been recorded most frequently at the Senné-Iňačovce fishponds in eastern Slovakia,

where a single pair attempted to breed in 1992 (Danko 1994). Reports on breeding in Senné in 1993 and 1997 (Voskamp et al 2005) were incorrect (cf Danko 1994; Štefan Danko in litt). In subsequent years, the number of observations in Slovakia increased; for example, there were 16 records in 1996 (Danko et al 2002). The first winter records were from the Danube in 1994; by 1999, already 35 individuals had been recorded there (Danko et al 2002, Kúdela & Lengyel 2004).

Sweden (1)

In early July 1913, an adult male was shot at Ljungbyholm, Småland (Bergström 1946, Breife et al 1990).

Switzerland (1)

On 25 October 1856, one was killed at Dietikon near Zürich (Fatio 1904, Maumary et al 2007).

Records in central and western Europe from 2000

Compared with the 19th and 20th century, there was a large increase in the number of sightings between 2000 and 2011 (figure 3–4). In this period, there were 227 records in central and western Europe (not counting records from Slovakia and the records from Neusiedler See after 2009). This represents an increase of over 200% in the last 12 years compared with the previous 200 years. After 2000, the species was found for the first time in Belarus, Belgium, Latvia and Lithuania. In Germany, it was recorded after a 40-year break and, in Switzerland, after nearly 150 years. The largest increase was in Poland but there were also substantial rises in Austria, the Czech Republic and Germany (figure 5–6). The expansion in Austria resulted in the first breeding in 2007 and, in 2011, almost 150 pairs were breeding in the Neusiedler See region. A large expansion also occurred in Slovakia, where currently up to 700 individuals regularly winter. In 2000–05, the annual number of records in central and western Europe did not exceed 15. A large increase has taken place since 2006, with the largest influx occurring in 2009 (54 records, including 24 in Poland; figure 4).

Pygmy Cormorants have been observed in all months, though mostly from August to January, after which the number of sightings decreased, reaching a minimum in July. The phenology of distribution varies among countries. For example, in Austria, it is most often observed from November to February, which shows clearly that it has found

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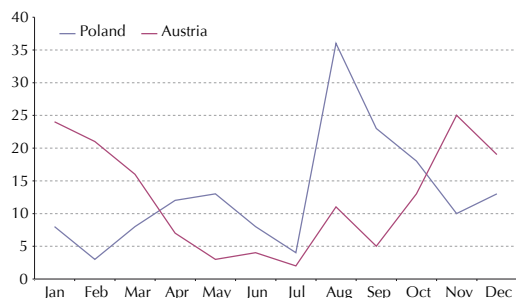


FIGURE 8 Phenology of Pygmy Cormorant *Phalacrocorax pygmeus* in Austria and Poland

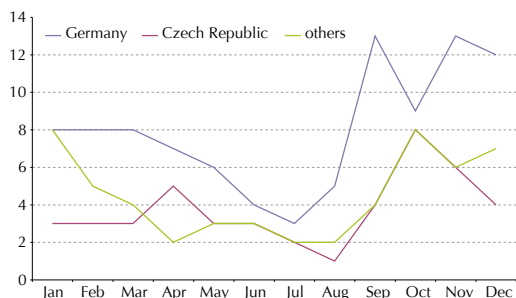


FIGURE 9 Phenology of Pygmy Cormorant *Phalacrocorax pygmeus* in Czech Republic, Germany and other countries (Belarus, Belgium, France, Lithuania, Netherlands, Sweden and Switzerland)

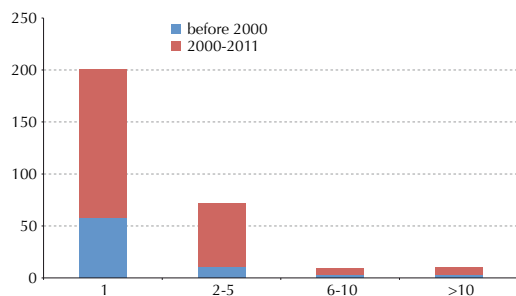


FIGURE 10 Group size of Pygmy Cormorant *Phalacrocorax pygmeus* in central and western Europe before 2000 and in 2000-11

wintering grounds there. In Poland, the peak occurs during the post-breeding season, in August-September, and it is very rarely seen in winter (figure 8). The phenology in the Czech Republic, Germany and other countries in western Europe is similar to Austria (figure 9). The majority of the records from central and western Europe concern single birds (figure 10). The following list shows all records in central and western Europe from 2000 to March 2012.

Austria (47 records of c 266 individuals)

Numbers have increased significantly, with almost annual records from seven of the nine provinces in 2000-11: 2000 (2 records/2 individuals), 2001 (2/6), 2004 (3/9), 2005 (3/22), 2006 (6/6), 2007 (6/65), 2008 (5/97), 2009 (10/34), 2010 (4/13), and 2011 (6/12). It must be mentioned that some of the wintering birds are most likely returning individuals, although being counted as a 'new record' every year. Most observations come from the eastern provinces of Steiermark (19), Burgenland (15) and Niederösterreich (6), with Burgenland

hosting a new breeding population in recent years (Ranner 2001, Ranner & Khil 2008, 2012; <http://birdlife-afk.at>). Note that since 2009 records from the Neusiedler See area, where the colony is located, are no longer taken into consideration by the Austrian rarities committee (Ranner & Khil 2012) – the number of records has therefore decreased since then. Nesting was first recorded (14 pairs) at Neusiedler See near the Hungarian border in 2007 (Nemeth 2008). In subsequent years, the number of breeding pairs there increased rapidly: 16 pairs in 2008, 77 in 2009, 52 in 2010, and 146 in 2011 (Erwin Nemeth in litt). Most records away from the breeding colony concern single birds and small flocks of up to 17 individuals in winter, with the majority between November and February (30 records) (Ranner 2001, Ranner & Khil 2008, 2012; <http://birdlife-afk.at>).

Belarus (1 record of 20 individuals)

Flocks from five to c 20 individuals were observed from mid-August to early September 2009 at the Selets fishponds near Brest. One immature was shot at this locality on 17 August 2009 (Samusenko 2011).

Belgium (2)

From 28 December 2000 to 21 January 2001, an immature was observed at Warneton, Hainaut, and the same individual was recorded during the same period at Lys valley in the French-Belgian border region (fourth for France; Capelle & De Smet 2002). The second record was at Hermalle-sous-Argenteau, Liège, on 3-23 March 2003 (adult). This bird was also seen across the border near Oost-Maarland, Limburg, as the fourth for the Netherlands (De Smet et al 2004, van der Vliet et al 2004).

Czech Republic (26 records of 90 individuals)

Since 2001, the species has been sighted regularly, and since 2005 in each year: 2001 (2 records/4 individuals), 2002 (1/1), 2005 (2/16), 2006 (5/16), 2007 (3/3), 2008 (1/3), 2009 (7/42), 2010 (3/3), 2011 (1/1) and 2012 (1 up to February) (Vavřík 2002, 2003, 2008, 2009, 2010, 2011). The largest flocks were seen on 24 November 2005 (15 in Ostrava; Stolarczyk et al 2006) and from 23 October to 13 December 2009 (15 in Chomoutov; Vavřík 2010). Most of the observations were in the eastern and southern parts of the country. They were sighted in each month, with the peak in October-November (details of all records are on: <http://fkcs.ces.cz/druhypo/phapyg.html>).

France (8)

By the end of 2011, there were eight records, all of single individuals: from 29 October to 1 November 2000; 28 December 2000 to 20 January 2001; 1 April 2001; 4-7 October 2007; 22-23 September 2009; 25 September to 2 October 2009; 21 November 2011; and 28 December 2011 (Capelle & De Smet 2002, Dubois et al 2008, Sébastien Reeber in litt; details of all records are on www.chn-france.org/chn_donnees.php).

Germany (34 records of 41 individuals)

After a 40-year gap, Pygmy Cormorants were again observed in 2000 at four localities (six individuals; Deutsche Seltenheitenkommission 2006). From 2001 to March 2012, they were recorded every year: 2001 (4 records/4 individuals), 2002 (4/4), 2003 (1/1), 2004 (1/1), 2005 (1/1; same individual as in 2004), 2006 (1/2), 2007 (2/2), 2008 (1/1), 2009 (9/12), 2010 (4/5), 2011 (1/1) and 2012 (2 up to March) (Deutsche Seltenheitenkommission 2008, 2009, 2010; Thomas Noah in litt, Christopher König in litt; <http://www.club300.de/>). Most (22 records) were observed in southern Germany (Baden-Württemberg, Bayern, Hessen and Rheinland-Pfalz); the most northerly records came from Schleswig-Holstein (Flemhuder See, 5 August to 6 October 2001) and Mecklenburg-Vorpommern (Polder Rodde, Nordvorpommern, 1 May to 10 June 2007, and Polder Große Rosin, Demmin, 18 September 2009). All German records relate to singles or twos. They were seen in all months, although mostly between September and December.

Latvia (1)

A bird stayed on the Uzava river, Ventspils, from 29 January to 2 February 2012 (plate 382; cf Dutch



382 Pygmy Cormorant / Dvergaalscholver *Phalacrocorax pygmeus*, Uzava river, Ventspils, Latvia, 30 January 2012 (Ainars Mankus). First record for Latvia.

Birding 34: 113, plate 148, 2012); after 2 February, there was a sharp drop in temperature and it probably died or was killed by a White-tailed Eagle *Haliaeetus albicilla* (Agris Celmins in litt).

Lithuania (1)

A bird stayed in Elektrenai near Vilnius from 25 December 2009 to 21 February 2010 (Morkūnas 2010).

Netherlands (3)

There are three records (all of single individuals): Cranendonck, Noord-Brabant, 6 May 2000; Oost-Maarland, Limburg, 1-26 March 2003 (plate 387); and Ubbergen, Gelderland, 9 May to 12 June 2010 (plate 388) (van der Vliet et al 2001, 2004, Ova et al 2011).

Poland (97 records of 211 individuals)

The species is regularly sighted every year, and the number of records has increased substantially since 2006, although the number was low in 2011 (as elsewhere in western and central Europe). The following numbers were recorded in consecutive years: 2000 (2 records/2 individuals), 2001 (2/2), 2002 (2/2), 2003 (5/7), 2004 (6/6), 2005 (2/2), 2006 (16/33), 2007 (10/14), 2008 (11/52), 2009 (24/63), 2010 (13/21) and 2011 (4/7) (Komisja Faunistyczna 2001-2012). It is usually seen from April and May, reaching a very distinct peak in August, after which the number drops to a minimum in winter. They are observed mostly in the southern part of the country (Silesia, Małopolska and Lubelskie – 75% of all records), less frequently in central Poland, and very rarely in the north

(only 7 records). Most records are from the following localities: Jeziorsko reservoir (8 records), Zator fishponds (8), Górki fishponds (7) and Kuźnica Wąreżyńska reservoir (6). One to three individuals are usually seen; the largest flock was reported from 26 August to 11 September 2008 (22 at Nielisz reservoir; plate 385) and on 10 August 2009 (12 at Przeręb fishponds).

Slovakia

In recent years, the species has been regularly sighted in Slovakia in flocks of up to several 10s. From January 2007 to March 2012, there were 136 records (Birding Slovakia: <http://tinyurl.com/8l94rrp>). Most records (43%) are from the winter period (December-February). The largest concentration was on 9 January 2010 (720 individuals at Čunovo near the border with Austria and Hungary; Richard Kvetko pers obs). In autumn and spring, the species was seen less frequently (maximum concentrations up to 100 individuals) and is least numerous from June to August (15 records). Most sightings were from southern Slovakia, mainly on the upper Danube; observations in the central and northern part of the country are scarce (Danko et al 2002, Kúdela & Lengyel 2004, Slabeyová et al 2011). A single pair successfully bred in Senné in 2010 (Miloš Balla in litt; plate 386).

Switzerland (7 records of 11 individuals)

All records are from 2000-03: 5-6 October 2000 (3 individuals); 13-15 October 2000 (1); 13 November 2000 to 6 March 2001 (3); 3 December 2000 to 15 January 2001 (1); 19 May 2001 to 22 January 2003 (1 at Bodensee, probably killed on the German part of the lake on 1 February 2003); 15 October 2001 to 26 February 2002 (1); and 12 January to 16 February 2003 (1) (Preiswerk & Knaus 2001, Maumary & Gysel 2002, Preiswerk 2004; Peter Knaus in litt).

Other countries

There are currently no records from Britain (Nigel Hudson in litt), Denmark (Alex Sand Frich in litt), Estonia (Uku Paal in litt), Finland (Aleksi Lehikoinen in litt), Iceland (Gunnlaugur Pétursson in litt), Ireland (Kieran Fahy in litt), Luxemburg (Patric Lorgé in litt), Norway (Tor Olsen in litt), Portugal (João Jara in litt) and Spain (José Luis Copete in litt; cf Copete et al 2011).

Increase of breeding population in southern Europe

The past 20 years have witnessed an increase in

the breeding population in southern Europe (cf Michev & Weber 1997, BirdLife International 2004; this paper). A very large increase has taken place in seven countries, while elsewhere the population has remained stable. No decline has been recorded in any country. The largest increases in recent years have occurred in Hungary, Italy, Ukraine and several countries of former Yugoslavia (table 1). The breeding range has also extended northwards (ie, a recent colonization in Austria and sporadic breeding records in Slovakia). In the Danube delta, numbers vary from year to year to a fairly large extent, depending on hydrological conditions, but in the long term there has been a recolonization and a large increase (Peter Shurulinkov in litt; see below).

Albania

According to Birdlife International (2004), the breeding population in 1996-2002 was none to 25 pairs. No data are available for more recent years (Grigor Jorgo in litt).

Bosnia and Herzegovina

There is one breeding site, Hutovo Blato natural reserve, where 573-855 pairs nested in 2007-10 (Stumberger et al 2009, BirdLife International 2012b). Larger numbers in recent years are the result of an accurate census; previous data (cf BirdLife International 2004, Voskamp et al 2005) were only estimates (Dražen Kotrošan in litt).

Bulgaria

The number of nesting pairs decreased by the beginning of the 20th century and the population fell to its smallest size in the 1950s. The decline was intensified by the regular shooting of the species as a (presumed) pest. A gradual increase began after the 1960s (Danko 1994). In the 1980s, the population was estimated at 10-50 pairs, in the early 1990s at 90-150 (Perrins 1998) and in 1997-2001 at 350-400 (BirdLife International 2004, Voskamp et al 2005). In 2006-11, numbers varied between 190 and 790 pairs on the islets in the Danube and the adjacent marshes. Numbers are strongly dependent on water levels in the Danube. The lowest numbers were recorded during the dry year of 2011, when Danube levels were extremely low and many wetlands along the river were without water (Shurulinkov et al 2007; Peter Shurulinkov in litt).

Croatia

In 2001, five to 10 pairs bred at Kopački Rit, while in 2002, breeding of four to eight pairs was con-



383 Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Belgrade, Serbia, 23 November 2008
(Maciej Szymański)

384 Pygmy Cormorants / Dwergaalscholvers *Phalacrocorax pygmeus*, Belgrade, Serbia, 28 December 2008
(Maciej Szymański)





385 Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Nielisz reservoir, Lubelskie, Poland, 12 October 2009 (*Łukasz Bednarz*) **386** Pygmy Cormorants / Dwergaalscholvers, pair with young, Senné fishponds, Slovakia, 6 August 2010 (*Miloš Balla*) **387** Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Oost-Maarland, Limburg, Netherlands, 10 March 2003 (*Ran Schols*) **388** Pygmy Cormorant / Dwergaalscholver *Phalacrocorax pygmeus*, Leuth, Gelderland, Netherlands, 16 May 2010 (*Toy Janssen*) **389** Pygmy Cormorants / Dwergaalscholvers *Phalacrocorax pygmeus*, Poda, Burgas, Bulgaria, 10 September 2008 (*Leander Khil*)

firmed at the Lonjsko Polje nature park along the Sava river and 11 pairs on Vransko lake in Dalmatia (Voskamp et al 2005). Currently, the species breeds regularly only at Vransko lake (10-30 pairs) (Tutiš et al in press; Jelena Kralj in litt).

Greece

In the 1970s, there were five colonies with c 550 pairs, mostly at Mikra Prespa lake with up to 650 pairs (1971) and 400 pairs (1973) (Perrins 1998). In 1997, 1250-1310 pairs and, in 1998, 1170-1230 were counted at three sites: Prespa national park (650-780 pairs), Kerkini lake (500) and Petron lake (15-30 pairs) (Kazantzidis & Nazirides 1999, BirdLife International 2004, Voskamp et al 2005). During the winter of 1997/98, 38 917 individuals were counted, while the most significant wintering area was Evros delta with 27 000 in November 1997 (Kazantzidis & Nazirides 1999, Gantlett 2001). There are no recent data on the breeding populations (Savas Kazantzidis in litt).

Hungary

The species bred on the Danube and Tisza rivers during the 19th century. After the species' extinction, breeding attempts were noted only occasionally during the second half of the 20th century (Perrins 1998, Szinai 2005). The first recolonization attempt was near Poroszló in 1988 and at Hortobágy in 1991 (Danko 1994). In 1990-97, the breeding population in Hungary was estimated at two to 14 pairs (Eőri 2010). In subsequent years, numbers rose and the distribution expanded. In 2000-08, the population increased from 118 to 624 pairs (Szinai 2005, Eőri 2010); in 2009, it was estimated at 664-748 pairs, mostly in Hortobágy national park and on Balaton lake (Eőri 2010; Péter Szinai in litt). In December 2011, a maximum of 4710 roosting individuals was recorded at Fehertó lake near Szeged, close to the border with Romania and Serbia (Béla Tokody in litt).

Italy

The first two breeding pairs were confirmed in 1981 in Punte Alberete nature reserve near Ravenna in the southern Po delta (Fasola & Barbieri 1981), and birds have been nesting regularly since 1994 (Volponi & Emiliani 1995). In the early 1990s, probable breeding was reported on the lagoon of Venezia, Veneto (Nardo 1994). Since then, the breeding population has risen sharply in both areas. In 2001, the population in north-eastern Italy was estimated at 120-130 pairs (Brichetti & Francasso 2003, BirdLife International 2004) but already in 2004 more than 600 pairs were re-

ported at Po delta (Voskamp et al 2005). In 2004-06, the Italian population was estimated at 570-730 pairs, and at present there are c 800-900 breeding pairs in three to five different sites in Emilia-Romagna and Veneto (Spina & Volponi 2008). In 2010, the first breeding record was reported near Ancona in central Italy (Gambelli et al 2010). On 25 September 2003, 1400 individuals were counted at a single nocturnal roost at Po delta (van den Berg 2003) and, during recent winters, 2500-3000 individuals have been counted at Po delta and Venezia lagoon (Spina & Volponi 2008).

Republic of Macedonia

According to Branko Micevski (in litt), the current breeding population size is unknown, and the data (100-150 pairs) presented by BirdLife International (2004) are not very reliable.

Moldova

The first successful breeding attempt was in 1982 along the Prut river (Voskamp et al 2005). Compared with the 1990s (BirdLife International 2004), the size of the breeding population has not changed: one to 10 pairs are now nesting in Moldova at two sites along the lower Dniestr river (Munteanu 2010; Nicolai Zubcov in litt).

Montenegro

There are currently three breeding sites, all in the southern part of the country: Skadar lake, Paratuk island on the Bojana river and Ada Bojana island. In 2002-05, the number of breeding pairs was estimated at 2200-2500, most of them on Skadar lake (Saveljić 2006). The species used to breed in Bojana delta, although no accurate data are available. In the 1980s and 1990s, the breeding population on Skadar lake was estimated at 1000-2000 pairs (Saveljić 2006).

Romania

In the Romanian part of the Danube delta the largest European breeding population occurs. In 1962, the population here was estimated at 8000 nests in 35 colonies (Perrins 1998). In the 1990s, the population fluctuated from 4000 to 7000 pairs (Marinov & Hulea 1996). The population given by BirdLife International (2004) was probably overestimated, since this assessment applied to the combined Romanian and Ukrainian breeding populations in the Danube delta (Janos Botond Kiss in litt; see table 1). An inventory in 11 colonies in the Romanian part of the Danube delta gave 8140 pairs in 2001 and 8311 in 2002

(Platteeuw et al 2004, 2006, Grinchenko 2004). In the years 2000-08, during winter censuses, 1024 to 7863 individuals were counted, with a maximum in 2001 and 2005. The main wintering grounds are in the Danube delta, on lakes Razim and Golovita and in the valley of the river Olt (www.sor.ro/IWC/specii_phapy.htm; Dan Ionescu in litt).

Serbia

In 2000-02, the population was estimated at 350-550 pairs: 150-250 in Vojvodina province and 200-300 in central Serbia (Puzović et al 2003). The species breeds in the following colonies: Perleska Bara (107 pairs in 2007); Becej fishponds (250-300 in 2007); Dubovacki Rit (340-360 in 1998 but only 50 in 2007); Sutjeska fishponds (86 in 2011); Baranda fishponds (15 in 2010); Obedska Bara (15-20 in 2006); and Mala Vrbica (200-300) (Puzović et al 1999, 2006, Puzović 2001, Gergelj et al 2007, Ham 2007, Ham & Tucakov 2010, Ham in press). The latest overall estimate is 600-1100 pairs (Puzović et al 2009, Marko Tucakov in litt).

Ukraine

The species nests at four localities: Danube delta, Dniestr delta, Dniepr delta and the northern part of the Crimea (eastern Sivach) (Korzyukov &

Korzyukov 2000, Ruslev & Korzyukov 2003, Grinchenko 2004, Schogolev et al 2005). 730 pairs nested in the Danube delta in 1998 and 525 pairs in 1999 but, in 1995-96, the species did not nest, presumably because of environmental reasons (during these years the winters were severe) (Korzyukov & Korzyukov 2000, Ruslev & Korzyukov 2003). The most complete census in the Danube delta was undertaken in 2002: in the Ukrainian part of the delta, there were 1030 breeding pairs in three colonies (Grinchenko 2004). In the Dniestr delta (probable first breeding record in 1954), the number of breeding pairs fluctuated from two to 120 between 1975 and 1995, and thereafter started to increase significantly, the highest number of 900 pairs being reached in 2001 (Korzyukov & Korzyukov 2000, Schogolev et al 2005). In the eastern Sivach, there were no more than 15-20 pairs in 1996 (Korzyukov & Korzyukov 2000), but there were 35-40 pairs in the Crimea in 2002 (Grinchenko 2004). In 2000, this species also nested for the first time in the Dniepr delta with 35-40 pairs; a year later, there were already c 360 pairs (Schogolev et al 2005). In 1998-99, the total Ukrainian population was estimated at 700-1000 pairs (Korzyukov & Korzyukov 2000) and, in 2002, the most complete census showed 2120 pairs: 1030 in the Danube delta, over 700 on the Dniestr, 350 pairs on the

TABLE 1 Comparison of breeding population of Pygmy Cormorant *Phalacrocorax pygmeus* in European countries in 1990-2002 (BirdLife International 2004) and 2000-11 (data cited in this paper). *No current data available. **Population probably overestimated: this statement applies to breeding populations in both Romanian and Ukrainian parts of Danube delta (Janos Botond Kiss in litt; see text). ***Total population for Serbia and Montenegro. Trend: ↑ = increase, ↑? = probable increase (see text), → = no directional trends, ? = unknown trend/no current data.

Country	BirdLife International (2004)		Data cited in this paper		Trend
	Breeding population size (pairs)	year(s)	Breeding population size (pairs)	year(s)	
Albania	0-25	1996-2002	(0-25)*	(1996-2002)	?
Austria	0		14-146	2007-11	↑
Bosnia and Herzegovina	50-60	1990-2000	573-855	2007-10	↑?
Bulgaria	350-400	1997-2001	190-790	2006-11	↑
Croatia	10-25	2002	10-30	2010	→
Greece	1250-1310	1997	(1250-1310)*	(1997)	?
Hungary	80-190	1998-2001	664-748	2009	↑
Italy	120-130	2001	800-900	2008	↑
Moldova	8-12	1990-2000	1-10	2010	→
Montenegro	2400-2800*** (including Serbia)	2000-02	2200-2500	2002-05	→
Romania	11 500-14 000**	1999-2002	8140-8311	2001-2002	→
Serbia	2400-2800*** (including Montenegro)	2000-02	600-1100	2009	↑
Slovakia	0-1	1990-99	0-1	2000-11	→
Ukraine	550-750	1990-98	2120	2002	↑

Dniepr and 35-40 in the Crimea (Grinchenko 2004).

Conclusion

The recent large increase in the Pygmy Cormorant's breeding population in southern and eastern Europe is probably the most important reason for the very strong increase in the number of sightings in central and western Europe. The greatest rise in numbers has taken place in the Danube delta, while a new, large wintering area has established on the border between Hungary and Slovakia and around Neusiedler See in Austria (which has also become an important breeding area). In future years, we can expect a further rise in the number of sightings, as well as new records in northern Europe (eg, Britain and Scandinavia; cf Gantlett 2001). Breeding may also occur in some countries in central and western Europe north and west of the species' traditional breeding grounds. Similarly, the species has also expanded to the east, into southern Russia and central Asia (Belik 2006, Kreuzberg-Mukhina 2008).

The reasons for the increases during the last 20 years are not completely clear. Eutrophication and the overfishing of large predatory fish resulted in larger numbers of smaller fish, hence food for cormorants. Combined with the better protection of Pygmy Cormorants this may have led to an increase in populations.

The last 40 years have witnessed a rapid and significant increase in the numbers of different species of cormorants around the world. The western population of Continental Great Cormorant *P c sinensis* (North Sea and Baltic Sea) increased in size from several 1000s pairs in 1980 to c 217 000 pairs in 2000, while the eastern European population (Black Sea) rose to 226 000 pairs in 2000 (eg, Bregnballe et al 2003). There has also been a growth in Asian (eg, *P c hanedae*; Ishida et al 2003) and African populations (eg, White-breasted Cormorant *P c lucidus*; Yésou & Triplet 2003). In North America, the population of Double-crested Cormorant *P auritus* has increased enormously (Hatch 1995, Weseloh et al 1995). Not all factors that have caused the worldwide increase in cormorant populations are known. It is difficult to fully explain the fact that this growth has occurred in such different places in the world at the same time. The most important factor responsible for the increasing numbers seems to be the increasing availability of food resulting from eutrophication and fishery management. Moreover, certain factors reducing the populations must have ceased in the early 1970s (eg, the pro-

scription of DDT). The introduction of the legal protection of cormorants was very important in this respect, especially because in the past (early 20th century), destruction of cormorant colonies by fishermen led to total extinctions in many European countries. It is also likely that northern wintering has become less onerous as a result of climate change (Grinchenko 2004, cf Huntley et al 2007).

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Samenvatting

TOENAME VAN DWERGAALSCHOLVER IN MIDDEN- EN WEST-EUROPA EN GROEI VAN BROEDPOPULATIE IN ZUID-EUROPA Dit artikel beschrijft de toename van het aantal waarnemingen van Dwergaalscholver *Phalacrocorax pygmeus* in Centraal- en West-Europa in de eerste decade van de 21e eeuw. Dit in vergelijking met eerdere data en met het oog op de toegenomen broedpopulatie in Zuid-Europa. Tot en met 1999 waren er 75 waarnemingen van Dwergaalscholvers in Centraal- en West-Europa. In de

19e eeuw werden 14 keer Dwergaalscholvers in Centraal- en West-Europa vastgesteld (inclusief de grote influx van 1856). Van 1900 tot 1989 waren er ongeveer 30, maar in het begin van de jaren 1990 nam het aantal meldingen toe in voornamelijk Oostenrijk, Polen en Slowakije, hoewel er in West-Europa vóór 2000 nog steeds erg weinig waren. In de jaren 1990-99 waren er 31 waarnemingen, inclusief 26 in Oostenrijk en Polen. In vergelijking met de 19e en de 20e eeuw is het aantal gevallen tussen 2000 en 2011 enorm toegenomen. In deze periode zijn 227 waarnemingen bekend voor Centraal- en West-Europa (zonder Slowakije en de Neusiedler See, Oostenrijk). Dit is een toename van 200% in de laatste 12 jaar, vergeleken met de 200 jaar daarvoor. De grootste toename was afkomstig van Polen; maar ook werden meer exemplaren gezien in Duitsland, Oostenrijk en Tsjechië. De toename in Oostenrijk resulteerde in de eerste broedgevallen in 2007. In 2011 was het aantal broedparen bij de Neusiedler See gestegen tot bijna 150. Een bijzonder grote toename vond plaats in Slowakije; hier overwintert de soort tegenwoordig regelmatig (tot maximaal 700 vogels).

De laatste 20 jaar is de broedpopulatie in Zuid-Europa enorm toegenomen. Deze toename was het sterkst in Hongarije, Italië, Oekraïne en de verschillende landen van voormalig Joegoslavië (tabel 1). De broedpopulatie heeft zich ook noordelijk uitgebreid (sporadisch broeden in Slowakije en kolonisatie van Oostenrijk). De recente uitbreiding van het broedbestand in Zuid- en Oost-Europa is waarschijnlijk de belangrijkste oorzaak voor het toegenomen aantal waarnemingen in Centraal- en West-Europa. De redenen voor de grote toename van Dwergaalscholvers in de laatste 20 jaar zijn niet geheel duidelijk: de toegenomen hoeveelheid voedsel in de vorm van kleinere vissoorten door eutrofiëring en overbevissing van vooral grote roofvis, het verbod op DDT, de betere bescherming van de soort en klimaatverandering worden als mogelijke oorzaken genoemd.

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Lukasz Ławicki, West-Pomeranian Nature Society, Flisacza 35e/6,
74-100 Gryfino, Poland (izuza@interia.pl)
Leander Khil, Neutorgasse 26, 8010 Graz, Austria (leander@khil.net)
Peter P de Vries, Zum Wyler Meer 8, 47559 Zyfflich, Germany
(P.deVries@nioo.knaw.nl)